Drainage Service Department

Monthly Environmental Monitoring & Auditing report for

Contract No.DC/2009/22
Drainage Improvement in Shuen Wan, Tai Po – Contract 1

November 2011

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: 12/12/2011

Miss. Goldie Fung
(Environmental Team Leader)

Ecologist (Asia Ecological Consultants Ltd.)

Signature: _____ Date: 12 Dec 2011

Dr. Michael Leven
(Ecologist)

RLA (Environmental Resources Management)

Signature: _____ Date: 6/12/2011

Miss. Christina Ip
(RLA)

and Verified by:

IEC (ENVIRON Hong Kong Limited)

Signature: _____ Date: 14 Dec 2011

Mr. Tony Cheng
(IEC)

LIST OF APPENDIXES

EXECUTIVE SUMMARY

This is the ninth 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 1st of November 2011 to 30th November 2011. The major site activities in this reporting period were mainly pumping station construction, Concreting works for box culvert and pumping station and plant maintenance.

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 4 abnormal incidents of water quality criteria were recorded in this reporting month. No particular observation of defective site activities were found causing water contamination and such conditions were believed to be mainly attributed by natural fluctuation.

No exceedance of A/L level was reported for the monitoring of hydrological characteristics in the reporting 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 ninth 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 1st November 2011 to 30th November 2011. This included the noise monitoring, water quality monitoring, hydrological characteristics monitoring, ecological monitoring, visual and landscape monitoring, and regular site inspections once per week for verification of implementation of the mitigation measures as recommended in the Environmental Permit (EP-303/2008) (EP), EM&A Manual (revision 3) and the Contractor's Environmental Management Plan (EMP).

2 Construction Stage

2.1 Construction activities in the reporting period

Major activities in the reporting period included the followings:

Area A – Construction for Proposed Stromwater Pumping Station.
Area A – Open trench excavation and pipes laying for DN2100 along Ting Kok Road.
Area A – Concreting base slab for the Proposed Stormwater Pumping Station.
Area A – Removal of sheet piles at desilting chamber.
Area A – Hoarding erection along the site boundary at Wai Ha River
Area A – Erection of formwork for lateral slab for the Proposed Stormwater Pumping Station.
Area B – Concreting of top and lateral slab for box culvert Bay 7A.
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. Installation of multi-part cover and backfilling for desilting chamber.
2. Concreting lateral slab for construction of the Proposed Stormwater pumping Station.
3. Construction of DN2100 along Ting Kok Road.
4. Construction of intake structure.

Area B (Tung Tsz Nursery)

1. Excavation for the construction of box culvert in Tung Tsz Nursery
2. Construction of box culvert bay 7
3. Backfilling for bay 7A

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 $5ms^{-1}$ or wind with gust exceeding $10ms^{-1}$. 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	2
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.

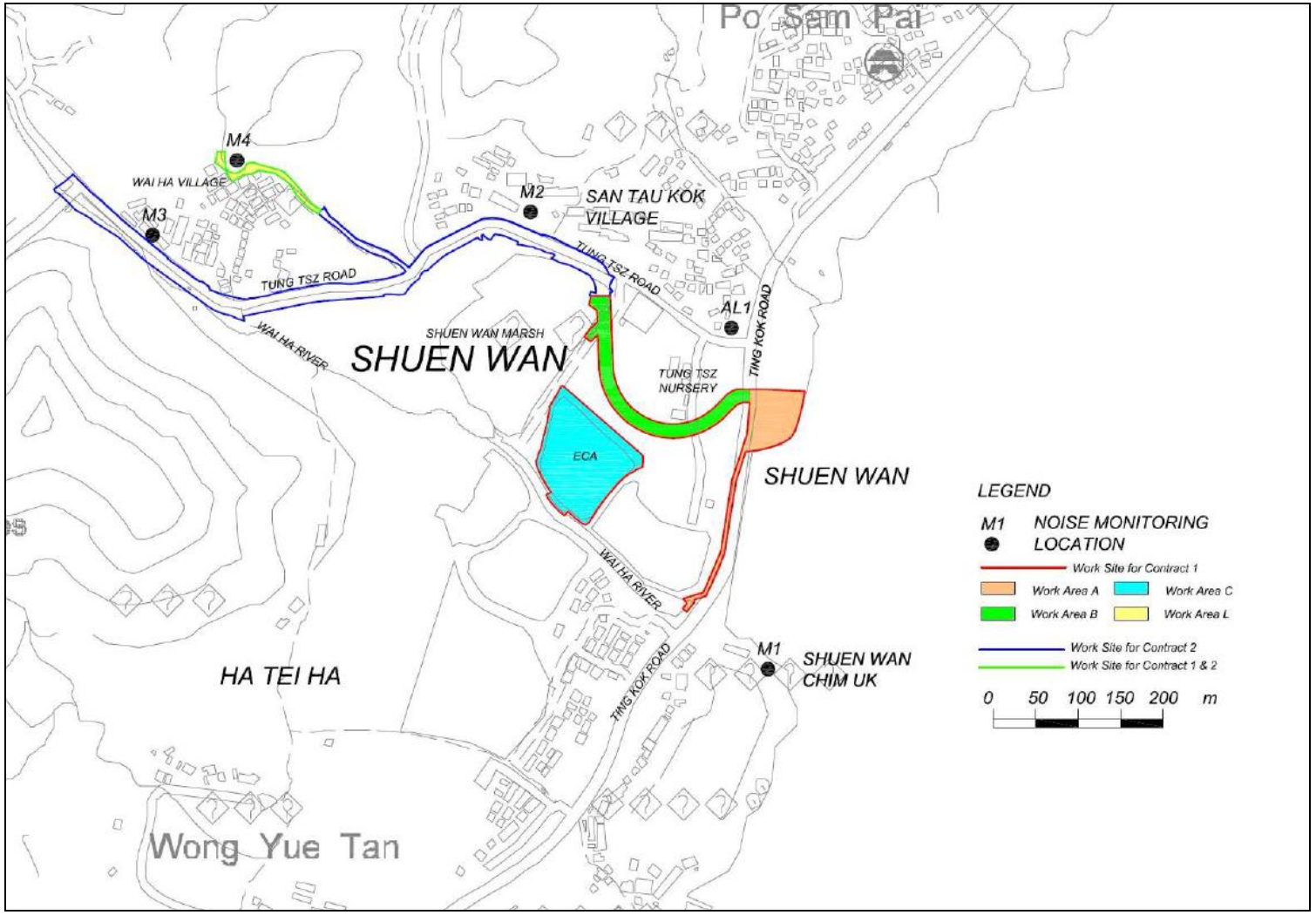


Figure 3.3.1 Impact noise monitoring locations

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 47.8dB (A) and 51.2dB (A), and AL1, ranged between 53.0dB (A) and 56.9dB (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_{Aeq} dB(A)	Limit dB(A)	Exceedance	Weather
M1	$L_{eq\ 30mins}$	3-Nov-11	12:24	51.2	75	N	Cloudy
M1	$L_{eq\ 30mins}$	10-Nov-11	13:54	51.0	75	N	Cloudy
M1	$L_{eq\ 30mins}$	17-Nov-11	13:00	48.0	75	N	Sunny
M1	$L_{eq\ 30mins}$	24- Nov-11	12:50	47.8	75	N	Sunny
AL1	$L_{eq\ 30mins}$	3-Nov-11	12:59	56.6	75	N	Cloudy
AL1	$L_{eq\ 30mins}$	10-Nov-11	13:19	56.9	75	N	Cloudy
AL1	$L_{eq\ 30mins}$	17-Nov-11	12:20	54.5	75	N	Sunny
AL1	$L_{eq\ 30mins}$	24- Nov-11	13:27	53.0	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 1st, 8th , 15th, 22nd and 29th of December2011.

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.

Limit Level	1. Notify IEC, ER, EPD and Contractor. 2. Identify source. 3. Repeat measurements to confirm findings. 4. Increase monitoring frequency. 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented. 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances. 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions. 2. Review C ontractor's' remedial actions whenever necessary to assure their effectiveness 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 properly implemented. 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.	1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

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^{o}C;
- Salinity in the range of 0-40ppt;
- pH in the range of 0-14.

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

Suspended solids was determined by the water samples collected from the monitoring locations for further analysis in accredited HOKLAS laboratory. Water samples were contained by polythene bottles, packed in ice (cooled in 4^{o}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

Monitoring Station	Location	Coordinates
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.

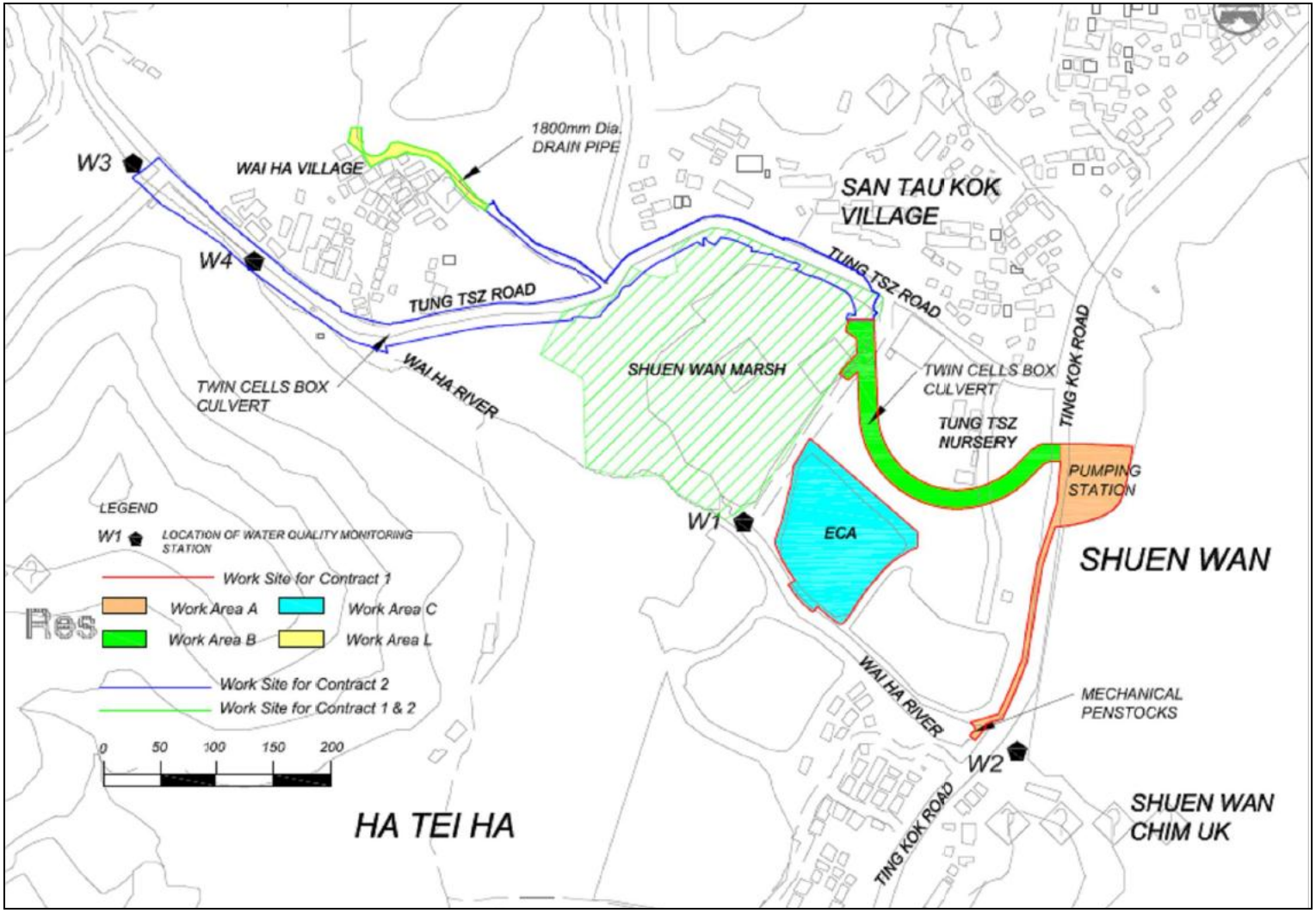


Figure 4.3.1 Water Quality Monitoring Locations

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 1st, 3rd, 5th, 8th, 10th, 12th, 15th, 17th, 19th, 22nd, 24th, 26th and 29th 2011.

4.5 Monitoring Results and Interpretation

Water quality monitoring was carried out thirteen 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 4 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 finding from the investigations showed no particular observations of defective site activities were found. Therefore, such conditions were believed to be attributed by natural fluctuation and are not considered as non-compliance events.

Details information of these incidents was presented in Section 8.

Table 4.5.1 Summary of Water Quality Monitoring Results of November 2011

	Average of Monitoring Results					
	Temperature (°C)	*Turbidity (NTU)*	*pH*	*Dissolved Oxygen (mg/L)*	*Dissolved Oxygen (%)*	*Suspended Solids (mg/L)*
W1	24.48	2.0	7.36	7.36	76.00	2.88
W2	25.08	1.6	7.58	7.14	73.75	3.78

Table 4.5.2 Interpretations of abnormal incidents recorded in the reporting month

Date	**Tide**	**Parameter**	**Interpretations**
2011/11/1	Ebb	Turbidity	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.
2011/11/3	Flood	Suspended Solids	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.
2011/11/19	Flood	Turbidity	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.
		Suspended Solids	
		Turbidity	
2011/11/29	Ebb	DO	Incident was regarded as natural fluctuation since no particular site practice deficiency was observed.

Table 4.5.3 Construction work conducted during abnormal incidents period

Date	Area	Construction works conducted
2011/11/1	A	Steel reinforcement bars fixing for the proposed Stormwater Pumping Station, Erection of formwork for the proposed Stormwater Pumping Station, Installation of hoarding for intake structure
	B	Excavation for the proposed box culvert for CH100 to 115
	C	In maintenance period
2011/11/3	A	Steel reinforcement bars fixing for the proposed Stormwater Pumping Station, Erection of formwork for the proposed Stormwater Pumping Station, Installation of hoarding for intake structure, Excavation of trench for DN2100 pipe
	B	Laying of blinding layer for the proposed box culvert for Ch 100 to 115
	C	In maintenance period
2011/11/19	A	Excavation of trench for DN2100 pipe, Dismantle formwork of base slab for the proposed stormwater pumping station
	B	Steel reinforcement bars fixing for lateral slab for the proposed box culvert for CH100 to 115, Erection of formwork for the lateral slab proposed box culvert for CH100 to 115
	C	In maintenance period
2011/11/29	A	Dismantle formwork of base slab for the proposed stormwater pumping station, Temperoary flow diversion for intake structure
	B	No activity
	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
ACTION LEVEL				
Action level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Repeat measurement on next day of exceedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.

Action level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exeedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
LIMIT LEVEL				
Limit level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform EPD, IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Request Contractor to critically review the working methods; 3. Make agreement	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC

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

			exceedance of Limit Level.	

4.7 Monitoring Schedule for the next reporting period

Water quality monitoring schedule is proposed to be carried out on 1st, 3rd, 6th, 8th, 10th, 13th, 15th, 17th, 20th, 22nd, 24th, 29th and 31st of December 2011.

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

Monitoring Station	Location	Coordinates
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.

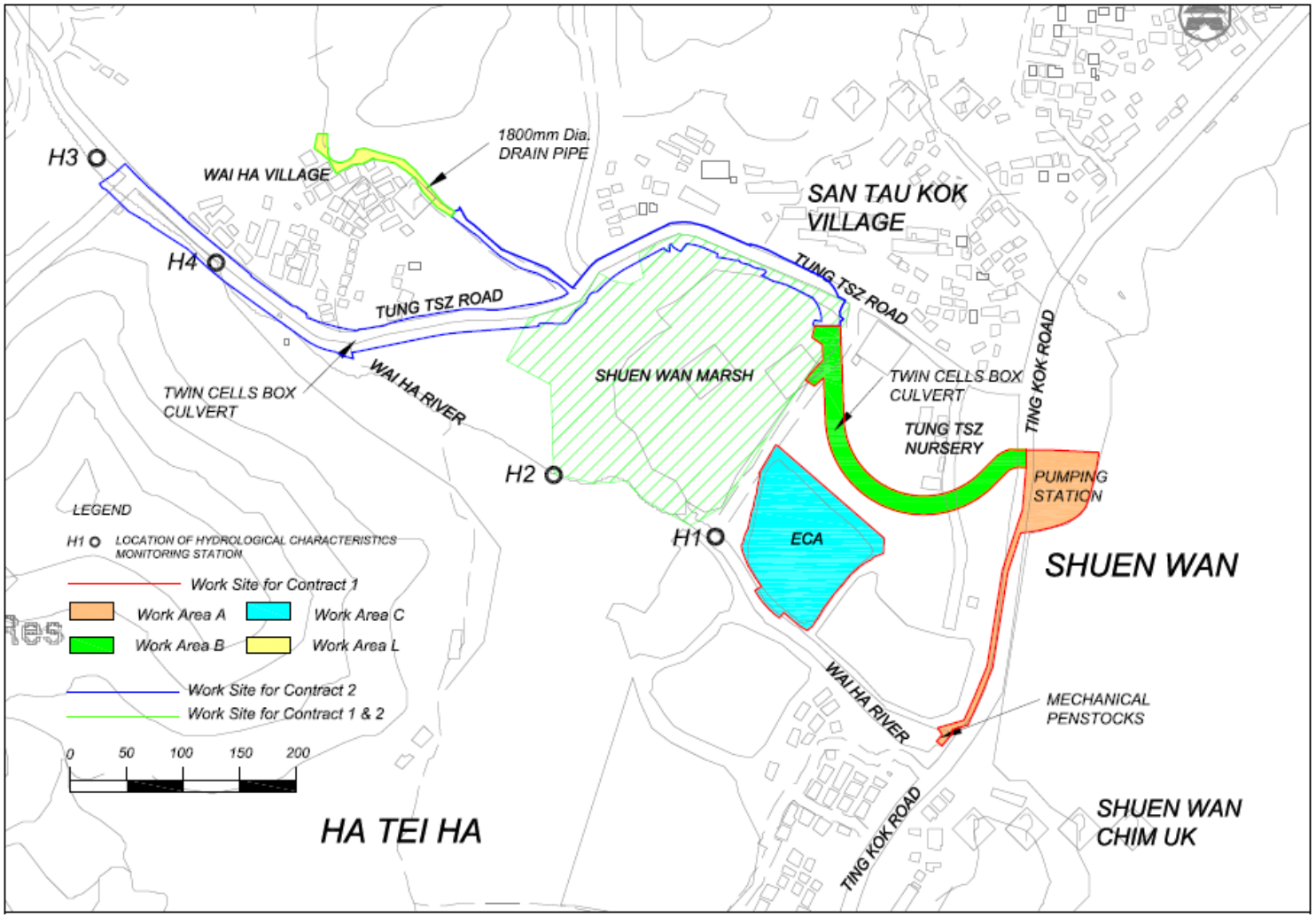


Figure 5.3.1 Hydrological Characteristics Monitoring Locations

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 5th, 12th, 19th and 26th November 2011.

5.5 Monitoring Results and Interpretation

Hydrological characteristics monitoring was carried out four 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^3/s)
H1	~0.2*	0.104
H2	~0.2*	0.523

*: 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^3/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**
ACTION LEVEL				
Action level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Repeat measurement on next day of	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC

	exceedance.			and Engineer within three working days; 6. Implement agreed mitigation measures.
Action level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exeedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
LIMIT LEVEL				
Limit level being	1. Repeat in-situ measurements to	1. Discuss mitigation measures with ET,	1. Discuss proposed	1. Inform Engineer and confirm in writing

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

	or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.	effectiveness of implemented mitigation measures.	mitigation measures to be implemented; 4. Assess effectiveness of implemented mitigation measures; 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.	and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures; 7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.

5.7 Monitoring Schedule for the next reporting period

Hydrological characteristics monitoring schedule is proposed to be carried out on 3rd, 10th, 17th, 24th and 31st of December 2011.

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 21st December 2010) and the approved Habitat Creation Plan (HCP) (approved by EPD on 24th September 2010) of the Project.

This report documents monitoring findings on the site inspections in the ECA undertaken in November 2011.

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 monitoring during the construction period was conducted on a monthly basis in the Ecological Compensatory Area (ECA) during the establishment period in November 2011. The growth and health of the recorded vegetation was inspected 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))**.

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 22 plant species were retained or newly succeed 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. Detailed information of the recorded vegetation was given in **Appendix L**.

The general growth/health of the retained or newly succeed vegetations was in fair condition.

The trees transplanted from works area within 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 (**Appendix L (B)**).

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 zone for F, within ECA as showed in **Figure 6.3.2.1**.

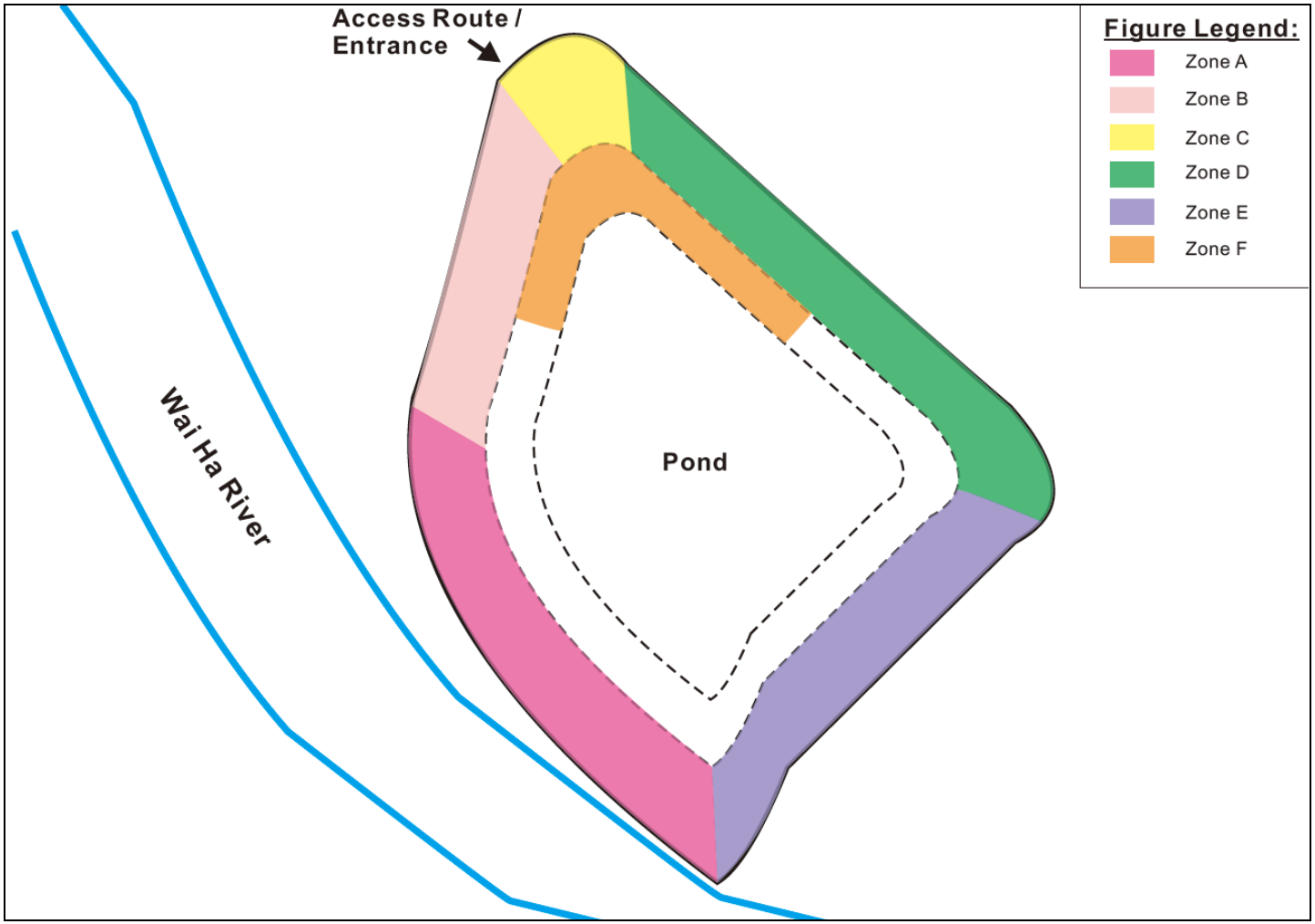


Figure 6.3.2.1 Landscape floor plan of ECA during establishment phase in November 2011.

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

Newly planted trees in Zone A, B and C were in fair condition.

However, trees in Zone D and E were in poor condition in terems of sparse crown and yellow leaves. These were:

- *Hibiscus tiliaceus*: tag no. 55 - 60; 62 – 66; 75 – 77; 238 – 241; 245 – 252; 254, 258, 259.
- *Ficus superb var japonica*: tag no. 38, 39
- *Macaranga tanarius*: tag no. 321
- *Celtis sinensis*: tag no. 1 , 12, 18, 130

Regular watering is recommended to improve the condition of the newly planted trees. Relevant mitigation measures will be proposed when necessary.

Physical injury was found on the bark of C. sinensis (tag no. 30) at Zone E. Repairing of wound is recommended to prevent decay and protect against insects and fungus/virus infections.

Celtis sinensis in Zone E (tag no. 13) was found fell down with root exposed. It is recommended that replanted of this C. sinensis with proper anchor or supporting structures.

Mangrove seedlings were planted in Zone F, but most of them were in poor condition or almost wilting, in particular for those planted along the slope. Sandy soil and nutrient leaching during surface runoff appear to be the concerns. Regular irrigation and improving soil texture are recommended.

Regular watering is recommended to improve the condition of the newly planted trees. 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, 22 trees, shrubs, climbers and herbs were retained or newly succeed in the ECA during the establishment period in November 2011. A total 16 trees were transplanted from work area under Contract 1and 2 to ECA. All of them were in fair condition. In addition, 370 trees, including *Celtis sinensis, Hibiscus tiliaceus, Macarango 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 will 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 30th 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.

6.3.6 Site Inspections

Twice monthly establishment phase monitoring has been commenced in November 2011. Two site inspections were carried out on 4th and 16th November 2011 and two additional site visits were undertaken on 18th and 29th November 2011 to inspect the tree labels tagged on the compensatory trees. Table 6-1 summarizes the observations and recommendations for each site inspection.

Table 6-1. *Observations and recommendations for each site inspection, November 2011.*

Inspection Date	Observation	Recommendation
4 November 2011	The site visit was conducted to update the Contractor's progress on clearing weedy herbs and tree Leucaena leucocephala and removal of rubbish (e.g. tile and	The Contractor was reminded to undertake the two outstanding items as soon as possible.

	concreted pavement). No significant progress has been observed since the last visit on 24 October 2011. Watering of the planted compensatory trees was observed.	
16 November 2011	The ECA has been maintained in fair condition. A construction worker was observed to remove the rubbish and seedlings/saplings of Leucaena leucocephala in the ECA (Photo 1). A fallen compensatory tree Celtis sinensis (Tree No. N13) was found on the eastern pond bund (Photo 2). It was observed that grass had germinated in the hydroseeded area (Photo 3).	The Contractor was reminded to replant the uprooted tree as soon as possible.
18 November 2011 (Additional site inspection)	An additional site visit to inspect and correct the tree labels tagged on all planted compensatory trees. Any tree labels with wrong scientific names were corrected (Photo 4). Two compensatory trees of Hibiscus tiliaceus were not tagged due to inadequate tree labels prepared by the Contractor. The fallen compensatory tree Celtis sinensis has not yet been replanted.	The Contractor was reminded to tag the two compensatory trees of Hibiscus tiliaceus and replant the fallen tree as soon as possible.
29 November 2011 (Additional site inspection)	All compensatory trees were re-inspected to confirm that all trees were tagged with correct tree labels. Removal of rubbish (e.g. tile and concreted pavement) and weedy herbs and trees by the construction worker were observed. The fallen compensatory tree was replanted and staked by	None.

	bamboo poles (Photo 5) and more grass regenerated at the hydroseeded area.	

Photo 1. A construction worker removed the rubbish and seedlings/saplings of *Leucaena leucocephala* in the ECA.

Photo 2. A fallen compensatory tree *Celtis sinensis* (Tree No. N13) was found on the eastern pond bund.

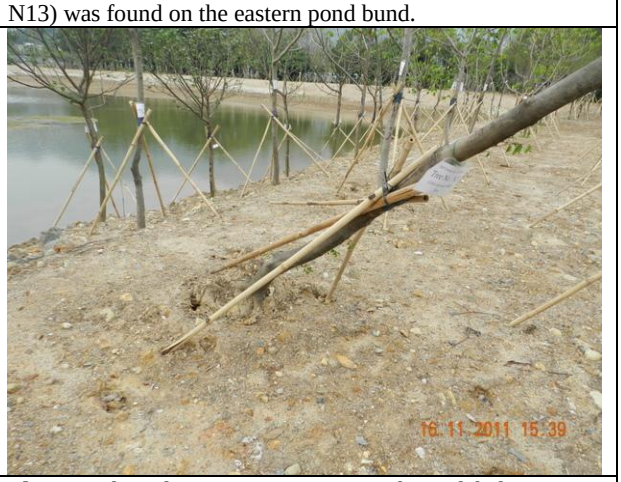
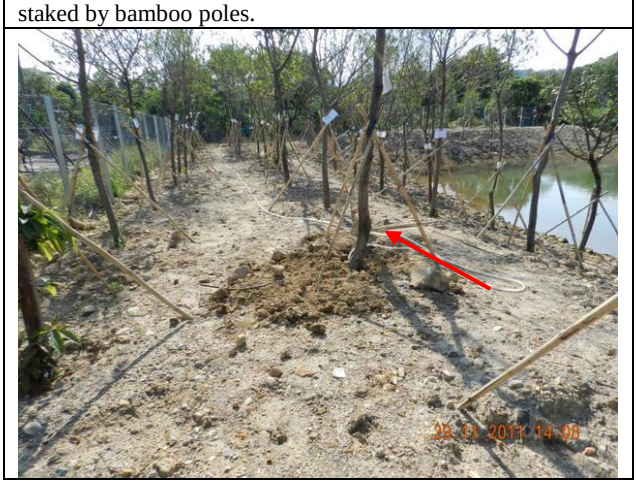


Photo 3. Grass germination was observed in the hydroseeded area.

Photo 4. Planted compensatory trees with tree labels.

Photo 5. The fallen compensatory tree was replanted and staked by bamboo poles.



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 in November 2011.

The construction works in the ECA has been completed. Removal of rubbish and weedy, unwanted herbs (such as Bidens alba) and seedlings/saplings of exotic tree Leucaena leucocephala has been undertaken by the Contractor in November 2011. As informed by the Contractor, due to the maintenance purpose, the construction hoarding at the main entrance of the ECA would not be removed until the completion of the establishment phase of the ECA.

As requested by AFCD on 25 October 2011, the Contractor is reminded to complete the five items prior to the formal handover to AFCD. These items include (1) formation of a proper access path from the future access gate adjacent to Tung Tsz Nursery, (2) removal of rubbish found in the ECA, (3) replacement of planted trees Hibiscus tiliaceus with poor performance following inspection in early wet season 2012, (4) review the health conditions of the suspected dead, planted trees and wetland herbs in early wet season in 2012 and replace them if necessary, and (5) additional hydroseeding of the upper 2/3 of the pond bank in the ECA.

6.5 Implication of the Survey Findings

6.5.1 Implication to the Wetland design of the ECA

Planting of the proposed vegetation (including trees, shrubs and wetland herbs) in the ECA was completed in October 2011. There was no implication to the wetland design from these two site inspection in November 2011.

6.6 Recommendations

All retained trees, transplanted trees and newly planted compensatory trees within the ECA should be maintained with acceptable health condition. These trees should be protected appropriately in accordance with the specification for landscape softworks

stipulated in the approved Landscape Plan. The Contractor should maintain adequate watering of the transplanted trees, all newly planted trees and shrubs in the ECA during establishment phases. The Contractor should follow-up and complete the outstanding management and maintenance issues highlighted by the Wetland Specialist and AFCD.

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 December 2010) of the Project. A Baseline Review on updating the landscape and visual condition, and the mitigation measures of the Project (including Contracts 1 and 2 of the Project) was undertaken before the commencement of the Project. The review findings were updated in the Baseline Environmental Monitoring Report submitted to the EPD on 14 February 2011.

This monthly monitoring report will detail the scope of landscape and visual monitoring work, monitoring findings and observations, and any recommendation and advice on proper implementation of the landscape mitigation measures 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 (November 2011) was conducted to cover only Areas A, B and C of Contract 1 of the Project. The bi-weekly monitoring was conducted on 4th and 18th November 2011.

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

Contract 2 of the Project has been commenced in July 2011 and the bi-weekly monitoring was also undertaken on 4th and 18th November 2011. 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 October 2011.

Observation

Construction hoardings have been erected in Area A along the entire site boundary.

A section of temporary hoarding has been erected from northwest to southwest parts of Tung Tsz Nursery in Area B (approximately along the works boundary from Trees U42 to U62), whilst line of hoardings have been maintained to the western part of Area B falling within the northwestern part of Tung Tsz Nursery.

A line of chain link fence has been erected to replace the temporary hoarding and surrounded Area C (Photo 1).

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 October 2011*.

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.

Area B

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

Area C

Construction of the wetland in the Area C was completed and the connection with the Wai Ha River was finished by the end of August 2011. No water was pumped out from the Ecological Compensatory Area (ECA).

Recommendation

No specific recommendation is required.

7.3.4 Pollution Control

All used water for washing vehicle wheel and construction works was filtrated and drained to the manholes, as following the recommendation stated in *Monthly EM&A Report for October 2011*.

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.

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 filtrated 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 2). 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 filtrated 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 November 2011, active construction works within Tung Tsz Nursery was still mainly restricted within the fenced areas to the southwest of the nursery. Other designed works areas within nursery have been under the normal operation and maintenance of Tung Tsz Nursery.

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.

The works practice and maintenance of trees within the nursery generally follow the recommendation as stated in Monthly EM&A Report for October 2011. Any observed issues related to the liaison with the nursery are highlighted in this section.

Observation

The temporary hoarding and hoarding footings have been maintained from northwest to southwest parts of Tung Tsz Nursery since April 2011. Major construction work within the temporary hoarding area was observed on 4th April 2011 and in the followed monitoring.

Declining health condition for the transplanted tree U58 Grevillea robusta was reported since late April. Regular monitoring for the subject tree was conducted bi-weekly. Tree defects of chlorotic leaves and defoliation were still found. Health condition of this transplanted tree has remained poor in November 2011 (Photo 3) and its poor health condition may due to the fact that this species is susceptible to transplantation shock.

No additional tree transplantation work were reported by the Main Contractor and observed during the inspections in November 2011.

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 October 2011, but temporary storage of construction materials was still observed in November 2011 (see details in the following section).

Regular watering of the retained trees, transplanted trees and the compensatory planting was anticipated. Watering of the compensatory trees in Area C was observed in the week of 14th November 2011. Maintenance of the existing trees within the works areas generally follows the recommendation as stated in Monthly EM&A Report for October 2011, except the observations as highlighted in the following sections.

Observation

Area A

TPZs with temporary storage of construction materials were still recorded for trees to be transplanted (E16 to E20) at the southwestern part of Area A (Photos 4-5).
One retained tree E25 along Ting Kok Road was reported as a collapsed tree after

Typhoon Signal No. 8 hoisted on 29th September, 2011 (Photo 6). The tree was removed immediately for safety reason. No significant damages on the crowns, trunks and roots of the remaining trees were observed during the monitoring in November 2011 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 November 2011. However, the transplanted tree U58 was still in poor health condition after the transplant. These signs may be due to transplantation shock to the tree.

The health conditions of U34 (Photo 7), U35 (Photo 8) and U37 (Photo 9) were found declining with defoliation and dried, loose tree bark.

The planter for a tree to be transplanted (A36) was not yet repaired by the time of the inspections. Two ropes have been used for guying the tree to prevent tree failure (Photo 10). Broken planter for a transplanted tree (U57) was observed at its temporary receptor site (Photo 11).

As reported by the Main Contractor, one tree to be transplanted T97 Lagerstroemia indica (Photo 12) and one tree to be retained A12 Macaranga tanarius (Photo 13) located outside the eastern and western sides of Tung Tsz Nursery respectively were collapsed after Typhoon Signal No. 8 hoisted on 29th September 2011. The trees were removed immediately for safety reason but resprout was observed on the remaining tree part of T97.

No significant damages on the crowns, trunks and roots of the remaining trees were observed during the monitoring in November 2011 in Area B.

Area C

The existing trees were maintained generally in fair health condition. 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 November 2011.

Defoliation was observed on the transplanted trees T152 (Photo 14), T153 (Photo 15), T250 (Photo 16) and one newly transplanted tree without a tree tag (Photos 17-18). These four trees were suspected dying with poor health condition, possibly due to transplantation shock and as unsuitable species for transplantation.

Recommendations

Area A

Proper TPZs (e.g. demarcate a clear TPZs by the tree dripline area) should be established for the highlighted trees. All TPZs should be maintained appropriately in accordance with the soft landscape works specification appended in the approved Landscape Plan, including but not limited to the maintenance work such as removal of any surplus soil and construction equipments around the trunk flare of the retained and transplanted trees. The Contractor should notify the on-site workers not to stockpile soil/construction materials or place construction equipments within the TPZs.

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

Area B

All transplanted trees should be watered regularly (e.g. at least every two days) by the appointed landscape contractor. This is a necessary maintenance practice to improve the survival rates and growth for trees showing poor health conditions (e.g. for trees U34, U35 and U37) resulting from the transplantation shock. Regular check of the health conditions of these trees should be conducted.

Regular inspection on 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 future, the Contractor should replace these specimens for compensation.

The Contractor has been informed to repair the planters of A36 and U57 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.

Area C

All transplanted trees and trees for compensatory planting 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 these trees are found to be dead

specimens for a prolonged period in the future, 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 October 2011*.

Observation

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

Recommendation

No specific recommendation is required.

7.4 Audit Schedule

The next bi-weekly Landscape & Visual Monitoring in December 2011 is scheduled to be conducted in the weeks of 1st, 12th and 26th December 2011.

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 4 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 incidents. No major site activity that may affect water quality was observed and no particular observations of defective site activities were found. There were no emissions of treated water from Area C to drainage system prior Wai Ha River within this report month. No muddy water and site runoff was observed at Wai Ha River, water condition of Wai Ha River is presented in photo attached in fAppendix M. During the incidents occurred, Contractor had already implemented sedimentation tank to prevent water quality impact. As no particular defect of site practices was observed, such conditions were believed to be attributed by natural fluctuation and are not considered as non-compliance events. No further actions for those incidents are required.

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)
Mar-11	0.330	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.055
Apr-11	0.280	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.02
May-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Jun-11	5.475	0.00	5.475	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
July-11	3.200	0.00	2.85	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aug-11	1.608	0.00	0.868	0.00	0.00	0.740	0.00	0.00	0.00	0.00	0.00
Spet-11	0.045	0.00	0.04	0.00	0.005	0.00	0.00	0.00	0.00	0.00	0.00
Oct-11	0.425	0.00	0.41	0.00	0.015	0.00	0.00	0.00	0.00	0.00	0.00
Nov-11	0.330	0.00	0.00	0.315	0.015	0.00	0.00	0.00	0.00	0.00	0.00
Total	12.408	0.00	10.487	0.665	0.7	0.556	0.00	0.00	0.00	0.00	0.145

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	Date of expiry	Status
Environmental Permit	EP-303/2008	2008/2/25	not applicable	Valid
Discharge Licence	WT00006448-2010	2010/6/15	30/6/2015	Valid
Registration as a Chemical Waste Producer	316597	2010/4/26	not applicable	Valid
Waste Disposal	7010348	2010/3/2	not applicable	Valid

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
Mar 2011	0	0	0	0
April 2011	0	0	0	0
May 2011	0	0	0	0
June 2011	0	0	0	0
July 2011	0	0	0	0
August 2011	0	0	0	0
September 2011	0	0	0	0
October 2011	0	0	0	0
November 2011	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 3rd, 10th, 17th and 21st of November 2011. A detailed checklist of each site inspection together with comments and relevant photos have been filed and kept. The findings from inspection were summarized in Table 12.1.

Table 12.1 Summary results of site inspections findings

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
7, 14 , 21 July 2011 5 , 11, 19, 23 Aug 2011 1, 8, 15, 22, 27 Sept 2011 6, 13, 20, 28 Oct 2011	C & D waste and general waste were found scattered in various locations	Observation	Contractor was advised to collect and relocate the wastes for temporary storage in order to maintain good housekeeping practices.	C&D waste was removed by contractor	17 Nov 2011	-
20 Oct 2011	Stagnant water was observed inside the ditch at Area B	Observation	Contractor was advised to remove the stagnant water and fill the concaved area of the cover with sand to prevent the accumulation of stagnant water and mosquito breeding.	Outstanding	-	-

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
28 Oct 2011	Stagnant water was observed inside the drip tray at Area A	Observation	Contractor was advised to remove the stagnant water and fill the concaved area of the cover with sand to prevent the accumulation of stagnant water and mosquito breeding.	As reported by contractor stagnant water inside the ditch at Area B was removed.	21 Nov 2011	-
28 Oct 2011	Oil container was observed without drip pan at area A	Observation	Contractor was reminded to provide proper drip pans for the fuel containers to prevent the land contamination.	Oil container was observed without drip pan at area A was removed by contractor	10 Nov 2011	-
3 Nov 2011	It was observed that the haul road is dry and dusty at Area A	Observation	Contractor was reminded that routine watering should be implemented for dust suppression.	The condition of Haul Road was improved	10 Nov 2011	-
3, 10 & 17 Nov 2011	Earthy stockpiles were observed without covering at Area A	Observation	Contractor was reminded that the earthy stockpiles should be covered by tarpaulin.	Outstanding	-	Part of Earthy stockpile at Area A was removed by contractor at 10 Nov 2011.
10 Nov 2011	Earthy stockpiles were observed without covering at	Observation	Contractor was reminded that the earthy stockpiles	As reported by contractor Earthly	21 Nov 2011	-

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
	Area B.		should be covered by tarpaulin.	stockpile at Area B was removed.		
17 Nov 2011	Damaged protective fence was observed at Area A.	Observation	Contractor was reminded to replace the fencing and provide a protective zone for the trees.	Outstanding	-	-

12.2 Compliance with legal and Contractual requirement

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

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 statues 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.
- Noise abatement measures for piling works.
- 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 21st of November 2011.

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

For water quality monitoring, total 4 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. No particular observations of defective site activities were found causing the incidents and such conditions were believed to be attributed by natural fluctuation.

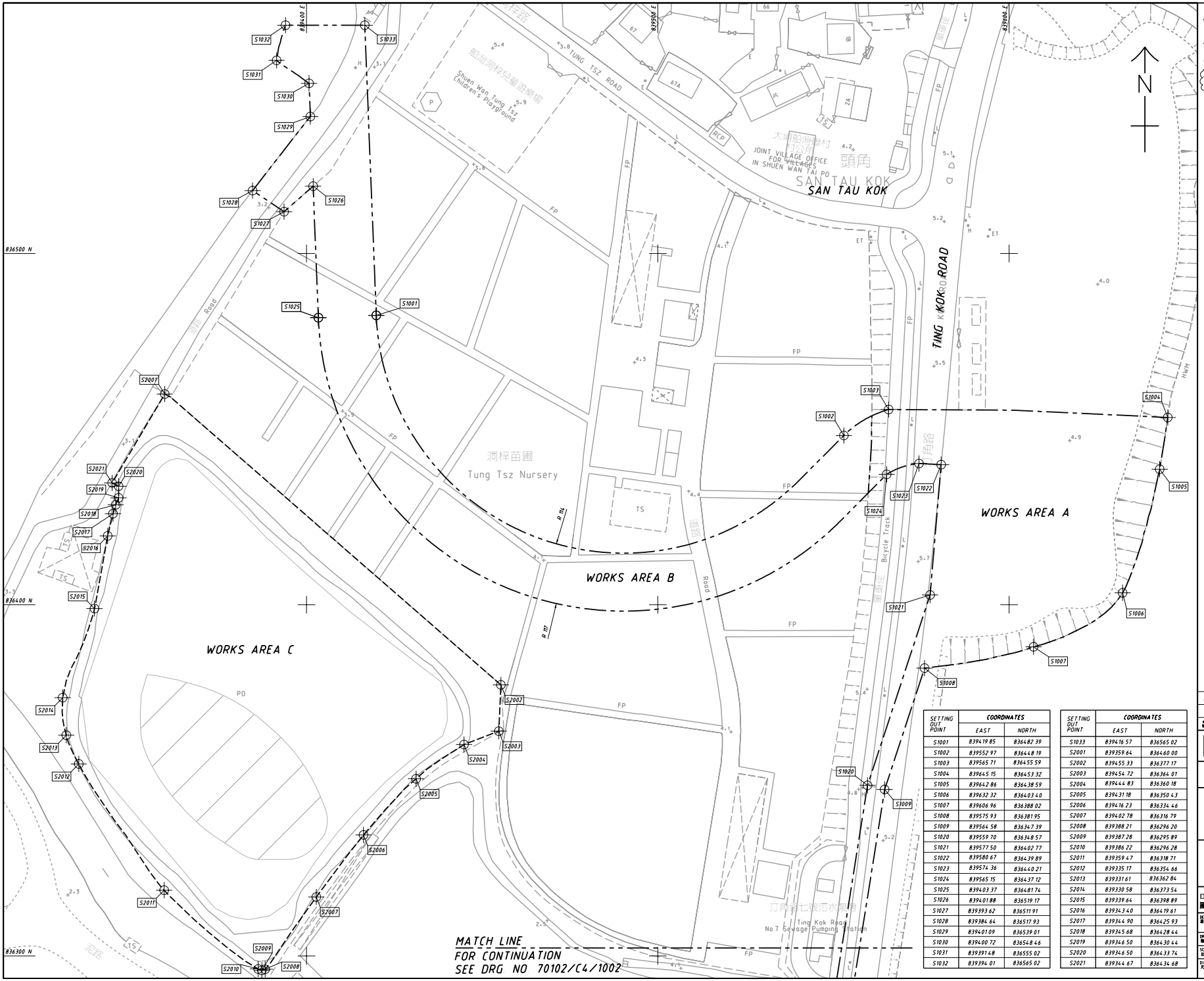
For ecological monitoring survey, all vegetations recorded were in fair condition, with no significance sign of health deterioration for the retained trees. In addition, the Monitoring of in situ water quality in the ECA was commenced in September 2011 by the IEC's ecologist.

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 2.5m BEYOND THE LIMIT OF WORKS AREAS EXCLUDING PRIVATE AREAS △A

LEGEND

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

SETTING OUT POINT	COORDINATES EAST	NORTH
S1001	839419.85	836482.39
S1002	839552.97	836448.19
S1003	839565.71	836455.59
S1004	839645.15	836453.32
S1005	839642.86	836438.59
S1006	839632.32	836403.40
S1007	839606.96	836388.02
S1008	839575.93	836381.95
S1009	839564.58	836347.39
S1020	839559.70	836348.57
S1021	839577.50	836402.77
S1022	839580.67	836439.89
S1023	839574.36	836440.21
S1024	839565.15	836437.12
S1025	839403.37	836481.74
S1026	839401.88	836519.17
S1027	839393.62	836511.91
S1028	839386.64	836517.93
S1029	839401.09	836539.01
S1030	839400.72	836548.46
S1031	839391.48	836555.02
S1032	839394.01	836565.02

SETTING OUT POINT	COORDINATES EAST	NORTH
S1033	839416.57	836565.02
S2001	839359.64	836440.00
S2002	839455.33	836377.17
S2003	839454.72	836364.01
S2004	839444.83	836360.18
S2005	839431.18	836350.43
S2006	839416.23	836334.46
S2007	839402.78	836316.79
S2008	839388.21	836296.20
S2009	839387.28	836295.89
S2010	839386.22	836296.28
S2011	839359.47	836318.71
S2012	839335.17	836354.66
S2013	839331.61	836362.84
S2014	839330.58	836373.54
S2015	839339.64	836398.89
S2016	839343.40	836419.61
S2017	839344.90	836425.93
S2018	839345.68	836428.44
S2019	839346.50	836430.44
S2020	839346.50	836433.74
S2021	839344.67	836434.68

A	TENDER ADDENDUM NO.2	ECYP	RCYK	10-09
-	TENDER DRAWING	ECYP	RCYK	09-09
REV. 修訂	DESCRIPTION 內容摘要	BY 修訂者	CHECKED 核准	DATE 日期

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.NO. 圖紙編號 70102/C4/1001A

DESIGNED BY 設計	CPWU	CONTRACT NO. 合約編號	DC/2009/22
DRAWN BY 繪圖	LWL	P. DIV.- APPROVED 負責人	DML
SCALE 比例	A1 1 500	STATUS 類別	
DIMENSIONS ARE IN 尺寸單位	METRES	© COPYRIGHT RESERVED 版權所有	

2010-2-5 11:54:09

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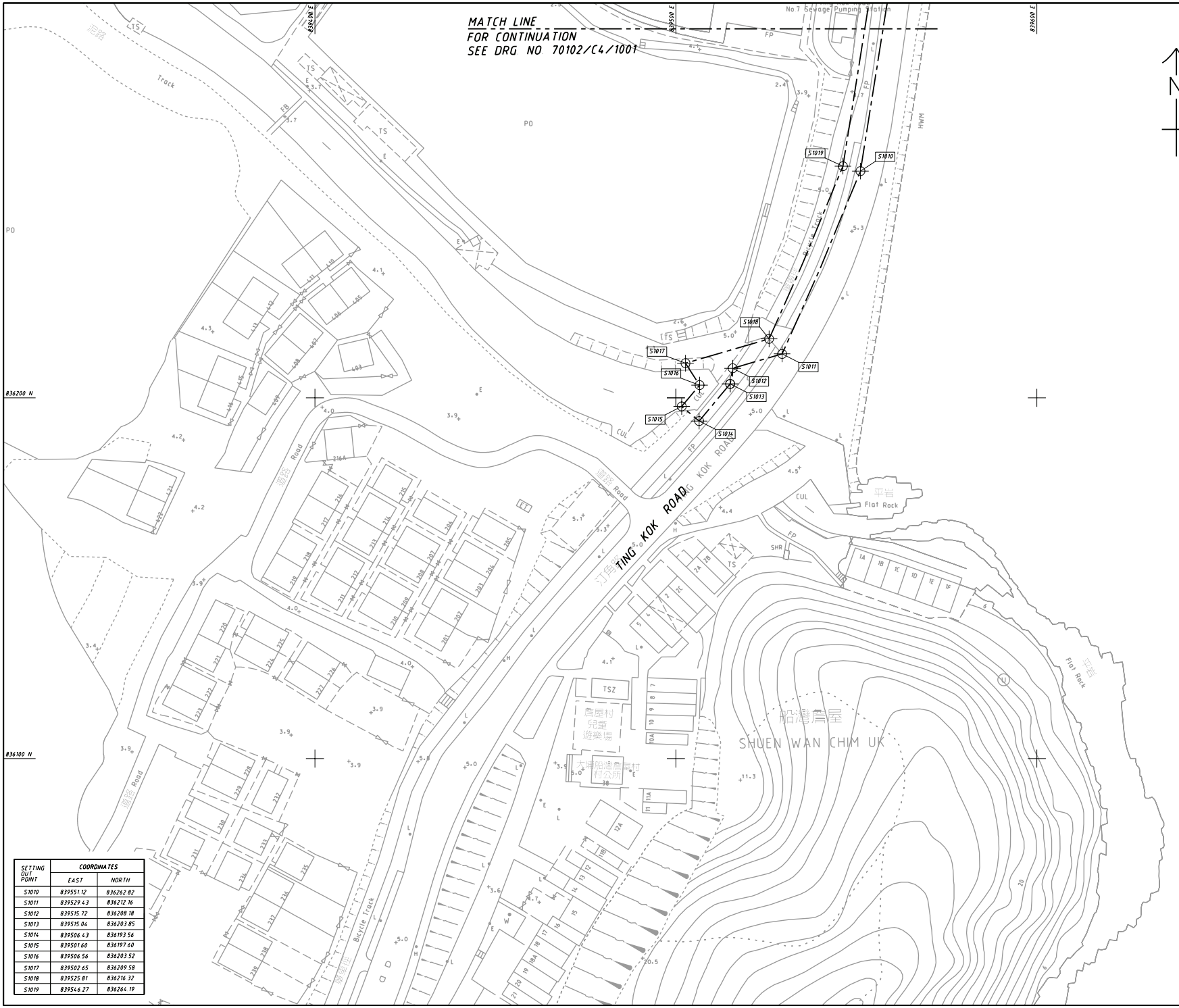

SETTING OUT POINT	COORDINATES	
	EAST	NORTH
S1010	839551.12	836262.82
S1011	839529.43	836212.16
S1012	839515.72	836208.18
S1013	839515.04	836203.85
S1014	839506.43	836193.56
S1015	839501.60	836197.60
S1016	839506.56	836203.52
S1017	839502.65	836209.58
S1018	839525.81	836216.32
S1019	839546.27	836264.19

NOTE

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

NO. 號碼	DESCRIPTION 內容說明	BY 繪製	CHECKED 檢查	DATE 日期
-	TENDER DRAWING	ECY	PRC	YK 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 2 OF 2

AECOM

DRG.NO. 圖紙編號 70102/C4/1002

DESIGNED BY 設計	CPWU	CONTRACT NO. 合約編號	DC/2009/22
DRAWN BY 繪圖	LWL	P. DIV.- APPROVED 負責人	DML
SCALE 比例	A1 1 500	STATUS 類別	
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2010-2-5 13 32 23

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Appendix B: Key Personal Contact information chart

Post	Name	Contact No.	Contact Fax	e-mail
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@yaho o.com.hk
Environmental Officer / Sub-agent	Mr. K. M. Ma	9552 1734	2674 6688	dc200922jv_suba@ya hoo.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.co m.hk
Environmental Pioneers & Solutions Limited (Environmental Team)	Miss. Goldie Fung	2556 9172	2856 2010	goldiefung@fseng.co m.hk

Appendix C: Calibration Certificates for measuring instruments

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **11494** Page 1 of 3 Pages

Customer : Environmental Pioneers and Solutions Limited

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

Order No. : Q10260 **Date of receipt :** 15-Mar-11

Item Tested

Description : Digital Sound Level Meter

Manufacturer : SVAN

Model : 949 **Serial No. :** 8571

Test Conditions

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

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

Test Results

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

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

Main Test equipment used:

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

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

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

Calibrated by : P. F. Wong

Approved by : Dorothy Cheuk

Date: 21-Mar-11

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Level Range	Octave Filter	Weight	Response		
105 dB	OFF	A	Fast	94.0	93.9
			Slow		93.9
		C	Fast		93.9
130 dB	OFF	A	Fast	94.0	94.0
			Slow		94.0
		C	Fast		94.0
	OFF	A	Fast	114.0	113.8
			Slow		113.8
		C	Fast		113.8

IEC 651 Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.1 dB

2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 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	± 0.7 dB
	104.0	104.0	0.0	
	94.0	94.0 (Ref.)	- -	
105	84.0	84.2	-0.2	
	74.0	74.1	-0.1	
	64.0	64.1	-0.1	
	54.0	54.2	-0.2	

Uncertainty : ± 0.1 dB

Calibration Certificate

3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
130	84.0	84.1	-0.1	± 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	-39.8	- 39.4 dB, ± 1.5 dB
63 Hz	-26.5	- 26.2 dB, ± 1.5 dB
125 Hz	-16.5	- 16.1 dB, ± 1 dB
250 Hz	-9.0	- 8.6 dB, ± 1 dB
500 Hz	-3.4	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+1.6	+ 1.2 dB, ± 1 dB
4 kHz	+1.6	+ 1.0 dB, ± 1 dB
8 kHz	-0.5	- 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	50.3	± 0.5 dB
$1/10^2$	50.0	49.8	
$1/10^3$	50.0	50.0	± 1.0 dB
$1/10^4$	50.0	50.0	

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 012 hPa.

---------- END ----------

Hong Kong Calibration Ltd.
香 港 校 正 有限公司

Calibration Certificate

Certificate No. **11218** Page 1 of 3 Pages

Customer : Environmental Pioneers and Solutions Limited

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

Order No. : Q10260 **Date of receipt :** 1-Mar-11

Item Tested

Description : Digital Sound Level Meter

Manufacturer : SVAN

Model : 949 **Serial No.** : 8569

Test Conditions

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

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

Test Results

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

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

Main Test equipment used:

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

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

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

Calibrated by : P. F. Wong

Approved by : Dorothy Cheuk

Date: 15-Mar-11

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. SPL Accuracy

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

IEC 651 Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.1 dB

2. Level Stability : 0.0 dB
IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 0.01 dB

3. Linearity

3.1 Level Linearity

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

Uncertainty : ± 0.1 dB

Calibration Certificate

3.2 Differential level linearity

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

Uncertainty : ± 0. 1 dB

4. Frequency Weighting

A weighting

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

Uncertainty : ± 0.1 dB

5. Time Averaging

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

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 010 hPa.
4. *Out of Specification

---------- END ----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 11495

Customer : Environmental Pioneers and Solutions Limited

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

Order No. : Q10260 **Date of receipt :** 15-Mar-11

Item Tested

Description : Sound Level Calibrator

Manufacturer : Svantek

Model : SV30A **Serial No. :** 7908

Test Conditions

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

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

Test Results

All results were within the IEC 942 Class 1 specification.

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

Main Test equipment used:

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

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

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

Calibrated by : P. F. Wong

Approved by : Dorothy Cheuk

Date: 21-Mar-11

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. Level Accuracy

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

Uncertainty : ± 0.1 dB

2. Frequency

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

Uncertainty : $\pm 3.6 \times 10^{-6}$

3. Level Stability : 0.0 dB
IEC 942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

4. Total Harmonic Distortion : < 1.0 %
IEC 942 Class 1 Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The above measured values are the mean of 3 measurements.
3. The uncertainty claimed is for a confidence probability of not less than 95%.
4. Atmospheric Pressure : 1012 hPa.

---------- END ----------

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: --
Date of Issue: 26/11/2011
Client: ENVIRONMENTAL PIONEERS & SOLUTIONS LTD

Scope of Test:

Description:	FLOW METER
Brand Name:	Global Water
Model No.:	FP201
Serial No.:	45360
Equipment No.:	--
Date of Calibration:	15/12/2010
Date of next Calibration:	14/12/2011

Parameters:

Flow Meter **In house method**

Expected Reading (MPH)	Displayed Reading (MPH)	Tolerance (%)
60	65	-8
150	144	-4
800	773	-1
	Tolerance Limit (±%)	10.0

ALS Technichem (HK) Pty Ltd

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR ALLEN CHAN	**WORK ORDER:**	HK1118870
CLIENT:	ENVIRONMENTAL PIONEERS & SOLUTIONS LTD	**LABORATORY:**	HONG KONG
ADDRESS:	FLAT 19A, CHAI WAN INDUSTRIAL CENTRE BUILDING, 20 LEE CHUNG STREET, CHAI WAN, HONG KONG.	**DATE RECEIVED:**	11/08/2011
		DATE OF ISSUE:	17/08/2011
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 aceptance criteria of ALS will be followed.

Scope of Test:	Dissolved Oxygen, pH, Temperature and Turbidity
Description:	Hand-held Water Quality Meter
Brand Name:	DKK-TOA
Model No.:	WQC-24
Serial No.:	682337
Equipment No.:	--
Date of Calibration:	16 August, 2011

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

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1118870
Date of Issue: 17/08/2011
Client: ENVIRONMENTAL PIONEERS & SOLUTIONS LTD

Description: Hand-held Water Quality Meter
Brand Name: DKK-TOA
Model No.: WQC-24
Serial No.: 682337
Equipment No.: --
Date of Calibration: 16 August, 2011 Date of next Calibration: 16 November, 2011

Parameters:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.61	4.48	-0.13
6.82	6.77	-0.05
7.95	7.85	-0.10
	Tolerance Limit (±mg/L)	0.20

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

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.00	3.97	-0.03
7.00	6.97	-0.03
10.00	10.08	0.08
	Tolerance Limit (±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 (°C)	Displayed Reading (°C)	Tolerance (°C)
12.0	11.8	-0.2
24.5	24.0	-0.5
31.5	31.4	-0.1
	Tolerance Limit (°C)	2.0

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0.0	0.1	--
4.0	3.9	-2.5
40.0	39.3	-1.8
80.0	78.0	-2.5
400.0	399.0	-0.3
800.0	798.6	-0.2
	Tolerance Limit (±%)	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		3/11/2011	3/11/2011
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		12:24	12:59
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		1.2	1.46
Measurement Results	L_{eq} (dB(A))	51.2	56.6
	L_{10} (dB(A))	52.9	59.0
	L_{90} (dB(A))	43.2	40.4
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:	Lai Chi Hang		3/11/2011

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		10/11/2011	10/11/2011
Weather Condition		Cloudy	Cloudy
Measurement Start Time (hh:mm)		13:54	13:19
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.9	0.35
Measurement Results	L_{eq} (dB(A))	51.0	56.9
	L_{10} (dB(A))	53.1	59.4
	L_{90} (dB(A))	38.7	39.1
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
Perpared by:	Lai Chi Hang		10/11/2011

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		17/11/2011	17/11/2011
Weather Condition		Cloudy	Cloudy
Measurement Start Time (hh:mm)		13:00	12:20
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		0.25	0.48
Measurement Results	L_{eq} (dB(A))	48.0	54.5
	L_{10} (dB(A))	50.8	56.8
	L_{90} (dB(A))	36.9	39.3
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:	Lai Chi Hang		17/11/2011

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		24/11/2011	24/11/2011
Weather Condition		Sunny	Sunny
Measurement Start Time (hh:mm)		12:50	13:27
Measurement Time Length (mins)		30 mins	
SLM Model & S/N		SVAN 949	
Wind Speed (m/s)		1.83	0
Measurement Results	L_{eq} (dB(A))	47.8	53.0
	L_{10} (dB(A))	49.4	55.6
	L_{90} (dB(A))	36.7	36.1
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
Perpared by:	Lai Chi Hang		24/11/2011

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 : 1/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	14:30	14:50	
Tide Mode	Mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.66	7.89	
Salinity (ppt)	7.4	20.9	
Temperature (^{o}C)	27.1	28.4	
Turbidity (NTU)	1.2	3.5	3.5
DO (mg/L)	7.75	7.12	
DO Saturation (%)	77%	72%	
Suspended Solids (mg/L)	4.8	2.0	2.0

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		1/11/2011

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

Date of Sampling : 3/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	13:30	12:30	
Tide Mode	Mid-flood		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.33	7.64	
Salinity (ppt)	3	18.2	
Temperature (^{o}C)	27.4	28.2	
Turbidity (NTU)	1.9	1.6	1.6
DO (mg/L)	7.70	7.89	
DO Saturation (%)	78%	79%	
Suspended Solids (mg/L)	1.8	8.0	8.0

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		3/11/2011

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

Date of Sampling : 5/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	10:00	9:30	
Tide Mode	Mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.23	7.53	
Salinity (ppt)	3	15.5	
Temperature (^{o}C)	26	26.8	
Turbidity (NTU)	0.3	1.2	1.2
DO (mg/L)	7.39	7.21	
DO Saturation (%)	79%	79%	
Suspended Solids (mg/L)	2.8	2.8	2.8

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		5/11/2011

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

Date of Sampling : 8/11/2011

Weather : rainy

Monitoring Location	**W1**	**W2**	
Time (hhmm)	12:25	11:56	
Tide Mode	mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.15	7.41	
Salinity (ppt)	9.1	16.8	
Temperature (^{o}C)	24.1	25.1	
Turbidity (NTU)	1.8	0.1	0.1
DO (mg/L)	7.13	6.88	
DO Saturation (%)	59%	54%	
Suspended Solids (mg/L)	3.4	2.4	2.4

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		8/11/2011

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

Date of Sampling : 10/11/2011

Weather : Cloudy

Monitoring Location	**W1**	**W2**	
Time (hhmm)	12:57	12:27	
Tide Mode	mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.23	7.37	
Salinity (ppt)	9.3	15.8	
Temperature (^{o}C)	22.1	23	
Turbidity (NTU)	4.4	0.4	0.4
DO (mg/L)	7.78	7.31	
DO Saturation (%)	79%	75%	
Suspended Solids (mg/L)	4.4	2.4	2.4

Remark or Observation : Rain last night

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		10/11/2011

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

Date of Sampling : 12/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	12:22	12:33	
Tide Mode	mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.42	7.38	
Salinity (ppt)	7.6	9.4	
Temperature (^{o}C)	23.1	23.4	
Turbidity (NTU)	0.7	1.2	1.2
DO (mg/L)	7.69	7.13	
DO Saturation (%)	82%	76%	
Suspended Solids (mg/L)	6.8	6.4	6.4

Remark or Observation : Measurement after rain

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		12/11/2011

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

Date of Sampling : 15/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	13:30	13:53	
Tide Mode	mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.26	7.80	
Salinity (ppt)	3.9	18.5	
Temperature (^{o}C)	26.9	26.9	
Turbidity (NTU)	2.2	2.3	2.3
DO (mg/L)	7.13	7.21	
DO Saturation (%)	76%	77%	
Suspended Solids (mg/L)	3.2	6.4	6.4

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		15/11/2011

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

Date of Sampling : 17/11/2011

Weather : Rainy

Monitoring Location	**W1**	**W2**	
Time (hhmm)	15:00	15:15	
Tide Mode	Mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.27	7.58	
Salinity (ppt)	2.5	15.6	
Temperature (^{o}C)	24.4	25.1	
Turbidity (NTU)	0.3	1.2	1.2
DO (mg/L)	7.46	7.30	
DO Saturation (%)	77%	76%	
Suspended Solids (mg/L)	1.00	3.20	3.20

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		17/11/2011

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

Date of Sampling : 19/11/2011

Weather : Cloudy

Monitoring Location	W1	W2	
Time (hhmm)	12:57	12:30	
Tide Mode	Mid-flood		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.34	7.39	
Salinity (ppt)	1.4	11	
Temperature (^{o}C)	26	26.1	
Turbidity (NTU)	2.9	3.3	3.3
DO (mg/L)	7.65	7.17	
DO Saturation (%)	74%	70%	
Suspended Solids (mg/L)	1.20	3.40	3.40

Remark or Observation :

	Name	Signature	Date
Prepared By :	Lai Chi Hang		19/11/2011

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

Date of Sampling : 22/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	10:43	10:23	
Tide Mode	Mid-ebb		
River Condition	normal	normal	
Water Depth (m)	<1	<1	
pH value	7.27	7.46	
Salinity (ppt)	7.1	15	
Temperature (^{o}C)	22.4	22.8	
Turbidity (NTU)	1.0	1.2	1.2
DO (mg/L)	7.25	7.00	
DO Saturation (%)	78%	76%	
Suspended Solids (mg/L)	2.40	3.80	3.80

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		22/11/2011

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

Date of Sampling : 24/11/2011

Weather : Suuny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	12:37	12:05	
Tide Mode	Mid-ebb		
River Condition	normal	nornal	
Water Depth (m)	<1	<1	
pH value	7.51	7.67	
Salinity (ppt)	6.9	16.9	
Temperature (^{o}C)	22.5	22.7	
Turbidity (NTU)	1.5	0.9	0.9
DO (mg/L)	7.18	6.87	
DO Saturation (%)	76%	73%	
Suspended Solids (mg/L)	3.60	3.20	3.20

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		24/11/2011

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

Date of Sampling : 26/11/2011

Weather : Cloudy

Monitoring Location	**W1**	**W2**	
Time (hhmm)	13:16	15:50	
Tide Mode	Mid-ebb		
River Condition	Cloudy	Cloudy	
Water Depth (m)	<1	<1	
pH value	7.45	7.70	
Salinity (ppt)	6.3	18	
Temperature (^{o}C)	21.8	22.4	
Turbidity (NTU)	0.0	2.4	2.4
DO (mg/L)	7.10	7.16	
DO Saturation (%)	77%	78%	
Suspended Solids (mg/L)	1.00	2.80	2.80

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		26/11/2011

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

Date of Sampling : 29/11/2011

Weather : Sunny

Monitoring Location	**W1**	**W2**	
Time (hhmm)	14:00	14:21	
Tide Mode	Mid-ebb		
River Condition	Sunny	Sunny	
Water Depth (m)	<1	<1	
pH value	7.50	7.71	
Salinity (ppt)	2.9	17.9	
Temperature (^{o}C)	25.2	25.5	
Turbidity (NTU)	7.2	1.6	1.6
DO (mg/L)	6.53	6.63	
DO Saturation (%)	70%	70%	
Suspended Solids (mg/L)	1.00	2.40	2.40

Remark or Observation :

	Name	**Signature**	**Date**
Prepared By :	Lai Chi Hang		29/11/2011

Appendix F: Hydrological Characteristics Monitoring Data

Location	Position	Tide	Date**	Time	Weather	Water Depth (m)*	Water Flow (m/s)	Water Flow (m^3/s)
H1	Mid	Flood	5-Nov-2011	14:45	Sunny	0.49	0.06	0.075
H1	Mid	Flood	12-Nov-2011	8:52	Sunny	0.18	0.06	0.075
H1	Mid	Flood	19-Nov-2011	12:57	Cloudy	0.18	0.12	0.150
H1	Mid	Flood	26-Nov-2011					
H2	Mid	Flood	5-Nov-2011	14:30	Sunny	0.43	0.06	0.377
H2	Mid	Flood	12-Nov-2011	8:36	Sunny	0.12	0.12	0.754
H2	Mid	Flood	19-Nov-2011	13:30	Cloudy	0.37	0.06	0.377
H2	Mid	Flood	26-Nov-2011					
H1	Mid	Ebb	5-Nov-2011	10:00	Sunny	0.24	0.06	0.075
H1	Mid	Ebb	12-Nov-2011	12:22	Sunny	0.18	0.12	0.150
H2	Mid	Ebb	19-Nov-2011					
H1	Mid	Ebb	26-Nov-2011	13:16	Cloudy	0.12	0.08	0.100
H2	Mid	Ebb	5-Nov-2011	9:00	Sunny	0.16	0.06	0.377
H2	Mid	Ebb	12-Nov-2011	12:04	Sunny	0.12	0.12	0.7536
H2	Mid	Ebb	19-Nov-2011					
H2	Mid	Ebb	26-Nov-2011	13:50	Cloudy	0.17	0.08	0.502

Appendix G: Landscape and Visual Monitoring Photos

to protect trees E16 to E20 in Area A.	collapsed after typhoon in September 2011. (Photo provided by the Main Contractor).
	
Photo 7 – Declining health condition of U34.	**Photo 8** – Declining health condition of U35.
	
Photo 9 – Declining health condition of U37.	**Photo 10** – A36 with a broken planter in Area B.

	
Photo 11 – Broken planter for a transplanted tree (U57) in Area B.	**Photo 12** – A tree proposed to be transplanted T97 on eastern side of Tung Tsz Nursery was collapsed after typhoon (Photo provided by the Main Contractor).
	
Photo 13 – A tree proposed to be transplanted A12 on western side of Tung Tsz Nursery was collapsed after typhoon (Photo provided by the Main Contractor).	**Photo 14** – Poor health condition of the transplanted tree T152 in Area C.

	
Photo 15 – Poor health condition of the transplanted tree T153 in Area C.	**Photo 16** – Sparse foliage of the transplanted tree T250 in Area C.
	
Photo 17 – Poor health condition of the transplanted tree without tree tag in Area C.	**Photo 18** – Poor health condition of the transplanted tree without tree tag 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?
A		***Noise Impact***					
S 3.30	2.18	Good Site Practice: ▪ Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program ▪ Silencers or mufflers on construction equipment shall be utilized and shall be properly maintained during the construction program ▪ Mobile plant, if any, shall be sited as far from NSRs as possible ▪ Machines and plant (such as	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 ▪ 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 ▪ Material stockpiles and other structures shall be effectively utilized, wherever practicable, in screening noise from on-site construction activities.					
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		***Air Quality Impact***					
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?
		▪ Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather; ▪ Use of frequent watering for particularly dusty static construction areas and areas close to ASRs; ▪ Tarpaulin covering of all dusty vehicle loads transported to, from and between site location; ▪ Establishment and use of vehicle wheel and body washing facilities at the exit points of the site; ▪ Routing of vehicles and					

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.					
C		***Water Quality Impact***					
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?
		sewers/drains. ▪ 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. ▪ 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					

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?
		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. ▪ Water pumped out from excavated pits shall be discharged into silt removal facilities. ▪ During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed.					

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?
		▪ Exposed soil areas shall be minimized to reduce potential for increased siltation and contamination of runoff. ▪ 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. ▪ Open stockpiles of construction materials or construction wastes on-site shall be covered with tarpaulin or similar fabric during rainstorms.					
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?
		▪ 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. ▪ For the construction of the box				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?
		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 ground level and +2.5 mPD (whichever is greater) to provide adequate allowance 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. ▪ Sheet-piles, which would be installed around the works trench near the Conservation Area, would					

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?
		be extended above ground level for about 2m to serve as hoardings to isolate the works site. ▪ 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. ▪ 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.					

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?
		▪ 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.					
S5.31-S5.32	4.8-4.9	General Construction Activities: ▪ 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	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. ▪ 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.					
S5.33	4.10	Sewage from Construction workforce: ▪ Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A	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: ▪ 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	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.					
D		***Waste Management Implications***					
S6.20 – 6.22	5.5	Good site practices: ▪ 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. ▪ Training of site personnel in proper waste management and chemical waste handling procedures. ▪ Provision of sufficient waste disposal points and regular	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?
		collection for disposal. ▪ Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers. ▪ Separation of chemical waste for special handling and appropriate treatment at the Chemical Waste Treatment Facility. ▪ Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. ▪ A Waste Management Plan					

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. ▪ A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.					
S6.23-6.24	5.7	Waste reduction measures: ▪ 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. ▪ To encourage collection of aluminium cans by individual collectors, separate labelled bins	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?
		shall be provided to segregate this waste from other general refuse generated by the work force. ▪ Any unused chemicals or those with remaining functional capacity shall be recycled. ▪ Maximising the use of reusable steel formwork to reduce the amount of C&D material. ▪ Proper storage and site practices to minimise the potential for damage or contamination of construction materials. ▪ Plan and stock construction materials carefully to minimise amount of waste generated and					

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		Construction & Demolition (C&D) Material: ▪ 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. ▪ Suitable areas should be designated within the works site boundaries for temporary stockpiling of C&D material. ▪ Within stockpile areas, the following measures should be taken to control potential environmental	To minimize off-site disposal of C&D material To minimize environmental impacts during the handling of C&D material	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: - covering material during heavy rainfall; - locating stockpiles to minimize potential visual impacts; and - minimizing land intake of stockpile areas as far as possible. ▪ When disposing C&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					

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: ▪ 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. ▪ 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	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. ▪ 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.					
S6.28		General refuse: ▪ It should be stored in enclosed bins or compaction units separate from C&D material. ▪ A reputable waste collector	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. ▪ An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.					
E		***Ecological Impact***					
S. 7.95	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	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	▪ 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. ▪ 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	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?
		▪ The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed.					
S 7.118	6.7	▪ 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. ▪ 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.	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?
		▪ 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. ▪ The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. ▪ 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.					
S 7.119	6.8	▪ The construction of the proposed box-culvert would have the potential to directly impact a few	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?
		individual of a plant species of conservation interest (Hong Kong Pavetta, *Pavetta hongkongensis*). The affected individuals should be transplanted to a suitable nearby habitats prior to the construction phase. ▪ 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. ▪ 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.		lturalist			

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	▪ 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. ▪ 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. ▪ Noise generating construction works near the Shuen Wan Egretry SSSI should be avoided as far as practicable during the breeding season (March to June) of the	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. ▪ 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. ▪ 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.					
S 7.121	6.10	▪ Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or	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	▪ 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.	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	▪ Waste skips should be provided to collect general refuse and construction wastes. The wastes would be disposed of timely and properly off-site.	To minimise disturbance to habitats.	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	▪ General drainage arrangements should include sediment and oil traps to collect and control construction site run-off.	To minimise sedimentation/ water quality impacts	Contractor	Whole site	Construction Phase	EIAO-TM
S 7.121	6.10	▪ Open burning on works sites is illegal, and should be strictly prohibited.	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	▪ De-silting should be limited to the dry season.	To minimise sedimentation/ water quality impacts	Maintenance parties of the channel	Whole site	Operation Phase	EIAO-TM
S 7.122	6.11	▪ Waste material produced during de-silting should be disposed of in a timely and appropriate manner.	To minimise sedimentation/ water quality impacts	Maintenance parties of the channel	Whole site	Operation Phase	EIAO-TM
S 7.123	6.12	▪ 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. ▪ 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	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. ▪ The compensatory planting should make use of native plant species with flowers/fruits attractive to wildlife.					
S 7.124	6.13	▪ 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. ▪ 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). ▪ The pond should be enhanced by removing boardwalks around the	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?
		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. ▪ 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.					

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?
F		***Landscape and Visual***					
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

B) Implementation status of environmental protection and mitigation

EM&A Ref.	Recommended Mitgation 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 Mitgation 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	Outstandinng
	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 Mitgation 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	Further precautionary measures during rainy season: 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. 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	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 Mitgation 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
	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. 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. 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. 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					
5.9	Reuse excavated material as much as possible	To achieve waste reduction	Works areas	Construction phase	EIAO-TM	Implemented
5.7	Any unused chemicals or those with remaining functional capacity shall be recycled.					Not applicable
	Recycle scrap metals or abandoned equipment					Implemented

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

EM&A Ref.	Recommended Mitgation Measures	Objectives of the Recommended Measure & main concern to Address	Location of the measure	When to implement the measure?	What requirements or standards for the measure to achieve?	Implementation status
5.5	A recording system for the amount of wastes generated, recycled and disposed should be proposed	To reduce waste management impacts	Works areas	Construction phase	ETWB TCW 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 steam 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 steam and natural river bank.	Whole site	Construction phase	EIAO-TM	No applicable

EM&A Ref.	Recommended Mitgation 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
	The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed.					
6.7	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. 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. 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. The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. 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.	To minimize sedimentation/ water quality impacts	Whole site	Construction phase	EIAO-TM	No applicable

EM&A Ref.	Recommended Mitgation 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
6.8	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, Pavetta hongkongensis). The affected individuals should be transplanted to a suitable nearby habitats prior to the construction phase. 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. 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.	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

EM&A Ref.	Recommended Mitgation 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
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

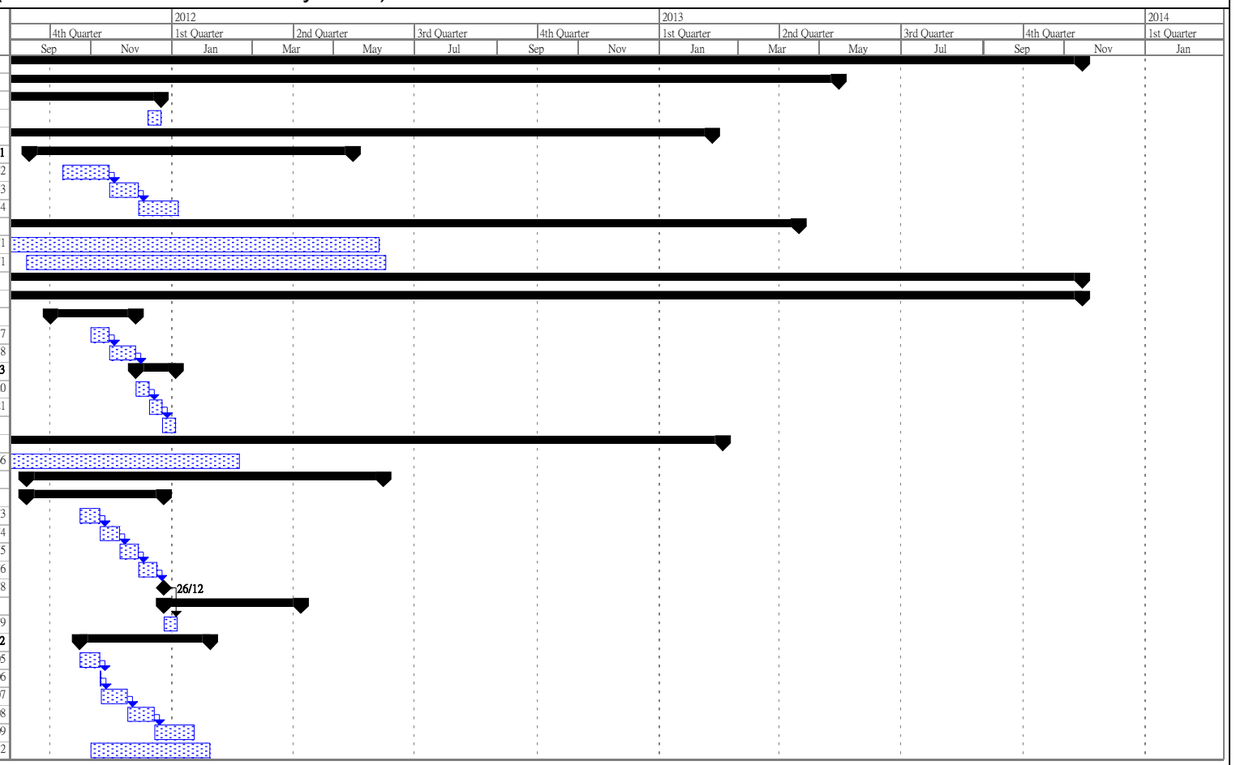
Appendix I: Construction programme

Contract No.: DC/2009/22
Contract Title: Drainage Improvement Works in Shuen Wan, Tai Po - Contract 1

Option 1: Laying DN2700 by Open Cut Method
(in series with DN2100)

3 Months Rolling Programme (November 2011 to January 2012)

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
15	**Section I (Area A,B - Shuen Wan)**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
35	**Pumping Station**	**1175 days**	**Fri 26/2/10**	**Wed 15/5/13**		
36	**Piling Works**	**666 days**	**Fri 26/2/10**	**Fri 23/12/11**		
46	Proof Drill	10 days	Wed 14/12/11	Fri 23/12/11		
47	**Main Structure of Pumping Station**	**980 days**	**Sun 6/6/10**	**Sat 9/2/13**		
49	**Reinforced Concrete Works**	**243 days**	**Fri 16/9/11**	**Tue 15/5/12**	**48**	**82,76,88,71**
51	Construction of Base Slab at -3.0 mPD	35 days	Tue 11/10/11	Mon 14/11/11	50	52
52	Construction of Wall Stem	22 days	Tue 15/11/11	Tue 6/12/11	51	53
53	Construction of Ground Floor Slab at +5.15 mPD (Screen House)	30 days	Wed 7/12/11	Thu 5/1/12	52	54
65	**E & M**	**1045 days**	**Sun 6/6/10**	**Mon 15/4/13**		
68	Fabrication & Delivery of Plant & Material	550 days	Fri 3/12/10	Mon 4/6/12	67	71
70	Fabrication & Delivery of Stormwater pumps	270 days	Wed 14/9/11	Sat 9/6/12	69	71
96	**Box Culvert**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
108	**Single Cell Box Culvert**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
114	**Box Culvert at Chainage 85 - 100**	**64 days**	**Sun 2/10/11**	**Sun 4/12/11**		
116	Construction of Base Slab	14 days	Tue 1/11/11	Mon 14/11/11	115	117
117	Construction of Wall & Roof	20 days	Tue 15/11/11	Sun 4/12/11	116	118
118	**Box Culvert at Chainage 70 - 85**	**30 days**	**Mon 5/12/11**	**Tue 3/1/12**	**117**	**123**
119	Excavation & Installation of Shoring System	10 days	Mon 5/12/11	Wed 14/12/11		120
120	Construction of Base Slab	10 days	Thu 15/12/11	Sat 24/12/11	119	121
121	Construction of Wall & Roof	10 days	Sun 25/12/11	Tue 3/1/12	120	
149	**Dia. 2100mm Drainage Pipe**	**1088 days**	**Fri 26/2/10**	**Sun 17/2/13**		
165	PCCW 's Cables Diversion Works	414 days	Mon 3/1/11	Mon 20/2/12	164FS-170 days	166
168	**MH03 to MH04 (approximate 90m)**	**268 days**	**Wed 14/9/11**	**Thu 7/6/12**	**167**	
169	**Stage 1 (MH04 and approx. 30m pipes laying)**	**103 days**	**Wed 14/9/11**	**Mon 26/12/11**		
172	Excavation and Temporary Diversion of Existing Sewer Drain	15 days	Mon 24/10/11	Mon 7/11/11	171	173
173	Concrete Pipe Installation	15 days	Tue 8/11/11	Tue 22/11/11	172	174
174	Manhole Construction	14 days	Wed 23/11/11	Tue 6/12/11	173	175
175	Backfill and Temp. Decking	14 days	Wed 7/12/11	Tue 20/12/11	174	176
176	As Instructed by RSS (Re-Open to Public)	0 days	Mon 26/12/11	Mon 26/12/11	175	178
177	**Stage 2 (approx. 30m pipes laying)**	**103 days**	**Mon 26/12/11**	**Fri 6/4/12**		
178	Apply RA and Implement TTA	10 days	Mon 26/12/11	Wed 4/1/12	176	179
203	**Intake (As required in Dry Season) - Section 1**	**98 days**	**Mon 24/10/11**	**Sun 29/1/12**		**212**
204	Hoarding Erection	15 days	Mon 24/10/11	Mon 7/11/11		205
205	Implement TDMP	1 day	Tue 8/11/11	Tue 8/11/11	204	206
206	Surround by concrete mass and backfill the works area	20 days	Wed 9/11/11	Mon 28/11/11	205	207
207	Shoring Installation and Excavation	20 days	Tue 29/11/11	Sun 18/12/11	206	208
208	Construction of Intake	30 days	Mon 19/12/11	Tue 17/1/12	207	209
211	Modification of Existing Outlet Structure of Wai Ha River	90 days	Tue 1/11/11	Sun 29/1/12		212



Master Programme II (-)
Data Date: 2011-3-8

Task | Progress | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary
Critical Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Deadline

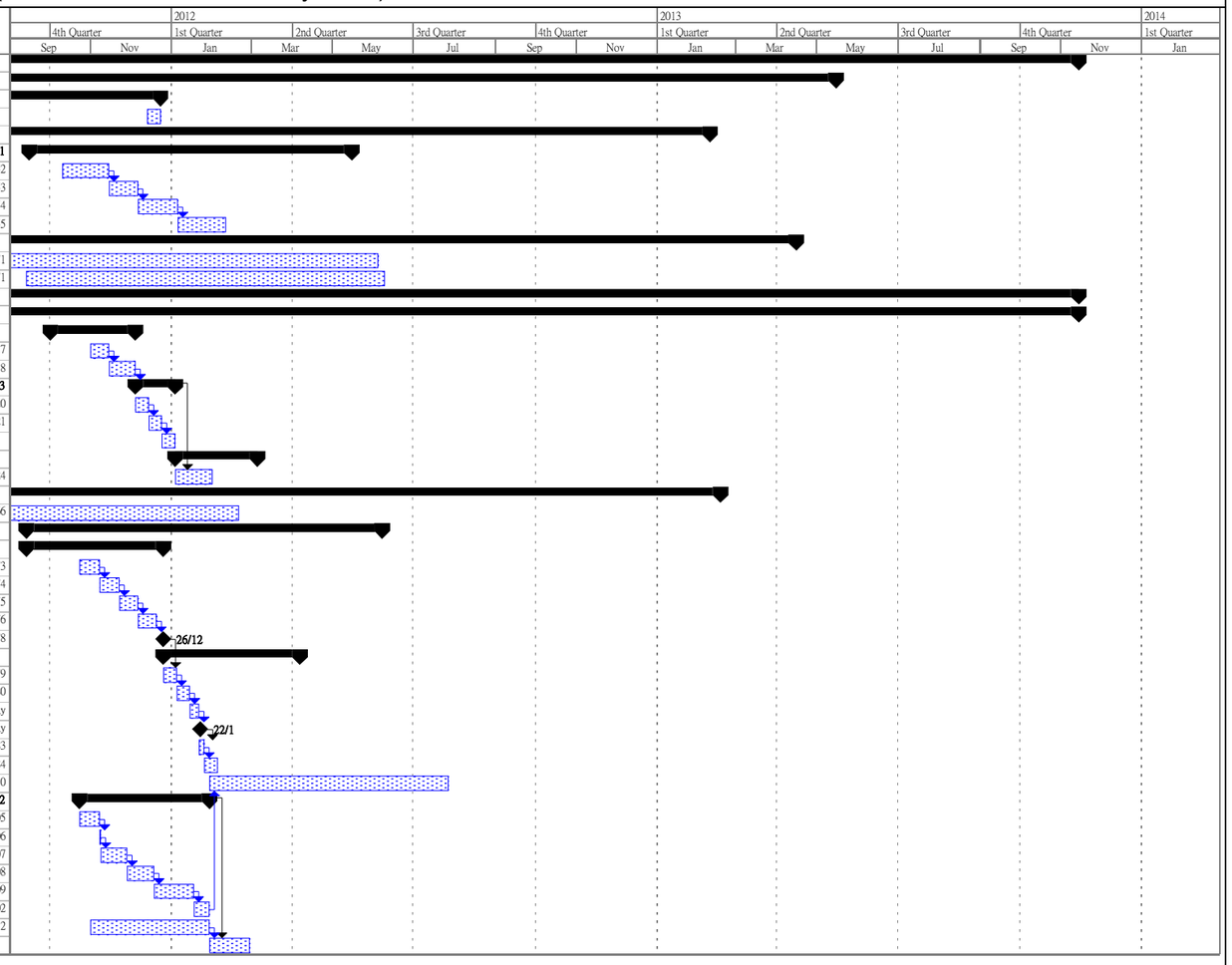
Appendix J: Three month rolling programme

Contract No.: DC/2009/22
Contract Title: Drainage Improvement Works in Shuen Wan, Tai Po - Contract 1

Option 1: Laying DN2700 by Open Cut Method
(in series with DN2100)

3 Months Rolling Programme (November 2011 to January 2012)

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
15	**Section I (Area A,B - Shuen Wan)**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
35	**Pumping Station**	**1175 days**	**Fri 26/2/10**	**Wed 15/5/13**		
36	**Piling Works**	**666 days**	**Fri 26/2/10**	**Fri 23/12/11**		
46	Proof Drill	10 days	Wed 14/12/11	Fri 23/12/11		
47	**Main Structure of Pumping Station**	**980 days**	**Sun 6/6/10**	**Sat 9/2/13**		
49	**Reinforced Concrete Works**	**243 days**	**Fri 16/9/11**	**Tue 15/5/12**	**48**	**82,76,88,71**
51	Construction of Base Slab at -3.0 mPD	35 days	Tue 11/10/11	Mon 14/11/11	50	52
52	Construction of Wall Stem	22 days	Tue 15/11/11	Tue 6/12/11	51	53
53	Construction of Ground Floor Slab at +5.15 mPD (Screen House)	30 days	Wed 7/12/11	Thu 5/1/12	52	54
54	Construction of Ground Floor Slab at +5.15 mPD (Wet Well)	36 days	Fri 6/1/12	Fri 10/2/12	53	55
65	**E & M**	**1045 days**	**Sun 6/6/10**	**Mon 15/4/13**		
68	Fabrication & Delivery of Plant & Material	550 days	Fri 3/12/10	Mon 4/6/12	67	71
70	Fabrication & Delivery of Stormwater pumps	270 days	Wed 14/9/11	Sat 9/6/12	69	71
96	**Box Culvert**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
108	**Single Cell Box Culvert**	**1358 days**	**Fri 26/2/10**	**Thu 14/11/13**		
114	**Box Culvert at Chainage 85 - 100**	**64 days**	**Sun 2/10/11**	**Sun 4/12/11**		
116	Construction of Base Slab	14 days	Tue 1/11/11	Mon 14/11/11	115	117
117	Construction of Wall & Roof	20 days	Tue 15/11/11	Sun 4/12/11	116	118
118	**Box Culvert at Chainage 70 - 85**	**30 days**	**Mon 5/12/11**	**Tue 3/1/12**	**117**	**123**
119	Excavation & Installation of Shoring System	10 days	Mon 5/12/11	Wed 14/12/11		120
120	Construction of Base Slab	10 days	Thu 15/12/11	Sat 24/12/11	119	121
121	Construction of Wall & Roof	10 days	Sun 25/12/11	Tue 3/1/12	120	
122	**Box Culvert at Chainage 40 - 70**	**62 days**	**Wed 4/1/12**	**Mon 5/3/12**		
123	Excavation & Installation of Shoring System	28 days	Wed 4/1/12	Tue 31/1/12	118	124
149	**Dia. 2100mm Drainage Pipe**	**1088 days**	**Fri 26/2/10**	**Sun 17/2/13**		
165	PCCW 's Cables Diversion Works	414 days	Mon 3/1/11	Mon 20/2/12	164FS-170 days	166
168	**MH03 to MH04 (approximate 90m)**	**268 days**	**Wed 14/9/11**	**Thu 7/6/12**	**167**	
169	**Stage 1 (MH04 and approx. 30m pipes laying)**	**103 days**	**Wed 14/9/11**	**Mon 26/12/11**		
172	Excavation and Temporary Diversion of Existing Sewer Drain	15 days	Mon 24/10/11	Mon 7/11/11	171	173
173	Concrete Pipe Installation	15 days	Tue 8/11/11	Tue 22/11/11	172	174
174	Manhole Construction	14 days	Wed 23/11/11	Tue 6/12/11	173	175
175	Backfill and Temp. Decking	14 days	Wed 7/12/11	Tue 20/12/11	174	176
176	As Instructed by RSS (Re-Open to Public)	0 days	Mon 26/12/11	Mon 26/12/11	175	178
177	**Stage 2 (approx. 30m pipes laying)**	**103 days**	**Mon 26/12/11**	**Fri 6/4/12**		
178	Apply RA and Implement TTA	10 days	Mon 26/12/11	Wed 4/1/12	176	179
179	Trial trench	10 days	Thu 5/1/12	Sat 14/1/12	178	180
180	Temp. Reinstatement or Decking	7 days	Sun 15/1/12	Sat 21/1/12	179	181FS+1 day
181	As Instructed by RSS (Re-Open to Public)	0 days	Sun 22/1/12	Sun 22/1/12	180FS+1 day	182FS-1 day
182	Re-Open to public	4 days	Sun 22/1/12	Wed 25/1/12	181FS-1 day	183
183	Re-implement TTA	10 days	Thu 26/1/12	Sat 4/2/12	182	184
202	From Intake to MH01 (approximate 20m DN1800)	180 days	Mon 30/1/12	Fri 27/7/12	209	210
203	**Intake (As required in Dry Season) - Section 1**	**98 days**	**Mon 24/10/11**	**Sun 29/1/12**		**212**
204	Hoarding Erection	15 days	Mon 24/10/11	Mon 7/11/11		205
205	Implement TDMP	1 day	Tue 8/11/11	Tue 8/11/11	204	206
206	Surround by concrete mass and backfill the works area	20 days	Wed 9/11/11	Mon 28/11/11	205	207
207	Shoring Installation and Excavation	20 days	Tue 29/11/11	Sun 18/12/11	206	208
208	Construction of Instake	30 days	Mon 19/12/11	Tue 17/1/12	207	209
209	Reinstatement	12 days	Wed 18/1/12	Sun 29/1/12	208	202
211	Modification of Existing Outlet Structure of Wai Ha River	90 days	Tue 1/11/11	Sun 29/1/12		212
212	Installation of 4 nos of Mechanical Penstocks	30 days	Mon 30/1/12	Tue 28/2/12	203,211	

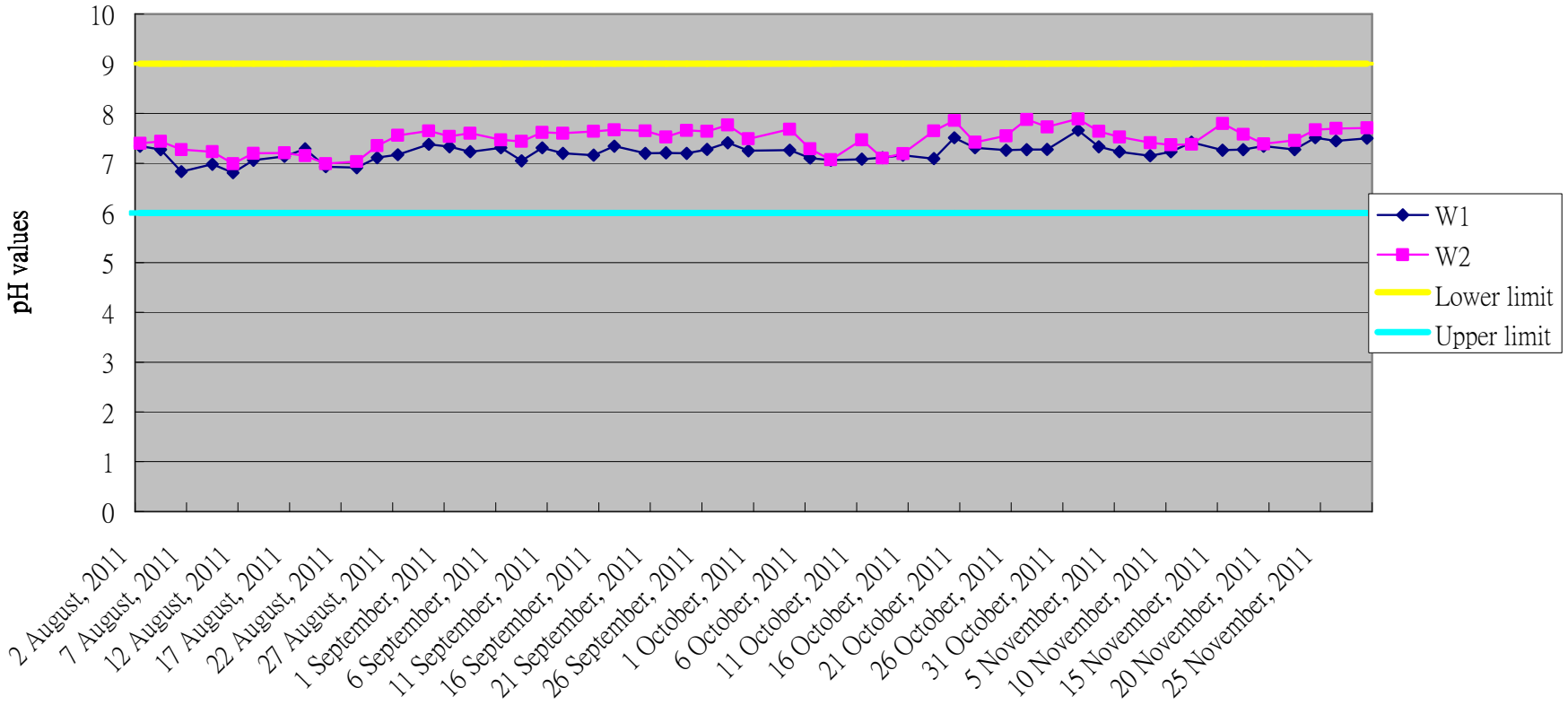


Master Programme II (-)
Data Date: 2011-3-8

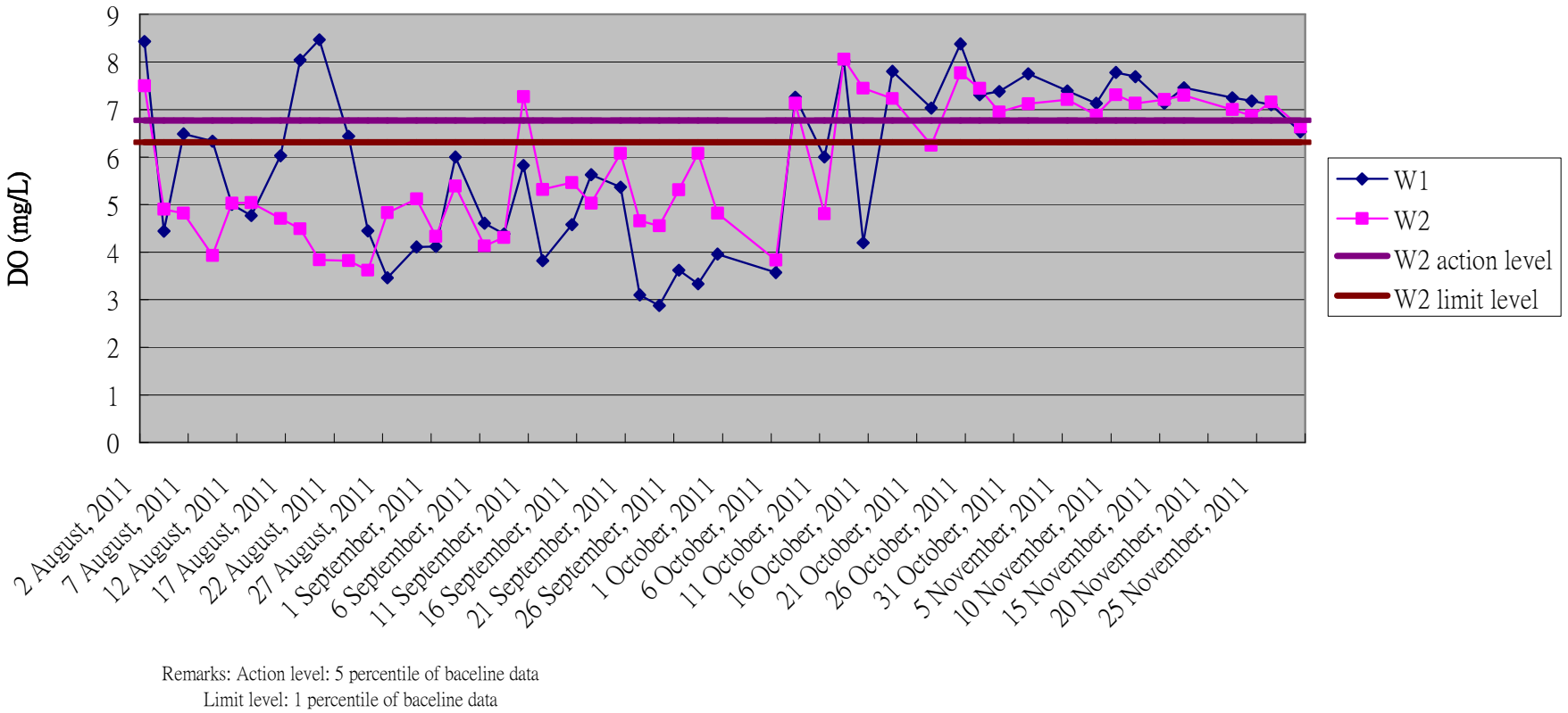
Task | Progress | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary
Critical Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Deadline

Appendix K. Graphical plots of trends of monitored parameter

Graphical plots of pH values W1&W2

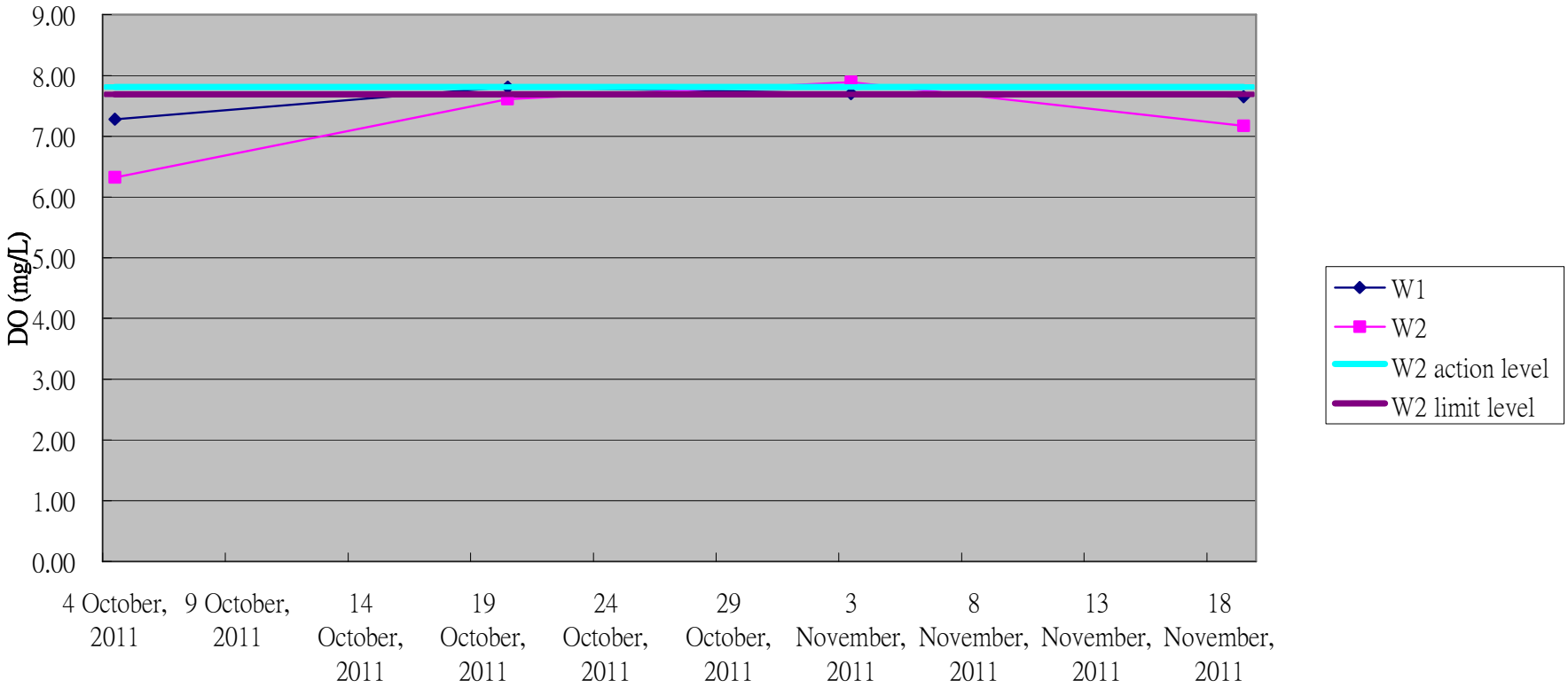


Graphical plots of DO (ebb tide) for W1&W2

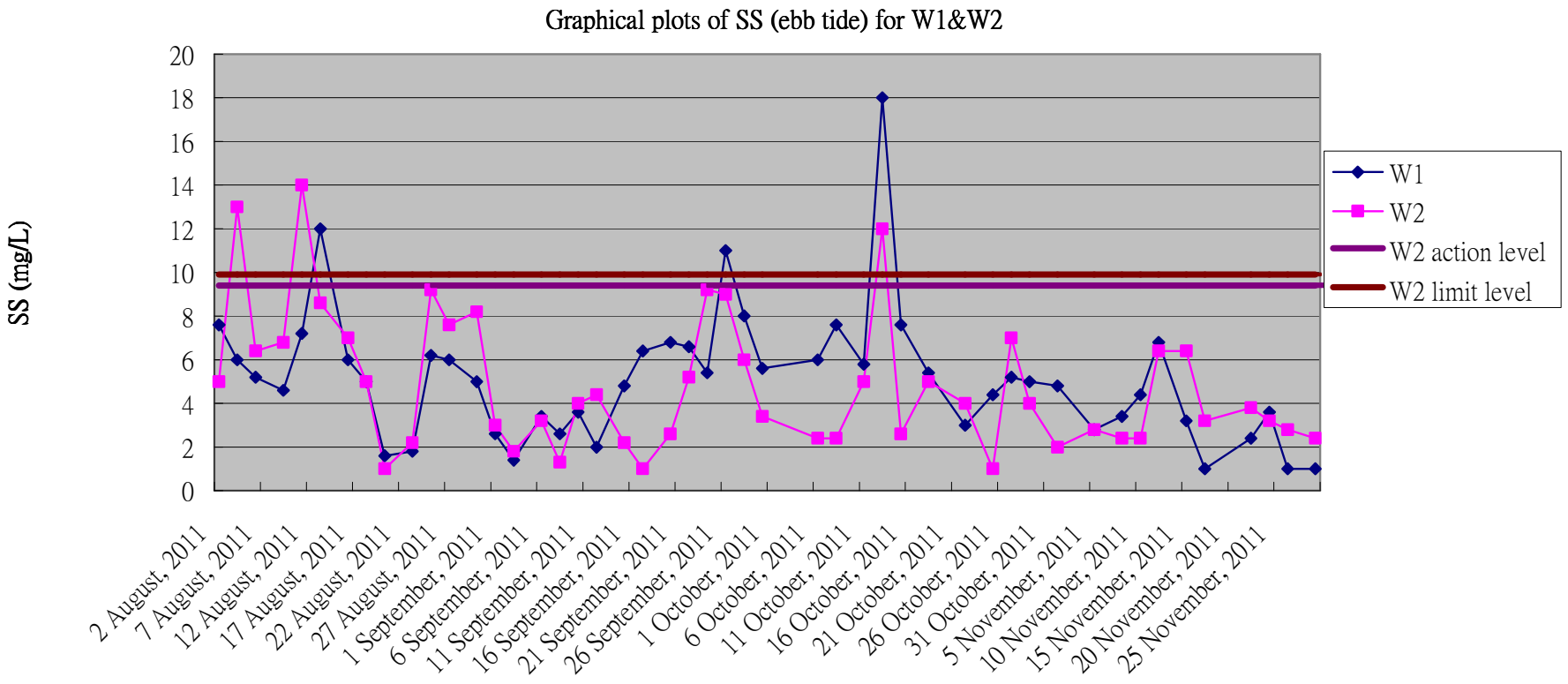


Remarks: Action level: 5 percentile of baceline data
Limit level: 1 percentile of baceline data

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

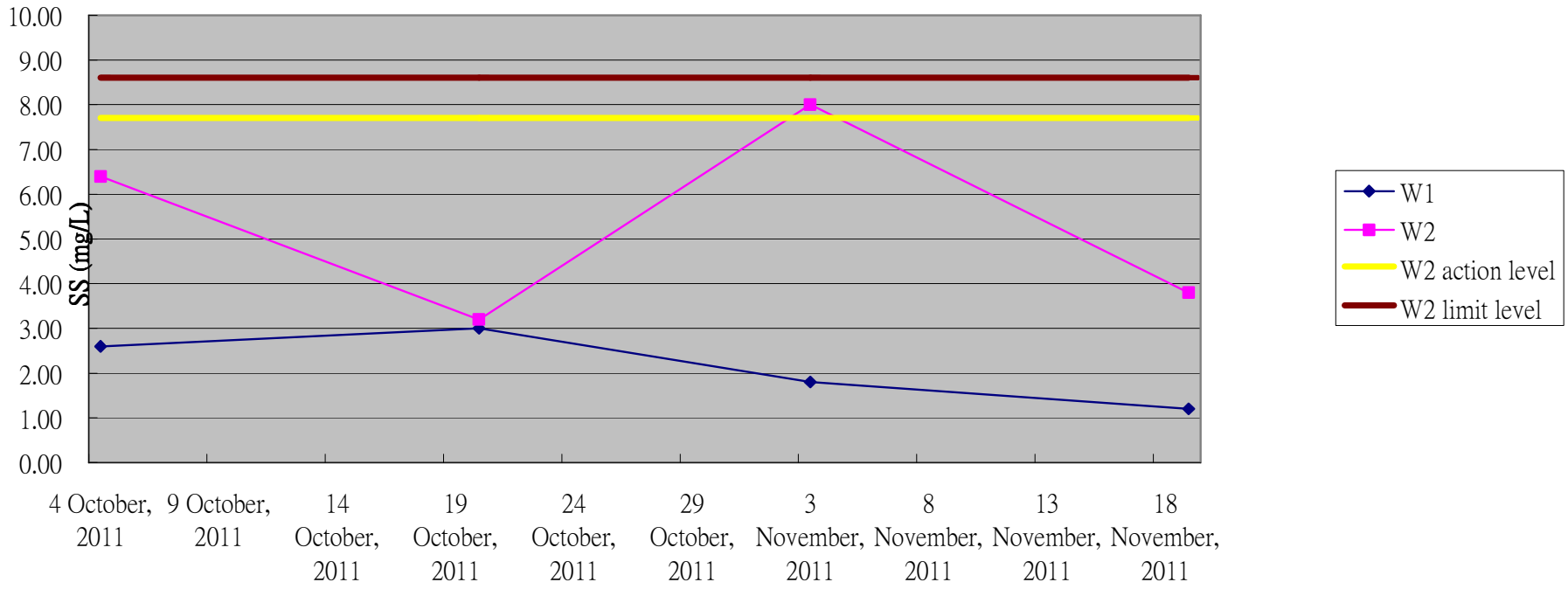


Remarks: Action level: 5 percentile of baceline data
Limit level: 1 percentile of baceline data



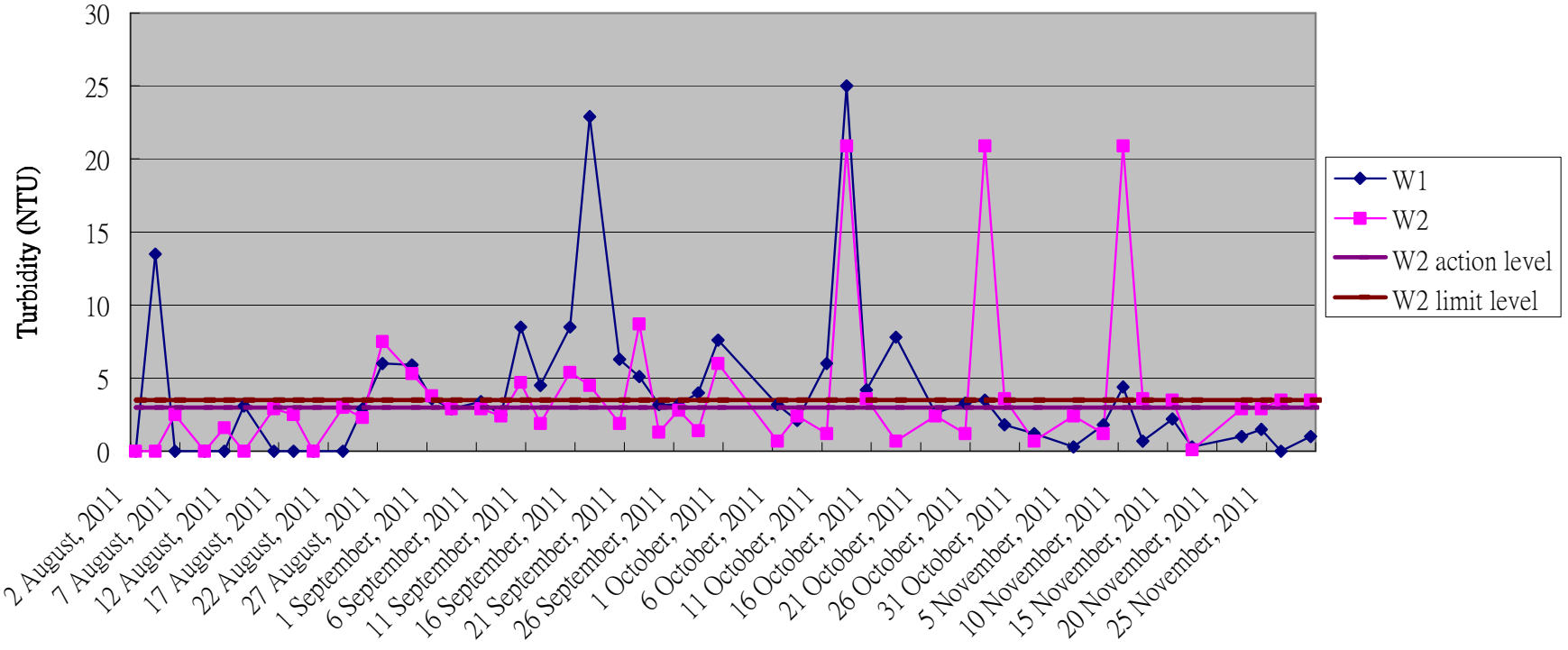
Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's SS
Limit level is 99% of baseline data or 130% of upsteam control station's SS

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



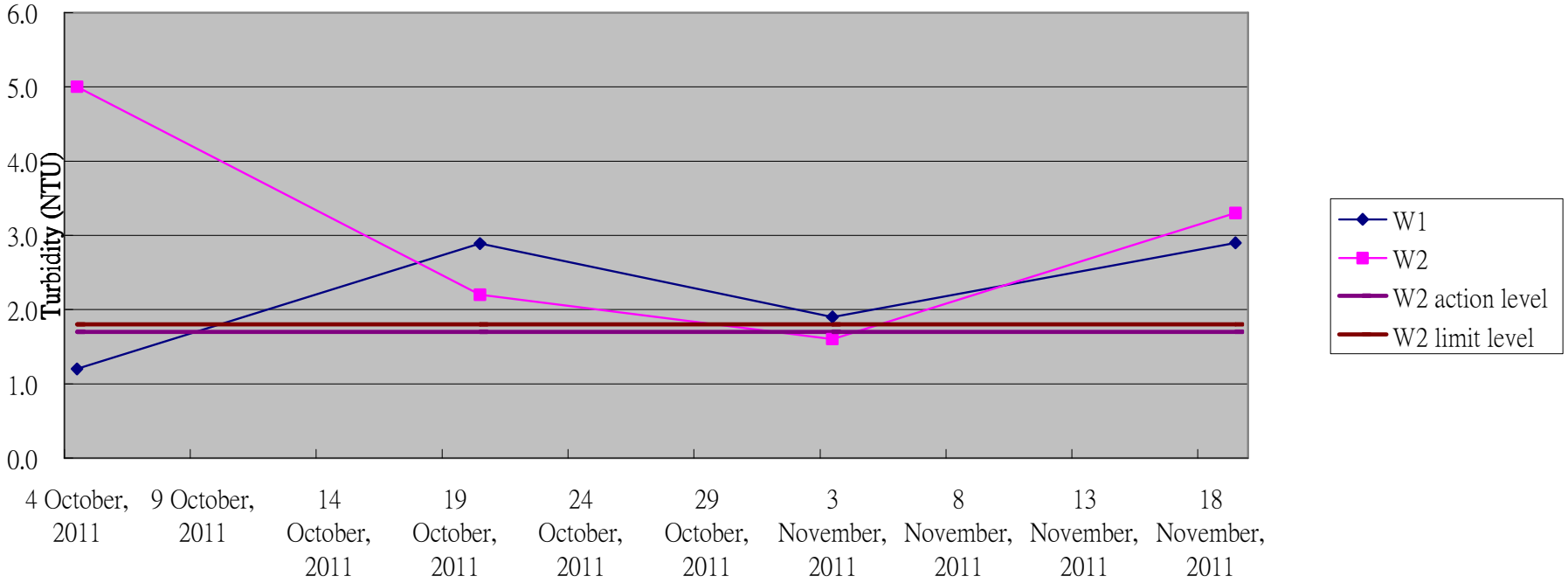
Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's SS
Limit level is 99% of baseline data or 130% of upsteam control station's SS

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



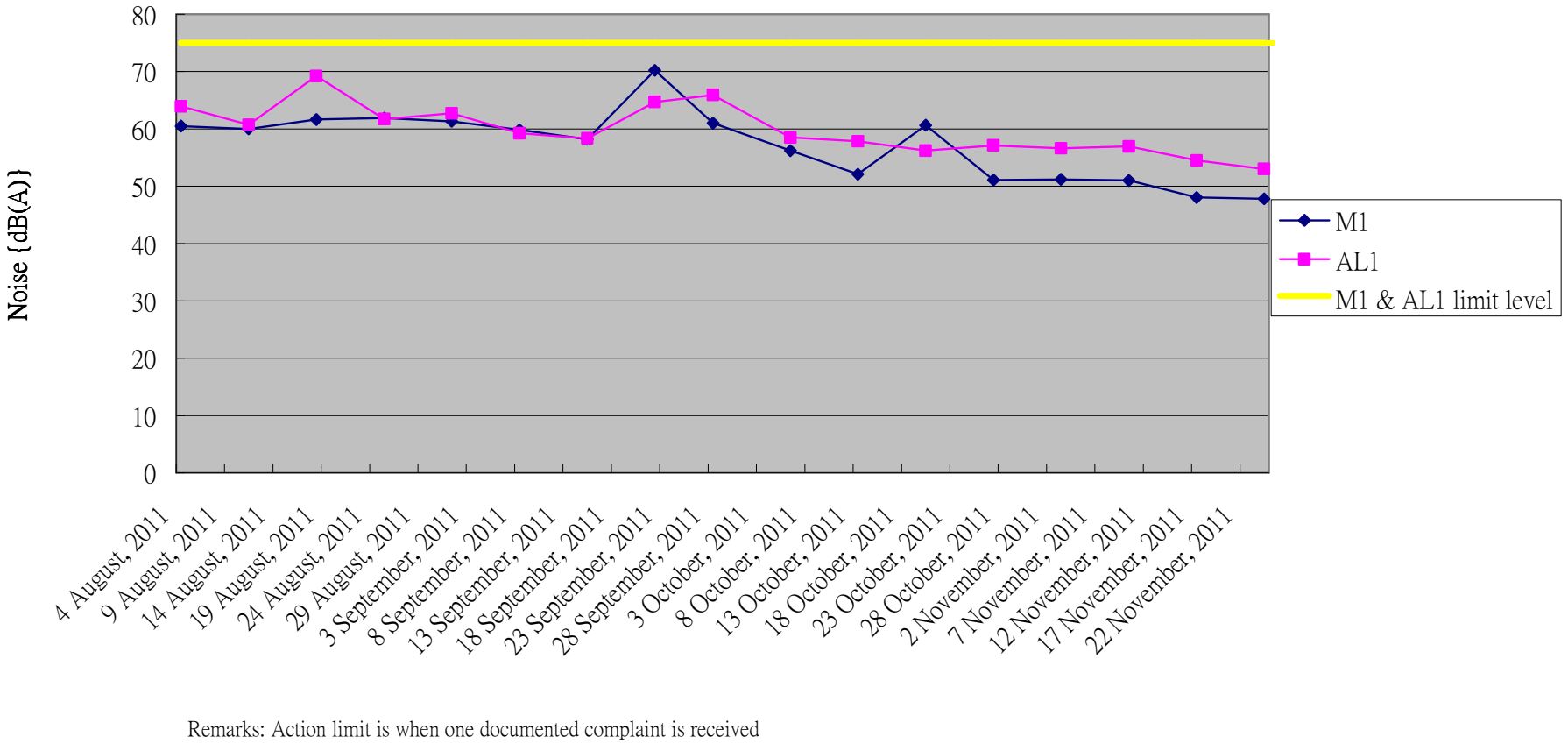
Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's Turbidity
Limit level is 99% of baseline data or 130% of upsteam control station's Turbidity

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



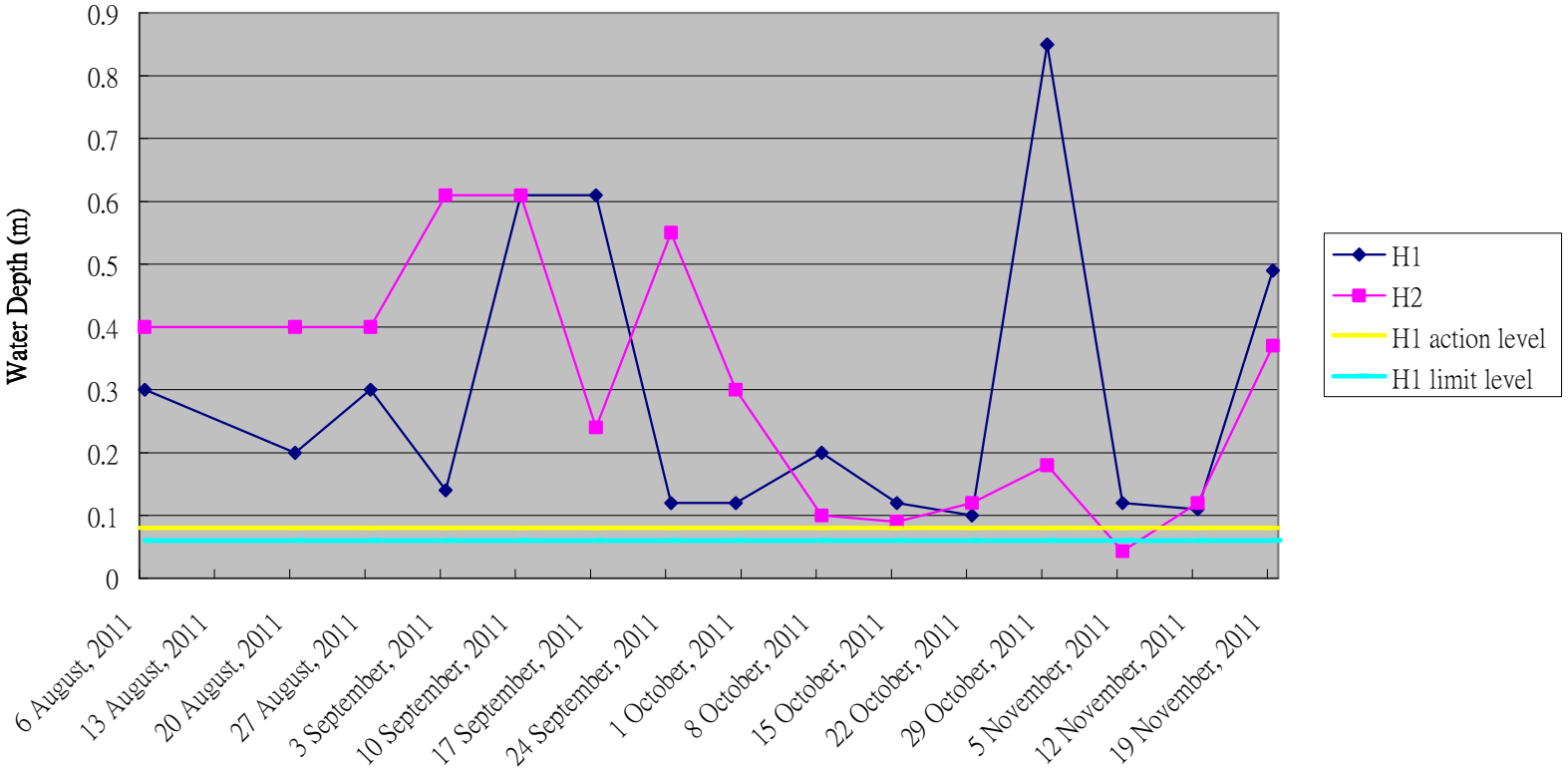
Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's Turbidity
Limit level is 99% of baseline data or 130% of upsteam control station's Turbidity

Graphical plots of Noise for M1 & AL1



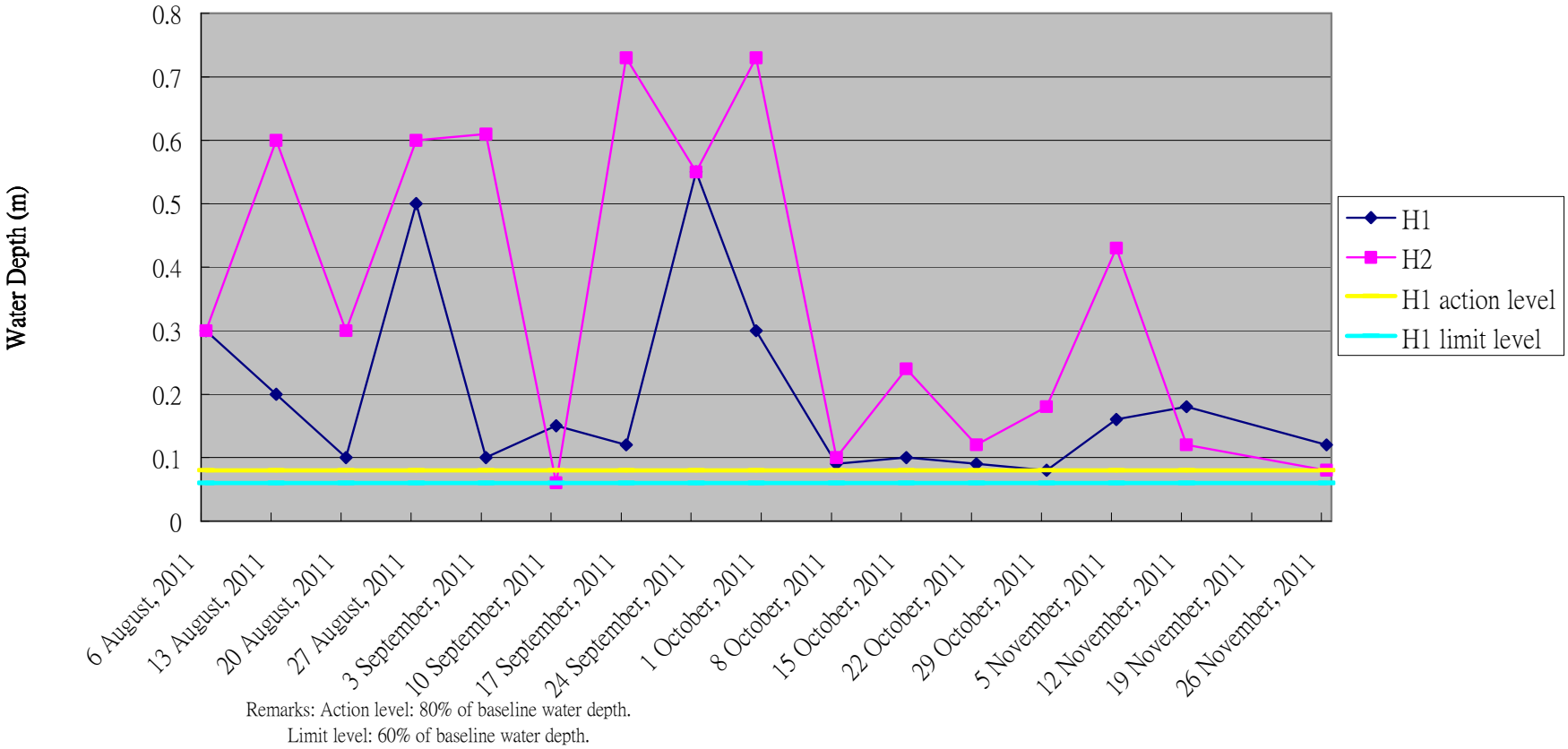
Remarks: Action limit is when one documented complaint is received

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



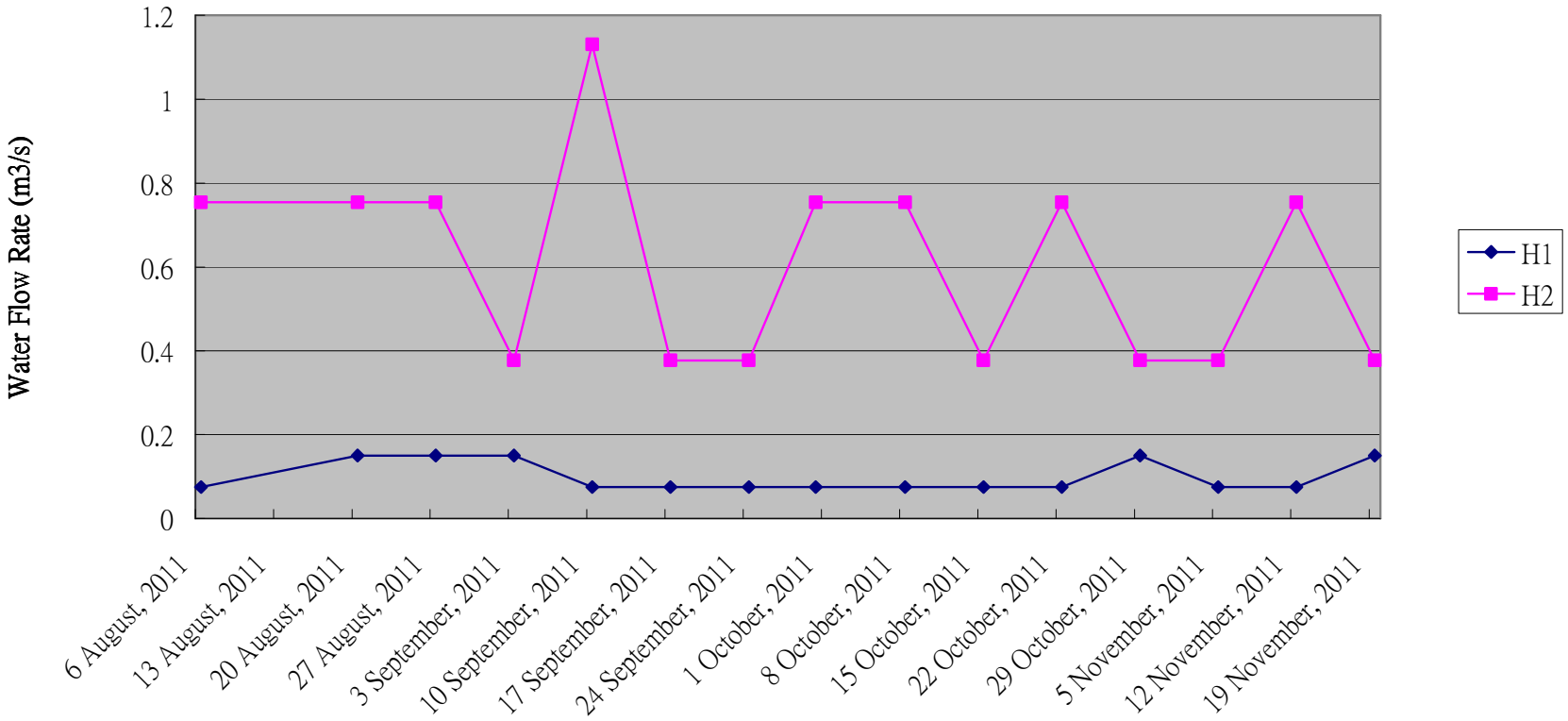
Remarks: Action level: 80% of baseline water depth.
Limit level: 60% of baseline water depth.

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



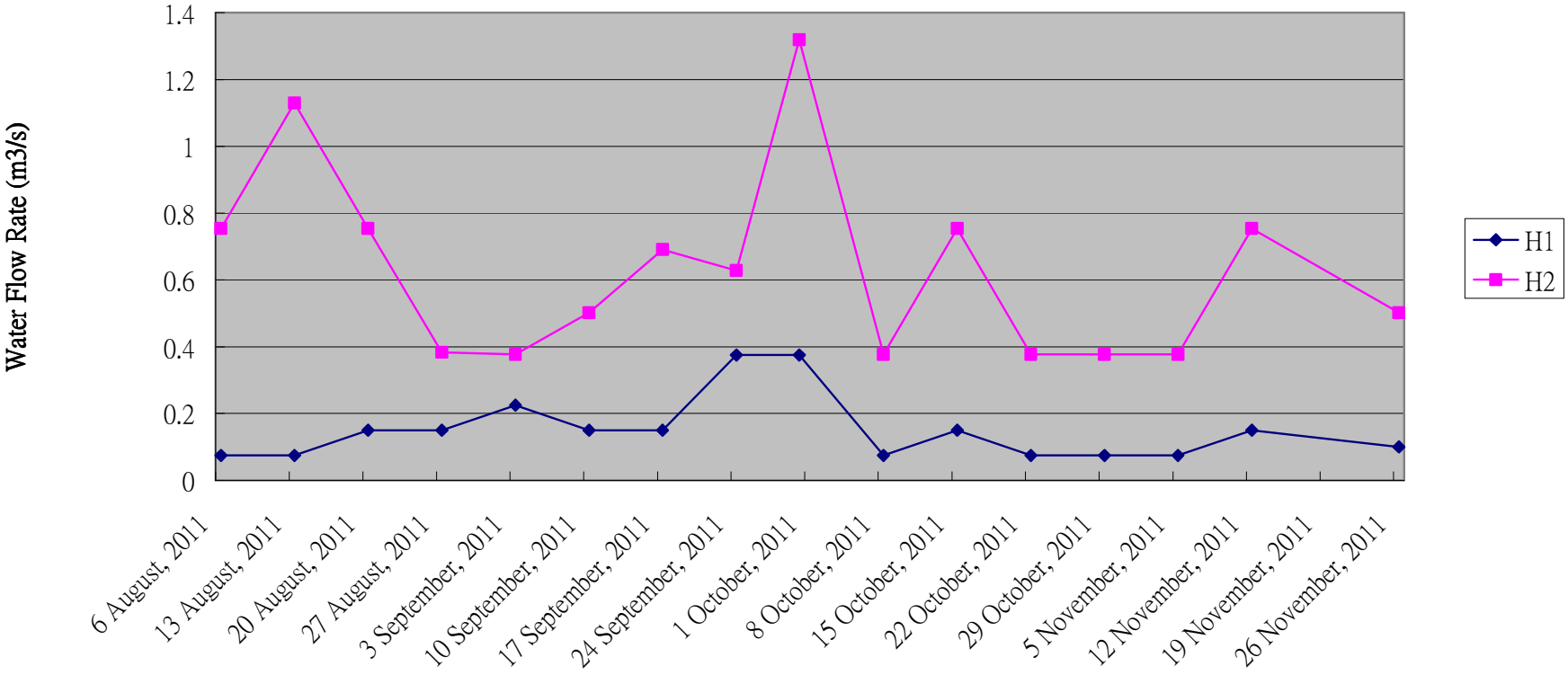
Remarks: Action level: 80% of baseline water depth.
Limit level: 60% of baseline water depth.

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 November 2011

B). List of transplanted trees in the Ecological Compensatory Area (ECA) during construction phase in November 2011.

Appendix L(A). List of recorded vegetations and relative abundance in the ECA during establishment phase in November 2011.

Species	*Status in Hong Kong	Growth form	[1]Status in ECA	[2]Relative abundance	Condition
Bidens bipinnata	E	Herbs	S	++	Fair
Panicum maximum	E	Herbs	S	++	Fair
Celtis sinensis	N	Trees	S	+	Fair
Terminalia catappa	E	Trees	R	+	Fair
Cocculus orbiculatus	N	Climbers	R	+	Fair
Mangifera indica	E	Trees	R	+	Fair
Dimocarpus longan	E	Trees	R	+	Fair
Michelia x alba	E	Trees	R	+	Fair
Oxalis corniculata	N	Herbs	S	+	Fair
Stephania longa	N	Climbers	S	+	Fair
Leucaena leucocephala	E	Shrubs	S	++	Fair
Amaranthus viridis	N	Herbs	S	+	Fair
Solanum nigrum	N	Herbs	S	+	Fair
Paspalum dialatum	E	Perennial Herb	S	+	Fair
Mikania micrantha	E	Climbing Herb	S	+	Fair
Mimosa pudica	E	Herb	S	++	Fair
Macaranga tanarius	N	Tree	R	+	Fair
Cassia surattensis	E	Shrub or Small Tree	S	+	Fair
Conyza sumatrensis	E	Herb	S	+	Fair
Sansevieria trifasciata Prain	E	Perennial Herb	S	+	Fair
Alocasia odora	N	Perennial Herb	S	+	Fair
Livistona chinensis	E	Tree Palm	S	+	Fair
Total number of species	**22**				

Key:

*Status in Hong Kong
E = Exotic
N = Native

[1]Status in ECA:
R = retained
S = newly succeed

[2]Relative abundance:
+ = Present
++ = Common
+++ = Abundant

Appendix L(B). List of transplanted trees in the ECA during establishment phase in November 2011.

Tree No.	Species Name	*Status in Hong Kong	Growth form	Date of transplantation	Condition	Remarks
T150	*Bombax ceiba*	E	Tree	22/6/2011	Fair	
T151	*Bombax ceiba*	E	Tree	22/6/2011	Fair	Sparse crown with some newly emerged small leaves
T152	*Bombax ceiba*	E	Tree	22/6/2011	Fair	Sparse crown with some newly emerged small leaves
T153	*Bombax ceiba*	E	Tree	22/6/2011	Fair	Sparse crown with some newly emerged small leaves
T154	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T155	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T156	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T157	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T158	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T159	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T160	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T161	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T162	*Bombax ceiba*	E	Tree	14/6/2011	Fair	
T250	*Celtis sinensis*	N	Tree	22/6/2011	Fair	
T165	*Melaleuca quinquenervia*	E	Tree	22/6/2011	Fair	
T168	*Melaleuca quinquenervia*	E	Tree	Nov 2011	Fair	

Appendix M. Photo of Wai Ha River at November 2011

	
Photo 1. Wai Ha River at W2	**Photo 2**. Wai Ha River at W2
	
Photo3. Wai Ha River at W1	**Photo4.** Wai Ha River at W1