

**Drainage Service Department**

**Monthly Environmental Monitoring & Auditing report for**

**Contract No.DC/2009/22**

**Drainage Improvement Works in Shuen Wan, Tai Po – Contract 1**

**March 2011**

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## **EXECUTIVE SUMMARY**

This is the first monthly Environmental Monitoring and Audit (EM&A) Report for the drainage improvement works in Shuen Wan, Tai Po under Drainage Services Department Contract No. DC/2009/22 entitled “Drainage Improvement Works in Shuen Wan, Tai Po – Contract 1”. This report concludes the impact monitoring for the activities undertaken during the period from 8<sup>th</sup> of March 2011 to 31<sup>st</sup> March 2011. The major site activities in this reporting month were mainly transplanting, piling construction and excavation works.

The Environmental Team (ET) is responsible for the EM&A works required in the EM&A manual (revision 3). Site inspections were carried out on weekly basis to investigate and audit the equipment and work methodologies with respect to pollution control and environmental mitigation. The weekly inspections records and photos taken were kept.

In general, waste management was satisfactory during the reporting month.

Impact monitoring for construction noise was conducted in the reporting month. No exceedance of A/L level was reported.

Furthermore, impact monitoring for water quality was conducted. Total 3 abnormal incidents of water quality criteria were recorded in this reporting month. No particular observation of defective site activities were found causing water contamination and such conditions were believed to be mainly attributed by natural fluctuation.

No exceedance of A/L level was reported for the monitoring of hydrological characteristics in the reporting month.

The ecological monitoring of the Ecological Compensatory Area (ECA) of the project is conducted. Details of the findings are referred to sections 7.2.

Visual and landscape monitoring has been conducted for the project. Details of

the observations are referred to sections 8.3.

There was no complaint, notification of any summons and successful prosecutions against the project received during the reporting month.

There was no reporting changes of the construction methods or working schedule during the reporting month.

Site works proposed to be carried out in the upcoming month will include transplanting, piling construction and excavation works.

It is expected that noise, air and water quality impacts will be resulted from the works. The contractor was require to abating these environmental issues in the environmental requirements of contract document, given in Appendix K. ET has reminded the contractor to provide environmental pollution control measures wherever necessary and to keep a good environmental management at site practice. The recommended mitigation measures proposed for the project as well as implementation status are refer to section 13.3.

The ET will continue to implement the environmental monitoring & audit programme in accordance with the EM&A Manual (revision 3) and Environmental Permit requirement.

## **1. Introduction**

This is the first monthly Environmental Monitoring and Audit (EM&A) Report for the drainage improvement works in Shuen Wan, Tai Po under Drainage Services Department Contract No. DC/2009/22 entitled “Drainage Improvement Works in Shuen Wan, Tai Po – Contract 1”. The site layout plan is shown in Appendix A. The Environmental Team, Environmental Pioneers & Solutions Limited appointed by Kwan Lee – Kuly Joint Venture, prepares the report. The report is to be submitted to the Contractor, the Engineer and the IEC.

This report presents the results of the environmental monitoring of the project activities conducted within the reporting month from 8<sup>th</sup> March 2011 to 31<sup>st</sup> March 2011. This included the noise monitoring, water quality monitoring, hydrological characteristics monitoring, ecological monitoring, visual and landscape monitoring, and regular site inspections once per week for verification of implementation of the mitigation measures as recommended in the Environmental Permit (EP-303/2008) (EP), EM&A Manual (revision 3) and the Contractor’s Environmental Management Plan (EMP).



## **2. Project Information**

### **2.1 Construction program**

The scope of the Project includes the following works:-

- (1) Construction of a 1000m long 3m x 2.5m twin-cell box culvert along Tung Tsz Road;
- (2) Replacement of existing gates by automatic mechanical gates at the mouth of Wai Ha River;
- (3) Construction of a 280m long 1200 dia. Drainage pipe near Wai Ha Village;
- (4) Construction of a 260m long 2100 dia. Flood relief drain along Ting Kok Road; and
- (5) Construction of a floodwater pumping station at Shuen Wan.

The construction of the project has been commenced on February 26<sup>th</sup>, 2010 and anticipated to complete in August 2013.

### **2.2 Project organization**

The Main Contractor, Kwan Lee – Kuly Joint Venture, has commissioned Environmental Pioneers & Solutions Limited and Asia Ecological Consultants Limited as the Environmental Team, which comprises the environmental team leader, the ecologists and the environmental technicians to execute the environmental monitoring and audit programme for this project.

The environmental management structure and is shown in Fig 2.2.1.

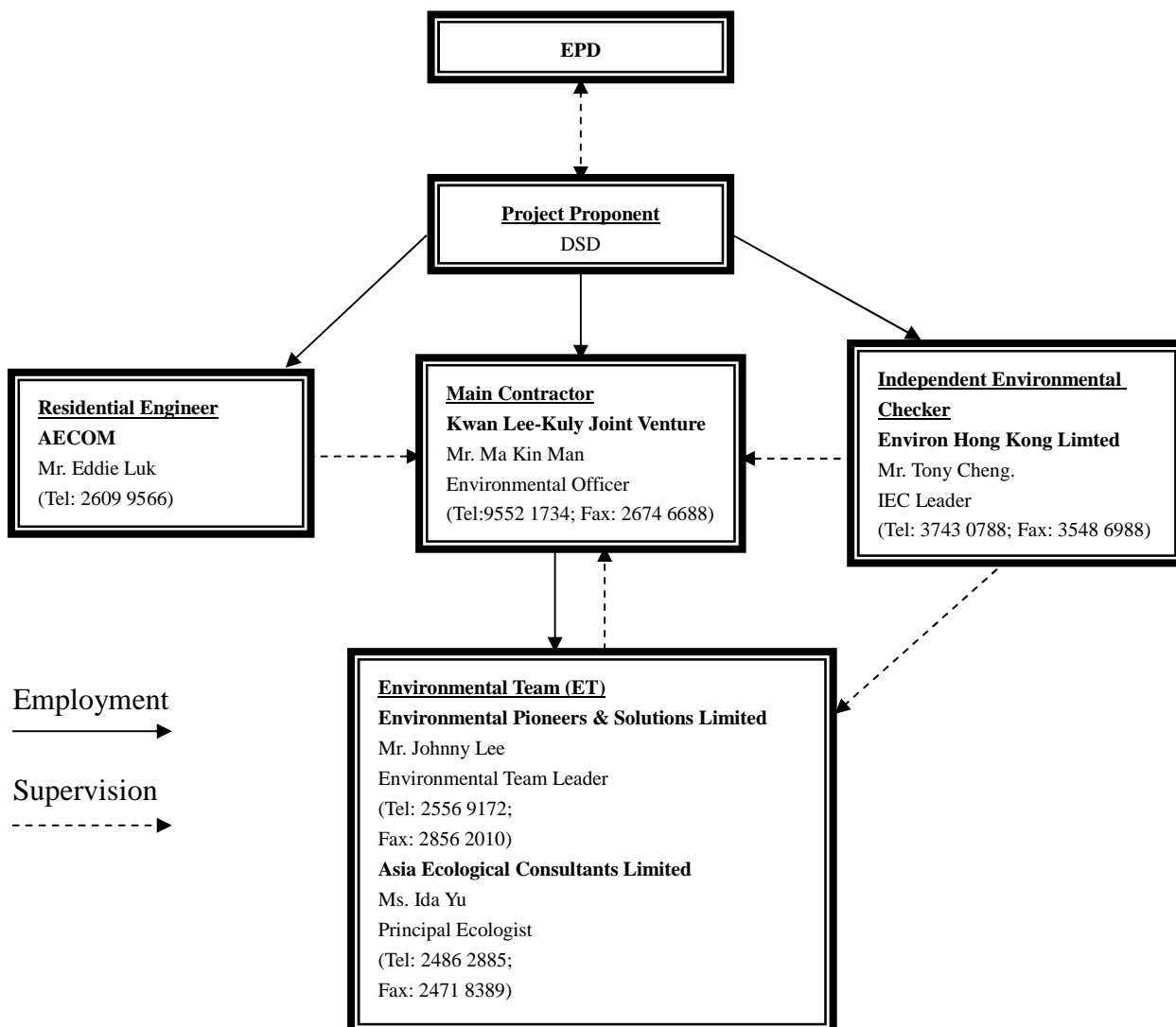


Figure. 2.2.1 Environmental Management structure for the project

### 2.3 Key personal contact information chart

Detailed contact of key persons involved in environmental aspect of the project is shown in Appendix B.

### **3. Construction Stage**

#### **3.1 Construction activities in the reporting month**

Major activities in the reporting month included the followings:

1. Tree planting and felling
2. Piling construction
3. Excavation for construction of box culvert near pumping station
4. Investigation of underground irrigation pipe in Tung Tsz Nursery
5. Re-contouring in ECA

#### **3.2 Construction activities for the coming month**

Proposed key construction works in the coming month will include:

1. Tree planting and felling
2. Piling construction
3. Excavation for construction of box culvert near pumping station
4. Investigation of underground irrigation pipe in Tung Tsz Nursery
5. Re-contouring in ECA

Appendix J shows the three month rolling programme.

#### **3.3 Environmental Status**

Appendix A shows the drawing of the project area.

Locations of the monitoring and control stations with environmental sensitive receivers are presented in Section 4.3, 5.3, and 6.3 for noise, water quality, and hydrological characteristics respectively.

## 4. Noise Monitoring

### 4.1 Monitoring Parameters and Methodology

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

Noise measurement results obtained from each monitoring location were recorded in the Construction Noise Monitoring Data Sheet (Appendix D) immediately after the measurement. As supplementary information for data auditing, statistical results  $L_{10}$  and  $L_{90}$  were also be recorded for reference.

In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action plan in Table 4.5.2, shall be carried out. This additional monitoring shall be carried out until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

### 4.2 Monitoring Equipment

The sound level meters and calibrators comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications as referred to in the Technical Memorandum (TM) to the Noise Control Ordinance was deployed as monitoring equipment for noise measurement.

Noise measurement was not be made in the presence of fog, rain, wind with a steady speed exceeding  $5\text{ms}^{-1}$  or wind with gust exceeding  $10\text{ms}^{-1}$ . Thus wind speed was checked by the portable wind speed indicator capable of measuring the wind speed in m/s. Table 4.2.1 summarizes the equipment list for noise monitoring

Table 4.2.1 Equipment List for Noise Monitoring

Equipment	Manufacturer & Model No.	Precision Grade	Qty
Integrated sound level meter	Svantek 949	IEC 651 Type 1 IEC 804 Type 1	2
Windscreen	Microtech gefell model W2	N/A	1
Acoustical calibrator	Svantek SV30A Castle GA607	IEC 942 Type 1	1 1
Wind speed indicator	Kestrel K1000	N/A	1
Remarks: Calibration details of the sound level meter is given in Appendix C for reference			

### 4.3 Monitoring Locations

According to the Environmental Monitoring and Audit manual, impact noise monitoring for contract 1 was undertaken at two locations during the construction phase of the project. The proposed monitoring locations are summarized in Table 4.3.1. Figure 4.3.1 shows the Noise Monitoring Locations

Noise measurement at each monitoring location was taken at a point 1m from the exterior of the selected premises and at a height of 1.2m above ground with no disturbance to the dweller and least obstructed view.

Table 4.3.1 Noise Monitoring Locations during Construction Phase

Noise Monitoring Station	Location	Coordinates
M1	14, Shuen Wan Chim Uk	E: 839546 N: 836160
AL1	Joint Village Office for Villages in Shuen Wan, Tai Po	E: 839553 N: 836529

In accordance with the requirements in the EM&A manual (revision 3), weekly impact monitoring was conducted. For the time period between 0700 and 1900 hours on normal weekdays, and noise parameter of  $L_{eq(30minutes)}$  was measured. As if the construction works were carried out during restricted period (i.e. 1900-2300, 2300-0700 of next day and Sundays / general holiday), impact monitoring that comprises 3 consecutive  $L_{eq(5minutes)}$  would be carried out.

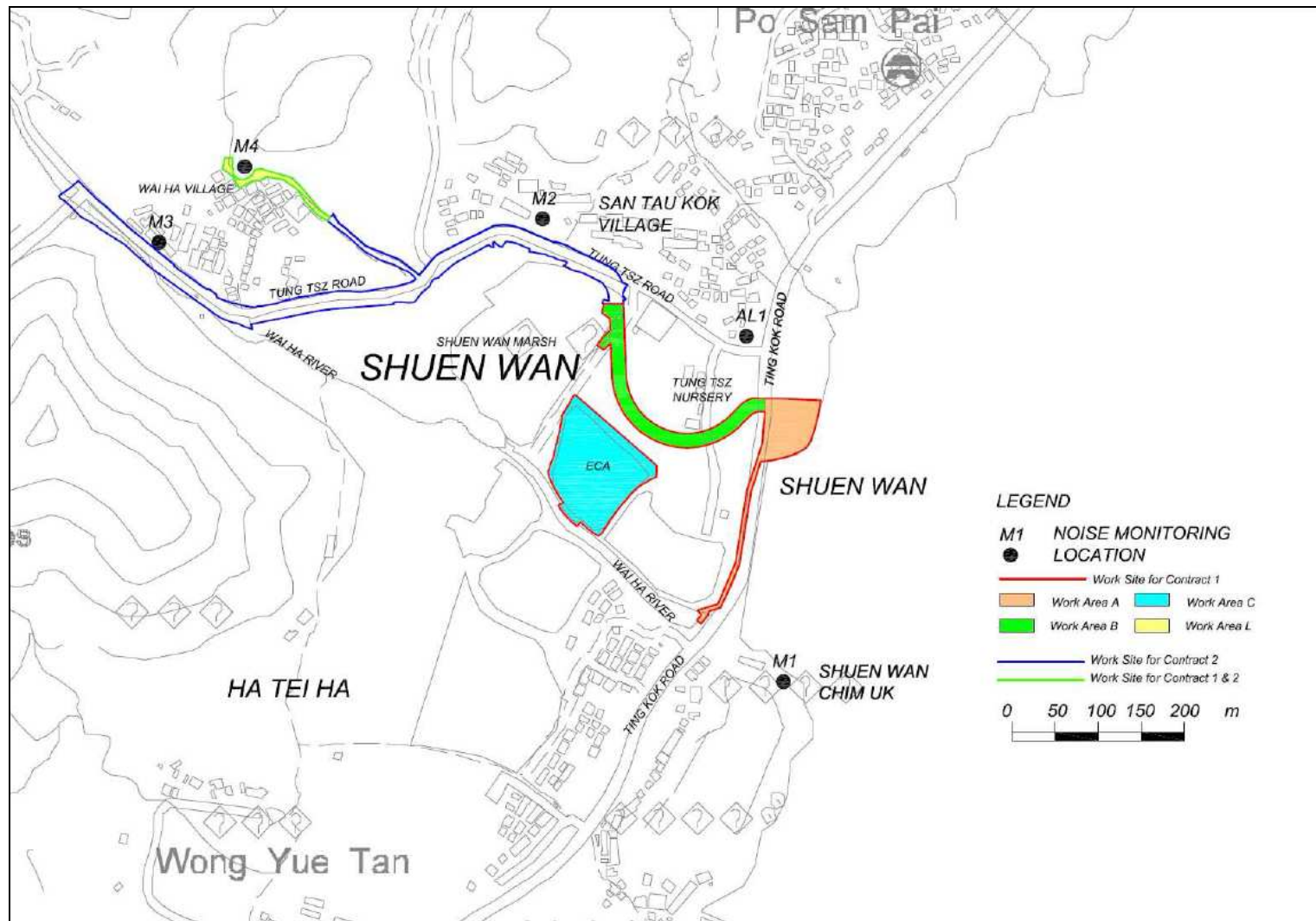


Figure 4.3.1 Impact noise monitoring locations

#### 4.4 Monitoring Results and Interpretation

Relevant details of the noise monitoring results are presented in Table 4.4.1. The results of M1, ranged between 66.3dB(A) and 68.1dB(A), and AL1, ranged between 65.2(A) and 69.7dB(A), were within the limit levels and therefore, no exceedance was found.

Location	Parameter	Date	Time	L <sub>Aeq</sub> dB(A)	Limit dB(A)	Exceedance	Weather
M1	L <sub>eq</sub> 30mins	10-Mar-11	13:58	62.1	75	N	Overcast
M1	L <sub>eq</sub> 30mins	17-Mar-11	11:37	66.3	75	N	Overcast
M1	L <sub>eq</sub> 30mins	24-Mar-11	10:46	68.1	75	N	Overcast
M1	L <sub>eq</sub> 30mins	31-Mar-11	10:52	64.5	75	N	Sunny
AL1	L <sub>eq</sub> 30mins	10-Mar-11	08:34	67.6	75	N	Overcast
AL1	L <sub>eq</sub> 30mins	17-Mar-11	10:52	65.2	75	N	Overcast
AL1	L <sub>eq</sub> 30mins	24-Mar-11	10:02	66.2	75	N	Overcast
AL1	L <sub>eq</sub> 30mins	31-Mar-11	11:42	69.7	75	N	Sunny

Remarks: Raw datasheet for noise monitoring are attached in Appendix D for reference.

#### 4.5 Action and Limit level for Construction noise

The Action and Limit (A/L) levels for construction noise are defined in Table 4.5.1. Should non-compliance of the criteria occur, action in accordance with the Action Plan in Table 4.5.2 should be carried out.

There was no exceedance recorded in the reporting month.

Table 4.5.1 Action and Limit Levels for Construction noise

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

Remarks: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

#### 4.6 Monitoring Schedule for the next reporting month

Noise monitoring schedule is proposed to be carried out on 7<sup>th</sup>, 14<sup>th</sup>, 21<sup>st</sup> and 28<sup>th</sup> of April 2011.

Table 4.5.2 Event / Action Plan for Construction Noise

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



## **5. Water Monitoring**

### **5.1 Water Quality Monitoring Parameters and methodology**

Turbidity in Nephelometric Turbidity Unit (NTU), and Dissolved Oxygen (DO) in mg/L, temperature, and pH measurements were in-situ measurements and suspended solids measurements were performed by a HOKLAS accredited laboratory using recommended reference method APHA 2540D.

### **5.2 Monitoring Equipment**

Turbidity, DO, Salinity, pH and temperature was measured by an instrument complied with the following requirements:

The instrument is a portable as well as weatherproof multimeter complete with cable and uses a DC power source. It is capable of measuring:

- A turbidity between 0-800NTU;
- A dissolved Oxygen level in the range of 0-20mg/L and 0-200% saturation;
- A temperature of 0-50°C;
- Salinity in the range of 0-40ppt;
- pH in the range of 0-14.

The measurements were performed by a portable and weatherproof multi-meter, model TOA-DKK WQC-24. The equipment was calibrated and verified by certified laboratory every 3 months to ensure they perform to the same level of accuracy as stated in the manufacturer's specification. Detailed calibration records of the multi-meter were shown in Appendix C for reference

Suspended solids was determined by the water samples collected from the monitoring locations for further analysis in accredited HOKLAS laboratory. Water samples were contained by polythene bottles, packed in ice (cooled in 4°C without frozen) and delivered to the laboratory for analysis as soon as possible after collection.

### 5.3 Monitoring Locations

In accordance with the EM&A Manual (revision 3), monitoring stations for contract 1 were established at two locations, which are summarized in Table 5.3.1.

**Table 5.3.1 – Water Quality Monitoring Stations**

<b>Monitoring Station</b>	<b>Location</b>	<b>Coordinates</b>
W1	Between the Shuen Wan Marsh and ECA	E:839301 N:836386
W2	Between Tolo Harbour and Proposed Penstock	E:839542 N:836184

As illustrated in Figure 5.3.1, W1 served as the control station while W2 was the monitoring location of water quality.

In accordance with the EM&A Manual (revision 3), measurements shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above river bed, except where the water depth less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored.

As the depth of water was less than 3m, water samples were collected at mid-depth of each proposed monitoring stations for measurements and sample collection.

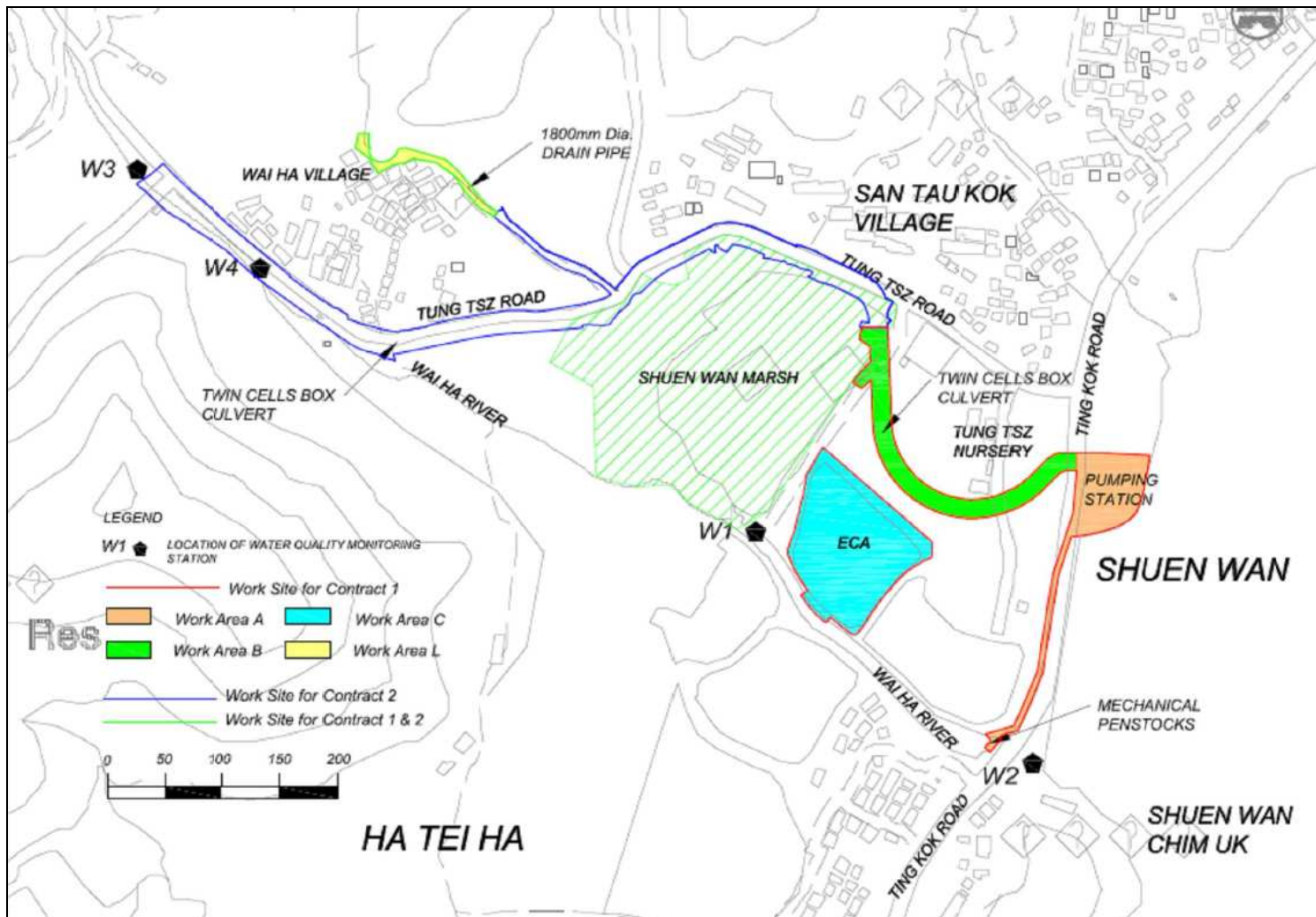


Figure 5.3.1 Water Quality Monitoring Locations

#### **5.4 Monitoring Frequency**

Impact water quality monitoring for each monitoring station were performed for 3 days per week during the course of the construction river works.

Monitoring were carried out on 8<sup>th</sup>, 10<sup>th</sup>, 12<sup>th</sup>, 15<sup>th</sup>, 17<sup>th</sup>, 19<sup>th</sup>, 22<sup>nd</sup>, 24<sup>th</sup>, 26<sup>th</sup> 29<sup>th</sup> and 31<sup>st</sup> of March 2011.

#### **5.5 Monitoring Results and Interpretation**

Water quality monitoring was carried out eleven times in this reporting month. Detailed on-site measurements are shown in Appendix E. Table 5.5.1 presents consolidated results throughout the reporting month.

There were 3 abnormal incidents of water quality limits (Dissolved Oxygen) were recorded in this reporting month according to the established action and limit levels. ET has arranged site investigations for the exceedance events and finding from the investigations showed no particular observations of defective site activities were found. Therefore, such conditions were believed to be attributed by natural fluctuation and are not considered as non-compliance events.

Detailed information of these incidents was presented in Section 9.

Table 5.5.1 Summary of Water Quality Monitoring Results of Mar 2011

	Average of Monitoring Results					
	Temperature (°C)	Turbidity (NTU)	pH	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Suspended Solids (mg/L)
W1	20.0	7.4	8.09	6.89	81	5.47
W2	19.2	9.0	7.96	7.09	84	4.15

Table 5.5.2 Interpretations of abnormal incidents recorded in the reporting month

Date	Tide	Parameter	Interpretations
2011/3/19	Ebb	DO	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.
2011/3/24	Ebb	DO	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.
2011/3/26	Flood	DO	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.

Table 5.5.3 Construction work conducted during abnormal incidents period

Date	Area	Construction works conducted
2011/3/19	A	Construction of Pre-bore H-pile
	C	No activity
2011/3/24	A	Construction of Pre-bore H-pile
	C	No activity
2011/3/26	A	Construction of Pre-bore H-pile
	C	No activity

## 5.6 Action and limit level for Water Quality

Based on the criteria stipulated in EM&A manual (revision 3) and baseline water quality monitoring data obtained, the A/L levels are shown in Table 5.6.1, Table 5.6.2. The A/L levels for W1 were ignored since W1 functions as the control station for contract 1. If the water quality monitoring results at any impact stations exceeded the criteria, the actions in accordance with the Event and Action Plan in Table 5.6.3 should be taken.

Table 5.6.1 Action and Limit Levels for Water Quality at All Monitoring Stations

Parameters	Action	Limit
DO in mg/L	5 percentile of baseline data	4 mg/L or 1 percentile of baseline data
pH	N/A	6.0 – 9.0
SS in mg/L	95 percentile of baseline data and 120% of upstream control station's SS	99 percentile of baseline data and 130% of upstream control station's SS
Turbidity in NTU	95 percentile of baseline data and 120% of upstream control station's Turbidity	99 percentile of baseline data and 130% of upstream control station's Turbidity

Table 5.6.2 Action and Limit Levels for Water Quality at All Monitoring Stations

Parameters	Monitoring Stations (Flood Tide)				Monitoring Stations (Ebb Tide)			
	W1		W2		W1		W2	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
DO (mg/L)	8.07	8.07	7.81	7.69	7.12	7.02	6.77	6.31
pH	N/A	6.0-9.0	N/A	6.0-9.0	N/A	6.0-9.0	N/A	6.0-9.0
SS (mg/L)	7.7	8.1	7.7	8.6	10.5	10.9	9.4	9.9
Turbidity (NTU)	4.9	5.3	1.7	1.8	4.2	4.7	3.0	3.5

Remarks:

For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits

For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table 5.6.3 Event and action Plan for Water Quality

Event	ET Leader	IEC	ER	Contractor
<b>ACTION LEVEL</b>				
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurements to confirm findings;</li> <li>2. Identify reasons for non-compliance and source(s) of impact;</li> <li>3. Inform IEC, Contractor and Engineer;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>6. Ensure mitigation measures are implemented.</li> <li>7. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>2. Make agreement on mitigation measures to be implemented;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes in working methods;</li> <li>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>6. Implement agreed mitigation measures.</li> </ol>
Action level being exceeded by more than two consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurements to confirm findings;</li> <li>2. Identify reasons for non-compliance and source(s) of impact;</li> <li>3. Inform IEC, Contractor and Engineer;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>6. Ensure mitigation measures are implemented.</li> <li>7. Prepare to increase the monitoring frequency to daily;</li> <li>8. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>2. Make agreement on mitigation measures to be implemented;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes in working methods;</li> <li>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>6. Implement agreed mitigation measures.</li> </ol>
<b>LIMIT LEVEL</b>				

<p>Limit level being exceeded by one sampling day</p>	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurements to confirm findings;</li> <li>2. Identify reasons for non-compliance and source(s) of impact;</li> <li>3. Inform EPD, IEC, Contractor and Engineer;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>6. Ensure mitigation measures are implemented;</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on mitigation measures to be implemented;</li> <li>4. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes in working methods;</li> <li>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>6. Implement agreed mitigation measures.</li> </ol>
<p>Limit level being exceeded by more than two consecutive sampling days</p>	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurements to confirm findings;</li> <li>2. Identify reasons for non-compliance and source(s) of impact;</li> <li>3. Inform EPD, IEC, Contractor and Engineer;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>6. Ensure mitigation measures are implemented.</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on mitigation measures to be implemented;</li> <li>4. Assess effectiveness of implemented mitigation measures;</li> <li>5. Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes in working methods;</li> <li>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>6. Implement agreed mitigation measures;</li> <li>7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>



## **5.7 Monitoring Schedule for the next reporting month**

Water quality monitoring schedule is proposed to be carried out on 2<sup>nd</sup>, 4<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, 12<sup>th</sup>, 14<sup>th</sup>, 16<sup>th</sup>, 18<sup>th</sup>, 19<sup>th</sup>, 21<sup>st</sup>, 26<sup>th</sup>, 28<sup>th</sup> and 30<sup>th</sup> of April 2011.

## 6. Hydrological Characteristics Monitoring

### 6.1 Hydrological Characteristics Monitoring Parameters and methodology

Impact monitoring of hydrological characteristics was undertaken to establish hydrological characteristics of sections of Wai Ha River adjacent to Drainage Improvement Works in Shuen Wan, Tai Po.

The hydrological characteristics of sections of Wai Ha River were measured by water flow rate and depth.

### 6.2 Monitoring Equipment

Monitoring performed by a portable echo-sounder, model Greyline Stingray. The equipment was calibrated and verified by certified laboratory or manufacturer every year to ensure they perform to the same level of accuracy as stated in the manufacturer's specification.

Calibration Certificate of the multi-meter is given in Appendix C.

### 6.3 Monitoring Locations

In accordance with the EM&A Manual (revision 3), monitoring stations for contract 1 were established at two locations and summarized in Table 6.3.1.

**Table 6.3.1 – Water Quality Monitoring Stations**

<b>Monitoring Station</b>	<b>Location</b>	<b>Coordinates</b>
H1	Between the Shuen Wan Marsh and ECA	E:839301 N:836386
H2	Route to Sam Kung Temple	E:839163 N:836433

As illustrated in Figure 6.3.1, H2 served as the control station while H1 was the monitoring location of hydrological characteristics.

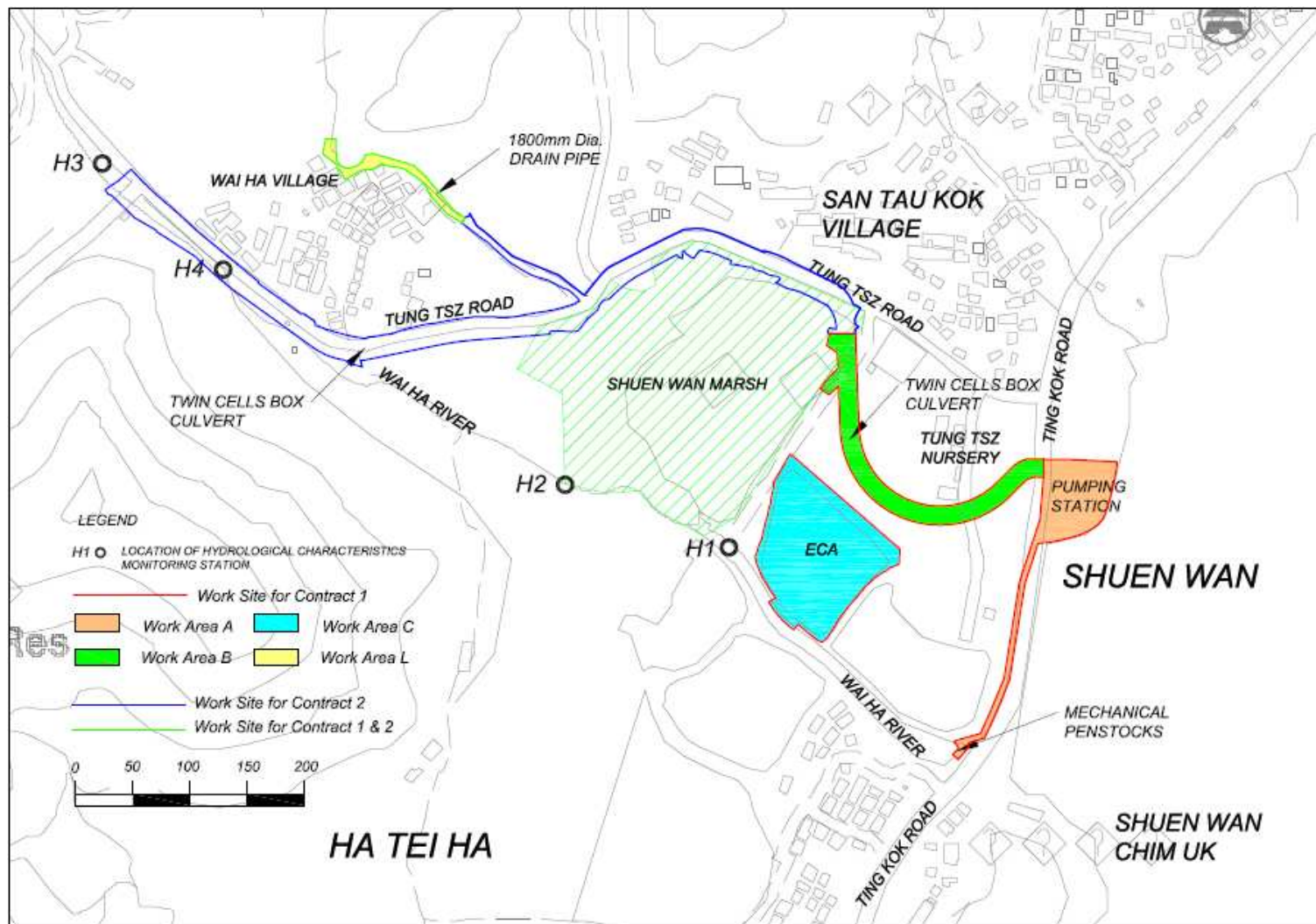


Figure 6.3.1 Hydrological Characteristics Monitoring Locations

## 6.4 Monitoring Frequency

Hydrological characteristics monitoring for each monitoring station were performed for once per week during the course of the construction river works.

Monitoring was carried out on 12<sup>th</sup>, 19<sup>th</sup> and 26<sup>th</sup> of March 2011.

## 6.5 Monitoring Results and Interpretation

Hydrological characteristics monitoring was carried out three times in this reporting month. The monitoring results are summarized in Table 6.5. All results were within the action and limit levels, therefore, no exceedance was found.

Table 6.5 Summary of Water Quality Monitoring Results

	Average of Monitoring Results	
	Water Depth (m)	Water Flow Rate (m <sup>3</sup> /s)
H1 (flood)	~0.13*	0.127
H1 (ebb)	~0.15*	0.152
H2 (flood)	~0.5*	1.021
H2 (ebb)	~0.5*	1.914

\*: Since the water levels were too low for the depth detector to determine, tape measure was instead adopted for estimation.

Details of the monitoring data were presented in Appendix G.

## 6.6 Action and limit level for Hydrological Characteristics

The Action and Limit levels for all monitoring stations are summarized in Table 6.6.1, which would be applied for compliance assessment of hydrological characteristics for this project. If the hydrological characteristics monitoring results at any impact stations exceeded the criteria, the actions in accordance with the Event and Action Plan in Table 6.6.2 should be taken.

Table 6.6.1 Action and Limit Levels for Hydrological Characteristics at All Monitoring Stations

Parameters	Action	Limit
Water Depth at Mid-flood (m)	0.08	0.06
Water Depth at Mid-ebb (m)	0.4	0.3
Water Flow Rate (m <sup>3</sup> /s)	120% of control station's water flow rate on the same day of measurement	140% of control station's water flow rate on the same day of measurement

Table 6.6.2 Event and action Plan for Hydrological Characteristics

Event	ET Leader	IEC	ER	Contractor
<b>ACTION LEVEL</b>				
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>Repeat in-situ measurements to confirm findings;</li> <li>Identify reasons for non-compliance and source(s) of impact;</li> <li>Inform IEC, Contractor and Engineer;</li> <li>Check monitoring data, Contractor's working methods and any excavation works or dewatering processes;</li> <li>Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>Ensure mitigation measures are implemented.</li> <li>Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>Make agreement on mitigation measures to be implemented;</li> <li>Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>Rectify unacceptable practice;</li> <li>Check working methods and any excavation works or dewatering processes;</li> <li>Consider changes in working methods and plans;</li> <li>Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> </ol>

				6. Implement agreed mitigation measures.
Action level being exceeded by more than two consecutive sampling days	<ol style="list-style-type: none"> <li>Repeat in-situ measurements to confirm findings;</li> <li>Identify reasons for non-compliance and source(s) of impact;</li> <li>Inform IEC, Contractor and Engineer;</li> <li>Check monitoring data, Contractor's working methods and any excavation works or dewatering processes;</li> <li>Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>Ensure mitigation measures are implemented.</li> <li>Prepare to increase the monitoring frequency to daily;</li> <li>Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>Make agreement on mitigation measures to be implemented;</li> <li>Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>Rectify unacceptable practice;</li> <li>Check working methods and any excavation works or dewatering processes;</li> <li>Consider changes in working methods and plans;</li> <li>Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>Implement agreed mitigation measures.</li> </ol>
<b>LIMIT LEVEL</b>				
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>Repeat in-situ measurements to confirm findings;</li> <li>Identify reasons for non-compliance and source(s) of impact;</li> <li>Inform AFCD, IEC, Contractor and Engineer;</li> <li>Check monitoring data, and Contractor's working methods and any excavation works or dewatering processes;</li> <li>Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>Ensure mitigation</li> </ol>	<ol style="list-style-type: none"> <li>Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>Request Contractor to critically review the working methods;</li> <li>Make agreement on mitigation measures to be implemented;</li> <li>Assess effectiveness of implemented mitigation</li> </ol>	<ol style="list-style-type: none"> <li>Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>Rectify unacceptable practice;</li> <li>Check working methods and any excavation works or dewatering processes;</li> <li>Consider changes in working methods and plans;</li> <li>Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> </ol>

	measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level.		measures.	6. Implement agreed mitigation measures.
Limit level being exceeded by more than two consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat in-situ measurements to confirm findings;</li> <li>2. Identify reasons for non-compliance and source(s) of impact;</li> <li>3. Inform AFCD, IEC, Contractor and Engineer;</li> <li>4. Check monitoring data, and Contractor's working methods and any excavation works or dewatering processes;</li> <li>5. Discuss mitigation measures with IEC, Engineer and Contractor;</li> <li>6. Ensure mitigation measures are implemented.</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</li> <li>3. Assess effectiveness of implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on mitigation measures to be implemented;</li> <li>4. Assess effectiveness of implemented mitigation measures;</li> <li>5. Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform Engineer and confirm in writing notification of the non-compliance;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check working methods and any excavation works or dewatering processes;</li> <li>4. Consider changes in working methods and plans;</li> <li>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</li> <li>6. Implement agreed mitigation measures;</li> <li>7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>

### 6.7 Monitoring Schedule for the next reporting month

Hydrological characteristics monitoring schedule is proposed to be carried out on 2<sup>nd</sup>, 9<sup>th</sup>, 16<sup>th</sup>, 18<sup>th</sup> and 30<sup>th</sup> of April 2011.

## **7. Ecology Monitoring**

### **7.1 Introduction**

The Ecological Monitoring of the Ecological Compensatory Area (ECA) of the Project is conducted to fulfill Clauses 5.2 and 5.4 of EP-303/2008 and the monitoring requirements in accordance with Section 6 of the approved updated EM&A Manual (approved by EPD on 21<sup>st</sup> December 2010) and the approved Habitat Creation Plan (HCP) (approved by EPD on 24<sup>th</sup> September 2010) of the Project.

This report documents monitoring findings on vegetation health and site inspections in the ECA undertaken in March 2011.

### **7.2 Ecological Monitoring of ECA**

#### **7.2.1 Scope of Monitoring**

A specific ecological monitoring programme and ecological monitoring requirements of the ECA are detailed in Section 7 of the approved Habitat Creation Plan (HCP) and Section 6.18 of the approved updated Environmental Monitoring & Audit (EM&A) Manual of the Project.

During the construction phase of the ECA, monthly monitoring of vegetation health (including the planted, retained and transplanted trees and shrub, and the proposed planting) and weekly site inspections should be undertaken. Monthly monitoring of *in situ* water quality check will be carried out once the ECA is filled with water from the nearby Wai Ha River.

During the 12-month establishment phase of the ECA, monitoring on habitat types, vegetation cover, intertidal fauna and other fauna (including avifauna, herpetofauna, fish, odonates and butterflies) will be undertaken on a six-monthly basis, while the vegetation health and *in situ* water quality check will be monitored monthly. Site inspections will be conducted twice per month.

#### **7.2.2 Monitoring Methodology during the construction phase**

##### *Monitoring of vegetation health*

Monthly monitoring on the health condition of the retained and transplanted trees and vegetation will be conducted. Once the proposed vegetation are planted in the ECA, monitoring on the growth and health conditions of these planted vegetation in various created habitats (i.e. brackish marsh, mangrove, woodland areas of planted trees and shrubs, and wooded areas with retained and (trans)planted trees) within the ECA will be conducted during the construction and establishment phases. General health and



growth status of the retained trees within the ECA are recorded and recommendation of appropriate tree care will be made to the maintenance party.

All planted, retained and transplanted trees and shrubs will be surveyed to update their growth and health. Any signs of pests and/ or poor growth of planted, retained and transplanted trees and shrubs will be recorded. Appropriate treatment or removal of pest will be implemented if necessary. Supplemental planting will be arranged if needed.

A fixed transect line will be run through the wetland habitats (including intertidal mudflat, brackish marsh and mangrove) and the general growth and health of the planted vegetation along both sides of the transect will be inspected and evaluated. Any adverse plant health, such as dieback of planted species, will be noted and supplemental planting will be arranged. Any signs of pests which cause adverse health problems to the plants will be identified and recorded.

#### *Monitoring of water quality*

Since there will be free movement of brackish river water in and out of the ECA, water quality in the ECA will be largely dependent on water quality in the river. In this open system it is not appropriate to set specific targets for water quality parameters. Nevertheless, baseline data on water quality, in particular seasonal patterns, would potentially be useful long term management of the ECA. Once the ECA is filled with water during construction phase of the ECA, *in-situ* water quality will be measured once per month during both Construction and Establishment Phases. Parameters, including temperature, pH, salinity, turbidity and dissolved oxygen, will be monitored. Additional measurements of these parameters should also be made by the ecologist in response to unexpected events (e.g. algal blooms or fish die-offs) in order to inform remedial management measures.

#### *Site inspection*

Weekly site inspection will be carried out by the Wetland Specialist to update the status and monitor the progress of the construction of the ECA. Any adverse ecological impact resulting from the construction should be identified and remedial action should be recommended.

### **7.2.3 Monitoring Methodology during the establishment phase**

#### *Monitoring of vegetation health*

Same monitoring methodology as in Section 7.2.2.

#### *Monitoring of water quality*

Same monitoring methodology as in Section 7.2.2.

#### *Site inspection*

Site inspection during the establishment phase of the ECA will be conducted twice per month for monitoring the health and condition of the wetland

during the establishment period. Any unsatisfied health and habitat criteria of the wetland will be identified and remedial action should be recommended.

#### *Monitoring of habitat types and vegetation cover*

Monitoring of habitat types and vegetation cover will be conducted twice during the 12 month Establishment Phase of the ECA; specifically at the end of the dry season and the end of the subsequent wet season after completion of the planting work. The monitoring aims to determine the exact extent of the wetland habitats and vegetation cover (i.e. open water, intertidal mudflat, brackish marsh and mangrove) during the establishment period and control any excessive colonization of unwanted vegetation specific habitats.

#### *Monitoring of intertidal fauna*

As the ECA would largely comprise an intertidal mudflat, monitoring for intertidal fauna will be conducted. Recolonisation will take time: accordingly monitoring will be tentatively conducted in February 2012 and August 2012. As the important aim of monitoring of intertidal fauna in the ECA is to examine the diversity of the colonising community, a qualitative manner by walk-through survey (i.e. walk through the site with species and relative abundance recorded) will be conducted. Core sampling will also be conducted at different levels to record infauna. Three samples at each level (low, middle and high) will be collected during each monitoring event and the monitoring will be conducted at low tide.

#### *Monitoring of other fauna*

Monitoring of other faunal groups, including birds, herpetofauna, fish, odonate and butterflies, will be conducted. Monitoring of any aquatic invertebrates will be covered by the intertidal surveys. Since the site will be intertidal, it is considered no suitable for local amphibian species. Therefore, no nighttime survey for detecting mating calls of amphibians is necessary and only daytime surveys are needed. Monitoring of these faunal groups will be conducted on a walk-through survey basis. The surveyor will walk through the site, recording and counting the fauna observed. Microhabitats for herpetofauna will be actively searched. This monitoring will be conducted twice within the establishment period (once in the dry season (tentatively in February 2012) and once in the wet season (tentatively in August 2012)).

Monitoring of wild mammals is not necessary in this case; however, if signs of wild mammals are observed (such as footprints) during any field surveys, these will be recorded.

### **7.2.4 Monitoring time and weather condition**

Site inspection and monitoring of vegetation, fauna groups and water quality should be carried out during day-time with calm weather. Monitoring of birds should commence within one hour of sunrise, when is

the peak activity period for birds. Other fauna groups shall be undertaken during the warmer part of the monitoring day.

### 7.3 Monitoring Results

#### Monitoring of Vegetation Health

Monitoring of vegetation health within the ECA was conducted on 22<sup>nd</sup> March 2011.

No tree felling has been implemented within the ECA since the approval of the Tree Felling Application (approved by DLO on 9<sup>th</sup> March 2011). No trees from the Area A (i.e. area under Contract 1) and no saplings of the protected tree *Pavetta hongkongensis* from areas under Contract 2 have been transplanted to the ECA in accordance with the approved Tree Felling Application and the approved Transplantation Proposal.

All trees have been maintained in acceptable health condition, with no significance sign of health deterioration for the retained trees. However, two retained trees were found to have recent pruned branches in the canopy (for tree C37), and tearing tree bark and damaged scaffold branch and small branches (for tree C76), possibly due to the vehicular or machinery damage during the construction of a temporary haul road.

#### Monitoring of Water Quality

No water quality check was conducted in March 2011 since the ECA has not yet filled with water from Wai Ha River.

#### Site Inspections

Four site inspections were carried out on 7<sup>th</sup>, 18<sup>th</sup>, 22<sup>nd</sup> and 30<sup>th</sup> March 2011. Table 1 summarizes the observations and recommendations for each site inspection.

**Table 7-1. Observation and recommendation for each site inspection, March 2011.**

Inspection Date	Observation	Recommendation
07 Mar 2011	Visual inspection of 3 soil test pits was undertaken. All pits contained marine deposit with a high percentage of sand and organic matter. No foreign materials were found in the soil test pits.	The remaining two soil test pits should be inspected by the Wetland Specialist when water level at the center of the ECA is lowered in the later construction stage.
18 Mar 2011	A temporary haul road was progressively formed along the northern part of the ECA. An undersized tree was cut down.	Not required.
22 Mar 2011	Formation of the temporary haul road was continued. Dumping of improper foreign materials such as concrete was observed during the site inspection.	The Main Contractor was informed and warned immediately for the observation of the foreign materials found on the temporary haul road. Removal of such materials was conducted by the Main Contractor

	A few branches of a retained tree were pruned to facilitate the vehicular access to the site.	immediately after the site inspection. No dumping of improper foreign materials was observed in the following site inspections.  Protection of the retained trees should follow the tree protection specification detailed in the approved Landscape Plan of the Project. The Main Contractor was informed and additional tree care was carried out.
30 Mar 2011	No work has been undertaken since the last site inspection. The observation of foreign materials on 22 <sup>nd</sup> March 2011 was removed by the Main Contractor.	Not required.

## 7.4 Management Activities

### 7.4.1 Ecological Issues/ Management Activities

No significant ecological issues or management activities were identified

## 7.5 Implication of the Survey Findings

### 7.5.1 Implication to the Wetland design of the ECA

There were no implications to the wetland design from the monthly monitoring data and weekly site inspection.

## 7.6 Recommendations

All existing trees to be retained within the ECA should be maintained with acceptable health condition. These trees should be protected appropriately in accordance with the specification for landscape softworks stipulated in the approved Landscape Plan.

The remaining two soil test pits should be visually inspected by the Wetland Specialist when water level at the center of the ECA is lowered in the later construction stage.

## **8. Landscape and Visual**

### **8.1 Introduction**

The Landscape and Visual Monitoring of the Project is conducted to fulfill Clauses 5.2 and 5.4 of EP-303/2008 and the monitoring requirements in accordance with Section 7 of the approved updated EM&A Manual (approved by EPD on December 2010) of the Project. A Baseline Review on updating the landscape and visual condition, and the mitigation measures of the Project (including Contracts 1 and 2 of the Project) was undertaken before the commencement of the Project. The review findings were updated in the Baseline Environmental Monitoring Report submitted to the EPD on 14 February 2011.

This monthly monitoring report will detail the scope of landscape and visual monitoring work, monitoring findings and observations, and any recommendation and advice on proper implementation of the landscape mitigation measures.

### **8.2 Scope of Monitoring**

#### **8.2.1 Monitoring Objectives**

Landscape and Visual Monitoring of the Project should be conducted in a bi-weekly basis for checking the design, implementation and maintenance of the landscape and visual mitigation measures throughout the construction phase and in a quarterly basis during the first year of operational phase of the Project. Observations of any potential conflicts between the proposed mitigation measures and the project works carried out by the Contractors should be recorded. Recommendation and advice on proper implementation of the landscape mitigation measures should be provided to the Contractor for minimizing any potential impacts on the landscape and visual elements.

### **8.2.2 Monitoring during Construction Phase**

The following landscape and visual mitigation measure should be implemented during the construction phase of the project to minimize the potential impacts:

- *Visual Screen* – Use of hoardings as visual screens for the construction in the works areas;
- *Contaminant/ Sediment Control* – Use of temporary barriers, covers and drainage provision around the construction works as contaminant/sediment control to prevent the contaminants and sediments from entering the sensitive water-based habitats;
- *Pollution Control* – Implementation of pollution control measures to minimize any adverse environmental impacts to the surrounding habitats;
- *Liaison with Nursery* – Liaison with the nursery operator as necessary to minimize any adverse impact to the daily operation and plant holding capacity of the nursery;
- *Existing Trees within Works Area* – Maintenance and protection of the existing trees, especially their crowns, trunks and roots, within work sites; and
- *Construction Light* – Provision of construction light should be controlled at night to avoid excessive glare to the surrounding villages and to Plover Cove.

### **8.2.3 Monitoring during Operational Phase**

The following landscape and visual mitigation measure should be implemented during the operational phase of the project to minimize the potential impacts:

- Viewing area formation by planting with shrubs, grasses and benches along the area;
- Architectural design of the pump house will help it fit into the existing suburban, natural to semi-natural surroundings;
- Landscape design of pump house by providing sufficient planting around its boundary fence;
- Enhancement planting along Tung Tsz Road with shrubs/ trees of suitable species to help protect the stream and marshes;
- Construction of box culvert should be with at least 1.0m soil depth for enhancement planting;
- Transplanting of existing affected trees to adjacent locations should be carried out;
- Preparation for transplanting is needed to allow sufficient time for root pruning and rootball preparation prior to transplanting; and
- Reinstatement of affected area should be carried out to check that the works areas are properly reinstated.

### **8.3 Landscape and Visual Monitoring Results**

#### **8.3.1 Monitoring Date(s)**

This monthly Landscape and Visual Monitoring (March 2011) was conducted to cover only Areas A, B and C of Contract 1 of the Project since Contract 2 (i.e. the construction of a twin-cell box culvert close to Shuen Wan Conservation Area and Wai Ha River along Tung Tsz Road, and a drainage pipe near Wai Ha Village) has not yet commenced. The first monitoring was conducted on 22<sup>nd</sup> March 2011.

#### **8.3.2 Visual Screen**

##### Observation

Construction hoardings have been erected in Area A and Area C along the entire site boundary. A line of hoardings have also been erected to the western part of Area B, falling with the northwestern part of Tung Tsz Nursery. No hoardings have been erected along the rest of the proposed works area within the Nursery since neither construction works nor any associated preparation works have been commenced. **Photos 1-3** show the views of the erected hoardings in the three Areas.

##### Recommendation

No specific recommendation is required.

### **8.3.3 Contaminant/ Sediment Control**

#### Observation

##### *Area A*

A temporary tarpaulin covering was found along the trunk of a tree to be transplanted (E32) for minimizing any contamination from the nearby ground investigation and concrete works in Area A.

Provision of vehicle wheel washing facilities was observed at the exit point of Area A.

Used water for washing vehicle wheel and groundwater from the excavated sites were pumped into the silt/sand removal facilities for filtration before discharging into the manhole adjacent to Area A.

##### *Area B*

No discharge of contaminants or any fluid was observed since no construction works has been commenced.

##### *Area C*

The existing pond has been drained as a preparation work for the later recontouring work and earthwork. Water pumped out from the pond was observed to be filtrated in the silt/sand removal facilities before discharging into the manhole adjacent to Area C.

#### Recommendation

No specific recommendation is required.

### **8.3.4 Pollution Control**

#### Observation

##### *Area A*

Provision of vehicle wheel washing facilities was observed at the exit point of Area A to reduce the contamination to the surrounding habitats in Plover Cove.

Used water for washing vehicle wheel and groundwater from the excavated sites were pumped into the silt/sand removal facilities for filtration before discharging into the manhole adjacent to Area A.

##### *Area B*



Not applicable as no construction works has been commenced within the Nursery.

#### *Area C*

Drained water from the existing pond was observed to be filtered in the silt/sand removal facilities before discharging into the manhole adjacent to Area C. No direct discharge of water into the adjacent Wai Ha River was observed.

#### Recommendation

No specific recommendation is required.

### **8.3.5 Liaison with Nursery**

#### Observation

Construction hoardings have been erected to the northwestern part of Tung Tsz Nursery and no major construction works has been commenced within the Nursery. Indicative lines were painted on the ground for demarcating the works boundary within the Nursery. A liaison meeting with the nursery operator was arranged by the Main Contractor on 19<sup>th</sup> March 2011.

#### Recommendation

No specific recommendation is required.

### **8.3.6 Existing Trees within Works Areas**

#### Observation

#### *Area A*

Tree felling of most proposed trees to be felled and root pruning of trees proposed to be transplanted were conducted by the landscape contractor within the core working area in Area A.

Trees to be transplanted (Trees E19, E20, E21, E22, E32, T149 and T250) were recorded without appropriate Tree Protection Zone (TPZ). Tree T149 is located near the entrance of the construction site and would be prone to damage by any heavy vehicle getting into the works area.

Minor disturbance was recorded inside some TPZs including installation of a mobile distribution board, clothes and stored road signs (**Photos 5-7**).

Trees E21, E22, E28 and T150 were transplanted to new locations within Area A for opening up the two entrance and exit points in the site. Minor bark tearing was observed along the tree trunk of T150, while trees E21 and E22 were transplanted close to a site office and both showed poor health conditions.

### *Area B*

Several tree tags were found missing, including the retained tree U68 and trees to be transplanted (U45, U47, U69, U70, U75, U76, A38, T97 and T102). No appropriate tree tags were marked on the undersized trees to be transplanted, in which these trees were selected by the representatives of Tung Tsz Nursery.

The proposed transplanted tree T97 *Lagerstroemia speciosa* was recorded with poor health condition, with the observation of dry tree bark and decayed wood on trunk and branches.

### *Area C*

A few recent pruning cuts were observed on the branch of a retained tree C37 (**Photo 4**), while tearing tree bark and damaged scaffold branch and small branches were observed on tree C76. These are possible due to the vehicular or machinery damage during the construction of a temporary haul road in Area C.

Tree tags of the retained tree C77, C78 and C79 were found missing.

### *Recommendations*

#### *Area A*

All TPZs should be demarcated for all trees remaining on site (either tree to be transplanted or retained). In any practical circumstances, temporary protective Hessian should be armored around the tree trunks or tree parts which are prone to any machinery injury. All retained trees or trees to be transplanted should be watered regularly to maintain its growth and health.

Disturbance is prohibited in all TPZs. In any practical circumstances, the contractor should follow Section 8 of Annex 4 of the approved Landscape Plan for protecting the existing trees from any potential damages resulting from construction works.

In regard to its close proximity to the transplanted trees E21 and E22, the site office should be relocated to other area within the site for removing its load damage on the tree roots and root flares.

### *Area B*

A proper tree tags for stating the undersized trees to be transplanted (i.e. A24, U65, U71 and U73) should be hanged on all of these trees.

Proper tree tags stating the recommendation of the trees (i.e. retain or transplant) should be hanged on all of the trees proposed to be retained and transplanted (as mentioned in Section 8.3.6).

Further evaluation on the suitability of transplanting the existing poor health tree T97 is required at the moment of root ball preparation.

### *Area C*

A proper tree tag should be hanged on each of these retained trees C77, C78 and C79.

Any existing trees located close to the major vehicular access or core works area should be protected in accordance with the tree protection specification stipulated in Annex 4 of the approved Landscape Plan.

## **8.3.7 Construction Light**

### Observation

No construction light impact to the surrounding villages and to Plover Cove as all construction activities and construction sites are halted at 1800. No construction light at night is provided by the Main Contractor.

### Recommendation

No specific recommendation is required.

## **8.4 Audit Schedule**

The next bi-weekly Landscape & Visual Monitoring in April 2011 is scheduled to be conducted in the week of 4<sup>th</sup> and 18<sup>th</sup> April 2011.

## **9. Action taken in Event of Exceedance**

If the measurements (Noise, Water, Hydrological Characteristics, and Ecology) exceed the action / limit level, exceedance details will be reported and follow-up actions will be taken by relevant parties involved.

During the reporting month there was no exceedance for noise, hydrological characteristics, and ecological measurements recorded; therefore, no actions were taken.

Total 3 abnormal incidents of water quality limits (Dissolved Oxygen) were recorded in this reporting month according to the established level. ET has arranged site investigations for the incidents. No major site activity that may affect water quality was observed and no particular observations of defective site activities were found. During the incidents occurred, Contractor had already implemented silt trap and oil interceptor to prevent water quality impact. As no particular defect of site practices was observed, such conditions were believed to be attributed by natural fluctuation and are not considered as non-compliance events. No further actions for those incidents are required.

## **10. Construction waste disposal**

It is the contractor's responsibility to ensure that all wastes produced during the construction phase for the drainage improvement works are handled, stored and disposed of in accordance with good waste management practices and EPD's regulation and requirement. Waste materials generated during construction activities, such as construction and demolition (C&D) material, chemical wastes and general refuse, are recommended to be audited at regular intervals to ensure that proper storage, transportation and disposal practices are being implemented.

Table 10.1 is a summary of figures of the construction wastes disposal provided by Contractor

Table 10.1 Summary of Construction Waste Disposal

Month	Actual Quantities of Inert C & D Materials Generated Monthly						Actual Quantities of C & D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/cardboard packaging	Plastics (see note3)	Chemical Waste	Others, e.g. general refuse
	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)
Mar-11	0.330				0.33						0.055
Apr-11											
May-11											
Jun-11											
Total											
Forecast of Total Quantities of C & D Materials to be Generated from the Contract											
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/cardboard packaging	Plastics (see note3)	Chemical Waste	Others, e.g. general refuse
	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	( in'000m3 )	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)
	37.37	8.27	12.09	0	25.28	2.1	10	2	0.5	1	1

- Notes:
- (1) The Performance targets are given in PS Clause 26.23 (14)
  - (2) The waste flow table shall also include C & D materials that are specified in the Contract to be imported for used at the sites
  - (3) Plastics refer to plastics bottles/containers, plastic sheets/foam from packaging materials.
  - (4) The summary table shall be submitted to the Engineer's Representative monthly together with the Waste Flow Table for review and monitoring in accordance with the PS Clause 25.20A(4)

## 11. Status of Permits and Licenses obtained

Table 11.1 is the updated status of environmental related permits/ license obtained for the construction activities

Table 11.1 Status of Permits and Licenses Obtained

Description	License / Permit No.#	Date of Issue	Date of expiry	Status
Environmental Permit	EP-303/2008	2008/2/25	not applicable	Valid
Discharge Licence	WT00006448-2010	2010/6/15	30/6/2015	Valid
Registration as a Chemical Waste Producer	316597	2010/4/26	not applicable	Valid
Waste Disposal	7010348	2010/3/2	not applicable	Valid

## 12. Complaint Log

There was no formal complaint received during the reporting month. Therefore, follow up actions for the environmental complaint is not required.

Table 12.1 Summary of Formal Complaints received

	Noise	Water	Ecology	Others
Mar 2011	0	0	0	0
Total	0	0	0	0



### 13. Site Environmental Audits

#### 13.1 Site Inspection

Site inspections were undertaken weekly to inspect the construction activities in active site areas to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.

Within this reporting month, site inspections were conducted on 10<sup>th</sup>, 17<sup>th</sup>, and 23<sup>rd</sup> of March 2011. A detailed checklist of each site inspection together with comments and relevant photos have been filed and kept. The findings from inspection were summarized in Table 13.1.

Table 13.1 Summary results of site inspections findings

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
10 Mar 2011	No particular observation	N/A	N/A	N/A	N/A	N/A
17 Mar 2011	Muddy water was observed in the wheel washing bay at Area C	Observation	Accumulated water should be drained regularly to prevent muddy water from bringing to public area through vehicles left from site	Sedimentation tank will be installed for treatment of used water in the wheel washing bay by 1 Apr 11	To be followed	N/A
	Fencing was removed for preserved tree numbered E-55	Observation	Setting fencing for the preserved tree as tree protection measures	Fencing was set for the preserved tree	23 Mar 2011	N/A
	Contractor was reminded to cover the stockpile of cement when those are no in use	Reminder	N/A	N/A	N/A	N/A
23 Mar 2011	Muddy water was observed in the wheel washing bay at Area C	Observation	Accumulated water should be drained regularly to prevent muddy water from bringing to public area through vehicles left from site	Sedimentation tank will be installed for treatment of used water in the wheel washing bay by 1 Apr 11	N/A	N/A

### **13.2 Compliance with legal and Contractual requirement**

There was no non-compliance recorded for the month of March 2011.

### **13.3 Implementation status and effectiveness of the mitigation measures**

Contractor has implemented mitigation measures to address those problems as advised by ER and ET. Some of the measures taken by the contractor were considered as effective to minimize negative impact to the environment. Ongoing investigation will be carried out to observe performance and effectiveness of those measures. Outstanding environmental items will be inspected in next month.

As there were some ongoing follow up practices, contractor was reminded to regularly review and rectify the discrepancy once found and maintain good site condition. The contractor implemented various environmental mitigation measures as recommended in the Environmental Permit and Final Mitigation Measures Report.

The recommend mitigation measures of EM&A manual (revision 3) are presented in Appendix H (A).

The implemented statues of mitigation measures are presented in Appendix H (B).

#### **14. Future key issues and recommendations.**

According to the forecasted site activities, key environmental issues to be considered should at least include:

- Site water control and relevant protective measures.
- Quality of effluent discharge from Area A.
- Noise abatement measures for piling works.
- Control and disposal for construction wastes generated from works.

## 15. Conclusions

Tree transplanting, piling construction and excavation works were major site activities being carried out within this reporting month.

Regular site meetings and inspection audits led by the seniors for discussing site environmental matters were held among Project Proponent, Contractor and the ET on weekly basis. Also monthly site meeting and inspection audits with the above parties and IEC were carried out on 26<sup>th</sup> of April 2011.

For noise level monitoring, all results were within the established A/L limits.

For water quality monitoring, total 2 abnormal accidents of water quality limits (Turbidity and Dissolved Oxygen) were recorded in this reporting month according to the established level. ET has arranged site investigations for the abnormal incidents. No particular observations of defective site activities were found causing the incidents and such conditions were believed to be attributed by natural fluctuation.

For ecological monitoring survey, all trees have been maintained in acceptable health condition, with no significance sign of health deterioration for the retained trees. In addition, there was no ecological water quality monitoring conducted in this reporting month.

Also, there were not any notifications of summons recorded during the reporting month. Furthermore, there were not any formal prosecution and complaints recorded.

ET has reminded the contractor to provide environmental pollution control measures wherever necessary, and to keep a good environmental management at site practice.

The ET will continue to implement the environmental monitoring & audit programme in accordance with the EM&A Manual (revision 3) and Environmental Permit requirement.

## **Appendix A: Site Location**





**Appendix B: Key Personal Contact information chart**



<b>Post</b>	<b>Name</b>	<b>Contact No.</b>	<b>Contact Fax</b>	<b>e-mail</b>
Project Manager	Mr. W. K. Chan	6821 1136	2674 6688	dc200922jv_pmcwk@yahoo.com.hk
Site Agent	Mr. C. L. Wong	9280 0166	2674 6688	dc200922jv_sa@yahoo.com.hk
Environmental Officer / Sub-agent	Mr. K. M. Ma	9552 1734	2674 6688	dc200922jv_suba@yahoo.com.hk
Environmental Supervisor	Mr. Anthony Chan	9179 2092	2674 6688	anthony277@hotmail.com
Asia Ecological Consultants Ltd. (Wetland Specialist)	Dr. Mike Leven	2486 2885	2471 8389	mrleven@asiaecol.com.hk
Environmental Pioneers & Solutions Limited (Environmental Team)	Mr. Johnny Lee	2889 0569	2856 2010	johnnylee@epsl.com.hk

**Appendix C: Calibration Certificates for measuring instruments**



# Calibration Certificate

Certificate No. 01190

Page 1 of 3 Pages

**Customer :** Environmental Pioneers and Solutions Limited

**Address :** Flat A, 8 Floor, Chaiwan Industrial Centre Building, 20 Lee Chung Street, Chaiwan, Hong Kong.

**Order No. :** Q00196

**Date of receipt :** 11-Mar-10

## Item Tested

**Description :** Digital Sound Level Meter

**Manufacturer :** SVAN

**Model :** 949

**Serial No. :** 8571

## Test Conditions

**Date of Test :** 12-Mar-10

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

## Test Results

All results were within the IEC 651 Type 1, IEC 804 Type 1 & IEC 1260 Class 1 specification.


The results are shown in the attached page(s).


Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceable to</u>
S017	Multi-Function Generator	C081456	18-Mar-10	SCL-HKSAR
S024	Sound Level Calibrator	93758	16-Jul-10	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).  
The test results apply to the above Unit-Under-Test only

Calibrated by :   
P.F. Wong

Approved by :   
Dorothy Cheuk

Date: 15-Mar-10



# Calibration Certificate

Certificate No. 01190

Page 2 of 3 Pages

Results :

## 1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Level Range	Octave Filter	Weight	Response		
105 dB	OFF	A	Fast	94.07	94.0
			Slow		94.0
		C	Fast		94.0
130 dB	OFF	A	Fast	94.07	94.0
			Slow		94.0
		C	Fast		94.0
	OFF	A	Fast	113.95	113.9
			Slow		113.9
		C	Fast		113.9

IEC 651 Type 1 Spec. :  $\pm 0.7$  dB

Uncertainty :  $\pm 0.1$  dB

## 2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. :  $\pm 0.3$  dB

Uncertainty :  $\pm 0.01$  dB

## 3. Linearity

### 3.1 Level Linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (inside Primary)
130	114.0	114.0	0.0	$\pm 0.7$ dB
	104.0	104.0	0.0	
	94.0	94.0 (Ref.)	--	
150	84.0	84.0	0.0	
	74.0	74.0	0.0	
	64.0	64.0	0.0	
	54.0	54.0	0.0	

Uncertainty :  $\pm 0.1$  dB



# Calibration Certificate

Certificate No. 01190

Page 3 of 3 Pages

## 3.2 Differential level linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
130	84.0	84.0	0.0	± 0.4 dB
	94.0	94.0 (Ref.)	--	
	95.0	95.0	0.0	± 0.2 dB
	104.0	104.0	0.0	± 0.4 dB
	105.0	105.0	0.0	± 0.4 dB
	114.0	114.0	0.0	± 1.0 dB

Uncertainty : ± 0.1 dB

## 4. Frequency Weighting A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	- 39.4	- 39.4 dB, ± 1.5 dB
63 Hz	- 26.2	- 26.2 dB, ± 1.5 dB
125 Hz	- 16.2	- 16.1 dB, ± 1 dB
250 Hz	- 8.7	- 8.6 dB, ± 1 dB
500 Hz	- 3.3	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+ 1.2	+ 1.2 dB, ± 1 dB
4 kHz	+ 1.0	+ 1.0 dB, ± 1 dB
8 kHz	- 1.0	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	- 6.9	- 6.6 dB, + 3 dB ~ -∞

Uncertainty : ± 0.1 dB

## 5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	50.0	--	--
1/10	50.0	50.2	± 0.5 dB
1/10 <sup>2</sup>	50.0	50.4	
1/10 <sup>3</sup>	50.0	50.4	± 1.0 dB
1/10 <sup>4</sup>	50.0	50.4	

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. Atmospheric Pressure : 1 013 hPa.

----- END -----



# Calibration Certificate

Certificate No. **11218**

Page **1** of **3** Pages

**Customer :** Environmental Pioneers and Solutions Limited

**Address :** Flat B, 6/F., Hop Shi Factory Building, 29 Lee Chung Street, Chai Wan, Hong Kong.

**Order No. :** Q10260

**Date of receipt :** 1-Mar-11

## Item Tested

**Description :** Digital Sound Level Meter

**Manufacturer :** SVAN

**Model :** 949

**Serial No. :** 8569

## Test Conditions

**Date of Test :** 14-Mar-11

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

## Test Results

All results were within the IEC 651 Type 1 & IEC 804 Type 1 specification after adjustment.

The results are shown in the attached page(s).


Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S017A	Multi-Function Generator	07279	SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).

The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
P. F. Wong

**Approved by :**   
Dorothy Cheuk

**Date:** 15-Mar-11

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646



# Calibration Certificate

Certificate No. 11218

Page 2 of 3 Pages

Results :

## 1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)	
Level Range	Octave Filter	Weight	Response		Before Adjust.	After Adjust.
105 dB	OFF	A	Fast	94.0	*92.2	93.9
			Slow		--	93.9
		C	Fast		--	93.9
130 dB	OFF	A	Fast	94.0	--	93.9
			Slow		--	93.9
		C	Fast		--	93.9
	OFF	A	Fast	114.0	--	113.9
			Slow		--	113.9
		C	Fast		--	113.9

IEC 651 Type 1 Spec. :  $\pm 0.7$  dB

Uncertainty :  $\pm 0.1$  dB

## 2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. :  $\pm 0.3$  dB

Uncertainty :  $\pm 0.01$  dB

## 3. Linearity

### 3.1 Level Linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (inside Primary)
130	114.0	113.9	0.0	$\pm 0.7$ dB
	104.0	103.9	0.0	
	94.0	93.9 (Ref.)	--	
105	84.0	83.9	0.0	
	74.0	74.0	+0.1	
	64.0	64.1	-0.2	
	54.0	54.1	-0.2	

Uncertainty :  $\pm 0.1$  dB



# Calibration Certificate

Certificate No. 11218

Page 3 of 3 Pages

### 3.2 Differential level linearity

UUT Range	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
130	84.0	83.9	0.0	± 0.4 dB
	94.0	93.9 (Ref.)	--	
	95.0	95.0	-0.1	± 0.2 dB

Uncertainty : ± 0.1 dB

### 4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.7	- 39.4 dB, ± 1.5 dB
63 Hz	-26.5	- 26.2 dB, ± 1.5 dB
125 Hz	-16.5	- 16.1 dB, ± 1 dB
250 Hz	-9.0	- 8.6 dB, ± 1 dB
500 Hz	-3.5	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+1.5	+ 1.2 dB, ± 1 dB
4 kHz	+1.4	+ 1.0 dB, ± 1 dB
8 kHz	-0.7	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	-6.6	- 6.6 dB, + 3 dB ~ -∞

Uncertainty : ± 0.1 dB

### 5. Time Averaging

Applied Burst duty Factor	Applied Leq. Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	40.0	--	--
1/10	40.0	40.1	± 0.5 dB
1/10 <sup>2</sup>	40.0	40.0	
1/10 <sup>3</sup>	40.0	40.2	± 1.0 dB
1/10 <sup>4</sup>	40.0	40.0	

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. Atmospheric Pressure : 1 010 hPa.

4. \*Out of Specification

----- END -----





# Calibration Certificate

Certificate No. 11495

Page 1 of 2 Pages

**Customer :** Environmental Pioneers and Solutions Limited

**Address :** Flat B, 6/F., Hop Shi Factory Building, 29 Lee Chung Street, Chai Wan, Hong Kong.

**Order No. :** Q10260

**Date of receipt :** 15-Mar-11

## Item Tested

**Description :** Sound Level Calibrator

**Manufacturer :** Svantek

**Model :** SV30A

**Serial No. :** 7908

## Test Conditions

**Date of Test :** 17-Mar-11

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

## Test Results

All results were within the IEC 942 Class 1 specification.

The results are shown in the attached page(s).


Main Test equipment used:


<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	03926	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR
S041	Universal Counter	04461	SCL-HKSAR
S206	Sound Level Meter	04462	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).

The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
P. F. Wong

**Approved by :**   
Dorothy Cheuk

**Date:** 21-Mar-11

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

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# Calibration Certificate

Certificate No. 11495

Page 2 of 2 Pages

Results :

## 1. Level Accuracy

UUT Nominal Value (dB)	Measured Value (dB)	IEC 942 Class 1 Spec.
94	94.08	± 0.3 dB
114	114.18	

Uncertainty : ± 0.1 dB

## 2. Frequency

UUT Nominal Value	Measured Value	IEC 942 Class 1 Spec.
1 kHz	1.000 kHz	± 2 %

Uncertainty : ± 3.6 x 10<sup>-6</sup>

## 3. Level Stability : 0.0 dB

IEC 942 Class 1 Spec. : ± 0.1 dB

Uncertainty : ± 0.01 dB

## 4. Total Harmonic Distortion : < 1.0 %

IEC 942 Class 1 Spec. : < 3 %

Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test

2. The above measured values are the mean of 3 measurements.

3. The uncertainty claimed is for a confidence probability of not less than 95%.

4. Atmospheric Pressure : 1012 hPa.

----- END -----



## CERTIFICATE OF CALIBRATION

Certificate No.: 11CA0117 01-02

Page: 1 of 2

### Item tested

Description: Acoustical Calibrator (Class 1)  
Manufacturer: Castle  
Type/Model No.: GA607  
Serial/Equipment No.: 039543  
Adaptors used: -

### Item submitted by

Customer: Geotechnics & Concrete Engineering (H.K.) Ltd.  
Address of Customer: 6 Ko Shan Rd., Ground FL., Hung Hom, Kowloon, Hong Kong  
Request No.: RS/11/010-PO  
Date of request: 17-Jan-2011

Date of test: 20-Jan-2011

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	02-Jul-2011	SCL
Preamplifier	B&K 2673	2239857	14-Dec-2011	CEPREI
Measuring amplifier	B&K 2610	2346941	15-Dec-2011	CEPREI
Signal generator	DS 360	61227	24-Jun-2011	CEPREI
Digital multi-meter	34401A	US36087050	09-Dec-2011	CEPREI
Audio analyzer	8903B	GB41300350	28-Jun-2011	CEPREI
Universal counter	53132A	MY40003662	05-Jul-2011	CEPREI

### Ambient conditions

Temperature:  $22 \pm 1$  °C  
Relative humidity:  $60 \pm 10$  %  
Air pressure:  $1000 \pm 5$  hPa

### Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

### Test results

Details of the performed measurements are presented on page 2 of this certificate.

Approved Signatory:

  
Huang Jian Min/Feng Jun Qi

Date: 21-Jan-2011

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.





## QUALITY CONTROL CALIBRATION AND TEST CERTIFICATE

**Date Issued:** 10/27/2010

<b>Instrument Description</b>	<b>Model</b>	<b>Serial Number</b>
Level-Velocity Logger	Stingray	45525

Greyline's quality control calibration and testing program includes distance measurement verification using fixed, calibrated targets.

### CALIBRATION CONDITIONS

<p><b>Minimum Level = 1.00"</b> <b>Intermediate Level = 16.00 ft</b> <b>Pipe I.D. = 8.00"</b> <b>Maximum Velocity = 10 ft/s</b></p>
---

### CERTIFICATION

The above product has been tested to meet or exceed the following specifications:

Accuracy	+/- 2%
Repeatability	+/- 0.1%
Linearity	+/- 0.5%

Level / Velocity

and has also passed the following tests:

1. Functional test including output signals.
2. Adjustment of circuit variables to calibrated values
3. Reliability test (burn-in) 48 hr





**Dissolved Oxygen:**

(Reference : APHA 20ed 4500-O B&C, ISO 5814:1990(E) and DKK-TOA Hand-held Water Quality Meter WQC-24 Instruction Manual)

DO value evaluated by Iodometric Method (mg/L)		Indicated value by meter (mg/L)	Linearity (R <sup>2</sup> )
0.00		0.00	0.9999
2.95		3.02	
5.42		5.50	Acceptance Criterion
8.62		8.68	R <sup>2</sup> > 0.995 Within ± 0.1 mg/L against standard value
10.27		10.35	
13.12		13.06	
Repeatability	1 <sup>st</sup> time	0.00 , 8.70	Within ± 0.1 mg/L against average value
	2 <sup>nd</sup> time	0.00 , 8.65	
	3 <sup>rd</sup> time	0.00 , 8.68	
	0.00 , 8.62	Ave.: 0.00 , 8.68	

Remark: For repeatability, the maximum difference from the average value of 3 measurements was taken.

**pH Value:**

(Reference : APHA 20ed 4500-H<sup>+</sup> B, ISO 10523:1994(E) and DKK-TOA Hand-held Water Quality Meter WQC-24 Instruction Manual)

pH buffer for Meter Calibration (20°C)	Input value (pH buffer) (20°C)	Indicated pH value by meter (20°C)	Linearity (R <sup>2</sup> )
pH = 4.00	1.67	1.71	0.9999
pH = 6.88	4.00	4.03	Acceptance Criterion
pH = 7.00	6.88	6.89	R <sup>2</sup> > 0.995 Within ± 0.05 pH against standard value
pH = 9.22	7.00	7.02	
pH = 10.00	7.43	7.45	
	9.22	9.19	
	10.00	9.96	
	12.64	12.67	Within ± 0.05 pH against average value
Repeatability	1 <sup>st</sup> time	4.03 , 9.97	
	2 <sup>nd</sup> time	4.03 , 9.96	
	3 <sup>rd</sup> time	4.02 , 9.95	
	pH 4.00 , 10.00	Ave.: 4.03 , 9.96	

Remark: For repeatability, the maximum difference from the average value of 3 measurements was taken.



**Temperature:**

(Reference : APHA 20ed 2550 B, In-house method and DKK-TOA Hand-held Water Quality Meter WQC-24 Instruction Manual)

Setting Temperature (°C)	Indicated value by meter (°C)		Linearity (R <sup>2</sup> )
5.0	4.6		0.9997
15.0	15.2		
25.0	25.4		Acceptance Criterion R <sup>2</sup> > 0.995 Within ± 0.5°C against standard value
35.0	34.7		
45.0	45.3		
55.0	55.3		
Repeatability	1 <sup>st</sup> time	15.3 , 45.4	Within ± 0.25°C against average value
	2 <sup>nd</sup> time	15.1 , 45.3	
	3 <sup>rd</sup> time	15.2 , 45.2	
	15.0 , 45.0		

Remark: For repeatability, the maximum difference from the average value of 3 measurements was taken.


**Turbidity:**

(Reference : APHA 20ed 2130 B and DKK-TOA Hand-held Water Quality Meter WQC-24 Instruction Manual)

Formazin Standards (NTU)	Indicated value by meter (NTU)		Linearity (R <sup>2</sup> )
0.0	0.0		1.0000
20.0	20.7		Acceptance Criterion R <sup>2</sup> > 0.995 Within ± 3% F.S. against span calibration value 100, 400 and 800 NTU
100.0	102.2		
400.0	401.7		
800.0	802.1		
Repeatability	1 <sup>st</sup> time	0.0 , 801.9	Within ± 3% F.S. against average value
	2 <sup>nd</sup> time	0.0 , 802.1	
	3 <sup>rd</sup> time	0.0 , 802.4	
	0.0 , 800.0		

Remark: For repeatability, the maximum difference from the average value of 3 measurements was taken.

Comments : Pass, (comply with the criteria)

Tested by : Fong Ka Lun Certified by :   
 Gu Chin  
 Chemist

Checked by : Gu Chin Date : 4-3-2011



## **Appendix D: Construction Noise Monitoring Data**

# 大成環境科技拓展有限公司

## Environmental Pioneers and Solutions Limited

### Noise Monitoring Data Sheet

Monitoring Location		M1	AL1
Monitoring Method		Façade	Façade
Date of Monitoring		2011/03/10	2011/03/10
Weather Condition		Overcast	Overcast
Measurement Start Time (hh:mm)		13:58	08:34
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.3	0.5
Measurement Results	L <sub>eq</sub> (dB(A))	62.1	67.6
	L <sub>10</sub> (dB(A))	65.6	70.1
	L <sub>90</sub> (dB(A))	51.6	59.5
Major Construction Noise Source(s) During Monitoring		The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities
Other Noise Source(s) During Monitoring		– Background Noise – Traffic Noise	– Background Noise – Traffic Noise

Name

Signature

Date

Prepared by:

Ronan Chan



2011/03/10

**大成環境科技拓展有限公司**  
**Environmental Pioneers and Solutions Limited**

**Noise Monitoring Data Sheet**

Monitoring Location		M1	AL1
Monitoring Method		Façade	Façade
Date of Monitoring		2011/03/17	2011/03/17
Weather Condition		Overcast	Overcast
Measurement Start Time (hh:mm)		11:37	10:52
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.4	0.6
Measurement Results	L <sub>eq</sub> (dB(A))	66.3	65.2
	L <sub>10</sub> (dB(A))	69.5	68.3
	L <sub>90</sub> (dB(A))	53.6	51.1
Major Construction Noise Source(s) During Monitoring		- Drilling	- Drilling
Other Noise Source(s) During Monitoring		- Background Noise - Traffic Noise	- Background Noise - Traffic Noise - Public Noise

Name

Signature

Date

Prepared by:

Ronan Chan



2011/03/17

**大成環境科技拓展有限公司**  
**Environmental Pioneers and Solutions Limited**

**Noise Monitoring Data Sheet**

Monitoring Location		M1	AL1
Monitoring Method		Façade	Façade
Date of Monitoring		2011/03/24	2011/03/24
Weather Condition		Overcast	Overcast
Measurement Start Time (hh:mm)		10:46	10:02
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.2	0.4
Measurement Results	L <sub>eq</sub> (dB(A))	68.1	66.2
	L <sub>10</sub> (dB(A))	70.3	69.2
	L <sub>90</sub> (dB(A))	55.6	52.1
Major Construction Noise Source(s) During Monitoring		- Drilling	- Drilling
Other Noise Source(s) During Monitoring		- Background Noise - Traffic Noise	- Background Noise - Traffic Noise - Public Noise

Name

Signature

Date

Prepared by:

Ronan Chan



2011/03/24

**大成環境科技拓展有限公司**  
**Environmental Pioneers and Solutions Limited**

**Noise Monitoring Data Sheet**

Monitoring Location		M1	AL1
Monitoring Method		Façade	Façade
Date of Monitoring		31/3/2011	31/3/2011
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		10:52	11:42
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.2	0.4
Measurement Results	L <sub>eq</sub> (dB(A))	64.5	69.7
	L <sub>10</sub> (dB(A))	68.3	73.4
	L <sub>90</sub> (dB(A))	51.7	62.6
Major Construction Noise Source(s) During Monitoring		- Drilling	- Drilling
Other Noise Source(s) During Monitoring		- Background Noise - Traffic Noise	- Background Noise - Traffic Noise

Name

Signature

Date

Prepared by:

Ronan Chan



2011/03/31

## **Appendix E: Water Quality Monitoring Data**

### **Remark:**

Red highlighting: The value is exceeding limit level.

Yellow highlighting: The value is exceeding action level but within limit level.

**Environmental Pioneers and Solutions Limited**






















**Environmental Pioneers & Solutions Limited**  
**Water Quality Monitoring - Summary of On-Site Measurement Results**

Date of Sampling : 29/3/2011

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	10:00	9:20	
Tide Mode	Mid-ebb		
River Condition	Normal	Normal	
Water Depth (m)	< 1.0	< 1.0	
pH value	7.99	8.49	
Salinity (ppt)	11.7	29.4	
Temperature (°C)	18.6	18.9	
Turbidity (NTU)	32.4	16.4	16.4
DO (mg/L)	7.59	6.81	
DO Saturation (%)	86%	85%	
Suspended Solids (mg/L)	5.80	<2	<2

Remark or Observation : \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

	<u>Name</u>	<u>Signature</u>	<u>Date</u>
Prepared By : <u>Jimmy Cheng</u>		_____	<u>29/3/2011</u>





## **Appendix F: Hydrological Characteristics Monitoring Data**

Location	Position	Tide	Date	Time	Weather	Water Depth (m)	Water Flow (m/s)*	Water Flow (m <sup>3</sup> /s)
H1	Mid	Flood	03/12	10:30	Overcast	~0.1	0.12	0.152
H1	Mid	Flood	03/19	17:30	Rainy	~0.2	0.06	0.076
H1	Mid	Flood	03/26	09:49	Cloudy	~0.1	0.12	0.152
H2	Mid	Flood	03/12	10:05	Overcast	~0.5	0.18	1.148
H2	Mid	Flood	03/19	18:01	Rainy	~0.5	0.06	0.383
H2	Mid	Flood	03/26	10:30	Cloudy	~0.5	0.24	1.531
H1	Mid	Ebb	03/12	17:05	Overcast	~0.1	0.12	0.152
H1	Mid	Ebb	03/19	12:33	Rainy	~0.2	0.12	0.152
H2	Mid	Ebb	03/12	17:25	Overcast	~0.5	0.24	1.531
H2	Mid	Ebb	03/19	11:55	Rainy	~0.5	0.37	2.297

## **Appendix G: Landscape and Visual Monitoring Photos**



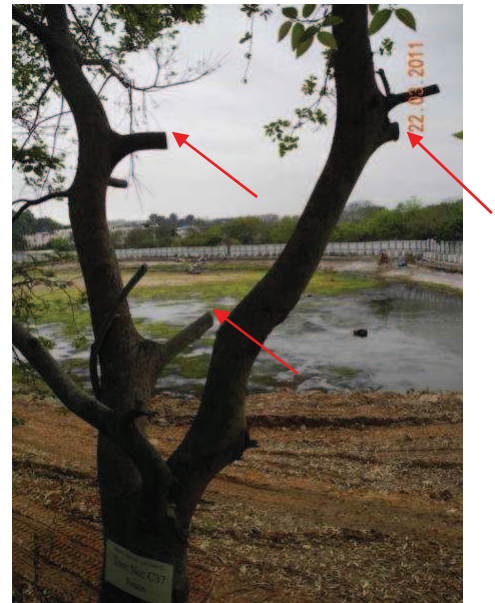
**Photo 1** – Construction hoardings have been erected in Area A along the entire site boundary.



**Photo 2** - A line of hoardings has also been erected in the western part of Area B, falling within the northwestern part of the Nursery.



**Photo 3** - Hoardings have been erected in Area A along the entire site boundary.



**Photo 4** - Some recent pruning cuts was observed on the branch of C37



**Photo 5** - No Tree Protection Zone (TPZ) for the tree (E20) proposed to be transplanted.



**Photo 6** - A mobile distribution board was found inside TPZ.



**Photo 7** – Clothes were found close to tree E19, which was not demarcated by any TPZ.

**Appendix H:**

**A)**

**The recommended mitigation measures of EM&A manual (revision 3)**

**B)**

**Implementation status of environmental protection and mitigation measures**

A) The recommended mitigation measures of EM&A manual (revision 3)

EIA Ref. Ref.	EM&A Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
<b>A</b> <i>Noise Impact</i>						
S 3.30	Good Site Practice: <ul style="list-style-type: none"> <li>▪ Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program</li> <li>▪ Silencers or mufflers on construction equipment shall be utilized and shall be properly maintained during the construction program</li> <li>▪ Mobile plant, if any, shall be sited as far from NSRs as possible</li> <li>▪ Machines and plant (such as</li> </ul>	To minimize construction noise impacts	Contractor	Works areas	Construction phase	EIAO-TM NCO



EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		trucks) that may be in intermittent use shall be shut down between work periods or shall be throttled down to a minimum <ul style="list-style-type: none"> <li>▪ Plant known to emit noise strongly in one direction shall, wherever possible, be orientated so that the noise is directed away from the nearby NSRs</li> <li>▪ Material stockpiles and other structures shall be effectively utilized, wherever practicable, in screening noise from on-site construction activities.</li> </ul>					
S 3.31 - 3.32	2.19	Use of quieter PME	To minimize construction noise impacts	Contractor	Works areas	Construction phase	EIAO-TM NCO
S 3.33 – 3.34	2.20-2.21	Use of temporary noise barrier	To minimize construction noise impacts	Contractor	Works areas as shown in Figure	Construction phase	EIAO-TM NCO

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
3.36-3.38	2.23-2.24				3.5		
S 3.35 and Table 3.6	2.22	Use of alternative quieter construction method (the Low Impact Method)	To minimize construction noise impacts	Contractor	Part of the works area for pipe laying in Wai Ha (refer to Figure 3.5)	Construction phase	EIAO-TM NCO
3.36-3.38	2.23-2.24	Use of noise enclosure	To minimize construction noise impacts	Contractor	Part of the works area for pipe laying in Wai Ha (refer to Figure 3.5)	Construction phase	EIAO-TM NCO
<b>B Air Quality Impact</b>							
S4.16	3.5	Implementation of mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices including but not limited to the following:	To minimize construction dust impacts	Contractor	Construction Sites	Construction Phase	EIAO-TM

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<ul style="list-style-type: none"> <li>▪ Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather;</li> <li>▪ Use of frequent watering for particularly dusty static construction areas and areas close to ASRs;</li> <li>▪ Tarpaulin covering of all dusty vehicle loads transported to, from and between site location;</li> <li>▪ Establishment and use of vehicle wheel and body washing facilities at the exit points of the site;</li> <li>▪ Routing of vehicles and</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>positioning of construction plant should be at the maximum possible distance from ASRs.</p> <ul style="list-style-type: none"> <li>▪ Stockpiled excavated materials should be covered with tarpaulin, and should be removed off-site within 24 hours to avoid any odour nuisance arising.</li> </ul>					
<b>C</b>							
<b>Water Quality Impact</b>							
S5.29	4.5	<p>Construction Site Run-off and Drainage:</p> <ul style="list-style-type: none"> <li>▪ Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public</li> </ul>	To minimize water quality impacts	Contractor	Works sites	Construction phase	ProPECC PN 1/94 Construction Site Drainage

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		sewers/drains. <ul style="list-style-type: none"> <li>▪ Temporary ditches shall be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond. No site run-off shall enter the fishponds at Shuen Wan.</li> <li>▪ Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities shall be based on the guidelines provided in ProPECC PN 1/94. All drainage</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.</p> <ul style="list-style-type: none"> <li>▪ Water pumped out from excavated pits shall be discharged into silt removal facilities.</li> <li>▪ During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means.</li> </ul> <p>Other measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed.</p>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<ul style="list-style-type: none"> <li>▪ Exposed soil areas shall be minimized to reduce potential for increased siltation and contamination of runoff.</li> <li>▪ Earthwork final surfaces shall be well compacted and subsequent permanent work or surface protection shall be immediately performed to reduce the potential of soil erosion.</li> <li>▪ Open stockpiles of construction materials or construction wastes on-site shall be covered with tarpaulin or similar fabric during rainstorms.</li> </ul>					
S5.30	4.7	Further precautionary measures during rainy season:	To minimize water quality impacts to the designated Conservation Area	Contractor	Works areas near the Conservation Area	Rainy seasons during construction	EIAO-TM Water Pollution Control Ordinance

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<ul style="list-style-type: none"> <li>▪ For the construction of the box culvert next to the existing channel of the Wai Ha River, sand bags should be deployed around the boundary of the works trench to prevent muddy water ingress into the adjacent CA or Wai Ha River. Sand bags should also be used to surround the excavated trench. Generally, the sand bags will be placed up to a height of 300mm to provide adequate allowance for the built-up water level during rainstorm event. With sand bags in place, surface runoff will be intercepted and flow to Wai Ha River or collected by the existing drainage system as usual.</li> <li>▪ For the construction of the box</li> </ul>				phase	(WPCO)



EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>culvert in the extreme northeast corner of Shuen Wan Marsh</p> <p>Conservation Area sand bags should be deployed along the limit of the works area to prevent muddy water ingress into the CA.</p> <p>Sand bags should be placed to a height of at least 300mm from ground level and +2.5 mPD (whichever is greater) to provide adequate allowance for the built-up water level during rainstorm events.</p> <p>Unpolluted surface runoff within the works area should then be collected and directed into the existing drainage system.</p> <ul style="list-style-type: none"> <li>▪ Sheet-piles, which would be installed around the works trench near the Conservation Area, would</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>be extended above ground level for about 2m to serve as hoardings to isolate the works site.</p> <ul style="list-style-type: none"> <li>▪ Tarpulin sheets would be used to cover the excavation areas during heavy rainstorms. This would prevent the ingress of rainwater into the trench minimising the risk of muddy water getting into Wai Ha River and the adjacent Conservation Area.</li> <li>▪ Any concrete washing water would be contained inside the works site surrounded by the extended sheet piles. A pump sump at the bottom of the trench would be provided to pump any excess water during concrete washing.</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
S5.31-S 5.32	4.8-4.9	<p>General Construction Activities:</p> <ul style="list-style-type: none"> <li>▪ Stockpiling the excavated materials adjacent to the Conservation Area would not be allowed. The excavated materials would be either removed off site immediately after excavation, or stockpile at location(s) away from the Conservation Area. The stockpile locations shall be approved by the site engineer.</li> <li>▪ Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering the Wa Ha River and fish ponds at Shuen Wan. Stockpiles of cement and other construction materials should be kept covered</li> </ul>	To minimize water quality impacts	Contractor	Works sites	Construction phase	EIAO-TM WPCO

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
S5.33	4.10	<p>when not being used.</p> <ul style="list-style-type: none"> <li>▪ Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event. </li></ul>					
		<p>Sewage from Construction workforce:</p> <ul style="list-style-type: none"> <li>▪ Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A</li> </ul>	To minimize water quality impacts	Contractor	Works sites	Construction phase	EIAO-TM WPCO

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
S5.34	4.11	<p>licensed contractor would be responsible for appropriate disposal and maintenance of these facilities.</p> <p>River Channel Excavation Works:</p> <ul style="list-style-type: none"> <li>▪ The excavation works within the upstream end of the existing river channel of the Wai Ha River for the construction of the proposed box culvert shall be carried out in dry condition. Containment measures such as bunds and barriers shall be used within the affected length of the river channel and the excavation works restricted to within an enclosed dry section of the channel. The excavation works within Wai Ha River shall be restricted to the period from October</li> </ul>	To minimize water quality impacts	Contractor	Works sites	Construction phase	EIAO-TM WPCO

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		to April.					
<b>D Waste Management Implications</b>							
S6.20 – 6.22	5.5	Good site practices: <ul style="list-style-type: none"> <li>▪ Nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.</li> <li>▪ Training of site personnel in proper waste management and chemical waste handling procedures.</li> <li>▪ Provision of sufficient waste disposal points and regular</li> </ul>	To reduce waste management impacts	Contractor	Works sites	Construction phase	ETWB TCW No.19/2005 ETWB TCW No.31/2004

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>collection for disposal.</p> <ul style="list-style-type: none"> <li>▪ Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.</li> <li>▪ Separation of chemical waste for special handling and appropriate treatment at the Chemical Waste Treatment Facility.</li> <li>▪ Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.</li> <li>▪ A Waste Management Plan</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		should be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No. 15/2003 for details. <ul style="list-style-type: none"> <li>▪ A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.</li> </ul>					
S6.23-6.24	5.7	Waste reduction measures: <ul style="list-style-type: none"> <li>▪ Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.</li> <li>▪ To encourage collection of aluminium cans by individual collectors, separate labelled bins</li> </ul>	To achieve waste reduction	Contractor	Works sites	Construction phase	EIAO-TM



EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		<p>shall be provided to segregate this waste from other general refuse generated by the work force.</p> <ul style="list-style-type: none"> <li>▪ Any unused chemicals or those with remaining functional capacity shall be recycled.</li> <li>▪ Maximising the use of reusable steel formwork to reduce the amount of C&amp;D material.</li> <li>▪ Proper storage and site practices to minimise the potential for damage or contamination of construction materials.</li> <li>▪ Plan and stock construction materials carefully to minimise amount of waste generated and</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		avoid unnecessary generation of waste.					
S6.25-6.26	<p>Construction &amp; Demolition (C&amp;D) Material:</p> <ul style="list-style-type: none"> <li>▪ Excavated material with suitable characteristics/size should be reused on-site as fill material as far as practicable, such as for backfilling of the box culvert and drainage pipe works.</li> <li>▪ Suitable areas should be designated within the works site boundaries for temporary stockpiling of C&amp;D material.</li> <li>▪ Within stockpile areas, the following measures should be taken to control potential environmental</li> </ul>	<p>To minimize off-site disposal of C&amp;D material</p> <p>To minimize environmental impacts during the handling of C&amp;D material</p>	Contractor	Works sites	Construction phase	EIAO-TM	

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		impacts or nuisance: <ul style="list-style-type: none"> <li>- covering material during heavy rainfall;</li> <li>- locating stockpiles to minimize potential visual impacts; and</li> <li>- minimizing land intake of stockpile areas as far as possible.</li> </ul> <ul style="list-style-type: none"> <li>▪ When disposing C&amp;D material at a public filling area, the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be</li> </ul>					

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		unsuitable by the Filling Supervisor.					
S6.27		Chemical waste: <ul style="list-style-type: none"> <li>▪ Contractor should register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.</li> <li>▪ Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately.</li> <li>▪ Appropriate labels should be securely attached on each chemical waste container indicating the</li> </ul>	To minimize environmental impacts during the handling, transportation and disposal of chemical waste	Contractor	Works sites	Construction phase	EIAO-TM Waste Disposal (Chemical Waste) (General) Regulation

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. <ul style="list-style-type: none"> <li>▪ The Contractor should use a licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.</li> </ul>					
S6.28		General refuse: <ul style="list-style-type: none"> <li>▪ It should be stored in enclosed bins or compaction units separate from C&amp;D material.</li> <li>▪ A reputable waste collector</li> </ul>	To minimize environmental impacts during the handling and transportation of general refuse	Contractor	Works sites	Construction phase	EIAO-TM

EIA Ref.	EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & Main Concern to Address	Who to implement the measure?	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?
		should be employed by the contractor to remove general refuse from the site, separately from C&D material. <ul style="list-style-type: none"> <li>▪ An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.</li> </ul>					

B) Implementation status of environmental protection and mitigation

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & main concern to Address	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?	Implementation status
2.18	Use well maintained construction plant	To minimize construction noise impact	Works areas	Construction phase	EIAO-TM NCO	Implemented
	Shut down plants between work periods					Implemented
	Install silencers on construction equipment					Implemented
	Locate mobile plant far away from NSRs					Implemented
	Quiet plants should be used					Implemented
	Use of quieter PME					Not applicable
2.19	Use of quieter PME					Implemented
2.20 - 2.21	Use of temporary noise barrier		Pipe laying in Wai Ha			Outstanding
2.22	Use of alternative quieter construction method		Part of the Works Pipe laying in Wai Ha			Not applicable
2.23 – 2.24	Use of noise enclosure		Pipe laying in Wai Ha			Not applicable

<b>EM&amp;A Ref.</b>	<b>Recommended Mitigation Measures</b>	<b>Objectives of the Recommended Measure &amp; main concern to Address</b>	<b>Location of the measure</b>	<b>When to implement the measure?</b>	<b>What requirements or standards for the measure to achieve?</b>	<b>Implementation status</b>
3.5	Implement regular watering and vehicle washing facilities  Cover excavated or stockpile of dusty material by impervious sheeting or sprayed with water  Use tarpaulin to cover dusty materials on vehicles	To minimize construction dust impact	Construction Site	Construction phase	EIAO-TM	Partially Implemented
4.5	Provide silt trap and oil interceptor to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before pumped to the public storm water drainage system	To minimize water quality impact	Construction Site	Construction phase	EIAO-TM WPCO	Implemented
4.5	During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means. Others measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed		Construction Site	Construction phase		Not applicable



<b>EM&amp;A Ref.</b>	<b>Recommended Mitigation Measures</b>	<b>Objectives of the Recommended Measure &amp; main concern to Address</b>	<b>Location of the measure</b>	<b>When to implement the measure?</b>	<b>What requirements or standards for the measure to achieve?</b>	<b>Implementation status</b>
4.10	Provide site toilet facilities	To minimize water quality impact	Construction Site	Construction phase	EIAO-TM WPCO	Implemented
4.7	<p>Further precautionary measures during rainy season:</p> <p>For the construction of the box culvert next to the existing channel of the Wai Ha River, sand bags should be deployed around the boundary of the works trench to prevent muddy water ingress into the adjacent CA or Wai Ha River. Sand bags should also be used to surround the excavated trench. Generally, the sand bags will be placed up to a height of 300mm to provide adequate allowance for the built-up water level during rainstorm event. With sand bags in place, surface runoff will be intercepted and flow to Wai Ha River or collected by the existing drainage system as usual.</p> <p>For the construction of the box culvert in the extreme northeast corner of Shuen Wan Marsh Conservation Area sand bags should be deployed along the limit of the works area to prevent muddy water ingress into the CA. Sand bags should be placed to a height of at least 300mm from round level and +2.5 mPD (whichever is greater) to provide adequate allowance</p>	<p>To minimize water quality impact to the designated Conservation Area</p>	<p>Works areas near the Conservation Area</p>	<p>Rainy seasons during construction</p>	<p>EIAO-TM WPCO</p>	<p>Not applicable</p>

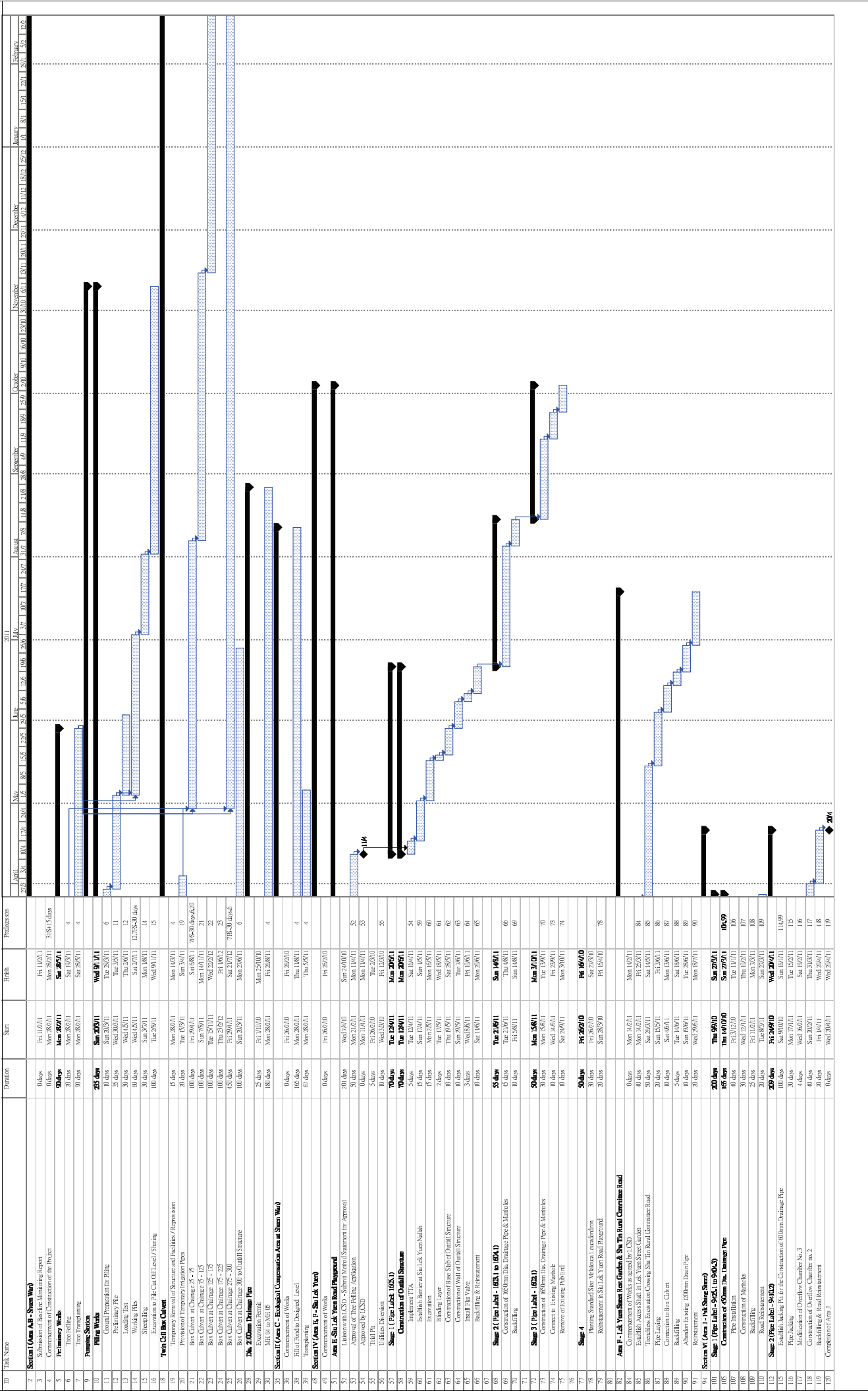
EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & main concern to Address	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?	Implementation status
	<p>for the built-up water level during rainstorm events. Unpolluted surface runoff within the works area should then be collected and directed into the existing drainage system.</p> <p>Sheet-piles, which would be installed around the works trench near the Conservation Area, would be extended above ground level for about 2m to serve as hoardings to isolate the works site.</p> <p>Tarpulin sheets would be used to cover the excavation areas during heavy rainstorms. This would prevent the ingress of rainwater into the trench minimising the risk of muddy water getting into Wai Ha River and the adjacent Conservation Area.</p> <p>Any concrete washing water would be contained inside the works site surrounded by the extended sheet piles. A pump sump at the bottom of the trench would be provided to pump any excess water during concrete</p>					
5.9	Reuse excavated material as much as possible	To achieve waste reduction	Works areas	Construction phase	EIAO-TM	Implemented
5.7	<p>Any unused chemicals or those with remaining functional capacity shall be recycled.</p> <p>Recycle scrap metals or abandoned equipment</p>					Not applicable
						Implemented

EM&A Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measure & main concern to Address	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?	Implementation status
5.5	A recording system for the amount of wastes generated, recycled and disposed should be proposed	To reduce waste management impacts	Works areas	Construction phase	ETWB TCW	Implemented
5.9	Adopt a trip ticket system for the disposal of C&D materials				No. 19/2005	Implemented
5.11	All general refuse should be segregated and stored in enclosed bins or compaction units				ETWB TCW	Implemented
					NO. 31/2004	Implemented

## **Appendix I: Construction programme**



## **Appendix J: Three month rolling programme**



## **Appendix K: Environmental Requirements in contract documents**



## **Wastewater Pollution Abatement**

1. The Contractor shall minimize the generation of wastewater from the Site through the following means:
  - (a) Prevent surface run-off from washing across the Site and spilling over to areas outside of the Site;
  - (b) Minimize the exposure of soil on the Site after excavation and backfilling where applicable and prevent the washout of soil or similar materials from the Site;
  - (c) Minimize water consumption; and
  - (d) Treat all surface run-off and wastewater collected for reuse or before discharge.
  
2. The Contractor shall also provide on Site an effective drainage system for proper control of surface run-off, and cover all exposed surfaces of soil slopes to prevent soil erosion.

## **Noise Pollution Abatement**

1. The Contractor shall adopt the following noise abatement practices:
  - (a) Use non-percussive pile driving methods such as hydraulic hammer, vibration or jacking method for installing or extracting sheet piles;
  - (b) Use non-percussive equipment such as hydraulic crusher, sawing, coring machines etc. for demolition and concrete breaking work;
  - (c) Close all hoods, cover panels and inspection hatches of powered mechanical plant such as generators, air compressors etc. during operation;
  - (d) Provide noise damping materials inside and outside refuse chutes during building construction; and
  - (e) Fit mufflers or silencers, and damping layer with steel collars to hand held pneumatic breakers.
  
2. Where percussive breakers are used, the Contractor shall enclose/wrap the breaker tip with sound insulating material to reduce the noise. This requirement is not applicable to works under emergency, or with prior agreement from the Engineer that the provision of such is not necessary or not practicable under a given site condition.
  
3. Where the noise level measured at the noise sensitive receivers (NSR) exceeds 75 dB(A) (Leq 30 min) for domestic premises, and 70 dB(A) (Leq 30 min) for schools or 65 dB(A) during school examinations, the Contractor shall provide an acoustic screen or enclosure to shield the public or NSR from the noisy activity at source or adopt the quality powered mechanical equipment pursuant to sub-clause (4) below, except for works under emergency or with the prior agreement of the Engineer that the provision of such is not necessary. The acoustic screen or enclosure shall be made of incombustible sound insulating material with performance such that the noise level

measured at the NSR do not exceed the limits as mentioned in this sub-clause. The detailed information including size and the form of the screen or enclosure shall be proposed by the Contractor and submitted to the Engineer for approval before work commences. The acoustic screen or enclosure shall be securely fixed at the base to avoid overturning. Notwithstanding any approval given, the Contractor shall be fully liable for his design in all respects.

4. The Environmental Protection Department (EPD) has published a category of Quality Powered Mechanical Equipment (QPME) in the website:

<http://www.epd.gov.hk/cgi-bin/npg/qpme/list.pl?lang-eng>

5. The categories of QPME include, but are not limited to:

- (a) Asphalt paver
- (b) Bulldozer, wheel
- (c) Bulldozer, tracked
- (d) Compactor, vibratory
- (e) Crane, mobile
- (f) Excavator, wheel/tracked
- (g) Generator
- (h) Loader, wheel
- (i) Loader, tracked
- (j) Powered rammer
- (k) Road roller
- (l) Roller, vibratory

A list of plant models under the QPME is also given by the EPD at the website:

[http://www.epd.gov.hk/cgi-bin/npg/qpme/search\\_gen.pl?lang=eng&st=sim&smttype=1](http://www.epd.gov.hk/cgi-bin/npg/qpme/search_gen.pl?lang=eng&st=sim&smttype=1).

6. Where a QPME is used, the plant should be registered with EPD, and the label issued by EPD from such registration shall be affixed on the plant at all times and kept legible. The Contractor shall also establish a register to record all QPME used on the Site.

7. The Engineer or his Representative shall have the power to inspect the QPME if he has doubt on its compliance with the QPME requirements. The Constructional Plant shall deem to be non-QPME for the purpose of this sub-clause if it does not have the registration label issued by EPD so affixed.

8. For Works carried out outside Normal Working Hours or where application of Construction Noise Permit (CNP) is necessary, the Contractor shall employ the silent possible types of equipment and implement all possible noise abatement measure so that working is

possible and complaint can be reduced or avoided. The Contractor shall not be entitled to any claim for time or payment in any form if application of CNP is rejected by EPD when the Contractor fail to comply with this clause or other relevant provisions in the Contract. If rejection of CNP is due to other reasons, the Contractor shall only be entitled to extension of time but not any claim for payment in any form. The Contractor shall allow for all the change in productivity or associated costs in complying with this clause and other relevant provisions in the Contract at the Contractor's own expense.

### **Air Pollution Abatement**

1. The Contractor shall ensure that dusty materials, including excavated materials, building debris and construction materials which are dusty by their nature, are properly covered by tarpaulin or other approved means. When dusty construction activities such as demolition work, drilling work, excavation in rock or artificial hard materials etc. are carried out in close proximity to the public, the Contractor shall provide dust abatement measures to the satisfaction of the Engineer. Such measures shall include where appropriate screens or enclosures, water spraying system or the fitting of vacuum cleaning devices to pneumatic or power driven drilling, cutting and polishing machines, etc.
2. Where the public will be affected by exhaust fumes or smoke emission from any Constructional Plant or construction activities (e.g. welding) in the Site, such Constructional Plant or construction activities shall be shielded by a screen. Such screen shall be at least 1.8m in height, incombustible and shall be approved by the Engineer.
3. The Contractor shall provide wheel washing system at all exit points of the Site, comprising high-pressure water jets, heavy duty metal grating cable for supporting the heaviest vehicles and a trough for collecting wastewater etc., in accordance with specification given in PS Appendix 25A Part A.
4. All dump trucks entering or leaving the Site shall be provided with mechanical covers in good service condition in accordance with the specification given in PS Appendix 25A Part B.
5. For Construction Plant driven by internal combustion engines, the Contractor shall ensure that the smoke emission from the plant shall not exceed Shade 1 on the Ringelmann Chart continuously for 30 seconds at any time.
6. Ultra-low-sulphur diesel (ULSD) (defined as diesel fuel containing not more

than 0.005% by weight of sulphur) shall be used in all diesel-operated Constructional Plant on the Site pursuant to SCC Clause 44. The Contractor shall demonstrate his compliance by maintaining a summary record of ULSD. A proforma of the summary record is attached at PS Appendix 25B.

7. Where there is practical difficulty in implementing any air pollution abatement measures specified above or in the Contract, the Contractor shall submit alternative proposals for the approval of the Engineer before work commences. The Engineer shall have the power to order the removal of any person who, or Constructional Plant or equipment which, fails to comply with the requirements under this PS clause off Site.

### **Waste Management**

1. All construction and demolition (C&D) materials arising from or in connection with the Whole of the Works shall be sorted on the site to recover reusable and/or recyclable materials. For the avoidance of doubt, C&D materials means both inert and non-inert materials generated from construction and demolition activities. The inert portion of the C&D materials including soil, building debris, broken rock, concrete, etc., and the non-inert portion of the C&D materials comprises timber, paper, plastics, general refuse, etc.

2. Unless otherwise stated, all surplus C&D materials arising from or in connection with the Whole of the Works shall become the property of the Contractor when it is removed from the Site. The Contractor shall promptly remove all sorted and processed surplus materials arising from or in connection with the Whole of the Works from the Site to minimise temporary stockpiling on the site.

#### **3. On-site Sorting of C&D Materials**

(a) The Contractor shall devise a system for on-site sorting of C&D materials. The system shall include the identification of the source of generation, estimated quantity, arrangement for on-site sorting and/or collection, temporary storage areas, frequency of collection by recycling contractors or frequency of removal off the Site, etc.

(b) The Contractor shall sort the materials at source into:

- (i) Hard rock and large broken concrete suitable for reuse on the Site or recycling at a designated location (see sub-clause (c) below);
- (ii) Metals;
- (iii) Paper and plastics;
- (iv) Chemical waste; and
- (v) Materials suitable for disposal at public fill reception facilities, sorting facilities

and landfills/outlying islands transfer facilities. Disposal at the sorting facilities should first be approved by the Engineer.

(c) The Contractor shall pay particular attention to hard rock and large broken concrete generated from demolition or road improvement works and deliver the materials to the location as notified by the Engineer.

(d) Equipment and material packaging (i.e. paper and cardboard shall be recovered, properly stockpiled in dry and covered condition to prevent cross contamination by other C&D materials. The Contractor shall pay particular attention to avoid cross contamination in the course of collecting paper for recycling.

(e) The Contractor shall ensure the materials disposed of at public fill reception facilities, sorting facilities, and landfills/outlying islands transfer facilities, comply with their respective requirements under Schedule 6 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap. 354) and be fully liable for all non-compliance.

(f) The Contractor shall identify and provide sufficient space for temporary storage of C&D materials to facilitate collection and/or sorting on the Site. The space provided shall commensurate with the estimated quantity for each type of C&D materials generated on the Sites.

(g) Except for those inert C&D materials to be reused on the Sites, the Contractor shall remove all other C&D materials off the Sites as soon as practicable in order to optimize the use of the on-site storage space.

(h) The Contractor shall make arrangements with potential recycling contractors to facilitate that recyclable materials sorted from the Sites are collected with reasonable care.

(i) The Contractor shall establish a system for proper handling and storage of chemical waste generated from the Sites, and arrange collection and disposal of such chemical waste by specialist contractors.

(j) The Contractor shall carry out thorough sorting of C&D materials generated from demolition works for recovering of broken concrete, reinforcement bars, mechanical and electrical fittings, hardware as well as other fittings/materials that have established recycling outlets.

#### (4) Waste Flow Table (WFT)

(a) The Contractor shall establish a mechanism to record the quantities of C&D materials generated each month, using the monthly summary “Waste Flow Table”

(WFT) as given in PS Appendix 25C. The Contractor shall complete monthly summary WFT, and submit it to the Engineer's representative together with the updated sections of EMP (if any) by not later than the 15th day of each month following the month reported on, or if it is a General Holiday, the day following the General Holiday.

(5) Control the Use of Timbers

(a) The Contractor shall avoid, reduce or minimise the use of timber in Temporary Works construction as far as possible. Where the Contractor has to use timber for a Temporary

Works construction process/activity with an estimated quantity exceeding 5m<sup>3</sup>, he should submit a method statement to the Engineer for agreement prior to commencement of the relevant Temporary Works.

(b) The method statement should include the justification for and the measures taken to minimize the use of timber in the said Temporary Works. In addition, the Contractor shall provide a summary table containing the description, justification and the estimated quantity for every work process/activity requiring the use of timbers for Temporary Works construction irrespective of the quantity of timber used.

(c) The Contractor shall update the summary table on the use of timber for Temporary Works construction, and submit it to the Engineer's Representative together with the monthly summary WFT for monitoring and review by not later than the 15th day of each month, or if it is a General Holiday, the day following the General Holiday. The Contractor shall draw the attention of the Engineer's Representative to those work process/activities for which the estimated quantity has been revised.

(6) Recording

(a) The Contractor shall record the quantities of all the recyclable materials before removal off the Sites by the recycling contractors, and include the details in the WFT for submission to the Engineer's Representative pursuant to the sub-clause

4(a) above.

(b) The Contractor shall establish a comprehensive register of the Disposal Delivery Form for recording the disposal of C&D materials. The register shall also cover the recyclable materials removed by the recycling contractors off the Sites.