

**Drainage Service Department**

**Monthly Environmental Monitoring & Auditing report for**

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

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

**May 2012**

**Environmental Pioneers & Solutions Limited**

Flat A, 19/F, Chaiwan Industrial Building,  
20 Lee Chung Street, Chai Wan, Hong Kong

Tel: 2556 9172

Fax: 2856 2010

## APPROVAL SHEET

The Contents of this report have been

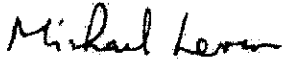
Certified by:

Signature: 

Date: 12 Jun 2012

Miss. Goldie Fung  
(Environmental Team Leader)

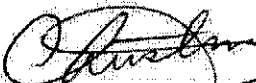
Ecologist (Asia Ecological Consultants Ltd.)

Signature: 

Date: 11 June 2012

Dr. Michael Leven  
(Ecologist)

RLA (Environmental Resources Management)


Signature: 

Date: 06/11/2012

Miss. Christina Ip  
(RLA)

and Verified by:

IEC (ENVIRON Hong Kong Limited)

Signature: 

Date: 12 Jun 2012

Mr. Tony Cheng  
(IEC)

## **TABLE OF CONTENT**

<b>EXECUTIVE SUMMARY</b> .....	v
<b>1 Introduction</b> .....	1
<b>2 Construction Stage</b> .....	2
<b>2.1 Construction activities in the reporting period</b> .....	2
<b>2.2 Construction activities for the coming month</b> .....	2
<b>2.3 Environmental Status</b> .....	3
<b>3 Noise Monitoring</b> .....	4
<b>3.1 Monitoring Parameters and Methodology</b> .....	4
<b>3.2 Monitoring Equipment</b> .....	4
<b>3.3 Monitoring Locations</b> .....	5
<b>3.4 Monitoring Results and Interpretation</b> .....	8
<b>3.5 Action and Limit level for Construction noise</b> .....	8
<b>3.6 Monitoring Schedule for the next reporting period</b> .....	9
<b>4 Water Monitoring</b> .....	11
<b>4.1 Water Quality Monitoring Parameters and methodology</b> .....	11
<b>4.2 Monitoring Equipment</b> .....	11
<b>4.3 Monitoring Locations</b> .....	12
<b>4.4 Monitoring Frequency</b> .....	14
<b>4.5 Monitoring Results and Interpretation</b> .....	14
<b>4.6 Action and limit level for Water Quality</b> .....	20
<b>4.7 Monitoring Schedule for the next reporting period</b> .....	25
<b>5 Hydrological Characteristics Monitoring</b> .....	26
<b>5.1 Hydrological Characteristics Monitoring Parameters and methodology</b> .....	26
<b>5.2 Monitoring Equipment</b> .....	26
<b>5.3 Monitoring Locations</b> .....	26
<b>5.4 Monitoring Frequency</b> .....	28
<b>5.5 Monitoring Results and Interpretation</b> .....	28
<b>5.6 Action and limit level for Hydrological Characteristics</b> .....	28
<b>5.7 Monitoring Schedule for the next reporting period</b> .....	33
<b>6 Ecological Monitoring of ECA</b> .....	34
<b>6.1 Introduction</b> .....	34
<b>6.2 Ecological Monitoring of ECA</b> .....	34
<b>6.3 Monitoring Results</b> .....	40
<b>6.4 Management Activities</b> .....	41
<b>6.5 Implication of the Survey Findings</b> .....	42

6.6	Recommendations .....	42
7	Landscape and Visual .....	43
7.1	Introduction .....	43
7.2	Scope of Monitoring .....	43
7.3	Landscape and Visual Monitoring Results.....	45
7.4	Audit Schedule .....	55
8	Action taken in Event of Exceedance .....	56
9	Construction waste disposal .....	57
10	Status of Permits and Licenses obtained .....	59
11	Compliant Log .....	60
12	Site Environmental Audits .....	61
12.1	Site Inspection .....	61
12.2	Compliance with legal and Contractual requirement .....	63
12.3	Implementation status and effectiveness of the mitigation measures 63	
13	Future Key issues and recommendations .....	63
14	Conclusions .....	64

## **LIST OF APPENDIXES**

Appendix A: Site Location

Appendix B: Key Personal Contact information chart

Appendix C: Calibration Certificates for measuring instruments

Appendix D: Construction Noise Monitoring Data

Appendix E: Water Quality Monitoring Data

Appendix F: Hydrological Characteristics Monitoring Data

Appendix G: Landscape and Visual Monitoring Photos

Appendix H: Implementation status of environmental protection and mitigation measures

Appendix I: Construction programme

Appendix J: Three month rolling programme

Appendix K: Graphical plots of trends of monitored parameters

Appendix L: List of recorded vegetation and relative abundance and list of transplanted trees in the Ecological Compensatory Area (ECA) during construction phase in March 2012

Appendix M: Ecological monitoring report

Appendix N: Photo of fish pond at Area C and Wai Ha River at May 2012

## **EXECUTIVE SUMMARY**

This is the fifteenth 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 1<sup>st</sup> of May 2012 to 31<sup>st</sup> May 2012. The major site activities in this reporting period were mainly construction of the proposed transformer room and switch room, construction of the proposed flow meter chamber RM2 and 4.8m Dn1200 concrete pipe laying, construction the proposed transformer room and switch room to +12.35mPD, laying of E&M ducting for the proposed stormwater pumping station and installation of stop-log for the proposed intake structure near the mouth of Wai Ha River.

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 period.

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

Furthermore, impact monitoring for water quality was conducted. Total 13 abnormal incidents of water quality criteria were recorded in this reporting month. It was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. During the reporting period, no construction works were carried out at the river bed. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and no particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total Suspended Solid were believed to be mainly attributed by high water flow rate and for the high level of turbidity and SS, it were also believed to be attributed by adverse weather. The exceedance of DO were

believed to be mainly attributed by natural fluctuation and, since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

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

The ecological monitoring of the Ecological Compensatory Area (ECA) of the project is conducted. Details of the findings are referred to sections 6.2.

Visual and landscape monitoring has been conducted for the project. Details of the observations are referred to sections 7.3.

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

Site works proposed to be carried out in the upcoming month at Area A, B & C are refer to section 2.2.

It is expected that noise, air and water quality impacts will be resulted from the works. 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 12.3.

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 fifteenth 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 period from 1<sup>st</sup> May 2012 to 31<sup>st</sup> May 2012. 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 Construction Stage**

### **2.1 Construction activities in the reporting period**

Major activities in the reporting period included the followings:

Area A – Construction of the proposed Transformer room and switch room.

Area A – Concreting the proposed transformer room and switch room to +12.35mPD.

Area A – Construction of the proposed flow meter chamber RM2 and 4.8m Dn1200 concrete pipe laying.

Area A – Laying of E&M ducting for the proposed Stormwater Pumping Station.

Area A – Construction of pile cap for the proposed Stormwater Pumping Station.

Area A – Backfilling of the proposed DN2100 Storm relief drain (CH120 to CH160) at Ting Kok Road.

Area A – Removal of sheetpiles of the proposed DN2100 Storm relief drain (CH120 to CH160) at Ting Kok Road.

Area A – Road opening and excavation for the proposed Dn2100 Storm relief drain (CH80 to CH140) at Ting Kok Road.

Area A – Installation of stop-log for the proposed intake structure near the mouth of Wai Ha River.

Area B – Excavation for construction of box culvert (CH55 to CH85)

Area B – Installation of first and second layer of waling (CH55 to CH85)

Area B – Concreting for base slab for the proposed box culvert (CH55 to Ch85)

Area B – Installation of sheetpiles for the proposed jacking pit.

Area B – Excavation and installation of first layer of waling for the proposed jacking pit.

Area C – Hydroseeding.

Area C – In Maintenance period.

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

Proposed key construction works in the coming month will include:



#### Area A (Pumping Station)

1. Internal finishing for the proposed transformer room and switch room.
2. Construction of screen house and store room.
3. Construction of pile cap for the proposed Stormwater Pumping Station at +3.65mPD.
4. Construction of flowmeter chamber.
5. Construction of DN2100 Storm relief drains (CH80 to CH120) at Ting Kok Road.
6. Construction of receiving pit for cross road DN2800 twin pipe.

#### Area B (Tung Tsz Nursery)

1. Construction of box culvert CH126.5 to CH214.5.
2. Construction of jacking pit for cross road DN2800 twin pipe

#### Area C (HCA)

1. In Maintenance Period

### **2.3 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 3.3, 4.3, and 5.3 for noise, water quality, and hydrological characteristics respectively.

### **3 Noise Monitoring**

#### **3.1 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 3.5.2, 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.

#### **3.2 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 3.2.1 summarizes the equipment list for noise monitoring

Table 3.2.1 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	1
Windscreen	Microtech gefell model W2	N/A	1
Acoustical calibrator	SvanteK SV30A	IEC 942 Type 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			

### 3.3 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 3.3.1. Figure 3.3.1 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 3.3.1 Noise Monitoring Locations during Construction Phase

Noise Monitoring Station	Location
M1	14, Shuen Wan Chim Uk
AL1	Joint Village Office for Villages in Shuen Wan, Tai Po

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.

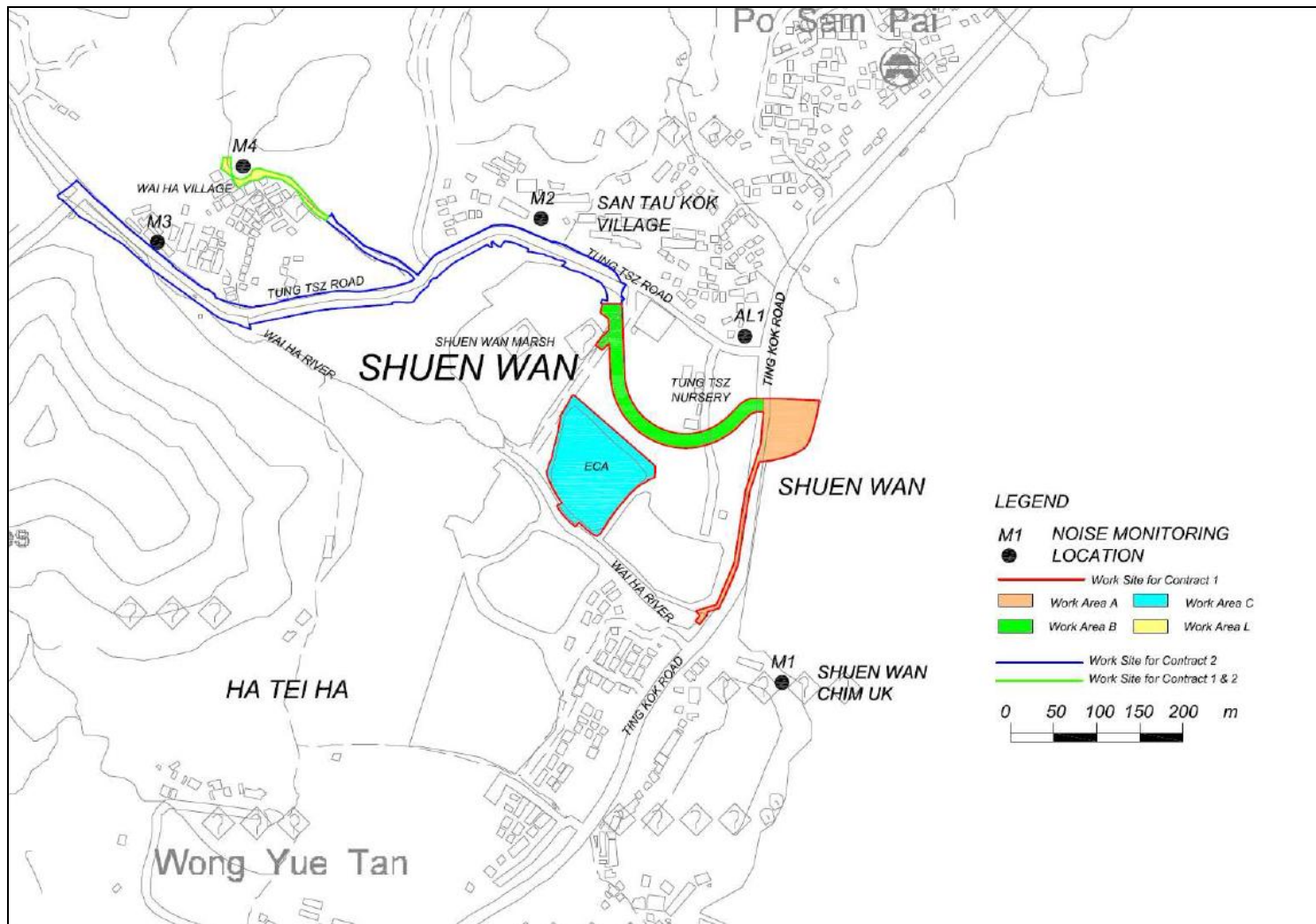


Figure 3.3.1 Impact noise monitoring locations

### 3.4 Monitoring Results and Interpretation

Relevant details of the noise monitoring results are presented in Table 3.4.1. The results of M1, ranged between 59.8dB (A) and 70.0dB (A), and AL1, ranged between 64.8dB (A) and 66.9dB (A), were within the limit levels and therefore, no exceedance was found.

Table 3.4.1 Noise Monitoring Results for the reporting period							
Location	Parameter	Date*	Time	L <sub>Aeq</sub> dB(A)	Limit dB(A)	Exceedance	Weather
M1	L <sub>eq</sub> 30mins	2-May-12	13:20	61.0	75	N	Cloudy
M1	L <sub>eq</sub> 30mins	9-May-12	11:45	59.8	75	N	Sunny
M1	L <sub>eq</sub> 30mins	16-May-12	12:25	63.0	75	N	Cloudy
M1	L <sub>eq</sub> 30mins	23-May-12	13:20	70.0	75	N	Sunny
M1	L <sub>eq</sub> 30mins	30-May-12	13:20	63.5	75	N	Sunny
AL1	L <sub>eq</sub> 30mins	2-May-12	13:58	66.9	75	N	Cloudy
AL1	L <sub>eq</sub> 30mins	9-May-12	12:23	64.8	75	N	Sunny
AL1	L <sub>eq</sub> 30mins	16-Mar-12	13:04	66.5	75	N	Cloudy
AL1	L <sub>eq</sub> 30mins	23-May-12	12:46	64.9	75	N	Sunny
AL1	L <sub>eq</sub> 30mins	30-May-12	12:46	65.7	75	N	Sunny

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

### 3.5 Action and Limit level for Construction noise

The Action and Limit (A/L) levels for construction noise are defined in Table 3.5.1. Should non-compliance of the criteria occur, action in accordance with the Action Plan in Table 3.5.2 should be carried out.

There was no exceedance recorded in the reporting period.

Table 3.5.1 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.		

### 3.6 Monitoring Schedule for the next reporting period

Noise monitoring schedule is proposed to be carried out on 6<sup>th</sup>, 13<sup>th</sup>, 20<sup>th</sup> and 27<sup>th</sup> of June 2012.

Table 3.5.2 Event / Action Plan for Construction Noise

EVENT				
	ET Leader	IEC	ER	CONTRACTOR
Action Level	1. Notify IEC and Contractor. 2. Carry out investigation. 3. Report the results of investigation to the IEC, ER and Contractor. 4. Discuss with the Contractor and formulate remedial measures. 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analysed results submitted by the ET. 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify Contractor. 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Check remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC. 2. Implement noise mitigation proposals.

<p>Limit Level</p>	<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</li> <li>2. Notify Contractor.</li> <li>3. Require Contractor</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>
--------------------	--	--	--	---



## **4 Water Monitoring**

### **4.1 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.

### **4.2 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 were 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.

### 4.3 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 4.3.1.

**Table 4.3.1 – 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 4.3.1, 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.

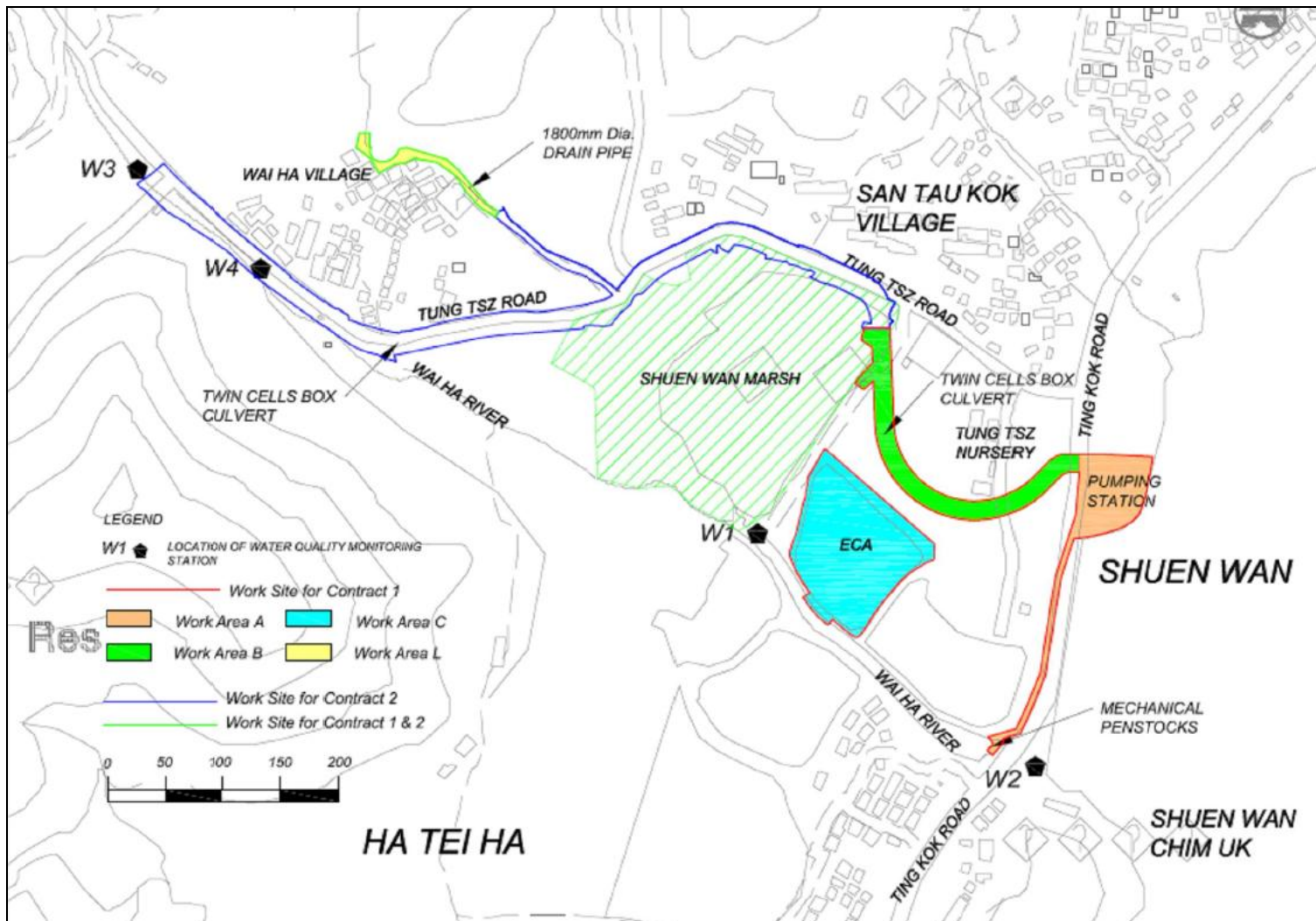


Figure 4.3.1 Water Quality Monitoring Locations

#### **4.4 Monitoring Frequency**

Impact water quality monitoring for each monitoring station were performed at mid-flood or mid-ebb tides for 3 days per week during the course of the construction river works.

Monitoring were carried out on 2<sup>nd</sup>, 5<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>, 21<sup>st</sup>, 23<sup>rd</sup>, 25<sup>th</sup>, 28<sup>th</sup> and 30<sup>th</sup> of May 2012.

#### **4.5 Monitoring Results and Interpretation**

Water quality monitoring was carried out ten times in this reporting month. Detailed on-site measurements are shown in Appendix E. Table 4.5.1 presents consolidated results throughout the reporting month.

There were 13 abnormal incidents of water quality limits (Dissolved Oxygen, Suspended Solid and Turbidity) were recorded in this reporting month according to the established action and limit levels. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. No construction activities were carried out at the river bed during the reporting period. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and no particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total Suspended Solid were believed to be mainly attributed by high water flow rate and adverse weather. The exceedance of DO were believed to be mainly attributed by natural fluctuation, since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

The water condition of Wai Ha River is presented in photo attached in Appendix N.

Details information of these incidents was presented in Section

Table 4.5.1 Summary of Water Quality Monitoring Results of this reporting month

	<b>Average of Monitoring Results</b>					
	<i>Temperature</i> (°C)	<i>Turbidity</i> (NTU)	<i>pH</i>	<i>Dissolved</i> <i>Oxygen</i> (mg/L)	<i>Dissolved</i> <i>Oxygen</i> (%)	<i>Suspended</i> <i>Solids</i> (mg/L)
W1	26.64	10.2	7.7	6.63	76	7.3
W2	27.29	13.5	7.68	6.98	76	13.2

Table 4.5.2 Interpretations of abnormal incidents recorded in the reporting month

<b>Date</b>	<b>Tide</b>	<b>Parameter</b>	<b>Interpretations</b>
2/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		DO	
4/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		DO	
7/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
9/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		DO	
		Suspended Solids	
11/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
14/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		DO	
16/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
18/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		SS	
21/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
		SS	
23/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
25/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.
28/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since

			river redirected and narrowed was observed.
30/5/2012	Ebb	Turbidity	Incident was regarded as high river flow rate since river redirected and narrowed was observed.

Table 4.5.3 Construction work conducted during abnormal incidents period

Date	Area	Construction works conducted
2/5/2012	A	Fixing tie bolts and strutting to wall formwork, shuttering for soffit of roof slab for transformer room and switch room Formwork shuttering for benching of re-circulation manhole RM2 Laying Ø 1200 concrete cut length pipe between re-circulation manhole RM2 and flow meter chamber
	B	Bay 5 – Fabricating lower layer of 1-beam waling and struts for sheetpile of box culvert trench Breaking up concrete footpath at Ch. 130-22
	C	In maintenance period
4/5/2012	A	Fixing tie bolts and waling for wall formworks, cutting and bending reinforcement bars for roof beams of screen house , transformer switch room Formwork shuttering and concreting for benching of recirculation manhole RM2 Backfilling & compacting of fill material for Ø 2100 pipe trench at Ch. 144-150 Laying geotextile membrane against trench shoring and backfilling granular material to surround the Ø 1200 concrete pipe at CH. 130-136
	B	Erecting steel framework and fixing corrugated sheets for site hoarding at Ch. 280 Excavating to expose underground irrigation pipe network at Ch. 130-Ch. 180 Bay 6 – Excavating for box culvert Bay 5 – Fabricating lower layer of 1 beam waling and struts for trench shoring
	C	In maintenance period
7/5/2012	A	Excavating to expose underground utilities at launching pit area Fixing tie bolts and wailings for wall formwork of screen house, transformer room and switch room Stripping off formwork form benching of recirculation chamber RM2 Laying Ø 2100concrete pipes (1 no.1.5m & 1 no. 2.5m) between RM2

		and flowmeter chamber
	B	Excavating to expose underground irrigation pipe network Bay 5 & 6 – Excavating for box culvert to formation level
	C	In maintenance period
9/5/2012	A	Excavating to expose underground utilities at launching pit area Laying D3 mesh for fire resistance purpose at roof beams (RB4 & RB5) of transformer room & switch room Backfilling & compacting of fill material for Ø 2100 pipe trench at Ch. 125 – 130 Delivery of fill material on site from Area B (14 Truckloads) Fabricating sheetpile stop end shoring and waling for Ø 2100 pipe
	B	Excavating to expose underground irrigation pipe network Transplanting existing trees (A22, A36, A38, A41, A43, U74, U77, U78, U79) Bay 6 – Excavating for box culvert to formation level Bay 5- Laying geotextile membrane for rockfills at formation
	C	In maintenance period
11/5/2012	A	Rebar fixing for roof beams of screen house, switchroom & transformer room Dismantling tie bolts and walings from wall formwork at transformer room and switch room Formwork shuttering for walls of recirculation manhole RM2 Laying G. I concealed conduits at wall formwork (under the RB17) for screen house
	B	Modification of site hoarding to make room for jacking pit shoring at Ch. 280 next to cycle track Excavating to expose underground irrigation pipe work Bay 5 – Excavating to formation level Bay 6 – Placing blinding concrete for box culvert
	C	In maintenance period
14/5/2012	A	Rebar fixing for roof slab of screen house switch room & transformer room ( 5 bar Fixer A. M) Concreting for walls for recirculation manhole RM2 (Total 7.5 cu M) Backfilling & compacting of fill material for Ø 2100 pipe trench at Ch. 125 – 160 Dismantling top layer of 1 – beam struts and walings from Ø 2100 pipe trench shoring at Ch. 140 – 154

		Breaking up existing footpath to expose HGC's cable ducts
	B	Bay 5 – Concreting blinding layer for box culvert Bay 6 – Rebar fixing of base slab for box culvert (5 Bar Fixer P. M only)
	C	In maintenance period
16/5/2012	A	Formwork shuttering for parapet wall on roof of switch room & transformer room Laying G. I concealed conduits at soffit of roof slab of screen house, switchroom & transformer room Ø 25 copper pipe at parapet wall for irrigation pipe Formwork shuttering & concreting for concrete surround to Ø 1200 concrete pipe between recirculation manhole RM2 pump station
	B	Excavating trench along shoring line to remove boulder at CH. 220 – 280 Bay 6 – Formwork shuttering for kickers on base slab
	C	Hydroseeding at slop area
18/5/2012	A	Concreting of parapet wall 7 roof slab for switchroom & transformer room (Total: 83.3 cu M) Extracting sheetpile from shoring of Ø 2100 pipe at Ch. 152 – 160. Footpath side Breaking up bituminous carriageway at Ch. 110 - 120
	B	Excavating trench along shoring line to remove boulders Dewatering from box culvert trench and miscellaneous works
	C	In maintenance period
21/5/2012	A	Stripping off formwork from walls at switch room & transformer room Excavating for brems and slab of store room Making good concrete surface of columns (CC2, CC2A, CC2B & CC3) Breaking up concrete of pre-bored H – pile (BP1 & BP20 after cutting the H-piles) Delivery of fill material from Area B (8 truckloads) Intake Structure – Installing frame of stoplog (SL07B)
	B	Bay 5 – Dewatering from box culvert trench Bay 6 – Pre-pour cleaning for base slab
	C	In maintenance period
23/5/2012	A	Stripping off formwork from walls of switch room 7 transformer room Excavating, compacting the formation and laying blinding concrete for



		slab & ground beams )BB2, BB2A, B3 & BB17) of store room Remedial works to concrete surface of columns Intake structure – Installation frame of stoplog (SL07B)
	B	Bay 12 – Driving sheetpiles for shoring of box culvert trench at Ch. 186 – 202 Temporary diversion of existing watermain pipe at Ch. 155 Delivery of excavated bituminous materials from Ø 2100 pipe trench at Ting Kok Road (3 truckloads) for paving temporary haul road Bay – Concreting for base slab (Total: 46.0 cu.M)
	C	Rectification of personnel gate link to Nursery (2 metal workers)
25/5/2012	A	Cutting & bending reinforcement bars for ground beams 7 slab store room Grass cutting in front of hoarding along Ting Kok Road Intake Structure – installing frame of stoplog (SL07A)
	B	Bay 13 – Excavating trench along shoring line to remove boulders Bay 6 – backfilling between base slab and trench shoring and dismantling lower layer of I – beam struts for wall construction Bay 5 – Rebar fixing for base slab (3 bar Fixer, a. m only)
	C	In maintenance period
28/5/2012	A	Cutting & bending reinforcement bars for ground beams, walls 7 slab of pumping station Rebars fixing of ground beams (bb1 & BB11A) of store room Intake Structure – Cement grouting for frame of stoplog (SL 07C)
	B	Bay 12 – Excavating trench along shoring line to remove boulders and driving sheetpile for shoring Temporary diversion of existing irrigation pipe at Ch. 202 Bay 5 – Formwork shuttering for kickers and pre-pore cleaning for base slab Bay 5 & 6 – Dewatering form box culvert trench
	C	In maintenance period
30/5/2012	A	Shuttering and concreting to strengthening the existing Ø 25 watermain pipe surround at launching pit area Remedial works for parapet walls of switch room & transformer room Intake Structure – Formwork shuttering & cement grouting for frame of stoplogs SL 07B & SL 07C
	B	Bay 12 – Excavating trench along shoring line to remove boulders

		Bay 12 & 13 – Driving sheetpiles for shoring of box culvert trench Excavating for jacking pit
	C	In maintenance period

#### 4.6 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 4.6.1, Table 4.6.2. 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 4.6.3 should be taken.

Table 4.6.1 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 or 120% of upstream control station's SS	99 percentile of baseline data or 130% of upstream control station's SS
Turbidity in NTU	95 percentile of baseline data or 120% of upstream control station's Turbidity	99 percentile of baseline data or 130% of upstream control station's Turbidity

Table 4.6.2 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 4.6.3 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>

<p>Action 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 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</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss mitigation measures with ET, Engineer and Contractor;</li> <li>2. Review</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</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</li> </ol>

	<p>impact;</p> <p>3. Inform EPD, IEC, Contractor and Engineer;</p> <p>4. Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>5. Discuss mitigation measures with IEC, Engineer and Contractor;</p> <p>6. Ensure mitigation measures are implemented;</p> <p>7. Increase the monitoring frequency to daily until no exceedance of Limit level.</p>	<p>proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</p> <p>3. Assess effectiveness of implemented mitigation measures.</p>	<p>2. Request Contractor to critically review the working methods;</p> <p>3. Make agreement on mitigation measures to be implemented;</p> <p>4. Assess effectiveness of implemented mitigation measures.</p>	<p>unacceptable practice;</p> <p>3. Check all plant and equipment;</p> <p>4. Consider changes in working methods;</p> <p>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</p> <p>6. Implement agreed mitigation measures.</p>
<p>Limit level being exceeded by more than two consecutive sampling days</p>	<p>1. Repeat in-situ measurements to confirm findings;</p> <p>2. Identify reasons for non-compliance and source(s) of impact;</p> <p>3. Inform EPD, IEC, Contractor and Engineer;</p> <p>4. Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>5. Discuss mitigation measures with IEC,</p>	<p>1. Discuss mitigation measures with ET, Engineer and Contractor;</p> <p>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</p> <p>3. Assess effectiveness of</p>	<p>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</p> <p>2. Request Contractor to critically review the working methods;</p> <p>3. Make agreement on mitigation measures to</p>	<p>1. Inform Engineer and confirm in writing notification of the non-compliance;</p> <p>2. Rectify unacceptable practice;</p> <p>3. Check all plant and equipment;</p> <p>4. Consider changes in working methods;</p> <p>5. Discuss with ET, IEC and Engineer and propose</p>

	<p>Engineer and Contractor;</p> <p>6. Ensure mitigation measures are implemented.</p> <p>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</p>	<p>implemented mitigation measures.</p>	<p>be implemented;</p> <p>4. Assess effectiveness of implemented mitigation measures;</p> <p>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.</p>	<p>mitigation measures to IEC and Engineer within three working days;</p> <p>6. Implement agreed mitigation measures;</p> <p>7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.</p>
--	---	---	--	---

#### 4.7 Monitoring Schedule for the next reporting period

Water quality monitoring schedule is proposed to be carried out on 1<sup>st</sup>, 4<sup>th</sup>, 6<sup>th</sup>, 8<sup>th</sup>, 11<sup>th</sup>, 13<sup>th</sup>, 15<sup>th</sup>, 18<sup>th</sup>, 20<sup>th</sup>, 22<sup>nd</sup>, 25<sup>th</sup>, 27<sup>th</sup> and 29<sup>th</sup> of May 2012.

## 5 Hydrological Characteristics Monitoring

### 5.1 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.

### 5.2 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.

### 5.3 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 5.3.1.

**Table 5.3.1 – 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 5.3.1, H2 served as the control station while H1 was the monitoring location of hydrological characteristics.



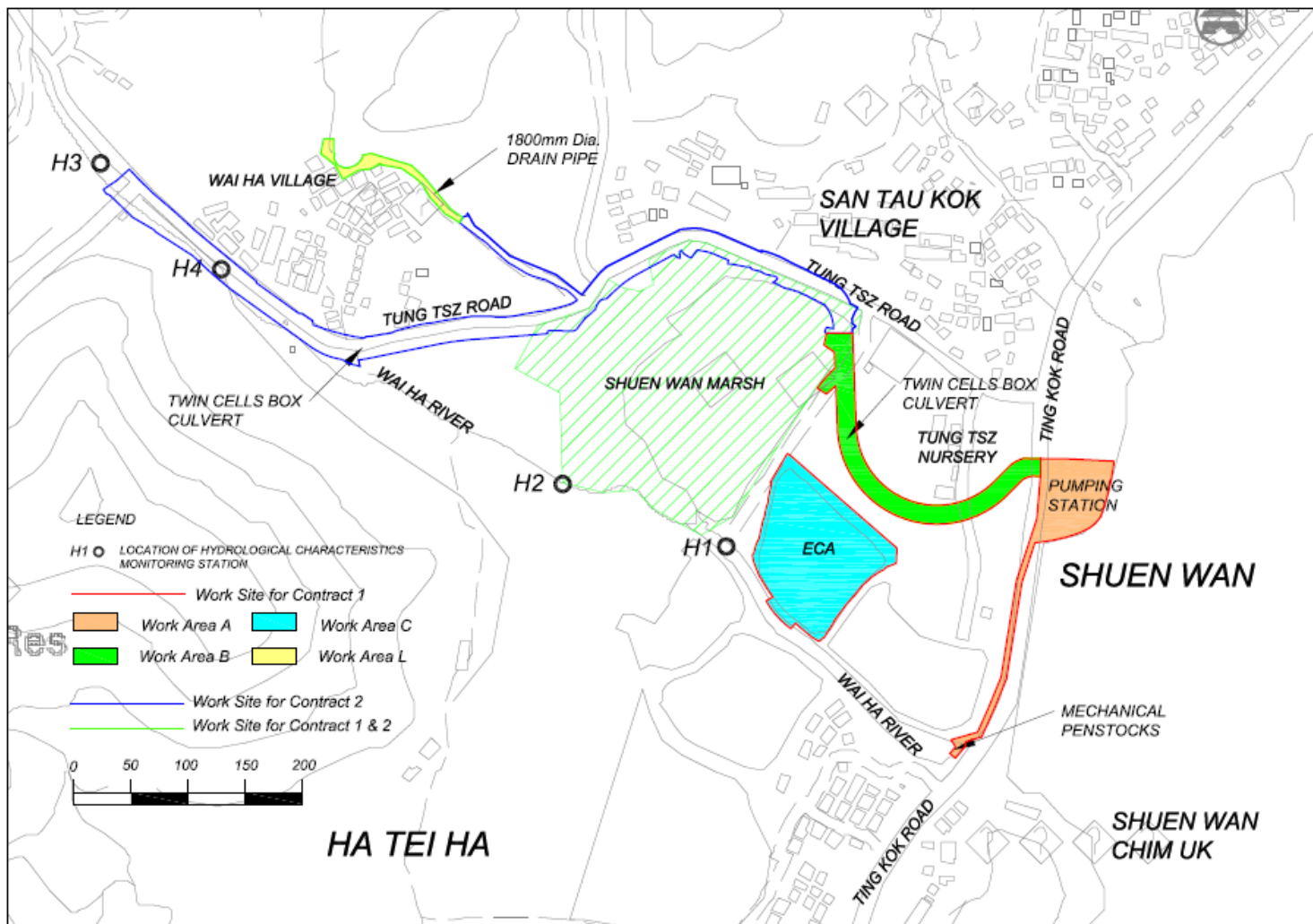


Figure 5.3.1 Hydrological Characteristics Monitoring Locations

## 5.4 Monitoring Frequency

Hydrological characteristics monitoring for each monitoring station were performed at mid-flood and mid-ebb tides for once per week during the course of the construction river works.

Monitoring was carried out on 4<sup>th</sup>, 11<sup>th</sup>, 18<sup>th</sup> and 25<sup>th</sup> of May 2012.

## 5.5 Monitoring Results and Interpretation

Hydrological characteristics monitoring was carried out five times in this reporting period. The monitoring results are summarized in Table 5.5. All results were within the action and limit levels, therefore, no exceedance was found.

Table 5.5 Summary of Water Quality Monitoring Results

	Average of Monitoring Results	
	Water Depth (m)	Water Flow Rate (m <sup>3</sup> /s)
H1(Floor)	~0.160*	0.113
H1(Ebb)	~0.245*	0.206
H2(Floor)	~0.120*	0.471
H2(Ebb)	~0.120*	0.603

\*: 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 F.

## 5.6 Action and limit level for Hydrological Characteristics

The Action and Limit levels for all monitoring stations are summarized in Table 5.6.1, 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 5.6.2 should be taken.

Table 5.6.1 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)	0.08	0.06
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 5.6.2 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</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,</li> </ol>

	<p>implemented.</p> <p>7. Repeat measurement on next day of exceedance.</p>			<p>IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;</p> <p>6. Implement agreed mitigation measures.</p>
<p>Action level being exceeded by more than two consecutive sampling days</p>	<p>1. Repeat in-situ measurements to confirm findings;</p> <p>2. Identify reasons for non-compliance and source(s) of impact;</p> <p>3. Inform IEC, Contractor and Engineer;</p> <p>4. Check monitoring data, Contractor's working methods and any excavation works or dewatering processes;</p> <p>5. Discuss mitigation measures with IEC, Engineer and Contractor;</p> <p>6. Ensure mitigation measures are implemented.</p> <p>7. Prepare to increase the monitoring frequency to daily;</p>	<p>1. Discuss mitigation measures with ET, Engineer and Contractor;</p> <p>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;</p> <p>3. Assess effectiveness of implemented mitigation measures.</p>	<p>1. Discuss proposed mitigation measures with IEC, ET and Contractor;</p> <p>2. Make agreement on mitigation measures to be implemented;</p> <p>3. Assess effectiveness of implemented mitigation measures.</p>	<p>1. Inform Engineer and confirm in writing notification of the non-compliance;</p> <p>2. Rectify unacceptable practice;</p> <p>3. Check working methods and any excavation works or dewatering processes;</p> <p>4. Consider changes in working methods and plans;</p> <p>5. Discuss with ET, IEC and Engineer and propose mitigation</p>

	8. Repeat measurement on next day of exceedance.			measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
<b>LIMIT LEVEL</b>				
Limit 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 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.</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 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> </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 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</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>
--	--	--	---	--

			Level.	
--	--	--	--------	--

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

Hydrological characteristics monitoring schedule is proposed to be carried out on 1<sup>st</sup>, 8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup> and 29<sup>th</sup> of June 2012.

## **6 Ecological Monitoring of ECA**

### **6.1 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 7th November 2011) and the approved updated Habitat Creation Plan (HCP) (approved by EPD on 8th December 2011) of the Project.

This report documents monitoring findings on the site inspections in the ECA undertaken in May 2012.

### **6.2 Ecological Monitoring of ECA**

#### **6.2.1 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 shrubs, and the proposed planting) and weekly site inspections should be



undertaken. Monthly monitoring of in situ water quality 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 of 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 will be monitored monthly. Site inspections will be conducted twice per month.

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

#### *Monitoring of vegetation health*

Monthly monitoring of the health condition of the retained and transplanted trees and vegetation will be conducted. Following planting of vegetation in the ECA, monitoring of the growth and health conditions of the planted vegetation in the 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 is to 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 status. Any signs of pests and/ or poor

growth of planted, retained and transplanted trees and shrubs will be recorded. Appropriate treatment or removal of pests 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 the 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 undertaken.

### **6.2.3 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.

Twice monthly establishment phase monitoring has been commenced in

November 2011.

*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 largely comprises 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 unsuitable for local amphibian species. Therefore, no nighttime survey for detection of 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.

#### **6.2.4 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.

### **6.3 Monitoring Results**

#### **6.3.1 Description of vegetation monitoring in Ecological Compensatory Area**

The vegetation health monitoring during the construction and establishment period required to be conducted on a monthly basis in the Ecological Compensatory Area (ECA). The growth and health of the recorded vegetation was inspected in May 2012 and detail vegetation information was shown in **Appendix L**.

Monitoring of transplanted trees were carried out and continued since the first transplantation (**Appendix L(B)**).

Three specimens of protected species *Pavetta hongkongensis* were transplanted to ECA. Weekly monitoring was carried out since transplantation on 20<sup>th</sup> December 2011.

All trees surveyed were evaluated according to the following criteria (Webb 1991)

- Trees of good form, moderate to large size and in good health are classified as **good**;

- Trees of reasonable form, with few or no visible defects or health problems are classified as being **fair**;
- Trees that are of poor form, badly damaged or clearly suffering from decay die back or the effects of very heavy vine growth are classified as **poor**.

### 6.3.2 Description of vegetations and remarks

Vegetation monitoring in the ECA was carried out on site and growth/health conditions were recorded.

A total of 23 plant species were retained or newly re-colonized within ECA in which 6 of them were retained plant species including Terminalia catappa, Cocculus orbiculatus, Mangifera indica, Dimocarpus longan, Michelia x alba and Macaranga tanarius. Some green algae, such as c.f. Ulothrix sp. and Enteromorpha sp. were re-colonized in the water body or attached to the substratum in the ECA. Those algae could attract algae feeding organisms and it also provide mirco-habitat for some marine or brackish water species especially juveniles. Detailed information of the recorded vegetation is given in **Appendix L**. Ecological monitoring report was shown in **Appendix M**.

*The general growth/health of the retained or newly re-colonized vegetations was in fair condition.*

*The trees transplanted from works area under Contract 1 and 2 to ECA,*

*including 13 Bombax ceiba, 2 Melaleuca quinquenervia and 1 Celtis sinensis, were in fair condition since the transplantation in June, except for Celtis sinensis (Appendix II). However, Bombax ceiba (T152, T158) & Celtis sinensis (T250) are in poor condition with injured bark & dehydrated crown. Replacement of these trees are suggested if the condition of the tree can no longer be improved. On the other hand, Bombax ceiba (T153 & T160) are in poor condition in terms of sparse crown, it is suggested to monitor the health condition in growing season continuously.*

A total of 370 trees were newly planted for amenity purpose within the ECA since September 2011. The 370 individual trees were randomly planted at different zones, except for zone F, as showed in **Figure 6.3.2.1**.



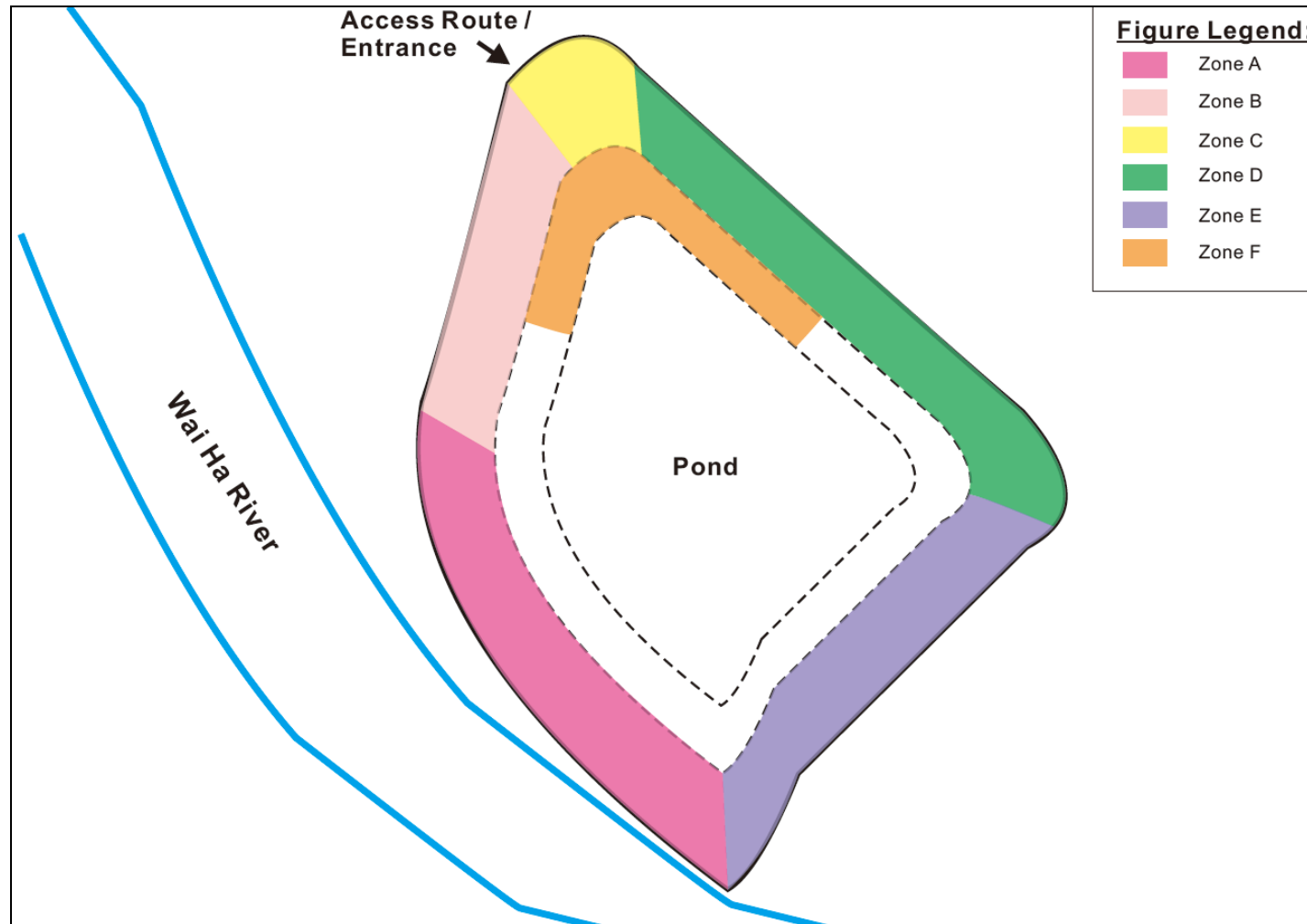


Figure 6.3.2.1 Landscape floor plan of ECA during establishment phase.

The newly planted trees included *Celtis sinensis* (95), *Hibiscus tiliaceus* (114), *Macaranga tanarius* (57), *Ficus superb var japonica* (28) and *Viburnum odoratissimum* (76).

Newly planted trees in Zone A, B and C were in fair condition, except for *Celtis sinensis* (tag no.195) & *Macaranga tanarius* (tag no 331) were in poor condition in terms of sparse crown & dehydrated crown respectively. Moreover, *Macaranga tanarius* (tag no 340) are in poor condition in terms of sparse crown, continuous monitoring of the health condition in growing season is suggested.

However, some trees in Zone D and E were in poor condition in terms of dehydrated crown or sparse crown. These are:

Dehydrated crown with no foliage

- *Hibiscus tiliaceus*: tag no. 69
- *Ficus superb var japonica*: tag no. 37
- *Celtis sinensis*: tag no. 13, 15, 21, 34, 35, 121, 132, 135

Replacement of these trees is suggested if the condition of the trees can no longer be improved.

Sparse Crown and yellow leaves

- *Celtis sinensis*: tag no. 130, 131, 213
- *Viburnum odoratissimum*: tag no. 167

Those planted tree poor condition were caused during trans-location or plantation. It is expect most of them would be recovered and the health condition would be improved in coming growing season.

Mangrove seedlings were planted in Zone F, but most of them were in poor to fair condition. It is expected they may grow better in wet season.

Three specimens of protected species *Pavetta hongkongensis* were transplanted from work area under Contract 2 to ECA at Zone D on 20<sup>th</sup> December 2011. Weekly monitoring was carried out and their overall conditions are fair so far (**Appendix L(C)**). Representative photographs of the transplanted *P. hongkongensis* are showed on **Figure 6.3.2.2**.



Figure 2.2a. Specimens 1 & 2.



Figure 2.2b. Specimen 3.

**Figure 6.3.2.2.** Representative photographs of transplanted *Pavetta hongkongensis* in ECA since the first transplantation in May 2012.

Regular watering is recommended to improve the condition of the planted or transplanted plants during non-raining period. Relevant mitigation measures will be proposed when necessary.

There is no sign of pest outbreak or dieback took place in the current monitoring.

### **6.3.3 Summary**

In total, 23 species of trees, shrubs, climbers and herbs were retained or naturally colonized in the ECA during initial establishment period. Starting in August 2011, a total of 16 tree and three specimens of protected species *Pavetta hongkongensis* were transplanted to ECA. Most of them were in fair condition. In addition, 370 trees, including *Celtis sinensis*, *Hibiscus tiliaceus*, *Macaranga tanarius*, *Ficus superb var japonica* and *Viburnum odoratissimum*, were newly planted in ECA since September 2011 for amenity purpose. Although there is no sign of pest outbreak or dieback, regular watering and close monitoring are still be recommended.

### **6.3.4 References**

Webb, R (ed.) 1991, Tree Planting & Maintenance in Hong Kong, Hong Kong Government, Hong Kong

### **6.3.5 Monitoring of Water Quality**

The point of linkage between the ECA and Wai Ha River at the southern pond bund of the wetland was completed on 30<sup>th</sup> August 2011. The constructed wetland habitats in the ECA have been filled with the tidal water from Wai Ha River. Monitoring of in situ water quality in the ECA was commenced in September 2011 by the IEC's ecologist. In addition, Ecological water quality monitoring at ECA was conducted on 30/5 with result: Turbidity: 8.45NTU; Temperature: 27.6°C; DO: 3.91mg/L; pH: 6.1.

### **6.3.6 Site Inspections**

Twice monthly establishment phase monitoring has commenced in November 2011. Two site inspections were carried out on 16th and 31st May 2012. Table 1 summarizes the observations and recommendations for each site inspection.

**Table 6-1. Observations and recommendations for each site inspection, May 2012.**

Inspection Dates	Observation	Recommendations
16 <sup>th</sup> May 2012	<p>The general condition and wetland function of the ECA were basically satisfactory. At least 20-30 compensatory trees of <i>Hibiscus tiliaceus</i> with unsatisfactory form and health condition were removed by the landscape contractor. However, new compensatory trees had not yet planted at the planting holes. Other original and newly replaced compensatory trees generally showed fair health condition (<b>Photo 1</b>). The sloping areas along the pond bund were hydroseeded and new grasses and other vegetation had germinated and colonized the area.</p> <p>The planted shrubs were in good condition. The created marsh area mainly dominated by the planted wetland herbs <i>Cyperus malaccensis</i> and <i>Bacopa monnieri</i>. Replacement planting of wetland herbs with unsatisfactory performance is required.</p> <p>A few propagules of mangrove <i>Kandelia obovata</i> germinated spontaneously in the created marsh and intertidal areas. These wetland herbs did not cause impact to the wetland function and are a welcome indicator that the site is becoming established as an intertidal wetland.</p>	<p>The Contractor was reminded to replace the compensatory trees and the selected wetland herbs showing poor growth performance. In particular, the replaced trees should not be planted too deep into the soil.</p>
31 <sup>st</sup> May 2012	<p>This was the second site inspection in May 2012 and a joint site inspection among the Wetland Specialist, the Contractor, Project's Engineer and landscape contractor was held on the same day.</p> <p>The compensatory trees and wetland herbs of unsatisfactory growth performance will be replaced by the landscape contractor soon. More than 70% of the hydroseeded sloping area around the wetland pond was covered by the germinated grass. The three transplanted shrubs of conservation interest,</p>	<p>The Contractor should work with the landscape contractor on the arrangement of the replacement planting of the new compensatory trees and wetland herbs. The Contractor is advised to weed the unwanted herbs along the northern to northeastern boundaries of the ECA.</p>

	<p><i>Pavetta hongkongensis</i>, had been growing satisfactorily since their transplantation in December 2011. One of these shrubs, PH-01, was flowering in May 2012 (<b>Photo 2</b>). The general condition of the ECA was basically satisfactory (<b>Photo 3</b>).</p> <p>The growth performance of the transplanted trees from Area A was generally in fair condition. However, the understory of the existing trees and transplanted trees along the northern to northeastern boundaries of the ECA had been overgrown with unwanted herb <i>Bidens alba</i> and climber <i>Mikania micrantha</i>. Removal of these herbs and climbers is necessary.</p> <p>A small excavated hole was observed on the upper pond bund next to the wetland opening point connected with the Wai Ha River. This hole was expected to be dug by dogs from the nearby recreational fishpond or a village house. It did not influence the structure of the wetland and the Contractor will refill the hole with the on-site soil.</p>	
--	---	--

<p><b>Photo 1.</b> The compensatory trees were in fair condition.</p>	<p><b>Photo 2.</b> One of the transplanted <i>Pavetta hongkongensis</i> (PH-01) was flowering in May 2012.</p>
---	--



**Photo 3.** The general condition of the ECA was satisfactory, with >70% of the hydroseeded sloping area around the wetland pond was covered by the germinated grass.



## 6.4 Management Activities

### 6.4.1 Ecological Issues/ Management Activities

No significant ecological issues were identified from the site inspection by the Wetland Specialist from the site inspections in May 2012.

The ECA has been maintained in basically good condition. The planted compensatory trees and shrubs have showed fair health condition. As abovementioned, the landscape contractor has to replace the compensatory trees and wetland herbs which are of unsatisfactory growth performance as soon as possible. The wetland herbs for replacement would be planted at suitable grade level to increase their survival rate and adaptability to the created marsh area.

The Contractor is advised to weed the unwanted herbs (especially herbs *Bidens alba*, *Mimosa pudica*, climber *Mikania micrantha*, and seedlings of weedy tree *Leucaena leucocephala*) along



the northern to northeastern boundaries of the ECA. Manual removal of the roots of these unwanted plant species is preferred.

## **6.5 Implication of the Survey Findings**

### **6.5.1 Implication to the Wetland design of the ECA**

No implication to the wetland design from these two site inspections in May 2012.

## **6.6 Recommendations**

The Contractor should undertake regular monitoring, and maintain frequent and adequate watering of all planted, replaced and transplanted terrestrial trees (including the newly planted compensatory trees for the replacement) and shrubs (including the shrubs of conservation interest *Pavetta hongkongensis*) throughout the establishment period of the ECA. The Contractor is advised to provide an appropriate planting programme for replacing the remaining compensatory trees/shrubs/herbs showing poor health/dead symptoms. In addition, the replacement trees and shrubs with healthy and structurally balanced form are preferred. The unwanted plant species should be removed to prevent their colonization in the ECA.

## **7 Landscape and Visual**

### **7.1 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 7th November 2011) 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 14th February 2011.

This monthly monitoring report will detail the scope of landscape and visual monitoring work, monitoring findings and observations, and any recommendations and advice on proper implementation of the landscape mitigation measures in the works areas under Contract 1 of the Project.

### **7.2 Scope of Monitoring**

#### **7.2.1 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 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.

#### **7.2.2 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.

### **7.2.3 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.

## 7.3 Landscape and Visual Monitoring Results

### 7.3.1 Monitoring Date(s)

This monthly Landscape and Visual Monitoring (May 2012) was conducted to cover only Areas A, B and C of Contract 1 of the Project. The bi-weekly monitoring was conducted on 4<sup>th</sup>, 16<sup>th</sup> and 30<sup>th</sup> May 2012.

All photos stated in this section are recorded in Appendix G.

The bi-weekly monitoring for Contract 2 was also undertaken on 4<sup>th</sup>, 16<sup>th</sup> and 30<sup>th</sup> May 2012. The monitoring findings and recommendation will be submitted in a separate Monthly EM&A Report under Contract DC/2010/02.

### 7.3.2 Visual Screen

No follow-up action by the Contractor is required as from the *Monthly EM&A Report for April 2012*.

#### Observation

Construction hoardings have been erected in Area A along the entire site boundary. As the work for building an automatic mechanical penstock at Wai Ha River estuary has commenced since March 2012, temporary construction hoardings (**Photo 1**) have been erected around this works area.

A section of temporary hoarding has been erected from northwest to southwest parts (i.e. Phase I construction works) of Tung Tsz Nursery in Area B (approximately along the works boundary from Trees U42 to U62) (**Photo 2**). As observed during the monitoring on 4<sup>th</sup> May 2012, a new section of temporary hoarding has been erected from southwest to eastern parts of the Nursery (**Photo 3**) and connected with the Phase I construction works area. An open section with no construction work has been maintained as a major road access inside Tung Tsz Nursery for their daily operations.

A line of chain link fence has been maintained around the boundary of Area C since the onset of its establishment period.

Recommendation

No specific recommendation is required.

**7.3.3 Contaminant/ Sediment Control**

No follow-up action by the Contractor is required as from the *Monthly EM&A Report for April 2012*.

Observation

*Area A*

Provision of dust control measure (such as 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. No unauthorized discharge of contaminated water/ sewerage was observed during the monitoring.

*Area B*

Used water was collected and drained directly to the sedimentation tank placed adjacent to the fenced Area C. The water was further filtered through the silt/sand removal facilities in the tank before discharging into the manhole adjacent to Area C..

*Area C*

The establishment phase of the Ecological Compensatory Area (ECA) has commenced and the pond of the ECA is connected with the Wai Ha River directly. No water resulting from normal wetland maintenance practice was pumped out from the ECA.

### Recommendation

No specific recommendation is required.

### **7.3.4 Pollution Control**

All used water for washing vehicle wheel and construction works was filtered and drained to the manholes, as following the recommendation stated in *Monthly EM&A Report for April 2012*.

#### 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. The drainage pipes were maintained appropriately to discharge the used water to the manhole at Ting Kok Road. No direct discharge of polluted water into the adjacent Wai Ha River was observed from the works area for building the automatic mechanical penstock at Wai Ha River estuary.

##### *Area B*

No direct discharge of contaminants or any fluid was observed within the active works area during the inspections. All used water was collected and drained directly to the sedimentation tank placed adjacent to the fenced Area C. This water was further filtered through the silt/sand removal facilities in the tank before discharging into the manhole adjacent to Area C.

##### *Area C*

The pond of the ECA was observed to be connected to Wai Ha River directly as following the scheme design of Habitat Compensatory Plan (**Photo 4**). No direct discharge of turbid

water into the adjacent Wai Ha River was observed.

### Recommendation

No specific recommendation is required for Areas A, B and C. As a reminder, the Contractor should regularly check the condition of the drainage pipe and ensure that the used water should be appropriately filtered and discharged to the manhole/other discharge point agreed by the Engineer and EPD. This is to avoid any potential contamination to the vegetation in Shuen Wan marsh and other vegetated/marinated areas adjacent to the active works area.

### **7.3.5 Liaison with Nursery**

As observed in May 2012, active construction works within Tung Tsz Nursery was extended to the east of the nursery in connection with Ting Kok Road.

The health condition of the *Grevillea robusta* (U58) has been closely monitored on a bi-weekly basis and regular watering of the retained trees and transplanted trees was anticipated. New leaves were observed on its branches and along the trunk.

The works practice and maintenance of trees within the nursery generally follow the recommendation as stated in *Monthly EM&A Report for April 2012*. Any observed issues related to the liaison with the nursery are highlighted in this section.

### Observation

As abovementioned in Section “Visual Screen”, the temporary hoarding has been erected from northwest to southwest parts of Tung Tsz Nursery in Area B since April 2011. The major construction work within Area B has been extended to the east of the nursery in connection with Ting Kok Road with establishment of temporary hoarding. The major road access within the Nursery has been maintained to minimize the impact on the nursery’s daily operation resulting from the construction works.

Regular monitoring for the transplanted tree U58 *Grevillea robusta* was conducted

bi-weekly. Tree defects of new leaves of smaller sizes and poor physiological performance were still found. New leaves were observed on the tree branches and even watersprouts on the tree trunk. Health condition of this transplanted tree has remained fairly poor in May 2012 (**Photo 5**) and close monitoring has to be continued to update its health and structural condition.

As the construction area was extended this month, several trees were found being translocated to temporary receptor sites as observed during the monitoring on 4<sup>th</sup> May 2012. More trees were found being translocated as observed during the monitoring on 16<sup>th</sup> May 2012 (**Photo 6**). A total of 14 trees were translocated to the temporary receptor sites within the active works area within Area B, including A22, A36, A38, A41, A42, A43, U62, U72, U74, U76, U77, U78, U79 and a *Terminalia catappa* without a tree tag.

#### Recommendation

The works area and the construction works should be properly managed and implemented without influencing the daily operation of the nursery (i.e. provide enough access road and works area for the nursery operation).

All transplanted trees should be watered regularly (e.g. at least every two days) by the appointed landscape contractor.

Regular monitoring and watering of *Grevillea robusta* (U58) are still recommended to be the major treatment to the tree. The appointed landscape contractor and the Contractor should closely monitor the health conditions throughout the establishment period.

### **7.3.6 Existing Trees within Works Areas**

Tree Protection Zones (TPZs) in Areas A and B were demarcated within the construction sites as following the recommendation stated in the *Monthly EM&A Report for April 2012*, but observation of piling of construction materials within or close to the TPZs were still recorded in Area A (see details in the following section). The shading net tied on the trunk of U57 has still remained since the tree transplantation in May 2011.



Regular watering of the retained trees, transplanted trees and the compensatory planting was anticipated. Maintenance of the existing trees within the works areas generally follows the recommendation as stated in *Monthly EM&A Report for April 2012*, except the observations as highlighted in the following sections.

### Observation

#### *Area A*

TPZs with temporary storage of construction materials were still observed for trees to be transplanted (E16 to E20) at the southwestern part of Area A (**Photos 7-8**). Locations of the construction hoardings, which were erected to form the TPZs, were often adjusted by the site workers to facilitate their storage of materials. These construction materials were often placed within or close to the TPZs and there were potential damage to the trunks and roots of these trees to be transplanted.

The tree health of three relocated *Melaleuca cajuputi* subsp. *cumingiana* (E22, E33 and E34) on the eastern side of Area A next to the site hoarding was regularly monitored (**Photos 9-10**). No new leaves or buds were observed on these relocated trees. Health condition of these trees has remained very poor as a result of the transplantation shock and poor transplantation skill in planting them too deep in the soil. The tree tags on E33 and E34 were still missing. The construction materials stored near the trunk of E22, which were recorded last month, was removed. An orange construction net forming a TPZ was observed at the lower trunk of E22, E33 and E34 (**Photos 9-10**).

As observed in the monitoring on 30<sup>th</sup> May 2012, the injured part of the tree to be felled E44 (*Macaranga tanarius* var. *tomentosa*), was still wrapped by burlap and watersprouts were found near the wound (**Photo 11**). Such damage on the tree and the wrapping around the wounds have been reported since March 2012.

No other significant damages on the crowns, trunks and roots of the remaining trees were observed during the monitoring in May 2012 in Area A.

#### *Area B*

Trees, including retained and transplanted specimens, within the nursery were maintained generally in fair condition, with no significant damages on tree crowns, trunks and roots observed during the monitoring in May 2012. Small watersprouts and new leaves were observed on the trunk and branches of the transplanted tree U58 (*Grevillea robusta*) but its physiological condition has still remained fairly poor after the transplant.

The health conditions of U34 (**Photo 12**), U35 (**Photo 13**) and U37 (**Photo 14**) were found to be very poor, with no leaves in the canopies and dried, loose tree bark.

As the construction area within the nursery was extended this month, several trees were found translocated to the temporary receptor sites in May 2012 (**Photos 6, 15-16**). Among them, the tree tags was found missing on A38 (*Terminalia catappa*) and U74 (*Delonix regia*) during the monitoring on 30<sup>th</sup> May 2012. And U72 (*Tabebuia chrysantha*) was found wrongly tagged as U74. A translocated tree *Terminalia catappa* was found with no tree tag. As observed on 14<sup>th</sup> May 2012, these trees were often planted too deep at their temporary receptor sites and excessive soil was piled to cover the trunk flare or even the lower trunk. The Contractor was informed immediately after the monitoring. During the monitoring on 30<sup>th</sup> May 2012, the excessive soil was removed from the trunk base of those translocated trees except A22 (*Terminalia catappa*) (**Photo 17**) and a *Terminalia catappa* without tree tag (**Photo 18**). Some branches of these translocated trees were poorly pruned (e.g. bark tearing and long stubs still remained).

After the recent translocation work, the planter of A36 was removed. However, the guying ropes were also removed and the palm was slightly leaning (**Photo 19**). Besides, all of the translocated trees were not guyed and protected by any TPZs.

For the tree proposed to be transplanted, U69 and U70, they were found remaining on their original locations. The planter of U70 was found partially broken for the establishment of the temporary site hoarding (**Photo 20**). Another planter of an under-sized tree was also found partially broken for the establishment of the temporary site hoarding (**Photo 21**).

Broken planters for 3 trees (U54 and two existing trees with no tag next to U54) were

observed at their temporary receptor sites within the active works area to the northwest of the nursery. Only the planter of U54 have been surrounded by orange construction nets to prevent further damage to the remained planters in May 2012 (**Photo 22**). The nets were not found surrounding the planters of another 2 trees. The planter of the untagged trees to the south of U54 was totally removed and excessive soil was piled at its the trunk base (**Photo 23**).

The stump of the tree to be transplanted T97 (*Lagerstroemia speciosa*) was not found during the monitoring on 16<sup>th</sup> May 2012 onwards once the site hoarding was established. The tree to be transplanted T102 (*Melaleuca cajuputi* subsp. *cumingiana*) was recorded mechanically injured during the inspection on 16<sup>th</sup> May 2012 (**Photo 24**).

The retained tree U50 (*Ficus elastica*) was also found mechanically injured during the inspection on 30<sup>th</sup> May 2012 (**Photo 25**) but the damage was minor. The piled soil inside the works area was found spreading towards the tree through the broken site hoarding (**Photo 26**).

No significant damages on the crowns, trunks and roots of the remaining trees were observed during the monitoring in May 2012 in Area B.

#### *Area C*

The existing trees were maintained generally in fair health condition, except that a very few planted compensatory trees showing poor health conditions. No branch pruning and tree felling were observed in the monitoring. No significant damages on the crowns, trunks and roots on trees within Area C were observed during the monitoring in May 2012.

Some compensatory trees (*Hibiscus tiliaceus*) with poor tree form or growth performance was removed as observed in the monitoring on 16<sup>th</sup> May 2012. As informed by the Contractor, these trees will be replaced with new compensatory trees by the landscape contractor.

No leaves were observed on the transplanted tree T152 (**Photo 27**). New leaves were observed on the transplanted trees T153 (**Photo 28**) and T250. The transplanted tree

(*Bombax ceiba*) without a tree tag (possibly T149) was relocated within Area C and new leaves was found on it (**Photo 29**).

The three transplanted specimens (Tree No.: PH01, PH02 and PH03) of the protected shrub species of conservation interest *Pavetta hongkongensis* have remained in fair health condition (**Photos 30-31**). Newly regenerated leaves were observed on these three specimens.

### Recommendations

#### *Area A*

Maintenance of proper TPZs with no temporarily stored construction materials and excessive stockpiled soil around the lower trunk and trunk flare have been the major tree management issues in Areas A and B. The Contractor should continue notifying the on-site workers not to stockpile soil/construction materials or place construction equipment within and close to the TPZs or lower trunk/trunk flare. Any temporarily stored construction materials/ equipment should be removed immediately. This is particularly important for the relocated trees (E22, and suspected E33 and E34) as they perform poor in health due to the result of the transplantation shock.

All retained trees or trees to be transplanted should be watered regularly (e.g. at least every two days) by the landscape contractor. The Contractor should conduct regular inspection on the health condition and protection measures of each existing trees within the Area A. Soil surrounding the trunk bases of the relocated trees (E22, and suspected E33 and E34) has to be removed to level off the grade difference. In particular, regular watering should be applied on the three recently relocated trees (i.e. E22 and suspected E33 and E34) with regard to their poor health condition.

#### *Area B*

All transplanted trees should be watered regularly (e.g. at least every two days) by the landscape contractor. This is a necessary maintenance practice to improve the survival rates and growth for trees showing poor health conditions as a result of the transplantation shock. Regular check of the tree health should be conducted. Proper protective measures

such as guying and TPZs are recommended especially for the newly transplanted trees.

Regular inspection on the tree health of U58, U34, U35 and U37 should be undertaken to update their health conditions and any tree defects. If these trees are found to be dead specimens for a prolonged period in the wet season, the Contractor should replace these specimens for compensation.

The Contractor has to repair the planters or establish proper TPZs for the tree U54 and the two untagged trees adjacent to U54 as soon as possible. In addition, the Contractor should ensure that all planters have been properly maintained. Manual weeding of overgrowth vegetation within the tree planters is recommended.

The Contractor is recommended to re-tag the translocated trees and regularly check the condition of the tags. All tree tags on the trees should be managed properly by the Contractor throughout the construction and establishment phases. A good tree tag system is important for the Contractor, subcontractor and the auditor to undertake routine maintenance, monitoring and rapid remedial actions (if any).

The shading net tied on the trunk of U57 in Area B should be removed as soon as possible. The Contractor should have regular site check on the conditions of the trees and tree tags within the Project Area.

#### *Area C*

All transplanted trees, planted compensatory trees and the three transplanted individuals of *Pavetta hongkongensis* should be watered regularly (e.g. at least every two days) by the appointed landscape contractor. Regular check of the health conditions of these trees should be conducted. If any of these trees are found to be dead specimens for a prolonged period in the wet season, the Contractor should replace these specimens for compensation.

### **7.3.7 Construction Lights**

No follow-up action on maintenance of construction light is required as from the *Monthly EM&A Report for April 2012*.

*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 Contractor.

*Recommendation*

No specific recommendation is required.

**7.4 Audit Schedule**

The next bi-weekly Landscape & Visual Monitoring in June 2012 is scheduled to be conducted in the weeks of 11<sup>th</sup> and 25<sup>th</sup> June 2012.

## **8 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.

For water quality monitoring, total 13 abnormal incidents of water quality limits (Dissolved Oxygen, Suspended solids and Turbidity) were recorded in this reporting month according to the established level. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. No construction activities were carried out at the river bed during the reporting period. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and no particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total Suspended Solid were believed to be mainly attributed by high water flow rate and adverse weather. The exceedance of DO were believed to be mainly attributed by natural fluctuation, since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

The water condition of Wai Ha River is presented in photo attached in **Appendix N**.

## **9 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 9.1 is a summary of figures of the construction wastes disposal provided by Contractor.



Table 9.1 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)
Year2011	11.758	0.00	9.703	0.665	0.750	0.556	0.00	0.00	0.00	0.00	0.165
Jan-12	0.010	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.005
Feb-12	0.130	0.00	0.13	0.00	0.00	0.00	2.37	0.00	0.00	0.00	0.00
Mar-12	0.125	0.00	0.125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Apr-12	0.265	0.00	0.26	0.00	0.005	0.00	0.00	0.00	0.00	0.00	0.015
May-12	0.552	0.00	0.552	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
<b>Total</b>	<b>13.003</b>	<b>0.00</b>	<b>11.624</b>	<b>0.665</b>	<b>0.71</b>	<b>0.556</b>	<b>2.37</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.215</b>
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	0.00	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)

## 10 Status of Permits and Licenses obtained

Table 10.1 is the updated status of environmental related permits/ license obtained for the construction activities

Table 10.1 Status of Permits and Licenses Obtained

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

## 11 Compliant Log

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

Table 11.1 Summary of Formal Complaints received

	Noise	Water	Ecology	Others
Year 2011	0	0	0	0
January 2012	0	0	0	0
February 2012	0	0	0	0
March 2012	0	0	0	0
April 2012	0	0	0	0
May 2012	0	0	0	0
Total	0	0	0	0

## 12 Site Environmental Audits

### 12.1 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 period, site inspections were conducted on 3<sup>rd</sup>, 10<sup>th</sup>, 17<sup>th</sup>, 23<sup>rd</sup> and 31<sup>st</sup> of May 2012. 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 12.1.

Table 12.1 Summary results of site inspections findings

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
23 & 30 Mar 12 3, 12, 19 & 24 Apr 12 3, 10, 17, 23 & 31 May 12	Construction materials were observed inside the tree protection zone at Area A.	Observation	Contractor was reminded to remove the construction materials.	Part of construction materials were removed by contractor on 3 May 12  Outstanding		
19 & 24 Apr 12 3, 10 & 17 May 12	Damaged tree protection fence was observed at Area A.	Observation	Contractor was reminded to repair or replace the tree protection fence.	23 May 12		
24 Apr 12	Construction materials were observed inside the tree protection zone.	Observation	Contractor was reminded to remove the construction materials.	Construction materials were removed by contractor	3 May 12	

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
24 Apr 12	Accumulation of general wastes were observed at Area A	Observation	Contractor was reminded to clean the general wastes as soon as possible	General wastes were cleaned by contractor.	3 May 12	
3 May 12	Earthy stockpile was observed without cover at Ting Kok Road of Area A	Observation	Contractor was reminded to cover the stockpile with tarpaulin	Earthy stockpile was removed by contractor	10 May 12	
10, 17, 23 & 31 May 12	Haul road was dry and dusty	Observation	Contractor was reminded that routine water spraying should be implemented	Outstanding		
10, 17, 23 & 31 May 12	Tree protection zone was not provided by contractor at Area B	Observation	Contractor was reminded to set up the tree protection zone with fencing for all the trees	Outstanding		
17 May 12	Construction materials were observed inside the tree protection zone at Area B	Observation	Contractor was reminded to remove the construction materials from the tree protection zone	23 May 12		
23 May 12	Tree protection zone was provided by contractor at Area A	Observation	Contractor was reminded to set up the tree protection zone with fencing for all the trees	31 May 12		

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

There was no non-compliance recorded for the month of May 2012.

## **12.3 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 statuses of mitigation measures are presented in Appendix H (B)

## **13 Future Key issues and recommendations**

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

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

Tree protective measure for tree planting and transplanting, such as tree protection zone and regular watering.

## 14 Conclusions

Pumping station construction, Concreting works for box culvert and pumping station and plant maintenance were major site activities being carried out within this reporting period.

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 23<sup>rd</sup> of May 2012.

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

For water quality monitoring, total 13 abnormal accidents of water quality limits (Dissolved Oxygen, Suspended solids and Turbidity) were recorded in this reporting month according to the established level. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. No construction activities were carried out at the river bed during the reporting period. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and No particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total Suspended Solid were believed to be mainly attributed by high water flow rate and adverse weather. The exceedance of DO were believed to be mainly attributed by natural fluctuation, since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

For ecological monitoring survey, all vegetations recorded were in fair condition, with no significance sign of health deterioration for the retained trees. In addition, Ecological water quality monitoring at ECA was conducted on 30/5 with result: Turbidity: 8.45NTU; Temperature: 27.6°C; DO: 3.91mg/L and pH: 6.1.

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

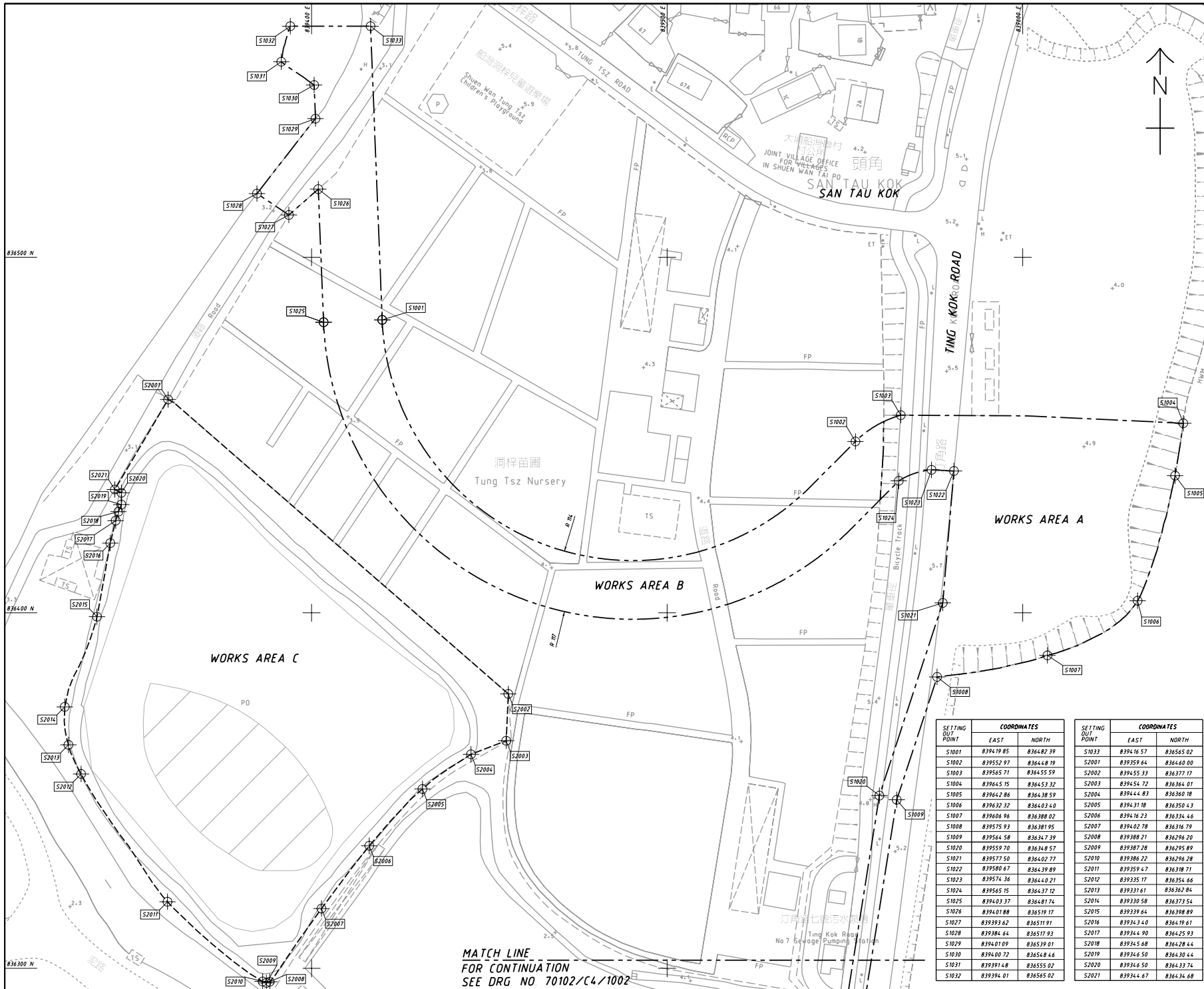
complaints recorded.

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**



**NOTES**

- 1 ALL LEVELS ARE IN METRE ABOVE PRINCIPAL DATUM
- 2 ALL CO-ORDINATES GIVEN ARE IN METRE AND ARE IN ACCORDANCE WITH HK(1980) COORDINATES SYSTEM
- 3 ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED
- 4 THE PUBLIC CLEANING AREA SHALL BE THE AREAS WITHIN 2.50 BEYOND THE LIMIT OF WORKS AREAS EXCLUDING PRIVATE AREAS

**LEGEND**

- LIMIT OF WORKS AREA A
- LIMIT OF WORKS AREA B
- LIMIT OF WORKS AREA C
- ⊕ S1001 SETTING OUT POINT

836500 N  
836400 N  
836300 N  
2010-2-5 11:54:09  
p:\projects\70102\1000\TENDER ADDENDUM NO 2\1001A.dgn

SETTING OUT POINT	COORDINATES		SETTING OUT POINT	COORDINATES	
	EAST	NORTH		EAST	NORTH
S1001	839419.85	836487.39	S1033	839416.57	836565.02
S1002	839552.87	836448.19	S2001	839359.64	836440.00
S1003	839565.71	836455.59	S2002	839455.33	836377.17
S1004	839645.15	836453.32	S2003	839454.72	836364.01
S1005	839642.86	836438.59	S2004	839444.83	836360.18
S1006	839632.32	836403.40	S2005	839431.18	836350.43
S1007	839606.96	836388.02	S2006	839416.23	836334.46
S1008	839575.93	836381.95	S2007	839402.78	836316.79
S1009	839564.58	836347.39	S2008	839388.21	836294.20
S1020	839559.70	836348.57	S2009	839387.28	836295.89
S1021	839577.50	836402.77	S2010	839386.22	836296.28
S1022	839580.67	836439.89	S2011	839359.47	836318.71
S1023	839574.36	836440.21	S2012	839335.17	836354.66
S1024	839565.15	836437.12	S2013	839331.61	836362.84
S1025	839403.37	836481.74	S2014	839330.58	836373.54
S1026	839401.88	836519.17	S2015	839339.64	836398.89
S1027	839393.62	836517.93	S2016	839343.40	836419.61
S1028	839384.64	836517.93	S2017	839344.90	836425.93
S1029	839401.09	836539.01	S2018	839345.68	836428.44
S1030	839400.72	836540.44	S2019	839346.50	836430.44
S1031	839391.48	836555.02	S2020	839346.50	836433.74
S1032	839394.01	836565.02	S2021	839347.67	836434.68

MATCH LINE  
FOR CONTINUATION  
SEE DRG NO 70102/C4/1002

A	TENDER ADDENDUM NO 2	ECYPREYM	10-09
-	TENDER DRAWING	ECYPREYM	09-09

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

**DRAINAGE IMPROVEMENT  
WORKS IN SHUEN WAN TAI PO - CONTRACT 1**

**SETTING OUT PLAN FOR  
WORKS AREA A, B AND C**

SHEET 1 OF 2

**AECOM**

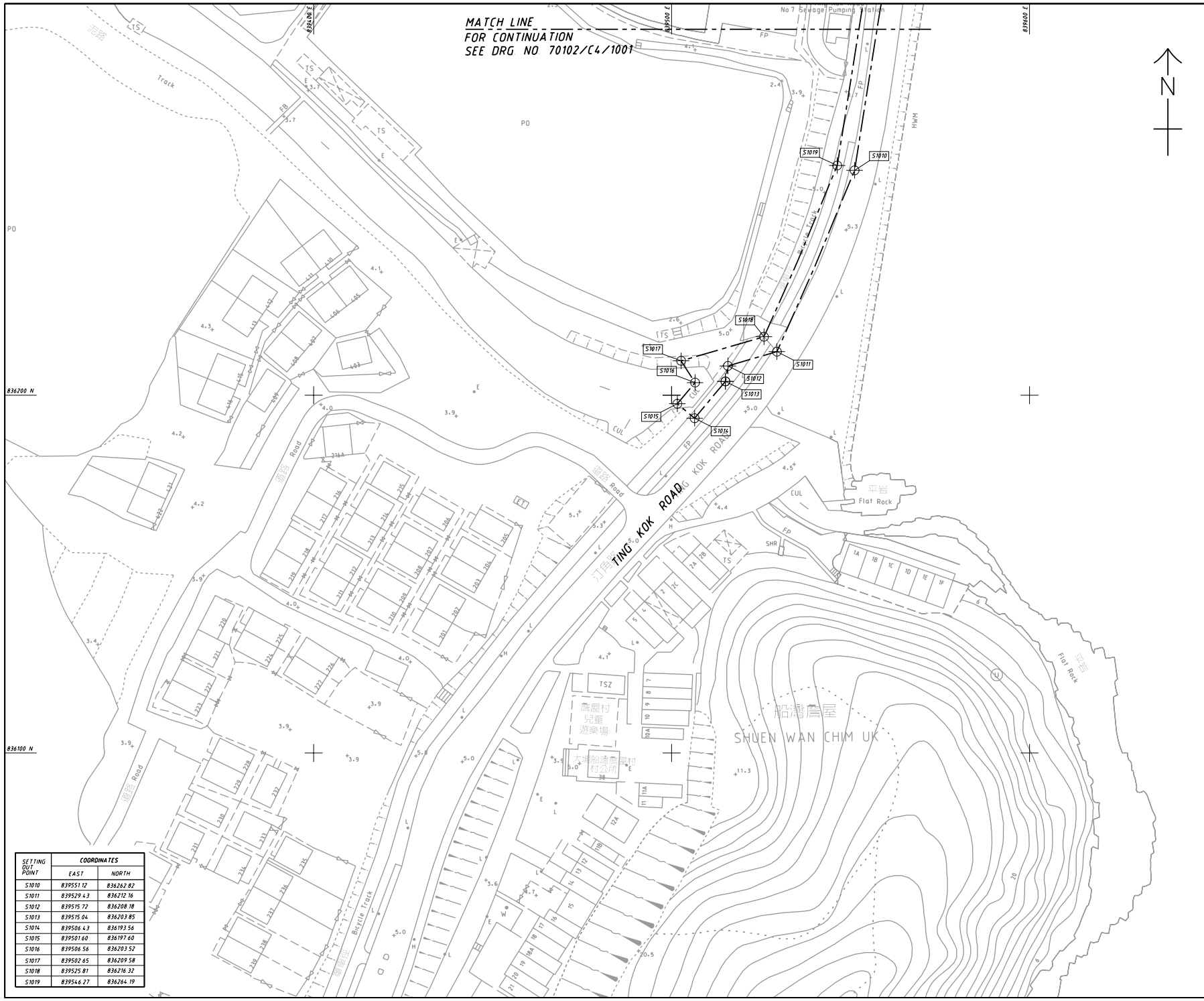
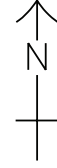
DRG.NQ. 70102/C4/1001A  
圖紙編號

DESIGNED BY CPWU	CONTRACT NO. DC/2009/22	DR. APPROVED DML
DRAWN BY LWL	STATUS ISSUED	
SCALE A1 : 1 500	DIMENSIONS ARE IN METRES	

© COPYRIGHT RESERVED

MATCH LINE  
FOR CONTINUATION  
SEE DRG. NO 70102/C4/1001

NOTE  
1. FOR NOTES AND LEGEND SEE DRAWING  
NO. 70102/C4/1001



836200 N

836100 N

2010-2-5 13:32:23

SETTING OUT POINT	COORDINATES	
	EAST	NORTH
S1010	839551.12	836262.82
S1011	839529.43	836212.16
S1012	839515.72	836208.18
S1013	839515.04	836203.85
S1014	839506.43	836193.56
S1015	839501.60	836197.60
S1016	839506.56	836203.52
S1017	839502.65	836209.58
S1018	839525.81	836216.32
S1019	839546.27	836264.19

TENDER DRAWING	ECYPRC14	09-09
NO.	DATE	SCALE

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

DRAINAGE IMPROVEMENT  
WORKS IN SHUEN WAN, TAI PO - CONTRACT 1

SETTING OUT PLAN FOR  
WORKS AREA A, B AND C  
SHEET 2 OF 2

**AECOM**

DRG. NO. 70102/C4/1002  
圖紙編號

DESIGNED BY 設計	CP/WU	CONTRACT NO. 合約編號	DC/2009/22	APPROVED BY 核准人	DML
DRAWN BY 繪圖	LWL	STATUS 狀態			
SCALE 比例	A1:1 500				
DIMENSIONS ARE IN 尺寸單位	METRES				

© COPYRIGHT RESERVED  
版權所有

**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)	Miss. Goldie Fung	2556 9172	2856 2010	goldiefung@fseng.com.hk

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



# Calibration Certificate

Certificate No. 21289

Page 1 of 3 Pages

**Customer :** Environmental Pioneers and Solutions Limited

**Address :** Flat A, 19/F., Chai Wan Industrial Centre Building, 21 Lee Chung Street, Chai Wan, HK.

**Order No. :** Q20468

**Date of receipt :** 2-Mar-12

## Item Tested

**Description :** Digital Sound Level Meter

**Manufacturer :** SVAN

**Model :** 949

**Serial No. :** 8571

## Test Conditions

**Date of Test :** 5-Mar-12

**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	15136	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: 7-Mar-12

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. 21289

Page 2 of 3 Pages

Results :

## 1. SPL Accuracy

Level Range	UUT Setting			Applied Value (dB)	UUT Reading (dB)	
	Octave Filter	Weight	Response		Before adjust	After adjust
105 dB	OFF	A	Fast	94.0	*92.0	94.0
			Slow		--	94.0
		C	Fast		--	94.0
130 dB	OFF	A	Fast	94.0	--	94.0
			Slow		--	94.0
		C	Fast		--	94.0
	OFF	A	Fast	114.0	--	114.1
			Slow		--	114.1
		C	Fast		--	114.1

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 (dB)	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.)	--	
105	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. 21289

Page 3 of 3 Pages

## 3.2 Differential level linearity

UUT Range (dB)	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.)	0.0	
	95.0	95.0	0.0	± 0.2 dB

Uncertainty : ± 0.1 dB

## 4. Frequency Weighting

### A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-40.4	- 39.4 dB, ± 1.5 dB
63 Hz	-27.2	- 26.2 dB, ± 1.5 dB
125 Hz	-17.0	- 16.1 dB, ± 1 dB
250 Hz	-9.4	- 8.6 dB, ± 1 dB
500 Hz	-2.6	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+1.8	+ 1.2 dB, ± 1 dB
4 kHz	+1.8	+ 1.0 dB, ± 1 dB
8 kHz	-0.4	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	-6.3	- 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	49.8	
1/10 <sup>3</sup>	50.0	50.1	± 1.0 dB
1/10 <sup>4</sup>	50.0	49.9	

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 : 1 001 hPa.

4. \*Out of specification.

----- END -----



# Calibration Certificate

Certificate No. **21290**

Page 1 of 2 Pages

**Customer :** Environmental Pioneers and Solutions Limited

**Address :** Flat A, 19/F., Chai Wan Industrial Centre Building, 21 Lee Chung Street, Chai Wan, HK.

**Order No. :** Q20468

**Date of receipt :** 2-Mar-12

## Item Tested

**Description :** Sound Level Calibrator

**Manufacturer :** Svantek

**Model :** SV30A

**Serial No. :** 7908

## Test Conditions

**Date of Test :** 5-Mar-12

**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	13535	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	15136	NIM-PRC & SCL-HKSAR
S041	Universal Counter	15610	SCL-HKSAR
S206	Sound Level Meter	16338	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:** 7-Mar-12



# Calibration Certificate

Certificate No. 21290

Page 2 of 2 Pages

Results :

## 1. Level Accuracy

UUT Nominal Value (dB)	Measured Value (dB)	IEC 942 Class 1 Spec.
94	94.10	± 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 : < 0.8 %

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 : 1001 hPa.

----- END -----



## ALS Technichem (HK) Pty Ltd

### REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**CONTACT:** MR ALLEN CHAN  
**CLIENT:** ENVIRONMENTAL PIONEERS & SOLUTIONS LTD  
**ADDRESS:** FLAT 19A, CHAI WAN INDUSTRIAL CENTRE BUILDING,  
20 LEE CHUNG STREET,  
CHAI WAN,  
HONG KONG.

**WORK ORDER:** HK1207405  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 16/03/2012  
**DATE OF ISSUE:** 30/03/2012

**PROJECT:** --

#### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

**Scope of Test:** Conductivity, Dissolved Oxygen, pH, Temperature and Turbidity  
**Description:** Multi-meter  
**Brand Name:** DKK-TOA  
**Model No.:** WMS-24  
**Serial No.:** 685940  
**Equipment No.:** --  
**Date of Calibration:** 21/03/2012 and 27/03/2012

#### NOTES

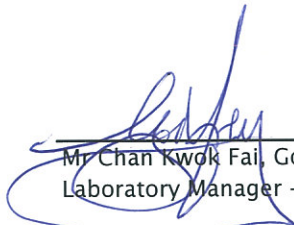
This is the Final Report and supersedes any preliminary report with this batch number. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

#### ISSUING LABORATORY: HONG KONG

##### **Address**

ALS Technichem (HK) Pty Ltd  
11/F Chung Shun Knitting Centre  
1-3 Wing Yip Street  
Kwai Chung  
HONG KONG

**Phone:** 852-2610 1044  
**Fax:** 852-2610 2021  
**Email:** [hongkong@alsglobal.com](mailto:hongkong@alsglobal.com)

  
Mr Chan Kwok Fai, Godfrey  
Laboratory Manager - Hong Kong

*This report may not be reproduced except with prior written approval from ALS Technichem (HK) Pty Ltd.*

Page 1 of 3

ADDRESS 11/F, Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., Hong Kong PHONE +852 2610 1044 FAX +852 2610 2021  
ALS TECHNICHEM (HK) PTY LTD Part of the ALS Laboratory Group A Campbell Brothers Limited Company

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1207405  
 Date of Issue: 30/03/2012  
 Client: ENVIRONMENTAL PIONEERS & SOLUTIONS LTD



Description: Multi-meter  
 Brand Name: DKK-TOA  
 Model No.: WMS-24  
 Serial No.: 685940  
 Equipment No.: --  
 Date of Calibration: 21/03/2012 and 27/03/2012 Date of next Calibration: 21 June, 2012

## Parameters:

### Conductivity

Method Ref: APHA (21st edition), 2510B

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	135.0	-8.1
6667	6340	-4.9
12890	11900	-7.7
58670	59300	1.1
	Tolerance Limit (%)	10.0

### Dissolved Oxygen

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
5.95	5.91	-0.04
6.66	6.63	-0.03
8.76	8.83	0.07
	Tolerance Limit ( $\pm$ mg/L)	0.20

### pH Value

Method Ref: APHA (21st edition), 4500H:B

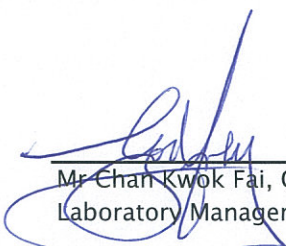
Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.05	0.05
7.0	7.10	0.10
10.0	10.08	0.08
	Tolerance Limit ( $\pm$ unit)	0.20

### Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading ( $^{\circ}$ C)	Displayed Reading ( $^{\circ}$ C)	Tolerance ( $^{\circ}$ C)
11.5	12.0	0.5
21.0	20.5	-0.5
32.0	31.1	-0.9
	Tolerance Limit ( $^{\circ}$ C)	2.0

  
 Mr Chan Kwok Fai, Godfrey  
 Laboratory Manager - Hong Kong

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1207405  
Date of Issue: 30/03/2012  
Client: ENVIRONMENTAL PIONEERS & SOLUTIONS LTD



Description: Multi-meter  
Brand Name: DKK-TOA  
Model No.: WMS-24  
Serial No.: 685940  
Equipment No.: --  
Date of Calibration: 21/03/2012 and 27/03/2012 Date of next Calibration: 21 June, 2012

## Parameters:

### Turbidity

Method Ref: ALPHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.00	--
4	3.86	-3.5
40	41.9	4.8
80	82.8	3.5
400	422.4	5.6
800	834.0	4.3
	Tolerance Limit ( $\pm\%$ )	10.0

  
Mr. Chan Kwok Fai, Godfrey  
Laboratory Manager - Hong Kong

## **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		2/5/2012	2/5/2012
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		11:07	10:29
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 955	
Wind Speed (m/s)		0.0	0.43
Measurement Results	L <sub>eq</sub> (dB(A))	61.0	66.9
	L <sub>10</sub> (dB(A))	64.9	67.7
	L <sub>90</sub> (dB(A))	53.1	50.5
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: Lau Kai Chung

Lau Kai Chung

2/5/2012



**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		9/5/2012	9/5/2012
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		11:30	10:30
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 27302	
Wind Speed (m/s)		0.2	0.3
Measurement Results	L <sub>eq</sub> (dB(A))	59.8	64.8
	L <sub>10</sub> (dB(A))	63.2	67.5
	L <sub>90</sub> (dB(A))	47.4	52.9
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

Perpared by: Lau Kai Chung

Lau Kai Chung

9/5/2012

**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		16/5/2012	16/5/2012
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		13:35	13:00
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 27302	
Wind Speed (m/s)		0.2	0.2
Measurement Results	L <sub>eq</sub> (dB(A))	63.0	66.5
	L <sub>10</sub> (dB(A))	64.9	68.9
	L <sub>90</sub> (dB(A))	53.7	61.5
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: Lau Kai Chung

Lau Kai Chung

16/5/2012

**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		23/5/2012	23/5/2012
Weather Condition		sunny	sunny
Measurement Start Time (hh:mm)		14:30	13:50
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 27302	
Wind Speed (m/s)		0.3	0.3
Measurement Results	L <sub>eq</sub> (dB(A))	70.0	64.9
	L <sub>10</sub> (dB(A))	71.5	67.7
	L <sub>90</sub> (dB(A))	63.1	58.5
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: Lau Kai Chung

Lau Kai Chung

23/5/2012

**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		30/5/2012	30/5/2012
Weather Condition		sunny	sunny
Measurement Start Time (hh:mm)		10:45	10:10
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 27302	
Wind Speed (m/s)		0.2	0.2
Measurement Results	L <sub>eq</sub> (dB(A))	63.5	65.7
	L <sub>10</sub> (dB(A))	65.5	67.7
	L <sub>90</sub> (dB(A))	55.2	55.1
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: Lau Kai Chung

Lau Kai Chung

30/5/2012

## **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 : 2/5/2012

Weather : Cloudy

Monitoring Location	W1	W2	
Time (hhmm)	10:19	10:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.33	7.25	
Salinity (ppt)	0.3	2.1	
Temperature (°C)	25.4	25.9	
Turbidity (NTU)	20.8	15.8	15.8
DO (mg/L)	6.35	6.00	
DO Saturation (%)	69%	65%	
Suspended Solids (mg/L)	7.0	8.8	8.8

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

2/5/2012

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

Date of Sampling : 4/5/2012

Weather : Cloudy

Monitoring Location	W1	W2	
Time (hhmm)	11:30	11:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.63	7.39	
Salinity (ppt)	1.7	8.4	
Temperature (°C)	27.5	27.4	
Turbidity (NTU)	20.5	23.8	23.8
DO (mg/L)	6.59	6.59	
DO Saturation (%)	64%	63%	
Suspended Solids (mg/L)	14.0	7.6	7.6

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

4/5/2012

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

Date of Sampling : 7/5/2012

Weather : Cloudy

Monitoring Location	W1	W2	
Time (hhmm)	14:30	15:30	
Tide Mode	Mid-ebb		
River Condition	Normal	Turbid	
Water Depth (m)	<1	<1	
pH value	7.53	7.42	
Salinity (ppt)	14.9	16.2	
Temperature (°C)	27.8	28.8	
Turbidity (NTU)	2.40	11.6	11.6
DO (mg/L)	6.68	6.89	
DO Saturation (%)	75%	87%	
Suspended Solids (mg/L)	6.2	7.6	7.6

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

7/5/2012



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

Date of Sampling : 9/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	14:10	14:30	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	8.06	8.19	
Salinity (ppt)	20.5.	21.6	
Temperature (°C)	29.7	30.4	
Turbidity (NTU)	9.4	16.1	16.1
DO (mg/L)	5.31	6.62	
DO Saturation (%)	68%	84%	
Suspended Solids (mg/L)	10.0	11.0	11.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

9/5/2012

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

Date of Sampling : 11/5/2012

Weather : Rainy

Monitoring Location	W1	W2	
Time (hhmm)	15:30	16:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Normal	
Water Depth (m)	<1	<1	
pH value	8.09	8.12	
Salinity (ppt)	19.3	21.2	
Temperature (°C)	26.9	27	
Turbidity (NTU)	8.1	13.2	13.2
DO (mg/L)	6.83	7.24	
DO Saturation (%)	69%	85%	
Suspended Solids (mg/L)	2.6	7.8	7.8

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

11/5/2012

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

Date of Sampling : 14/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	9:30	9:15	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.85	7.04	
Salinity (ppt)	0.5	8.5	
Temperature (°C)	26	26.8	
Turbidity (NTU)	3.1	13.5	13.5
DO (mg/L)	6.75	6.56	
DO Saturation (%)	82%	69%	
Suspended Solids (mg/L)	2.0	4.2	4.2

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

14/5/2012

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

Date of Sampling : 16/5/2012

Weather : Rainy

Monitoring Location	W1	W2	
Time (hhmm)	11:00	10:30	
Tide Mode	mid-ebb		
River Condition	Normal	Normal	
Water Depth (m)	<1	<1	
pH value	7.60	7.74	
Salinity (ppt)	0.5	8.4	
Temperature (°C)	25.6	27.2	
Turbidity (NTU)	8.5	16.1	16.1
DO (mg/L)	6.90	6.93	
DO Saturation (%)	78%	83%	
Suspended Solids (mg/L)	4.2	6.0	6.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

16/5/2012

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

Date of Sampling : 18/5/2012

Weather : Rainy

Monitoring Location	W1	W2	
Time (hhmm)	12:30	12:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.47	7.40	
Salinity (ppt)	0.6	2.5	
Temperature (°C)	25.6	25.9	
Turbidity (NTU)	5.6	3.3	3.4
DO (mg/L)	6.50	7.73	
DO Saturation (%)	75%	90%	
Suspended Solids (mg/L)	18.0	78.0	78.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

18/5/2012

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

Date of Sampling : 21/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	14:30	14:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.55	7.78	
Salinity (ppt)	14.5	15.6	
Temperature (°C)	26.7	27.7	
Turbidity (NTU)	16.4	18.1	18.1
DO (mg/L)	7.15	7.33	
DO Saturation (%)	85%	86%	
Suspended Solids (mg/L)	11.0	11.0	11.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

21/5/2012

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

Date of Sampling : 23/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	13:40	13:15	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	8.02	8.34	
Salinity (ppt)	14	19.5	
Temperature (°C)	25.8	26.6	
Turbidity (NTU)	6.6	7.4	7.4
DO (mg/L)	6.91	7.31	
DO Saturation (%)	82%	89%	
Suspended Solids (mg/L)	1.2	5.0	5.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

23/5/2012

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

Date of Sampling : 25/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	14:30	14:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.70	7.86	
Salinity (ppt)	16.3	18.2	
Temperature (°C)	27.7	28.4	
Turbidity (NTU)	8.9	14.5	14.5
DO (mg/L)	6.39	7.21	
DO Saturation (%)	73%	88%	
Suspended Solids (mg/L)	5.4	5.6	5.6

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

25/5/2012



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

Date of Sampling : 28/5/2012

Weather : Rainy

Monitoring Location	W1	W2	
Time (hhmm)	15:30	16:00	
Tide Mode	Mid-ebb		
River Condition	Turbid	Turbid	
Water Depth (m)	<1	<1	
pH value	7.62	7.49	
Salinity (ppt)	3.5	6.3	
Temperature (°C)	25.5	26	
Turbidity (NTU)	13.6	14.8	14.8
DO (mg/L)	7.24	7.35	
DO Saturation (%)	86%	87%	
Suspended Solids (mg/L)	4.6	8.0	8.0

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

28/5/2012

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

Date of Sampling : 30/5/2012

Weather : Sunny

Monitoring Location	W1	W2	
Time (hhmm)	9:30	9:00	
Tide Mode	Mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.58	7.58	
Salinity (ppt)	3	8.4	
Temperature (°C)	25	25.4	
Turbidity (NTU)	11.7	8.5	8.5
DO (mg/L)	7.21	7.32	
DO Saturation (%)	86%	87%	
Suspended Solids (mg/L)	6.20	5.80	5.80

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

**Name**

**Signature**

**Date**

Prepared By : Lau kai chung

Lau kai chung

30/5/2012

## **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	4-May-2012	15:45	Cloudy	0.24	0.12	0.150
H1	Mid	Flood	11-May-2012	11:05	Foggy	0.18	0.18	0.225
H1	Mid	Flood	18-May-2012	15:35	Rainy	0.12	0.18	0.225
H1	Mid	Flood	25-May-2012					0.000
H2	Mid	Flood	4-May-2012	15:30	Cloudy	0.12	0.12	0.754
H2	Mid	Flood	11-May-2012	11:20	Foggy	0.12	0.24	1.507
H2	Mid	Flood	18-May-2012	15:50	Rainy	0.18	0.12	0.754
H2	Mid	Flood	25-May-2012					0.000
H1	Mid	Ebb	4-May-2012	11:35	Sunny	0.37	0.12	0.150
H1	Mid	Ebb	11-May-2012	15:35	Foggy	0.12	0.12	0.150
H1	Mid	Ebb	18-May-2012	12:35	Rainy	0.37	0.30	0.375
H1	Mid	Ebb	25-May-2012	14:35	Sunny	0.18	0.12	0.150
H2	Mid	Ebb	4-May-2012	11:50	Sunny	0.12	0.12	0.754
H2	Mid	Ebb	11-May-2012	15:45	Foggy	0.12	0.12	0.754
H2	Mid	Ebb	18-May-2012	12:50	Rainy	0.24	0.18	1.130
H2	Mid	Ebb	25-May-2012	14:50	Sunny	0.12	0.18	1.130

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

\*\* : Only one mid-tide is within working hours of construction activity on 25 May.

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



Photo 1 – A temporary hoarding was established to surround the works area at Wai Ha River estuary.



Photo 2 – A temporary hoarding was established to surround Area B within Tung Tsz Nursery.



Photo 3 – A new section of temporary hoarding has been erected from southwest to eastern parts of the Tung Tsz Nursery.



Photo 4 – No polluted water was observed in the pond of the ECA and the adjacent Wai Ha River.



Photo 5 – Overall view of the transplanted tree U58 *Grevillea robusta*. New leaves were observed on the tree branches and trunk.



Photo 6 – Trees were newly translocated in May 2012.



Photo 7 – Temporarily stored construction materials were still observed within the TPZs in Area A.



Photo 8 – Temporarily stored construction materials were still observed within the TPZs in Area A.



Photo 9 – E22 has remained in poor health condition after the relocation in Area A.



Photo 10 – E33 and E34 have remained in poor health condition after relocation in Area A.



Photo 11 – The injured part of the retained tree E44 was wrapped by burlap and watersprouts was found near the wound.



Photo 12 – Declining health condition of U34 in Area B.



Photo 13 – Declining health condition of U35 in Area B.



Photo 14 – Declining health condition of U37 in Area B.



Photo 15 – Trees were translocated in May 2012.



Photo 16 – Trees were translocated in May 2012.



Photo 17 – Excessive soil was piled at the trunk base of A22 (*Terminalia catappa*).



Photo 18 – Excessive soil was piled at the trunk base of a *Terminalia catappa* without tree tag.





Photo 19 – After the translocation work, the planter and the guying ropes of A36 were removed. The palm was slightly leaning.



Photo 20 – The planter of U70 was found partially broken for the establishment of the temporary site hoarding.



Photo 21 – A planter of an under-sized tree was partially broken for the establishment of the temporary site hoarding



Photo 22 – The broken planter of U54 has been surrounded by orange construction nets.



Photo 23 – The planter of the untagged tree to the south of U54 was totally removed and the trunk base was covered by excessive soil.



Photo 24 – The tree to be transplanted T102 (*Melaleuca cajuputi* subsp. *cumingiana*) was recorded mechanically injured.



Photo 25 – The retained tree U50 (*Ficus elastica*) was also found mechanically injured.



Photo 26 – Piled soil inside the works area was found spreading towards U50 through the broken site hoarding



Photo 27 – Poor condition of the transplanted tree T152 in Area C.



Photo 28 – New leaves were found on the transplanted tree T153 in Area C.



Photo 29 – New leaves were found on the transplanted, untagged tree (possibly T149) in Area C.



Photo 30 – The protected shrubs *Pavetta hongkongensis* (PH01 and PH02) showed fair health condition in Area C.



Photo 31 – The protected shrub *Pavetta hongkongensis* (PH03) showed fair health condition in Area C.

**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.	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?
<b>A</b> <b>Noise Impact</b>							
S 3.30	2.18	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?
		positioning of construction plant should be at the maximum possible distance from ASRs.  ▪ Stockpiled excavated materials should be covered with tarpaulin, and should be removed off-site within 24 hours to avoid any odour nuisance arising.					
<b>C</b> <i>Water Quality Impact</i>							
S5.29	4.5	Construction Site Run-off and Drainage:  ▪ Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public	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?
		<p>sewers/drains.</p> <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. 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?
		<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> </ul>					
S5.31-S5.32	4.8-4.9	General Construction Activities: <ul style="list-style-type: none"> <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?
		when not being used. <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>					
S5.33	4.10	Sewage from Construction workforce: <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?
		licensed contractor would be responsible for appropriate disposal and maintenance of these facilities.					
S5.34	4.11	River Channel Excavation Works: <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>E Ecological Impact</b>							
S. 7.95	6.6	<ul style="list-style-type: none"> <li>▪ Sheet-pilings, which will be installed around the trench of excavation, should be extended above ground level for ~2m to act as hoarding to isolate the works site.</li> <li>▪ The trenching works for the construction of the proposed box culvert should be carried out in phases, with a trench length of not</li> </ul>	To minimize the impacts on the stream and natural river bank	Contractor	Whole site	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?
		more than 120m in each phase. The trench should be backfilled and compacted with suitable materials upon completion of each phase of the construction works.					
S7.117	6.6	<ul style="list-style-type: none"> <li>▪ The construction of intercept point of twin cell box culvert at the upstream of Wai Ha River should be confined to only one side of the river bank.</li> <li>▪ To restore and enhance the ecological value of the stream, the affected river bank should be reinstated to its original condition or lined with rock-filled gabion.</li> <li>▪ Planting pits should be provided in the gabion bank to allow the re-establishment of riparian vegetation.</li> </ul>	To minimize the impacts on the stream and natural river bank	Contractor	Whole site	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>▪ The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed.</li> </ul>					
S 7.118	6.7	<ul style="list-style-type: none"> <li>▪ All works carried out within the the river channel of Wai Ha River should be carried out from October to April, with construction carried out by land-based plant.</li> <li>▪ Works within river/stream channels should be restricted to an enclosed dry section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body.</li> </ul>	To minimise sedimentation/ water quality impacts	Contractor	Whole Site	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>▪ Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimize the risk of sedimentation and pollution of river water.</li> <li>▪ The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions.</li> <li>▪ To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet.</li> </ul>					
S 7.119	6.8	<ul style="list-style-type: none"> <li>▪ The construction of the proposed box-culvert would have the potential to directly impact a few</li> </ul>	To protect plant species of conservation interest	Contractor/ qualified botanist/horticu	Whole site	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>individual of a plant species of conservation interest (Hong Kong Pavetta, <i>Pavetta hongkongensis</i>). The affected individuals should be transplanted to a suitable nearby habitats prior to the construction phase.</p> <ul style="list-style-type: none"> <li>▪ A detailed vegetation survey of the affected species of conservation interest should be conducted by a suitably qualified botanist/ecologist to identify the affected individuals in order to provide details for transplantation scheme.</li> <li>▪ Transplantation should be supervised by a suitably qualified botanist/horticulturalist. A detailed transplantation methodology should be formulated during the detailed design stage of this Project.</li> </ul>		Horticulturalist			

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?
S 7.120	6.9	<ul style="list-style-type: none"> <li>▪ Noise mitigation measures such as the use of quieter construction plant and temporary noise barriers should be implemented to minimize disturbance to habitats adjacent to the works areas.</li> <li>▪ Temporary noise barriers should be used during the construction of the box-culvert along Tung Tsz Road, the floodwater pumping station, the mechanical gate, and drainage pipe to minimize potential construction phase disturbance to ardeids and avifauna foraging in marsh habitat.</li> <li>▪ Noise generating construction works near the Shuen Wan Egrettry SSSI should be avoided as far as practicable during the breeding season (March to June) of the</li> </ul>	To minimise disturbance impacts.	Contractor	Whole site	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?
		ardeids. <ul style="list-style-type: none"> <li>▪ Works near the SSSI (i.e. installation of mechanical gate) should be restricted to be executed outside the breeding season by provision of special conditions in the contract document.</li> <li>▪ Hoardings with minimum height of 2m should be set up along the south side of the proposed box culvert works area adjacent to the marsh, extending at least 20m at both ends, throughout the construction period.</li> </ul>					
S 7.121	6.10	<ul style="list-style-type: none"> <li>▪ Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or</li> </ul>	To minimise disturbance to habitats.	Contractor	Whole site	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?
		moderate-high ecological value habitats.					
S 7.121	6.10	<ul style="list-style-type: none"> <li>▪ Construction activities should be restricted to work areas that would be clearly demarcated. The work areas should be reinstated after completion of the works.</li> </ul>	To minimise disturbance to natural habitats outside works area.	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	<ul style="list-style-type: none"> <li>▪ Waste skips should be provided to collect general refuse and construction wastes. The wastes would be disposed of timely and properly off-site.</li> </ul>	To minimise disturbance to habitats.	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	<ul style="list-style-type: none"> <li>▪ General drainage arrangements should include sediment and oil traps to collect and control construction site run-off.</li> </ul>	To minimise sedimentation/ water quality impacts	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	<ul style="list-style-type: none"> <li>▪ Open burning on works sites is illegal, and should be strictly prohibited.</li> </ul>	To prevent accidental hill-fires.	Contractor	Whole site	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?
S 7.122	6.11	<ul style="list-style-type: none"> <li>▪ De-silting should be limited to the dry season.</li> </ul>	To minimise sedimentation/ water quality impacts	Maintenance parties of the channel	Whole site	Operation Phase	EIAO-TM
S 7.122	6.11	<ul style="list-style-type: none"> <li>▪ Waste material produced during de-silting should be disposed of in a timely and appropriate manner.</li> </ul>	To minimise sedimentation/ water quality impacts	Maintenance parties of the channel	Whole site	Operation Phase	EIAO-TM
S 7.123	6.12	<ul style="list-style-type: none"> <li>▪ Planting of trees should be provided within the project area to compensate for the unavoidable loss of approximately 0.08ha secondary woodland habitat due to the Project.</li> <li>▪ Planting of trees and other vegetation within project area along the banks of Wai Ha River and Tung Tsz Road should be carried out to provide compensation for unavoidable tree-felling and loss of riparian vegetation resulting from the</li> </ul>	To compensate the loss of vegetation	Contractor	Whole site	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?
		Project. <ul style="list-style-type: none"> <li>▪ The compensatory planting should make use of native plant species with flowers/fruits attractive to wildlife.</li> </ul>					
S 7.124	6.13	<ul style="list-style-type: none"> <li>▪ Compensation would be required for the loss of a small area of marsh habitat (about 0.30ha) within the CA resulting from the construction of the box-culvert.</li> <li>▪ An existing low ecological value recreational fishpond on government land adjacent to the marsh would be used as a proposed area (about 0.8ha) for the compensation for the marsh as well as secondary woodland habitats loss (0.08ha).</li> <li>▪ The pond should be enhanced by removing boardwalks around the</li> </ul>	To compensate the loss of marsh habitat and enhance the quality compensatory habitat	Contractor / qualified ecologist	The recreational fish pond located to the southwest of the existing Tung Tsz Nursery	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>existing pond, and restoring vegetation along the pond bunds, and it would be re-profiled to provide areas of shallow water (approximately 15-50cm deep), creating a suitable foraging habitat for avifauna, particularly ardeids and other waders.</p> <ul style="list-style-type: none"> <li>▪ Screen planting of shrubs and trees along the south-eastern bund of the pond should be implemented to minimise disturbance to avifauna and other wildlife from the adjacent recreational fishpond. The enhanced pond is expected to provide a moderate-high ecological value wetland habitat.</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?
<b>F</b>		<b><i>Landscape and Visual</i></b>					
Table 8.4	7.6	Visual screen, contaminant/ liaison with nursery, protection of existing trees with works area and construction light are used or practiced to mitigate the impacts during construction phase.	To mitigate the landscape	Contractor	Whole site	Construction	EIAO-TM
Table 8.4	7.7	Viewing area formation, architectural design for pump house, landscape design for pump house, enhancement planting along Tung Tsz Road, sufficient soil depth for enhancement planting, transplanting of trees to adjacent locations, preparation for transplanting and reinstatement of affected area are practiced to mitigate the impacts during operational phase.	To mitigate the landscape and visual impacts during the operational phase.	Contractor	Whole site	Detail Design / Operational Phase	EIAO-TM

**Appendix H:**

**A)**

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

**B)**

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

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
2.19	Use of quieter PME					Not applicable
2.20 - 2.21	Use of temporary noise barrier		Pipe laying in Wai Ha			Not applicable
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



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
3.5	Implement regular watering and vehicle washing facilities	To minimize construction dust impact	Construction Site	Construction phase	EIAO-TM	Outstanding
	Cover excavated or stockpile of dusty material by impervious sheeting or sprayed with water					Implemented
	Use tarpaulin to cover dusty materials on vehicles					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					Not applicable

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
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>	To minimize water quality impact to the designated Conservation Area	Works areas near the Conservation Area	Rainy seasons during construction	EIAO-TM WPCO	Not applicable

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					Implemented
5.7	Any unused chemicals or those with remaining functional capacity shall be recycled.	To achieve waste reduction	Works areas	Construction phase	EIAO-TM	Not applicable
	Recycle scrap metals or abandoned equipment					Implemented

<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>
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 NO. 31/2004	Implemented
5.10	Contractor should be a required to register with the EPD as a Chemical Waste Producer and to follow the guidelines states in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.	To minimize the environmental impacts associated with the handling, transportation and disposal of chemical waste.	Work site	Construction phase	EIAO-TM Waste Disposal (Chemical Waste)(General) Regulation	Implemented
	Good quality containers compatible with the chemical wastes should be used, and Incompatible chemicals should be stored separately.  Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc.					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>
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 No. 19/2005 ETWB TCW NO. 31/2004	Implemented
6.6	Sheet-pilings, which will be installed around the trench of excavation, should be extended above ground level for ~2m to act as hoarding to isolate the works site.  The trenching works for the construction of the proposed box culvert should be carried out in phases, with a trench length of not more than 120m in each phase. The trench should be backfilled and compacted with suitable materials upon completion of each phase of the construction works.	To minimize the impacts on the stream and natural river bank.	Whole site	Construction phase	EIAO-TM	Implemented
6.6	The construction of intercept oint of twin cell box culvert at the upstream of Wai Ha River should be confined to only one side of the river bank.  To restore and enhance the ecological value of the stream, the affected river bank should be reinstated to its original condition or lined with rock-filled gabion.  Planting pits should be provided in the gabion bank to allow the re-establishment of riparian vegetation.	To minimize the impacts on the stream and natural river bank.	Whole site	Construction phase	EIAO-TM	No 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>
	<p>The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed.</p>					
6.7	<p>All works carried out within the the river channel of Wai Ha River should be carried out from October to April, with construction carried out by land-based plant.</p> <p>Works within river/stream channels should be restricted to an enclosed dry section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body.</p> <p>Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimize the risk of sedimentation and pollution of river water.</p> <p>The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions.</p> <p>To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet.</p>	<p>To minimize sedimentation/ water quality impacts</p>	<p>Whole site</p>	<p>Construction phase</p>	<p>EIAO-TM</p>	<p>No applicable</p>

<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>
6.8	<p>The construction of the proposed box-culvert would have the potential to directly impact a few individual of a plant species of conservation interest (Hong Kong Pavetta, <i>Pavetta hongkongensis</i>). The affected individuals should be transplanted to a suitable nearby habitats prior to the construction phase.</p> <p>A detailed vegetation survey of the affected species of conservation interest should be conducted by a suitably qualified botanist/ecologist to identify the affected individuals in order to provide details for transplantation scheme.</p> <p>Transplantation should be supervised by a suitably qualified botanist/horticulturalist. A detailed transplantation methodology should be formulated during the detailed design stage of this Project.</p>	To protect plant species of conservation interest	Whole site	Construction phase	EIAO-TM	No applicable
6.9	Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimize disturbance to natural or moderate-high ecological value habitats.	To minimise disturbance to habitats.	Whole site	Construction phase	EIAO-TM	No applicable
6.13	General drainage arrangements should include sediment and oil traps to collect and control construction site run-off.	To minimise sedimentation/ water quality impacts	Whole site	Construction phase	EIAO-TM	Implemented

<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>
6.13	Construction activities should be restricted to work areas that would be clearly demarcated. The work areas should be reinstated after completion of the works.	To minimise disturbance to natural habitats outside works area.	Whole site	Construction phase	EIAO-TM	Implemented
6.13	Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimize disturbance to natural or moderate-high ecological value habitats.	To minimise disturbance to natural habitats	Whole site	Construction phase	EIAO-TM	Implemented
7.6	Visual screen, contaminant/ liaison with nursery, protection of existing trees with works area and construction light are used or practiced to mitigate the impacts during construction phase	To mitigate the landscape and visual impacts during the Construction phase	Whole site	Construction phase	EIAO-TM	Implemented
7.7	Viewing area formation , architectural design for pump house, landscape design for pump hose, enhancement planting along Tung Tsz Road, sufficient soil depth for enhancement planting, transplanting of trees to adjacent locations preparation for transplanting and reinstatement of affected area are practiced to mitigate the impacts during operational phase.	To mitigate the landscape and visual impacts during the operational phase	Whole site	Detail Design / Operational Phase	EIAO-TM	Not Applicable



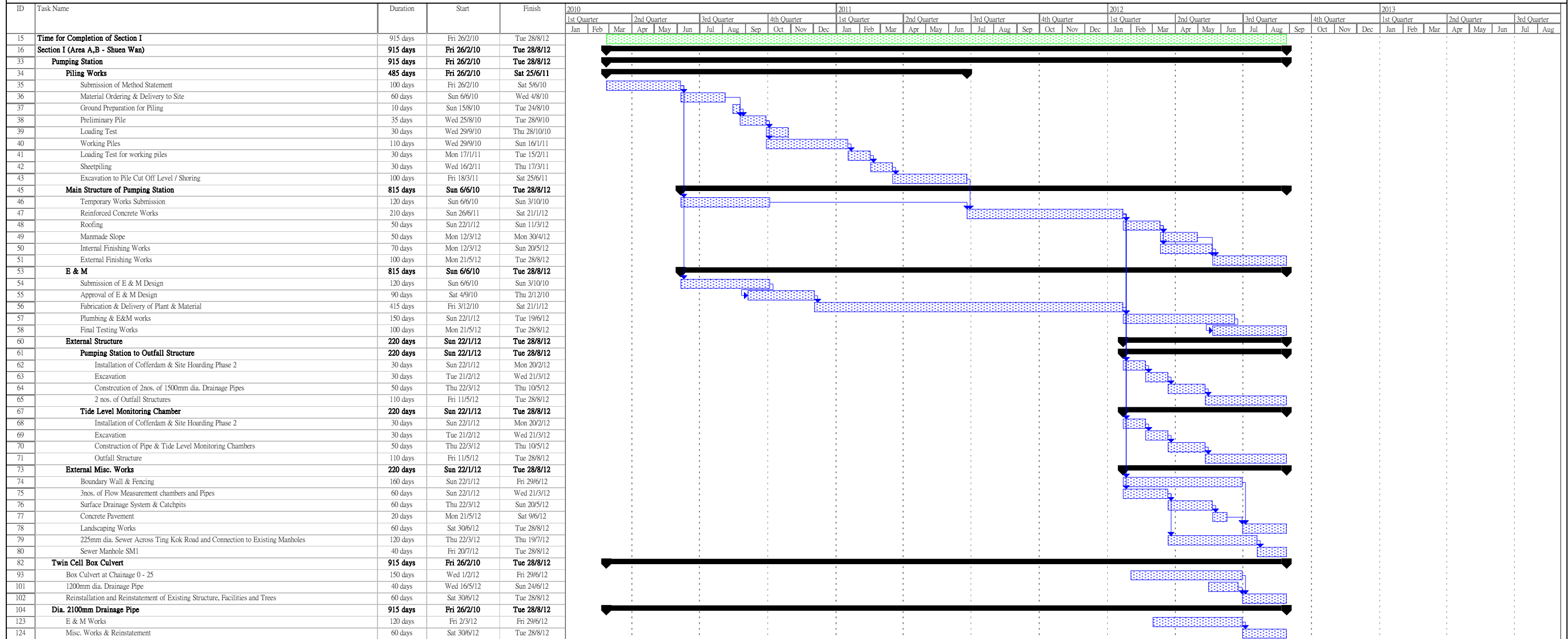
## **Appendix I: Construction programme**





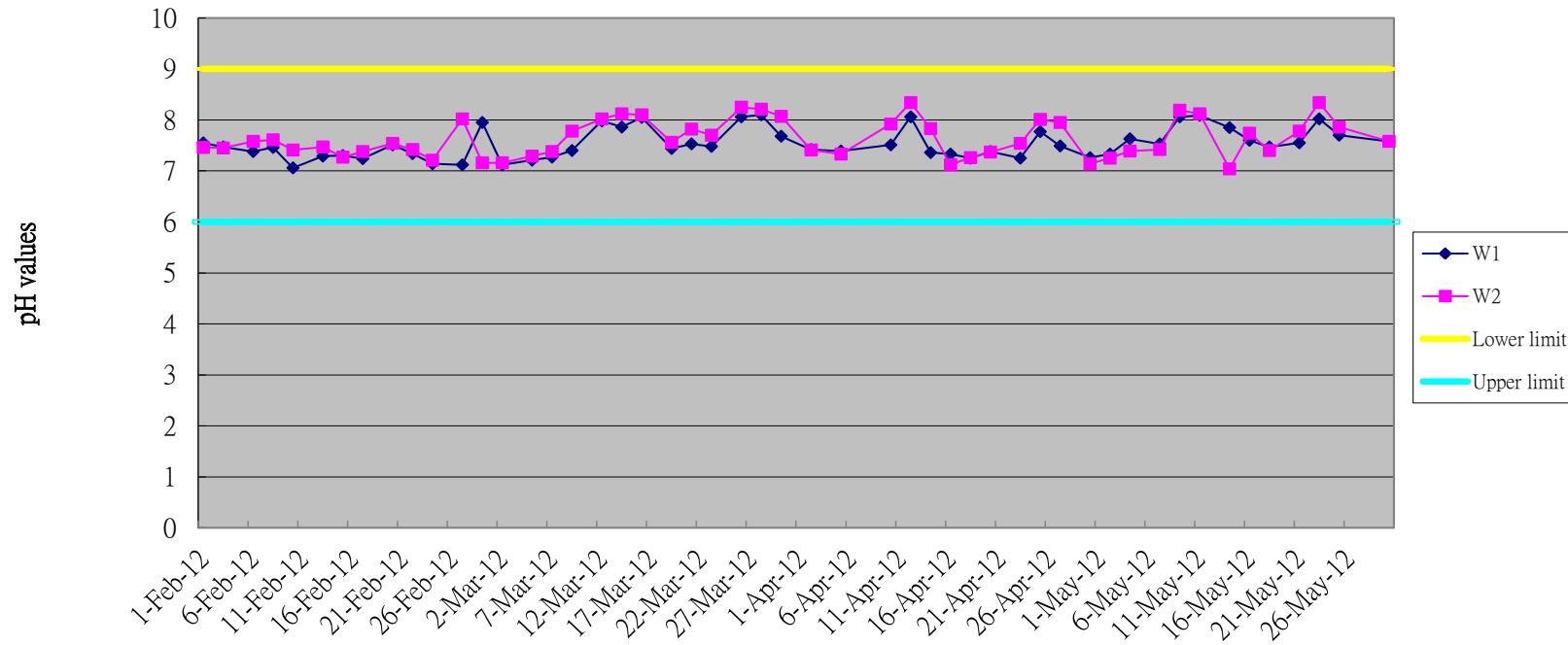
## **Appendix J: Three month rolling programme**

Master Programme ( Rev. 6)

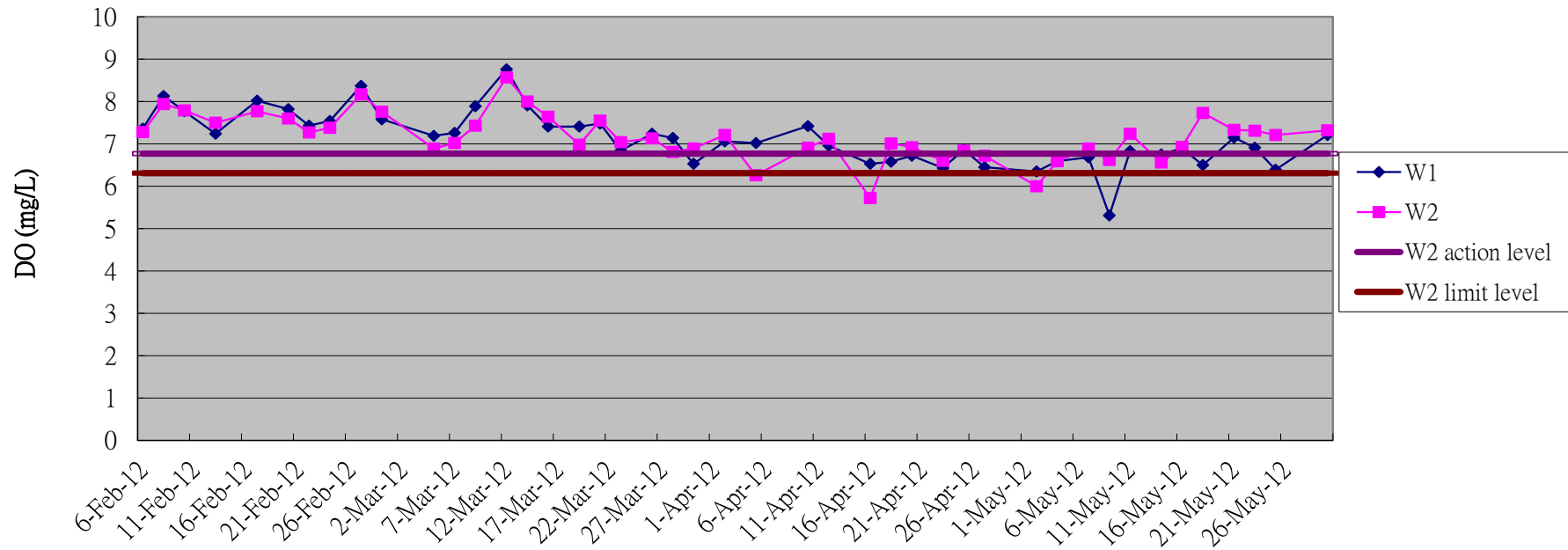


**Appendix K. Graphical plots of trends of monitored parameter**

Graphical plots of pH values W1&W2



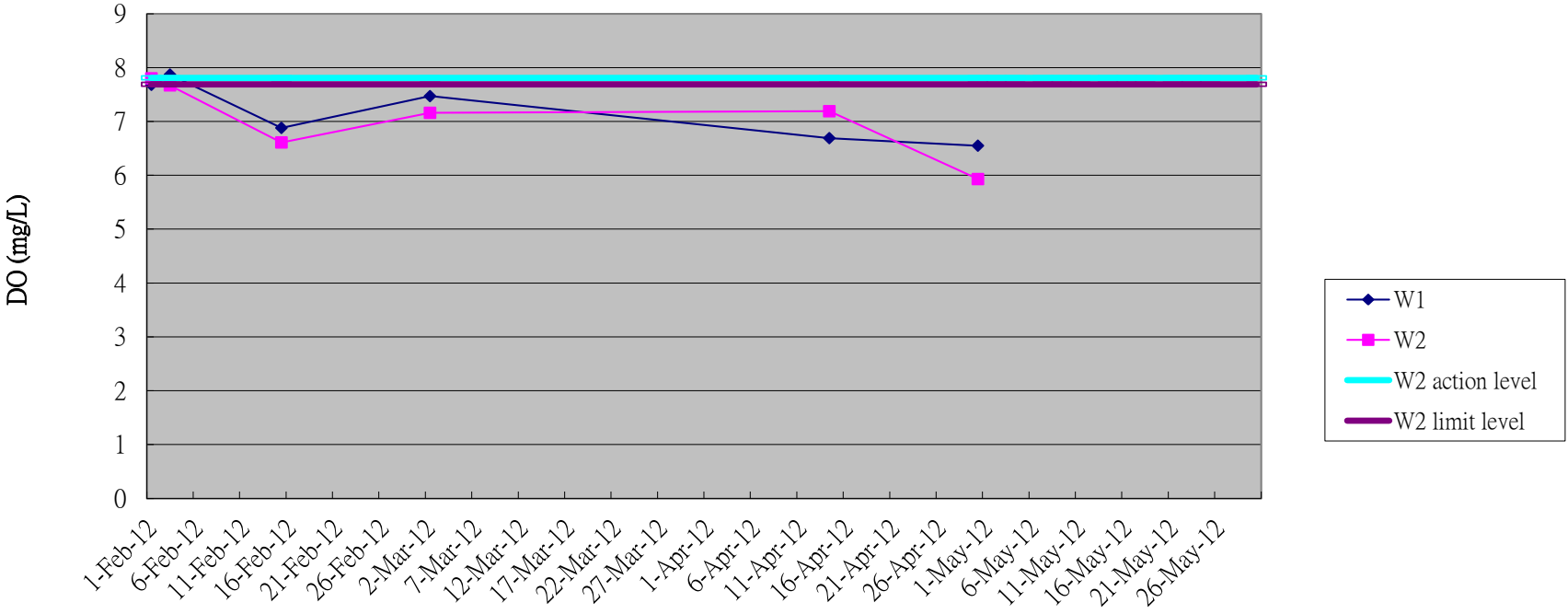
Graphical plots of DO (ebb tide) for W1&W2



Remarks: Action level: 5 percentile of baseline data  
Limit level: 1 percentile of baseline data

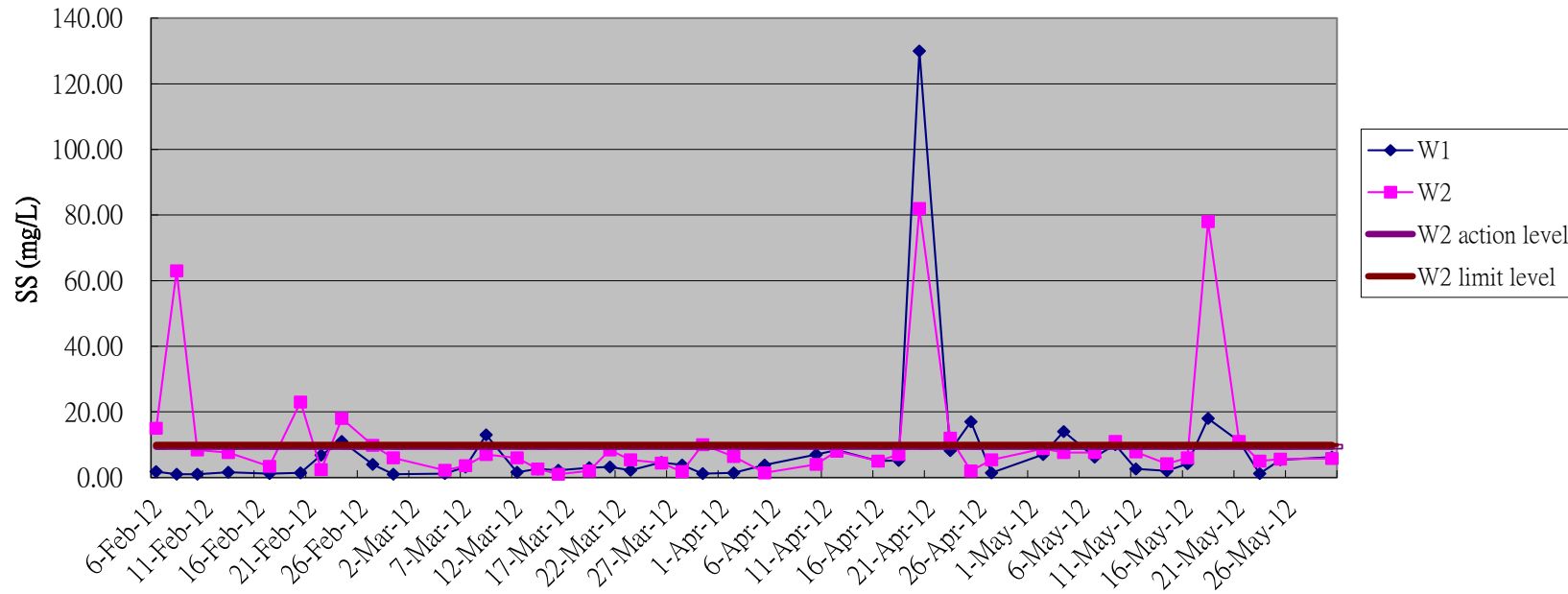


Graphical plot of DO (flood tide) of W1&W2



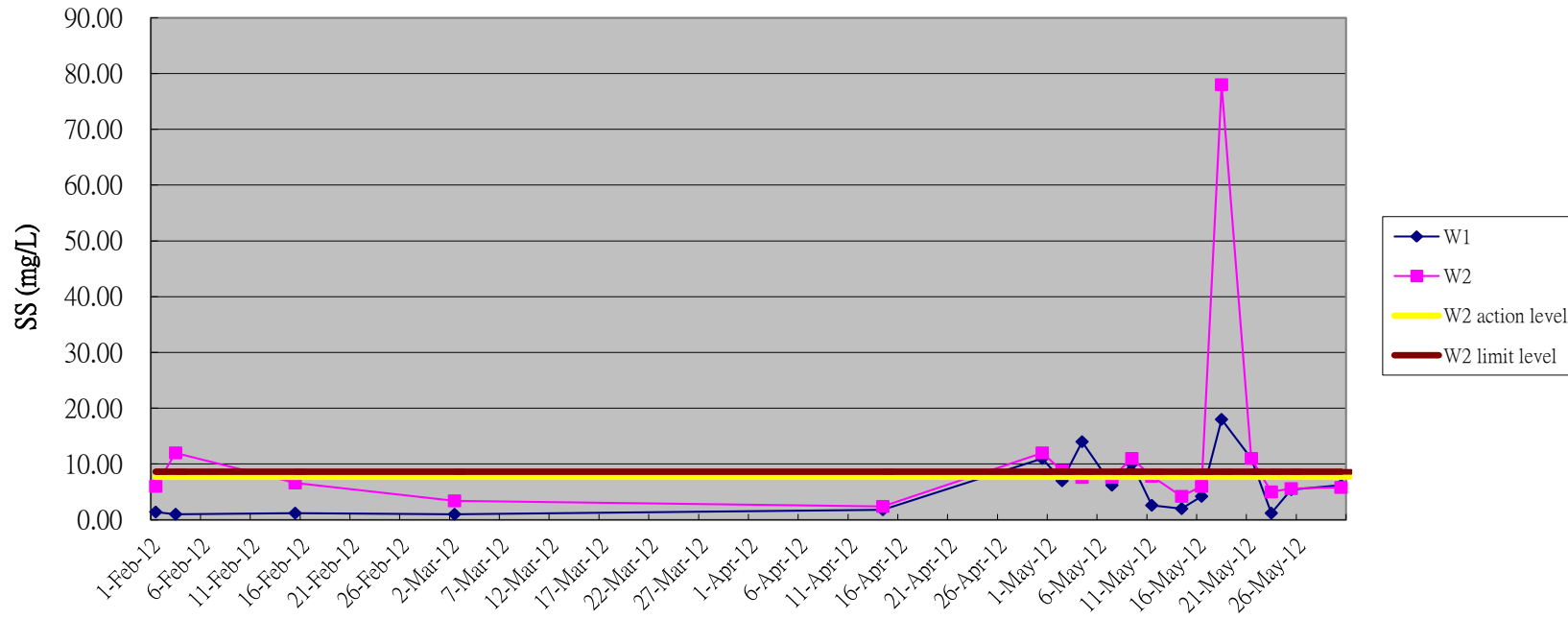
Remarks: Action level: 5 percentile of baseline data  
 Limit level: 1 percentile of baseline data

Graphical plots of SS (ebb tide) for W1&W2



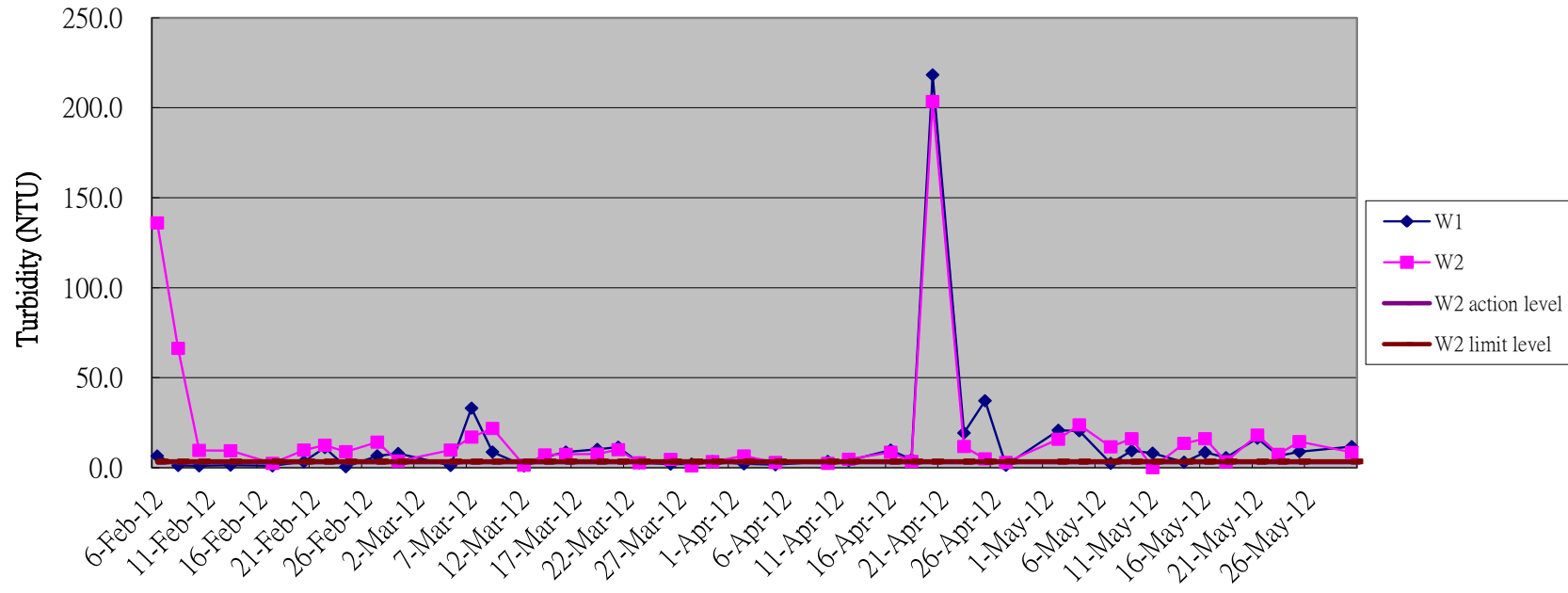
Remarks: Action limit is 95% of baseline data or 120% of upstream control station's SS  
 Limit level is 99% of baseline data or 130% of upstream control station's SS

Graphical plots of SS (flood tide) for W1&W2



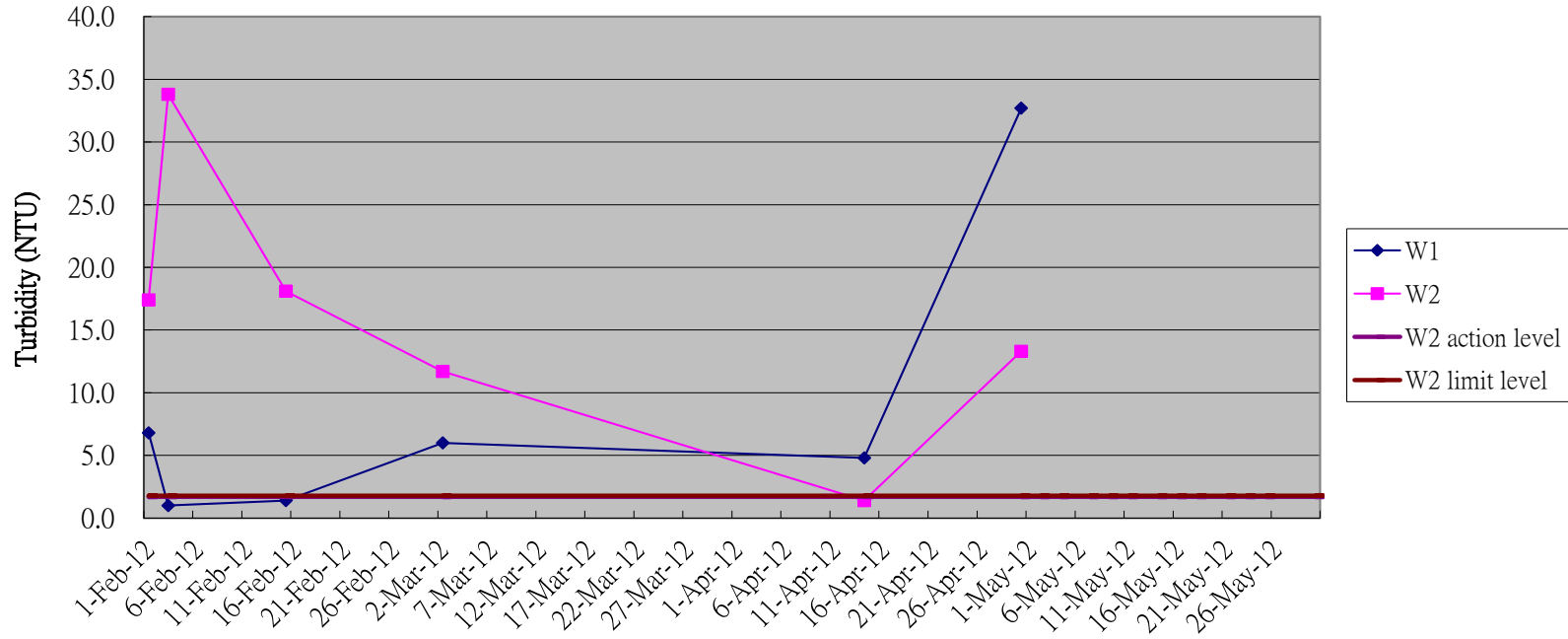
Remarks: Action limit is 95% of baseline data or 120% of upstream control station's SS  
Limit level is 99% of baseline data or 130% of upstream control station's SS

Graphical plots of Turbidity (ebb tide) for W1&W2



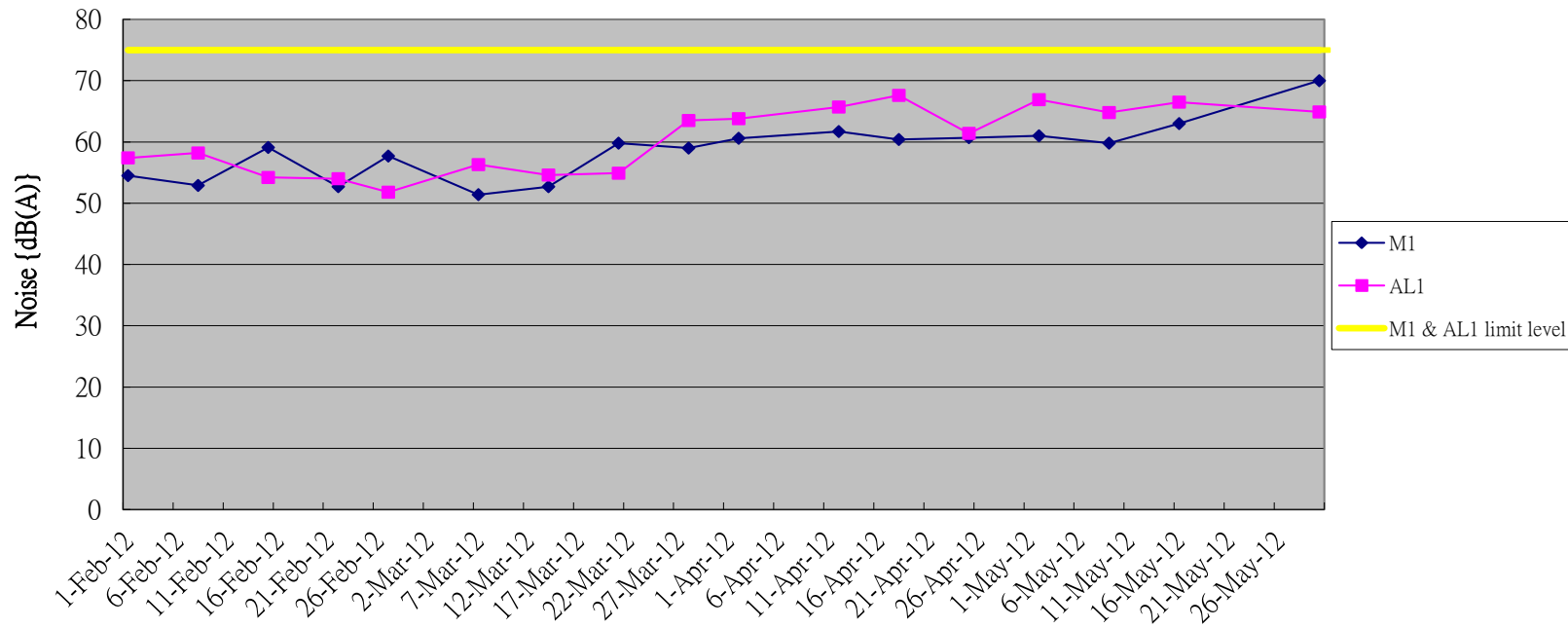
Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's Turbidity  
Limit level is 99% of baseline data or 130% of upsteam control station's Turbidity

Graphical plots of Turbidity (flood tide) for W1&W2



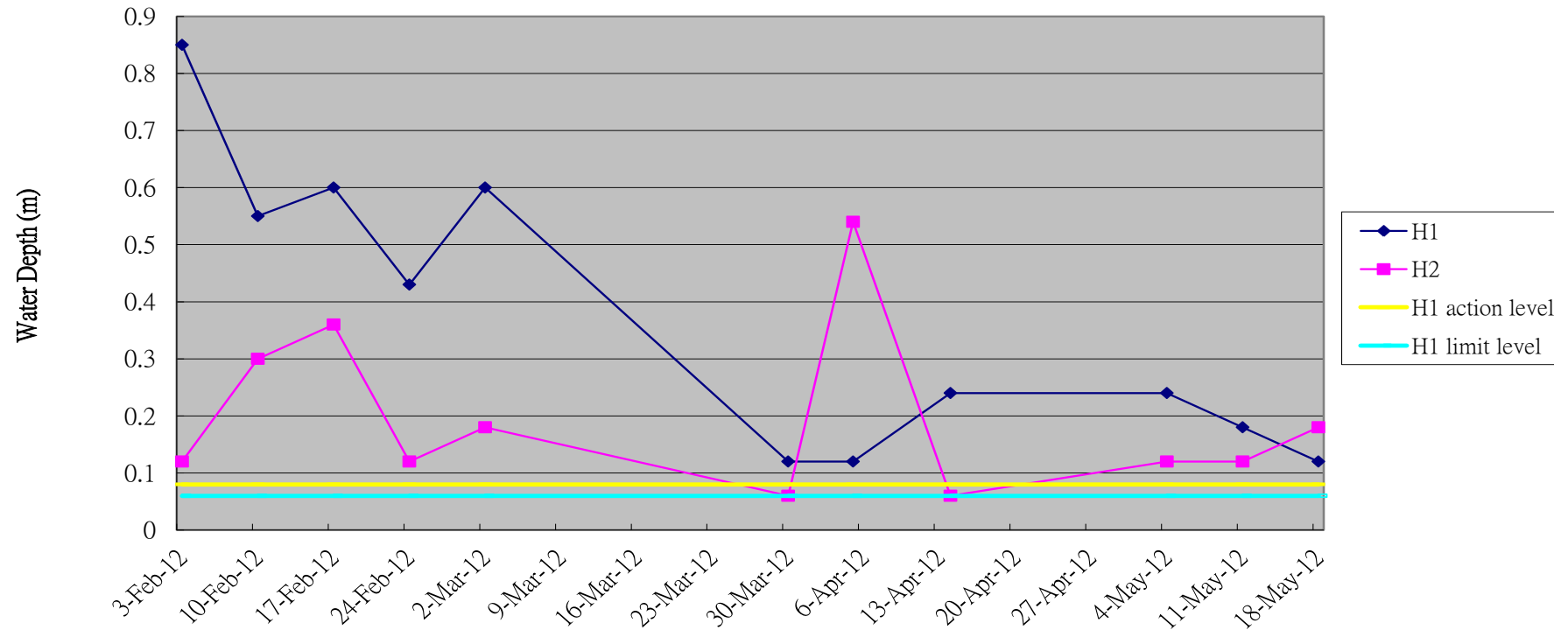
Remarks: Action limit is 95% of baseline data or 120% of upstream control station's Turbidity  
 Limit level is 99% of baseline data or 130% of upstream control station's Turbidity

Graphical plots of Noise for M1 & AL1



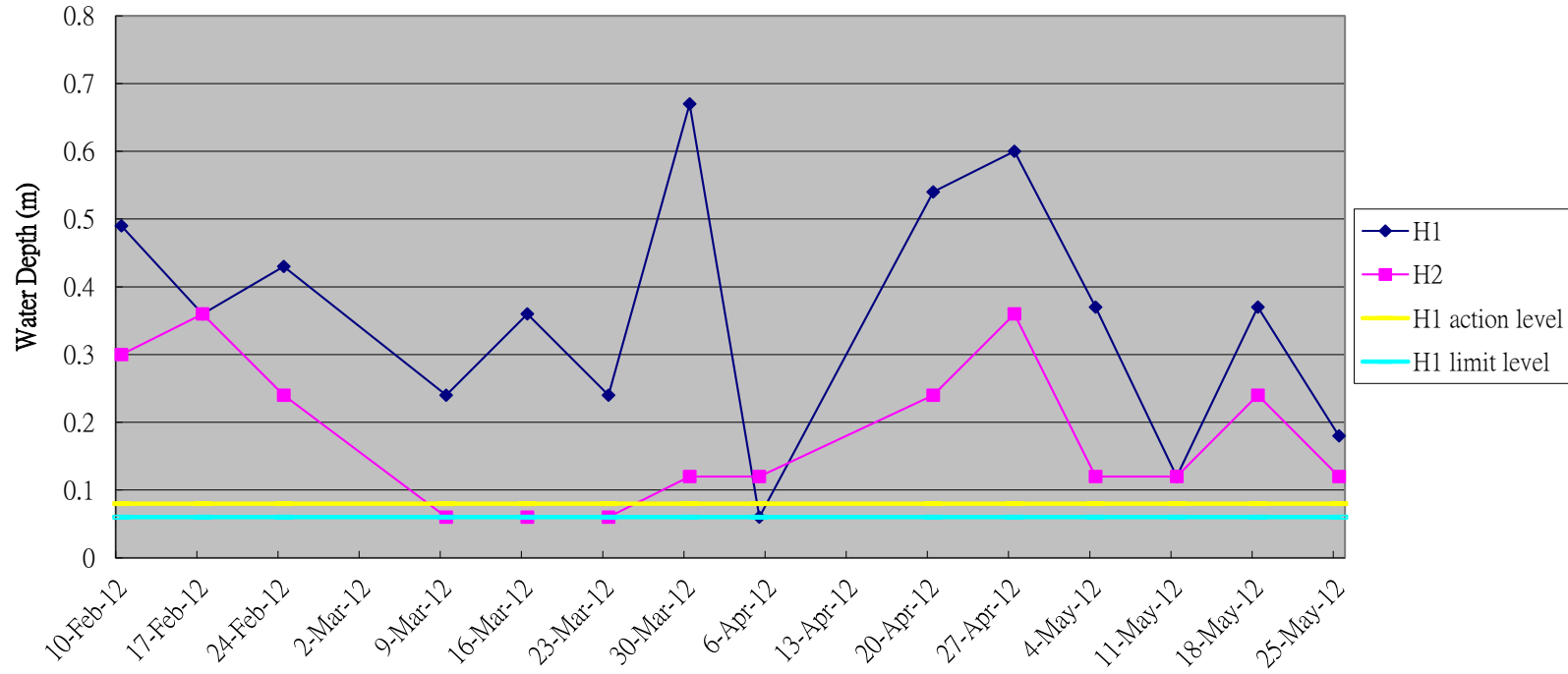
Remarks: Action limit is when one documented complaint is received

Graphical plots of Hydrological Monitoring(water depth at flood tide) for H1 & H2



Remarks: Action level: 80% of baseline water depth.  
Limit level: 60% of baseline water depth.

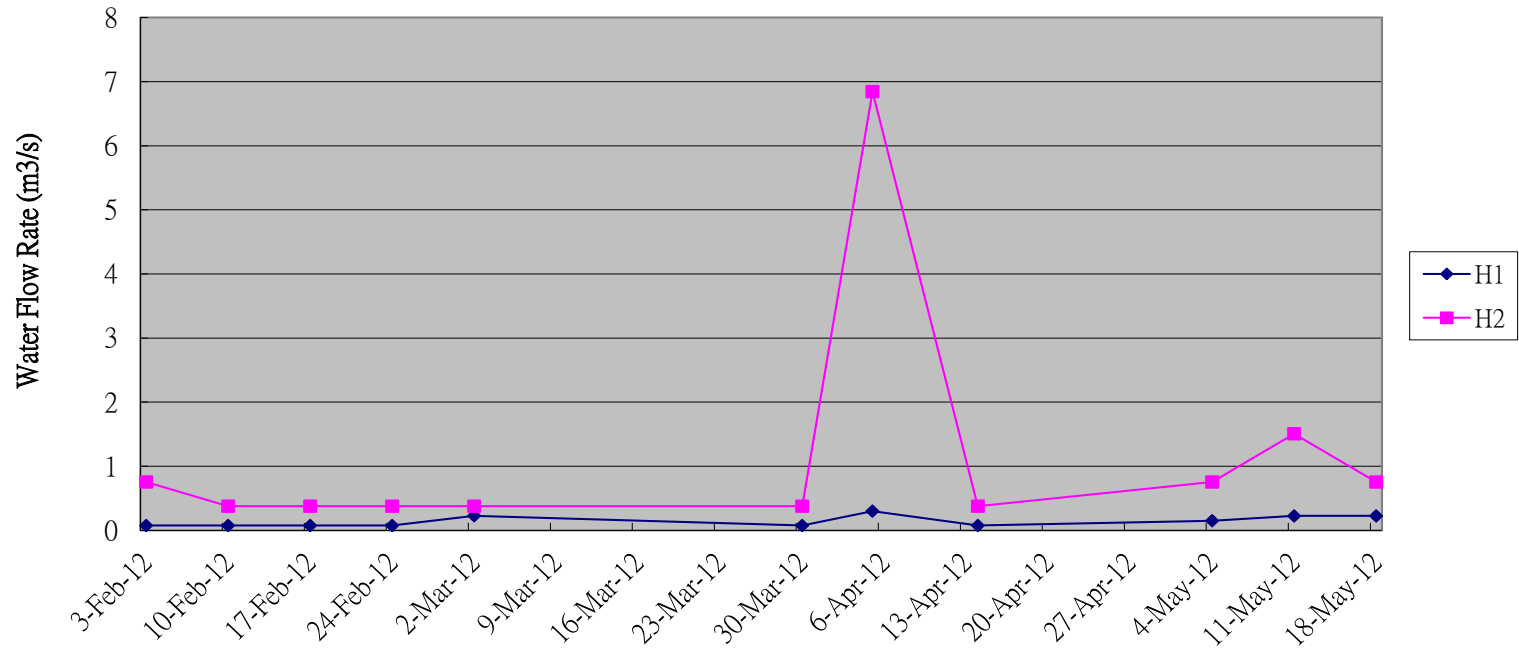
Graphical plots of Hydrological Monitoring(water depth at ebb tide) for H1 & H2



Remarks: Action level: 80% of baseline water depth.  
Limit level: 60% of baseline water depth.

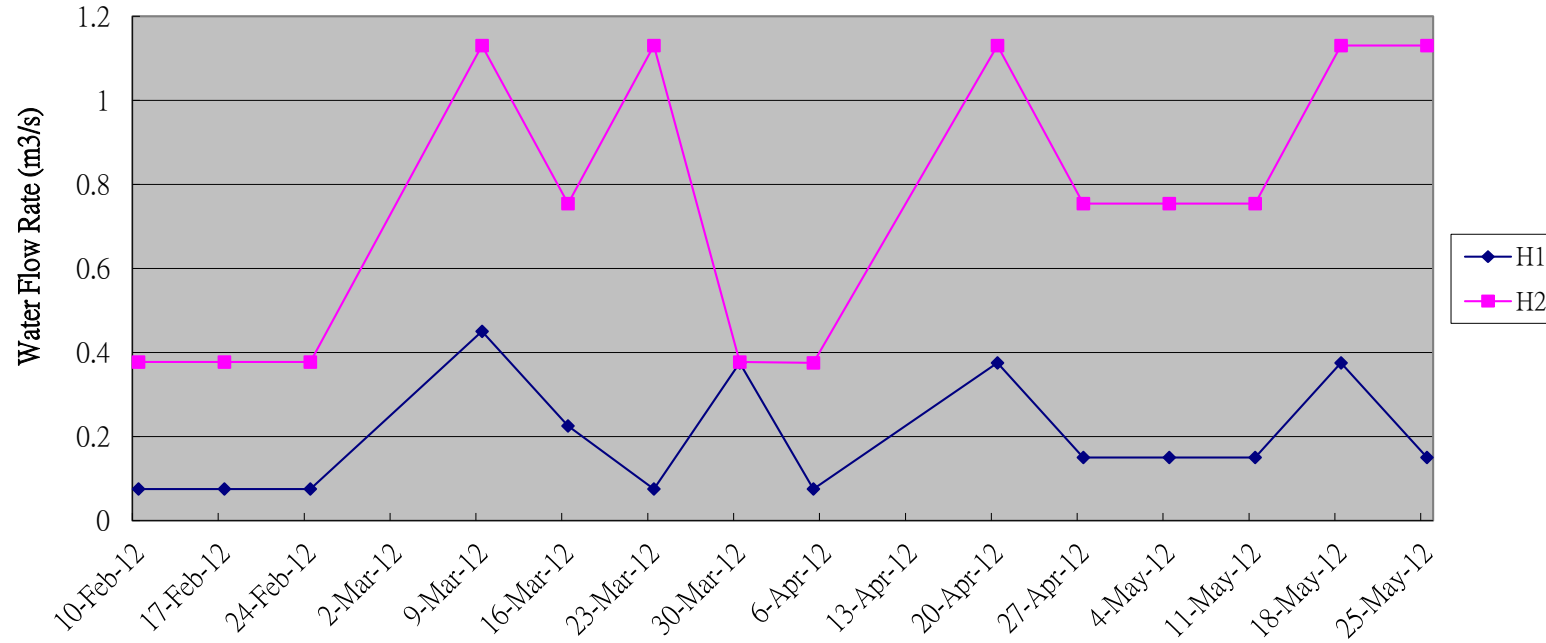


Graphical plots of Hydrological Monitoring(water flow rate at flood tide) for H1 & H2



Remarks: Action level: 120% of control station's water flow rate on the same day of measurement.  
Limit level: 140% of control station's water flow rate on the same day of measurement.

Graphical plots of Hydrological Monitoring(water flow rate at ebb tide) for H1 & H2



Remarks: Action level: 120% of control station's water flow rate on the same day of measurement.  
Limit level: 140% of control station's water flow rate on the same day of measurement.

Appendix L.

A). List of recorded vegetation and relative abundance in the Ecological Compensatory Area (ECA) during construction phase in May 2012.

B). List of transplanted trees in the Ecological Compensatory Area (ECA) during construction phase in May 2012.

C). Condition of transplanted species *Pavetta hongkongensis* in ECA since 20 th Dec 2011

**Appendix L (A).** List of recorded vegetations and relative abundance in the ECA during establishment phase in April 2012.

<b>Species</b>	<b>*Status in Hong Kong</b>	<b>Growth form</b>	<b><sup>1</sup>Status in ECA</b>	<b><sup>2</sup>Relative abundance</b>	<b>Condition</b>
<i>Bidens bipinnata</i>	E	Herbs	S	+	Fair
<i>Panicum maximum</i>	E	Herbs	S	+	Fair
<i>Celtis sinensis</i>	N	Trees	S	+	Fair
<i>Terminalia catappa</i>	E	Trees	R	+	Fair
<i>Cocculus orbiculatus</i>	N	Climbers	R	+	Fair
<i>Mangifera indica</i>	E	Trees	R	+	Fair
<i>Dimocarpus longan</i>	E	Trees	R	+	Fair
<i>Michelia x alba</i>	E	Trees	R	+	Fair
<i>Oxalis corniculata</i>	N	Herbs	S	+	Fair
<i>Stephania longa</i>	N	Climbers	S	+	Fair
<i>Leucaena leucocephala</i>	E	Shrubs	S	+	Fair
<i>Amaranthus viridis</i>	N	Herbs	S	+	Fair
<i>Solanum nigrum</i>	N	Herbs	S	+	Fair
<i>Paspalum dialatum</i>	E	Perennial Herb	S	+	Fair
<i>Mikania micrantha</i>	E	Climbing Herb	S	+	Fair
<i>Macaranga tanarius</i>	N	Tree	R	+	Fair
<i>Cassia surattensis</i>	E	Shrub or Small Tree	S	+	Fair

<i>Conyza sumatrensis</i>	E	Herb	S	+	Fair
<i>Sansevieria trifasciata</i> <i>Prain</i>	E	Perennial Herb	S	+	Fair
<i>Alocasia odora</i>	N	Perennial Herb	S	+	Fair
<i>Livistona chinensis</i>	E	Tree Palm	S	+	Fair
<i>c.f. Ulothrix</i> sp.	N	Algae	S	+	Fair
<i>Enteromorpha</i> sp.	N	Algae	S	+	Fair
<b>Total number of species</b>	<b>23</b>				

**Key:**

\*Status in Hong Kong

E = Exotic

N = Native

<sup>1</sup>Status in ECA:

R = retained

S = naturally colonized

<sup>2</sup>Relative abundance:

+ = Present

++ = Common

+++ = Abundant

**Appendix L (B).** List of trees transplanted from Work Areas of Contract 1 & 2 to ECA during establishment phase in April 2012.

<b>Tree No.</b>	<b>Species Name</b>	<b>*Status in Hong Kong</b>	<b>Growth form</b>	<b>Date of transplantation</b>	<b>Condition</b>	<b>Remarks</b>
T150	<i>Bombax ceiba</i>	E	Tree	22/6/2011	Fair	
T151	<i>Bombax ceiba</i>	E	Tree	22/6/2011	Fair	
T152	<i>Bombax ceiba</i>	E	Tree	22/6/2011	Fair	Dehydrated Crown
T153	<i>Bombax ceiba</i>	E	Tree	22/6/2011	Fair	Sparse Crown
T154	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T155	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T156	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T157	<i>Bombax ceiba`</i>	E	Tree	14/6/2011	Fair	
T158	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	Dehydrated Crown
T159	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T160	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T161	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T162	<i>Bombax ceiba</i>	E	Tree	14/6/2011	Fair	
T250	<i>Celtis sinensis</i>	N	Tree	22/6/2011	Poor	Injured and dried bark, Dehydrated Crown
T165	<i>Melaleuca quinquenervia</i>	E	Tree	22/6/2011	Fair	
T168	<i>Melaleuca quinquenervia</i>	E	Tree	Nov 2011	Fair	

**Appendix L (C).** Condition of transplanted species *Pavetta hongkongensis* in ECA since 20<sup>th</sup> Dec 2011.

<b>Specimen No.</b>	<b>Species Name</b>	<b>Growth Form</b>	<b>Height (m)</b>	<b>Date of transplantation</b>	<b>Condition</b>	<b>Remarks</b>
PH01	<i>Pavetta hongkongensis</i>	Tree / Shrub	2	20 <sup>th</sup> Dec 2011	Fair	Blooming observed
PH02	<i>Pavetta hongkongensis</i>	Tree / Shrub	2	20 <sup>th</sup> Dec 2011	Fair	
PH03	<i>Pavetta hongkongensis</i>	Tree / Shrub	1	20 <sup>th</sup> Dec 2011	Fair	

Date of weekly monitoring: 4 Jan, 13 Jan, 17 Jan, 28 Jan, 3 Feb, 6 Feb, 15 Feb, 22 Feb, 1 Mar, 6 Mar, 12 Mar, 18 Mar, 29 Mar, 27 Apr, 31 May 2012.

Appendix M: Ecological monitoring report



---

Agreement No. DP/01/2010  
Drainage Improvement Works in Shatin and Tai Po:  
Ecological Monitoring in area under Contract 1  
(Report 8a for May 2012)

Prepared for:  
**Drainage Services Department**

Prepared by:  
**ENVIRON Hong Kong Limited**

Date:  
**Jun 2011**

Reference Number:  
R2580\_V1.0

Agreement No. DP/01/2010  
Drainage Improvement Works in Shatin and Tai Po:  
Ecological Monitoring in area under Contract 1  
(Report 8a for May 2012)

Prepared by:



---

Justin Ye  
Assistant Environmental Consultant

Approved by:



---

Tony Cheng  
Project Manager

**ENVIRON Hong Kong Limited**  
**Room 2310, China Resources Building**  
**26 Harbour Road, Wan Chai, Hong Kong**

Tel: (852) 3743 0788

Fax: (852) 3548 6988

Email: [hkinfo@environcorp.com](mailto:hkinfo@environcorp.com)

*Q:\Projects\DSDSHUWNEM00\Report\Bi-Monthly Construction Phase Ecological Monitoring  
Report\201205\8a*

# Contents

	Page
<b>1. Introduction .....</b>	<b>1</b>
1.1 Project description .....	1
<b>2. Highlights of this report .....</b>	<b>1</b>
<b>3. Summary of construction activities for the month .....</b>	<b>2</b>
<b>4. Monitoring Methodology .....</b>	<b>2</b>
4.1 Vegetation survey .....	2
4.2 Avifauna .....	2
4.3 Herpetofauna .....	3
4.4 Butterflies and Odonata .....	3
4.5 Mammals.....	3
4.6 Aquatic fauna.....	3
<b>5. Monitoring data.....</b>	<b>4</b>
5.1 Vegetation survey .....	4
5.2 Birds watch .....	4
5.3 Herpetofauna .....	4
5.4 Butterflies .....	4
5.5 Odonata.....	4
5.6 Mammal .....	5
5.7 Aquatic fauna.....	5
<b>6. Remedial measures adopted to the adverse condition .....</b>	<b>5</b>
<b>7. Record of complains and remedial measures.....</b>	<b>5</b>
<b>8. Review of the monitoring results.....</b>	<b>5</b>
<b>9. Forecast of works programme and monitoring requirements .....</b>	<b>5</b>
<b>10. Comments and summary .....</b>	<b>6</b>
<b>11. References .....</b>	<b>7</b>

### List of Tables

- Table 1: List of riparian vegetation and coverage (%) recorded from two stream sampling points under Contract 1 (i.e. SEMP 1, 2).
- Table 2: List of vegetation recorded from works area under Contracts 1 and 100 m buffer area in the impact monitoring survey conducted in May 2012. Vegetation species presents in the identified location was indicated by "V".
- Table 3: List of avifauna species and maximum counts recorded from the impact monitoring survey in May 2012 at work area under Contracts 1 and 100 m buffer area.
- Table 4: List of herpetofauna and maximum counts recorded from the impact monitoring survey in May 2012 at work area under Contracts 1 and 100 m buffer area.

### List of Figures

- Figure 1: Map showing the ecological monitoring transect and the boundary of assessment area.
- Figure 2: SEMP 1, the first sampling point of Wai Ha River under Contract 1.
- Figure 3: SEMP 2, the second sampling point along Wai Ha River under Contract 1.

# 1. Introduction

## 1.1 Project description

The Drainage Improvement Works in Shuen Wan was undertaken to minimize the potential flooding impacts in Sha Tin and Tai Po area. Although the Ecological Impact Assessment in the EIA Report identified that ecological impacts resulting from the proposed drainage improvement works at Shuen Wan were anticipated to be very minor in scale, ecological mitigation and ecological monitoring were recommended in the EM&A Manual ([http://env-shuenwan.com/pdf/review\\_note\\_em&a\\_rev.3.pdf](http://env-shuenwan.com/pdf/review_note_em&a_rev.3.pdf)) as stipulated under Environment Permit No. EP-303/2008.

Scope of ecological impact monitoring was described in the Particular Specifications and EM & A Manual of the projects. In brief, the monitoring tasks include regular check on the retained and transplanted trees and shrubs, monitoring on fauna groups and aquatic fauna within the works area and any ecologically sensitive area within 100 m of the works boundary.

China-Hong Kong Ecology Consultants Co. was commissioned by ENVIRON Hong Kong Limited to perform the ecological impact monitoring survey for areas under Contract 1 starting from March 2011.

The outline of this ecological monitoring report was as follow:

- Highlights of this report
- Summary of construction activities for the month
- Monitoring methodology
- Monitoring data
- Remedial measures adopted to the adverse condition
- Record of complains and remedial measures
- Review of monitoring results
- Forecast of works programme and monitoring requirements
- Comments and brief summary

This is the report No. 8 ecological monitoring conducted on 31<sup>th</sup> May 2012 within the works boundary under Contract 1 and area within 100 m from the works boundary.

## 2. Highlights of this report

- Field survey was conducted on 31<sup>th</sup> March 2012
- Construction activities of Contract 1 was continued since March 2011
- Lower number of species was observed within the works area under Contract 1, in particular stream ecological monitoring point 2 (SEMP 2) due to recent river diversion for Ecological Compensatory Area (ECA) construction.
- Habitats in the 100 m buffer area retain its natural condition.

### 3. Summary of construction activities for the month

Major construction activities carried out in Contract 1 by the contractor during the present monitoring period (March 2012) includes:

- **Pumping station (Area A):**
  - Construction of superstructure of pumping station
  - Construction of 2100 drainage pipe along Ting Kok Road
  - Construction of Flow Measurement Chamber in Pumping Station
  
- **Tung Tsz Nursery Community Garden (Area B)**
  - Construction of Box Culvert in Tung Tsz Nursery
  - Construction of Jacking Pit in Tung Tsz Nursery
  
- **ECA (Area C)**
  - Hydroseeding, In maintenance stage

### 4. Monitoring Methodology

Ecological monitoring methods were generally followed those described in the baseline ecological surveys (DC/2009/22). However, sampling area maybe reduced because of habitat change, for instance, deforestation and channel modification due to drainage works, where sampling was not applicable. Survey data and evaluation are detailed in the following sections.

#### 4.1 Vegetation survey

Vegetation survey was performed along the designated transects (**Figure 1**) for ecological monitoring as described in the project specifications to monitor the vegetation health which could be adversely influenced by any bad site practice. Qualitative data of plants within the works boundary and wetland vegetation in the 100 m buffer area of Contract 1 adjacent to construction site and wetland was recorded. Riparian vegetation including aquatic and emergent at 4 stream ecological monitoring points (hereinafter referred to as "SEMP") under Contract 1 ( i.e. SEPM 1 & 2; **Figure 2 & 3**) along the affected stream channel and riparian habitat was recorded in terms of species, relative abundance and average heights. Any signs of damages and adverse health problems directly caused the works were recorded and reported. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Hong Kong Herbarium (2004).

## **4.2 Avifauna**

Bird survey was conducted by following the proposed transects which cover the major ecologically sensitive areas of the Project (**Figure 1**). All bird species were recorded with special attention paid on the species of conservation importance and wetland-dependent species. List of bird species recorded and the relative abundance was provided.

## **4.3 Herpetofauna**

Herpetofauna survey was conducted via direct observation and active searching along the survey transects with a focus in the work areas (**Figure 1**). All reptiles and amphibians encountered or heard were recorded. Nomenclature and conservation status of herpetofauna species follows AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)).

## **4.4 Butterflies and Odonata**

Odonates and butterfly survey of different habitats within the Study Area was conducted along the proposed transect (**Figure 1**). All butterflies and odonata were identified and relative abundance was recorded. Nomenclature and status of conservation of butterflies follows Lo & Hui (2005) while that of odonata follows AFCD websites ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)).

## **4.5 Mammals**

As the monitoring site was situated near traffics, plant nursery and residential buildings, mammals were unlikely inhabited at the site except rodents, domestic dogs and cats. Detailed mammal monitoring was not conducted. However, any sighting, tracks and signs of mammals encountered during survey of other faunal groups was recorded. Bat was surveyed by search for potential colony habitat, such as palm trees, which are often used by fruit bats as nesting sites.

## **4.6 Aquatic fauna**

Monitoring of aquatic fauna was carried out mainly by bank-side observation, sometimes with the aid of binoculars, at two stream ecological monitoring points under Contract 1 (i.e. SEMP 1 & 2). These points are selected for covering representative sections of Wai Ha River and are shown in Figure 1. Netting and fish traps were also deployed at these points to collect supplementary data. Aquatic fauna seen/collected was identified in situ to the lowest possible taxon and relative abundance was presented.

## 5. Monitoring data

### 5.1 Vegetation survey

The habitats identified in area under Contract 1 are marine, recreational fish pond, river course, wooded area, mangrove, marsh and developed area (including village). Vegetation were found in wooded area, mangrove, marsh, develop area and river bank. During the current monitoring period, some riparian climbers (*Cocculus orbiculatus*) at SEMP 2 was removed due to direct conflict with the construction of ECA. The riparian vegetations were dominated by *Leucaena leucocephala* and *Plantago* major with average coverage ranged from 15% to 40% (**Table 1**). A list of plant species recorded from different habitats within the assessment area under Contract 1 is presented on Table 2. A total of 130 species were recorded within the assessment boundary of Contract 1 in which 121 species were recorded within the buffer area, while 52 species recorded within the work areas under Contract 1. No protected species were recorded.

### 5.2 Birds watch

A total of 15 bird species were recorded in the current survey under Contract 1 (**Table 3**). In the work area under Contract 1, 7 bird species were recorded in which none are considered to be of conservation concern. A total of 15 bird species were recorded in the 100m buffer area in which one wetland dependent species *Ardeola bacchus* is recognized as being regional conservation concern, though it is common in suitable habitats in Hong Kong (Viney et al., 2005).

### 5.3 Herpetofauna

No reptile was recorded within the assessment area. Mating call of Gunter's Frog, Asiatic Painted and Paddy Frog were heard from the water of pools, ditches and river bank within the 100m buffer zone. Eggs of Brown Tree Frog were seen in the buffer zone of the site. The species recorded belongs to common species in Hong Kong. (**Table 4**)

### 5.4 Butterflies

A total of 9 butterfly species were recorded during surveys (**Table 5**). However, none of the species are of the conservation concern..



### **5.5 Odonata**

Only 1 odonata species were recorded during the surveys (**Table 6**). The species Wandering glider (*Pantala flavescens*) was found within the work boundaries under Contract 2 & along the river bank in the 100m buffer area.

### **5.6 Mammal**

No mammals or trace of mammals was observed within the assessment area.

### **5.7 Aquatic fauna**

Under Contract 1 (i.e. SEMP 1 & 2), a total of 9 fish species, 2 crustaceans, 1 bivalve and 1 snail were recorded and most of them were residing in brackish environments (**Table 7**). Some river works were carried out in SEMP 1 as showed in Figure 2. Overall, no protected or rare species were recorded.

## **6. Remedial measures adopted to the adverse condition**

There was no non-compliance event recorded within this reporting month.

## **7. Record of complains and remedial measures**

There was no complaint in relation to environmental issue recorded in this reporting month.

## **8. Review of the monitoring results**

During the present survey period, construction activities were carried out at works area under Contract 1, while 100 m buffer area remains natural. Much of the construction activities are carried out at Tung Tsz Nursery and pumping station under Contract 1. In general, lower numbers of species were recorded within the works area under Contract 1 than that of 100 m buffer area because of the associated constructions and urbanized in nature. It is noted that the diversity of aquatic fauna in SEMP 2 under Contract 1 is relatively lower because of the recent river works at SEMP 1 where has been regarded as the corridor for aquatic fauna to move between Wai Ha River and the marine area outside the assessment area. However, most of the construction activities are restricted in the developed area with low ecological significance. As mitigation measures recommended in the EM&A Manual were properly implemented during the current survey, and hence the residual environmental impacts would be minimized.

## **9. Forecast of works programme and monitoring requirements**

The tentative construction activities undertaken by the contractor in the coming months are as follows:

#### **Area A (Pumping Station)**

- External finishing works for main structure of pumping station
- Plumbing & E&M Works
- Final testing works of E&M
- Outfall structure of Tide level monitoring chamber
- External Misc. Works such as Boundary wall & fencing, construction of sewer across Ting Kok Road and connection to existing manholes.

#### **Area B (Tung Tsz Nursery)**

- Excavation for the construction of box culvert in Tung Tsz Nursery
- Construction of box culvert Chainage 0-25
- Erection of hoarding for stage 2.
- Construction of 1200mm dia. Drainage Pipe

#### **Area C (ECA)**

- In Maintenance Period

The monitoring programme described in EM&A will strictly follow to verify compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

## **10. Comments and summary**

The bi-monthly ecological impact monitoring under Contracts 1 (excluding the ECA) was conducted in May 2012 and relevant flora and fauna data were collected according to project specification and EM & A Manual. As indicated by the low diversity and abundance of species recorded within the work areas, habitats within the work boundary under Contracts 1 offer few ecological opportunities for inhabitation of fauna and flora. Given that the construction activities are restricted in the developed area with proper mitigation measures being implemented, disturbances associated with the current construction activities are largely affecting area with low ecological significance. On the other hand, the natural habitats in the 100 m buffer area are retained at acceptable condition, and hence the 100 m buffer area has not been significantly affected by the construction works.

## 11. References

Lo PYF & Hui WL (2005). *Hong Kong Butterflies* (2nd Edition). Friends of Country Parks. Hong Kong.

Wilson KDP (2003). *Field Guide to the Dragonflies of Hong Kong*. Agriculture, Fisheries and Conservation Department. Hong Kong.

Viney C, Philips K, Lam CY (2005). *The Birds of Hong Kong and South China* (8th Edition). Hong Kong Government Information Service. Hong Kong.

Hong Kong Herbarium (2004). *Check List of Hong Kong Plants*. Agriculture, Fisheries and Conservation Department. Hong Kong.

AFCD, Hong Kong Biodiversity Website:

<http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp>

Lee VLF, La, SKS, Ng FKY, Chan TKT, Young MLC (2004). *Field Guide to the freshwater fish of Hong Kong*. Agriculture, Fisheries and Conservation Department. Hong Kong.

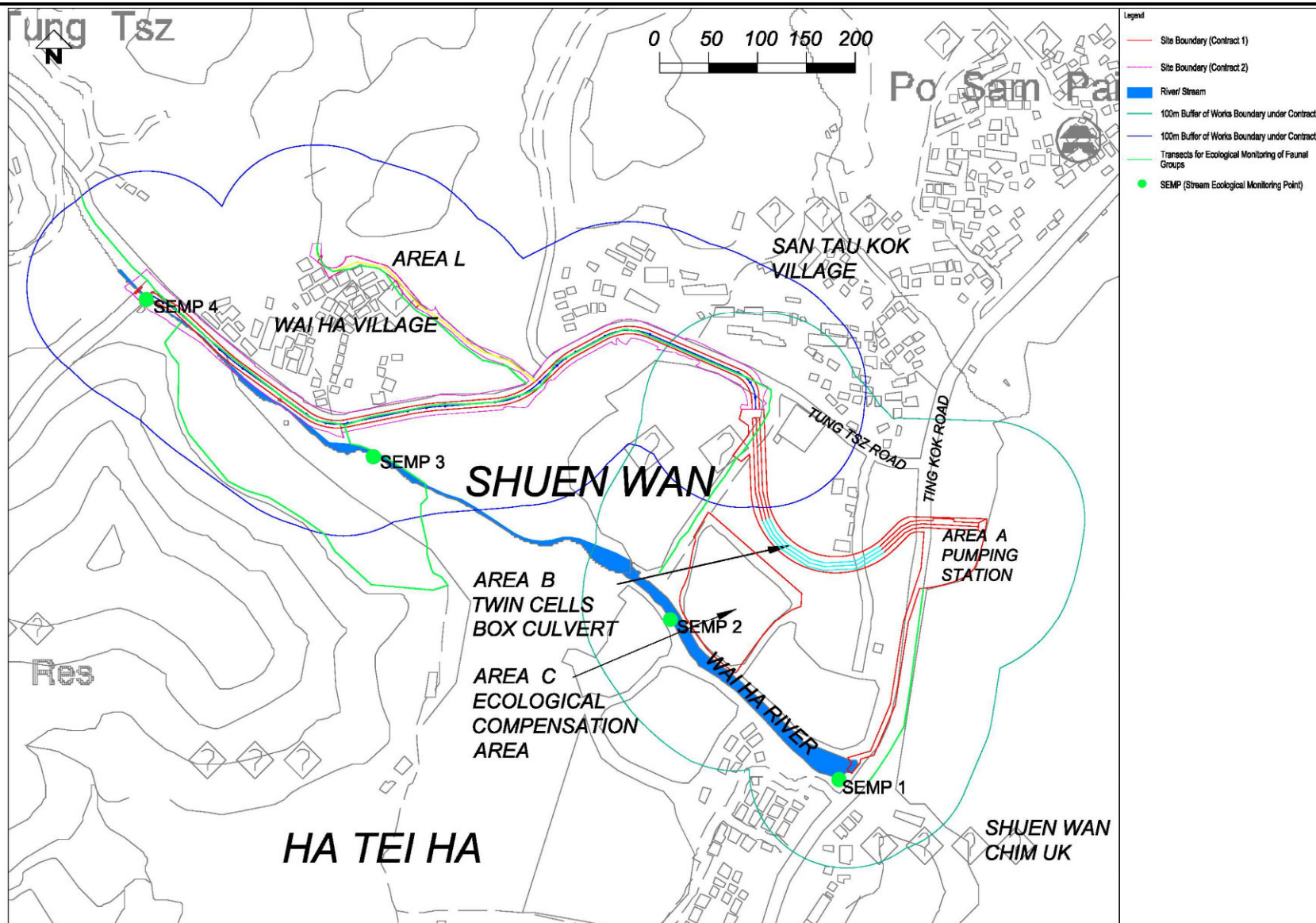
Shek CT (2006) *A Field Guide to the Terrestrial Mammals*. Agriculture, Fisheries and Conservation Department. Hong Kong.

Fellowes, J.R., Lau, M.W.N., Dudgeon, D., Reels, G., Ades, G.W.J., Carey, G.J., Chan, B.P.L., Kendrick, R.C., Lee, K.S., Leven, M.R., Wilson, K.D.P. & Yu, Y.T. (2002). Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 25: 123-159.

Karsen SJ, Lau MWN, Bogadek A (1986) *Hong Kong Amphibians and Reptiles*. The Urban Council Hong Kong. Hong Kong.



**Figure**



**Figure:** 1

**Title:** Map showing the ecological monitoring transect and the boundary of assessment area.

**Project:** Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (May 2012, Report 8b)

**ENVIRON**

Drawn by: IT

Checked by: JY

Rev.: 1.0

Date: May 2012



**Figure:** 2

**Title:** SEMP 1, the first sampling point of Wai Ha River under Contract 1.

**Project:** Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (May 2012, Report 8a)

**ENVIRON**

Drawn by: IT

Checked by: JY

Rev.: 1.0

Date: May 2012



**Figure:** 3

**Title:** SEMP 2, the second sampling point along Wai Ha River under Contract 1.

**Project:** Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (May 2012, Report 8a)

**ENVIRON**

Drawn by: IT

Checked by: JY

Rev.: 1.0

Date: May 2012

---

**Table**



**Table 1.** List of riparian vegetation and coverage (%) recorded from two stream sampling points under Contract 1 (i.e. SEMP 1, 2).

Species	Family	Growth form	Sampling point	SEMP 1		SEMP 2	
			Status in Hong Kong	Height (cm)	%	Height (cm)	%
<i>Albizia lebbbeck</i>	MIMOSACEAE	Tree	E			400	10
<i>Amaranthus viridis</i>	AMARANTHACEAE	Herb	N	30	1		
<i>Arundinella nepalensis</i>	POACEAE	Perennial Herb	N			150	2
<i>Bidens alba</i>	ASTERACEAE	Herb	E	30	10		
<i>Celtis sinensis</i>	ULMACEAE	Tree	N			500	10
<i>Digitaria ciliaris</i>	POACEAE	Herb	N	20	1		
<i>Eclipta prostrata</i>	ASTERACEAE	Perennial herb	N	30	1		
<i>Ficus virens</i>	MORACEAE	Tree	N	100	1		
<i>Kandelia obovata</i>	RHIZOPHORACEAE	Shrub or Small Tree	N			150	4
<i>Leucaena leucocephala</i>	MIMOSACEAE	Small Tree	E			600	40
<i>Macaranga tanarius</i>	EUPHORBIACEAE	Tree	N			100	1
<i>Mikania micrantha</i>	ASTERACEAE	Climbing Herb	E	10	1		
<i>Pennisetum alopecuroides</i>	POACEAE	Perennial Herb	N	250	10		
<i>Plantago major</i>	PLANTAGINACEAE	Perennial herb	N	30	15		
Bare	n/a	n/a	n/a	n/a	60	n/a	33

\*Key:

E = Exotic

N = Native

n/a = not available

**Table 2.** List of vegetation recorded from works area under Contracts 1 and 100 m buffer area in the impact monitoring survey conducted in May 2012. Vegetation species presents in the identified location was indicated by “V”.

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
<b>Stream</b>	<i>Chrysalidocarpus lutescens</i>	ARECACEAE	Shrub Palm	E		V
	<i>Melia azedarach</i>	MELIACEAE	Tree	E		V
	<i>Murraya paniculata</i>	RUTACEAE	Small Tree	E		V
	<i>Lantana camara</i>	VERBENACEAE	Shrub	E		V
	<i>Ficus hispida</i>	MORACEAE	Tree	N		V
	<i>Ficus virens</i>	MORACEAE	Tree	N		V
	<i>Chrysopogon aciculatus</i>	POACEAE	Perennial Herb	N		V
	<i>Microstegium ciliatum</i>	POACEAE	Perennial Procumbent Herb	N		V
	<i>Mucuna birdwoodiana</i>	FABACEAE (PAPILIONACEAE)	Climber: Vine	N		V
	<i>Pistia stratiotes</i>	ARACEAE	Floating Aquatic Herb	N		V
	<i>Cyperus flabelliformis</i>	CYPERACEAE	Herb	E		V
	<i>Acanthopanax gracilistylus</i>	ARALIACEAE	Shrub	E		V
	<i>Ficus triangularis</i>	MORACEAE	Tree	E		V
	<i>Spirodela polyrrhiza</i>	LEMNACEAE	Floating Small Herb	N		V
	<i>Glochidion zeylanicum</i>	EUPHORBIACEAE	Shrub or Small Tree	N		V
	<i>Sterculia lanceolata</i>	STERCULIACEAE	Semi-deciduous Tree	N		V

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Albizia lebbbeck</i>	MIMOSACEAE	Tree	E		V
	<i>Arundinella nepalensis</i>	POACEAE	Perennial Herb	N		V
	<i>Bidens alba</i>	ASTERACEAE	Herb	E		V
	<i>Clerodendrum inerme</i>	VERBENACEAE	Shrub	N		V
	<i>Coculus orbiculatus</i>	MENISPERMACEAE	Climber: Vine	N		V
	<i>Hibiscus tiliaceus</i>	MALVACEAE	Tree or Shrub	N		V
	<i>Leucaena leucocephala</i>	MIMOSACEAE	Small Tree	E		V
	<i>Manilkara zapota</i>	SAPOTACEAE	Tree	E		V
	<i>Sapium discolor</i>	EUPHORBIACEAE	Tree	N		V
<b>Developed area</b>	<i>Pericampylus glaucus</i>	MENISPERMACEAE	Woody Vine	N		V
	<i>Ficus variegata</i> var. <i>chlorocarpa</i>	MORACEAE	Tree or Shrub	N	V	V
	<i>Citrus reticulata</i> Blanco	RUTACEAE	Small Tree	E		V
	<i>Salvia japonica</i>	LAMIACEAE (LABIATAE)	Herb	N		V
	<i>Morus alba</i>	MORACEAE	Tree or Shrub	N		V
	<i>Emilia sonchifolia</i>	ASTERACEAE	Herb	N		V
	<i>Clausena lansium</i>	RUTACEAE	Small Tree	E		V
	<i>Pyrostegia venusta</i>	BIGNONIACEAE	Climber: Vine	E		V
	<i>Psidium guajava</i>	MYRTACEAE	Tree	E		V
	<i>Catharanthus roseus</i>	APOCYNACEAE	Subshrub	N		V
	<i>Archontophoenix alexandrae</i>	ARECACEAE	Tree Palm	E		V
	<i>Desmodium heterocarpon</i>	FABACEAE (PAPILIONACEAE)	Shrub	N		V
	<i>Rhinacanthus nasutus</i>	ACANTHACEAE	Herb	E		V
	<i>Acacia confusa</i>	MIMOSACEAE	Tree	E	V	V
	<i>Artocarpus macrocarpon</i>	MORACEAE	Tree	E	V	V

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Averrhoa carambola</i>	OXALIDACEAE	Small Tree	E	V	V
	<i>Bauhinia blakeana</i>	CAESALPINIACEAE	Tree or Shrub	N	V	V
	<i>Bauhinia variegata</i>	CAESALPINIACEAE	Tree	E	V	V
	<i>Bridelia tomentosa</i>	EUPHORBIACEAE	Shrub or Small Tree	N	V	V
	<i>Calliandra haematocephala</i>	MIMOSACEAE	Shrub	E	V	V
	<i>Caryota ochlandra</i>	ARECACEAE	Tree palm	E	V	V
	<i>Cassia spectabilis</i>	CAESALPINIACEAE	Small Tree	E	V	V
	<i>Casuarina equisetifolia</i>	CASUARINACEAE	Tree	E	V	V
	<i>Citrus grandis</i>	CASUARINACEAE	Tree	E	V	V
	<i>Cordyline fruticosa</i>	AGAVACEAE	Shrub	E	V	V
	<i>Cynodon dactylon</i>	POACEAE	Perennial Herb	N	V	V
	<i>Dracaena draco</i>	AGAVACEAE	Tree	E	V	V
	<i>Elaeocarpus haminanensis</i>	ELAEOCARPACEAE	Small Tree	E	V	V
	<i>Eleusine indica</i>	POACEAE	Herb	N	V	V
	<i>Eriobotrya japonica</i>	ROSACEAE	Small Tree	E	V	V
	<i>Ficus benjamina</i>	MORACEAE	Tree	E	V	V
	<i>Ficus elastica</i>	MORACEAE	Tree	E	V	V
	<i>Ficus simplicissima</i>	MORACEAE	Shrub	N	V	V
	<i>Hibiscus rosa-sinensis</i>	MALVACEAE	Shrub	E	V	V
	<i>Lantana camara</i>	VERBENACEAE	Shrub	E	V	V
	<i>Litchi chinensis</i>	SAPINDACEAE	Tree	E	V	V
	<i>Lumnitzera racemosa</i>	COMBRETACEAE	Shrub or Small Tree	N	V	V
	<i>Lygodium japonicum</i>	LYGODIACEAE	Climbing Herb	N	V	V
	<i>Melaleuca quinquenervia</i>	MYRTACEAE	Tree	E	V	V
	<i>Oxalis corniculata</i>	OXALIDACEAE	Perennial Herb	N	V	V

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Phoenix roebelenii</i>	ARECACEAE	Small Tree Palm	E	V	V
	<i>Polygonum hydropiper</i>	POLYGONACEAE	Herb	N	V	V
	<i>Psychotria serpens</i>	RUBIACEAE	Climber: Vine	N	V	
	<i>Pterocypsela indica</i>	ASTERACEAE	Herb	N	V	V
	<i>Rhapis excelsa</i>	ARECACEAE	Shrub Palm	N	V	V
	<i>Sansevieria trifasciata</i>	AGAVACEAE	Perennial Herb	E	V	V
	<i>Schefflera actinophylla</i>	ARALIACEAE	Climbing Shrub	E	V	V
	<i>Schefflera heptaphylla</i>	ARALIACEAE	Tree	N	V	V
	<i>Sesbania cannabina</i>	FABACEAE	Herb	E	V	V
	<i>Terminalia catappa</i>	COMBRETACEAE	Large Tree	E	V	V
	<i>Thuja orientalis</i>	CUPRESSACEAE	Tree	E	V	V
	<i>Tradescantia spathacea</i>	COMMELINACEAE	Herb	E	V	V
	<i>Youngia japonica</i>	ASTERACEAE	Herb	N	V	V
	<i>Acanthus ilicifolius</i>	ACANTHACEAE	Shrub	N		V
	<i>Acrostichum aureum</i>	ACROSTICHACEAE	Herb	N		V
	<i>Aegiceras corniculatum</i>	MYRSINACEAE	Shrub	N		V
	<i>Alocasia odora</i>	ARACEAE	Perennial Herb	N		V
	<i>Avicennia marina</i>	VERBENACEAE	Shrub	N		V
	<i>Digitaria ciliaris</i>	POACEAE	Herb	N		V
	<i>Panicum repens L.</i>	POACEAE	Perennial Herb	N		V
	<i>Pennisetum alopecuroides</i>	POACEAE	Perennial Herb	N		V
	<i>Phragmites australis</i>	POACEAE	Perennial Herb	N		V
	<i>Plantago major</i>	PLANTAGINACEAE	Perennial herb	N		V
	<i>Solanum nigrum</i>	SOLANACEAE	Herb	N		V
	<i>Bombax ceiba</i>	BOMBACACEAE	Tree	E	V	
	<i>Bidens alba</i>	ASTERACEAE	Herb	E	V	
	<i>Panicum maximum</i>	GRAMINEAE	Herb	E	V	

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Microstegium ciliatum</i>	POACEAE	Perennial Procumbent Herb	N	V	
	<i>Leucaena leucocephala</i>	MIMOSACEAE	Small Tree	E	V	
<b>Plantation</b>	<i>Bischofia javanica</i>	EUPHORBIACEAE	Tree	N		V
	<i>Scolopia chinensis</i>	FLACOURTIACEAE	Tree or Large Shrub	N		V
	<i>Piper hancei</i>	PIPERACEAE	Climber: Vine	N		V
	<i>Dimocarpus longan</i>	SAPINDACEAE	Tree	E		V
	<i>Paederia scandens</i>	RUBIACEAE	Climber: Vine	N		V
	<i>Cleistocalyx operculatus</i>	MYRTACEAE	Tree	N		V
	<i>Antidesma bunius</i>	EUPHORBIACEAE	Tree	N		V
	<i>Litsea monopetala</i>	LAURACEAE	Small Tree	N		V
	<i>Microcos paniculata</i>	TILIACEAE	Shrub or Small Tree	N		V
	<i>Maesa perlarius</i>	MYRSINACEAE	Shrub	N		V
	<i>Boehmeria nivea (L.) Gaudich.</i>	URTICACEAE	Subshrub or shrub	E		V
	<i>Mallotus apelta</i>	EUPHORBIACEAE	Shrub or Small Tree	N		V
	<i>Sapindus saponaria</i>	SAPINDACEAE	Tree	N		V
	<i>Aporosa dioica</i>	EUPHORBIACEAE	Tree	N		V
	<i>Wedelia chinensis</i>	ASTERACEAE	Perennial Herb	N		V
	<i>Carica papaya</i>	CARICACEAE	Tree	E		V
	<i>Rubus reflexus</i>	ROSACEAE	Climbing Shrub	N		V
	<i>Brassica rapa</i>	BRASSICACEAE (CRUCIFERAE)	Biennial Herb	E		V

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Mucuna championii Benth.</i>	FABACEAE	Climbing Vine	N		V
	<i>Pinus massoniana</i>	PINACEAE	Tree	N		V
<b>Ting Kok Nursery Community Garden</b>	<i>Bauhinia purpurea</i>	CAESALPINIACEAE	Tree	E	V	
	<i>Callistemon viminalis</i>	MYRTACEAE	Tree	E	V	
	<i>Dillenia indica</i>	DILLENACEAE	Tree	E	V	
	<i>Lonicera japonica</i>	CAPRIFOLIACEAE	Climber: Vine	N	V	
	<i>Tabebuia chrysantha</i>	BIGNONIACEAE	Small Tree	E	V	
	<i>Wisteria sinensis</i>	FABACEAE	Climber: Vine	E	V	
<b>Wooded area</b>	<i>Celtis sinensis</i>	ULMACEAE	Tree	N		V
	<i>Ligustrum sinensis</i>	OLEACEAE	Tree or Shrub	N		V
	<i>Macaranga tanarius</i>	EUPHORBIACEAE	Tree	N		V
	<i>Pandanus tectorius</i>	PANDANACEAE	Shrub or Small Tree	N		V
	<i>Excoecaria agallocha</i>	EUPHORBIACEAE	Tree	N		V
	<i>Kandelia obovata</i>	RHIZOPHORACEAE	Shrub or Small Tree	N		V
	<i>Thespesia populnea</i>	MALVACEAE	Tree or Shrub	N		V
	<i>Zoysia sinica</i>	POACEAE	Perennial Herb	N		V
<b>Marsh</b>	<i>Acanthus ilicifolius</i>	ACANTHACEAE	Shrub	N		V
	<i>Acrostichum aureum</i>	ACROSTICHACEAE	Herb	N		V
	<i>Aegiceras corniculatum</i>	MYRSINACEAE	Shrub	N		V
	<i>Alocasia odora</i>	ARACEAE	Perennial Herb	N		V
	<i>Avicennia marina</i>	VERBENACEAE	Shrub	N		V
	<i>Digitaria ciliaris</i>	POACEAE	Herb	N		V
	<i>Ficus hispida</i>	MORACEAE	Tree	N		V

Habitat	Species name	Family	Growth form	*Status in Hong Kong	Work Area under Contract 1	100 m buffer area under Contract 1
	<i>Hibiscus tiliaceus</i>	MALVACEAE	Tree or Shrub	N		V
	<i>Ipomea cairica</i>	CONVOLVULACEAE	Climber: Twining Herb	E		V
	<i>Kandelia obovata</i>	RHIZOPHORACEAE	Shrub or Small Tree	N		V
	<i>Macaranga tanarius</i>	EUPHORBIACEAE	Tree	N		V
	<i>Mikania micrantha</i>	ASTERACEAE	Climbing Herb	E		V
	<i>Panicum repens L.</i>	POACEAE	Perennial Herb	N		V
	<i>Pennisetum alopecuroides</i>	POACEAE	Perennial Herb	N		V
	<i>Phragmites australis</i>	POACEAE	Perennial Herb	N		V
	<i>Plantago major</i>	PLANTAGINACEAE	Perennial herb	N		V
	<i>Polygonum lapathifolium</i>	POLYGONACEAE	Herb	N		V
	<i>Pueraria lobata</i>	FABACEAE	Climber: Vine	N		V
	<i>Schefflera heptaphylla</i>	ARALIACEAE	Tree	N		V
	<i>Solanum nigrum</i>	SOLANACEAE	Herb	N		V
	<i>Solanum torvum</i>	SOLANACEAE	Shrub	E		V

**\*Key:**

**E = Exotic**

**N = Native**



**Table 3.** List of avifauna species and maximum counts recorded from the impact monitoring survey in May 2012 at work area under Contracts 1 and 100 m buffer area.

Species	Common name	Habitat	Work area: Contract 1	100m buffer area
<i>Acridotheres cristatellus</i>	Crested Myna		2	3
<i>Amaurornis phoenicurus</i>	White-breasted Water hen	W		1
<i>Ardeola bacchus</i>	Chinese Pond Heron	W		1
<i>Casmerodius alba</i>	Great Egret	W		1
<i>Copsychus saularis</i>	Oriental Magpie Robin		1	2
<i>Egretta garzetta</i>	Little Egret	W		2
<i>Eudynamys scolopacea</i>	Common Koel			1
<i>Garrulax perspicillatus</i>	Masked Laughing thrush		2	4
<i>Hirundo rustica</i>	Barn Swallow	W		2
<i>Passer montanus</i>	Eurasian Tree Sparrow		3	5
<i>Prinia flaviventris</i>	Yellow-bellied Prinia			1
<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul		2	4
<i>Pycnonotus sinensis</i>	Chinese Bulbul			2
<i>Streptopelia chinensis</i>	Spotted Dove		3	5
<i>Sturnus nigricollis</i>	Black-collared Starling		2	3
	Number of species		7	15

\* Key: W, Wetland dependant species

GC= Global Concern                      W =  
 LC = Local Concern                      RC =  
 NT = Near Threatened                      PRC =

**Table 4.** List of herpetofauna and maximum counts recorded from the impact monitoring survey in May 2012 at work area under Contracts 1 and 100 m buffer area..

<b>Species</b>	<b>Common name</b>	<b>Conservation status in Hong Kong</b>	<b>Work area: Contract 2</b>	<b>100m Buffer area of Contract 1</b>
<i>Rana guentheri</i>	Gunther's Frog	Common		1@
<i>Kaloula pulchra pulchra</i>	Asiatic Painted Frog	Common		2@
<i>Fejervarya limnocharis</i>	Paddy Frog	Common		1@
<i>Polypedates megacephalus</i>	Brown Tree Frog	Common		2*

Key:

@-Calling heard,

\*-Egg founded

**Table 5.** Relative abundance of butterfly species recorded under Contracts 1 in impact monitoring survey during May 2012.

<b>Species</b>	<b>Common name</b>	<b>Conservation status in Hong Kong</b>	<b>Work area: Contract 1</b>	<b>100m Buffer area of Contract 1</b>
<i>Abisara echerius</i>	Plum judy	Very Common		+
<i>Eurema hecabe</i>	Common Grass Yellow	Very Common	+	++
<i>Mycalesis mineus</i>	Dark-brand Bush Brown	Very Common	+	++
<i>Papilio memnon agenor</i>	Great Mormon	Very Common		+
<i>Papilio polytes</i>	Common mormon	Very Common		+
<i>Parantica aglea</i>	Glassy Tiger	Common		+
<i>Pieris canidia</i>	Indian Cabbage White	Very Common	+	++
<i>Ypthima baldus</i>	Common Five-ring	Very Common		+
<i>Zizeeria maha</i>	Pale Grass Blue	Very Common		+

Key:

+ : Species exists in the survey area

++ : Species common in the survey area

+++ : Species abundant in the survey area

**Table 6.** Relative abundance of odonata species recorded under Contracts 1 in impact monitoring survey during May 2012.

<b>Species</b>	<b>Common name</b>	<b>Conservation status in Hong Kong</b>	<b>Work area: Contract 1</b>	<b>100m Buffer area of Contract 1</b>
<i>Pantala flavescens</i>	Wandering Glider	Common	+	+

Key:

+ : Species exists in the survey area

++ : Species common in the survey area

+++ : Species abundant in the survey area

**Table 7.** Relative abundance of aquatic species recorded in Wai Ha River within the 100 m buffer of works boundary under Contracts 1 in the impact monitoring survey during May 2012.

Species	Common name	<sup>1</sup> Life-cycle characteristics	<sup>2</sup> Origin	SEMP 1	SEMP 2
<i>Ambassis gymnocephalus</i>	Glassperch	M	N	+	
<i>Cyprinus carpio</i>	Common Carp	F	I		+
<i>Gerres macracanthus</i>	Longspine Silverbidy	M	N	+	
<i>Mugil cephalus</i>	Flatehead Grey Mullet	M	N	+	
<i>Opsariichthys evolans</i>	Minnnow	F	N	+	
<i>Oreochromis mossambicus</i>	Mozambique Tilapa	F	I	++	+
<i>Oreochromis niloticus</i>	Nile Tilapa	F	I	++	+
<i>Poecilia reticulata</i>	Guppy	F	I		+
<i>Tilapia zillii</i>	Redbelly Tilapa	F	I	+	
<i>Sesarma (Perisesarma) bidens</i>	Sesarmine crab	M	N		+
<i>Uca arcuata</i>	Fiddler Crab	M	N		+
<i>Saccostrea cucullata</i>	Rock Oyster	M	N	++	+
<i>Cerithidea cingulata</i>	Mud snail	M	N	+	
<b>Total number of species:</b>	<b>13</b>			<b>9</b>	<b>7</b>

**Key:**

Relative abundance:

- + : Species exists in the survey area
- ++ : Species common in the survey area
- +++ : Species abundant in the survey area

<sup>1</sup> Life-cycle characteristics:

- M = Marine vagrant
- F = Freshwater species

<sup>2</sup>Origin:

- N = Native
- I = Introduced; / = not available

Appendix N. Photo of Wai Ha River at May 2012



**Photo 1.** Wai Ha River at W2



**Photo 2.** Wai Ha River at W2



**Photo 3.** Wai Ha River at W2



**Photo 4.** Wai Ha River at W2



**Photo5.** Wai Ha River at W1



**Photo6.** Wai Ha River at W1



**Photo7.** Wai Ha River at W1



**Photo8.** Wai Ha River at W1