

Drainage Service Department

Monthly Environmental Monitoring & Auditing report for

Contract No.DC/2006/11

Drainage Improvement in Southern Lantau

June 2011

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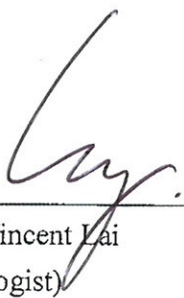
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EXECUTIVE SUMMARY

This is the thirty-fifth monthly environmental Monitoring and audit (EM&A) report for “Drainage Improvement in Southern Lantau Investigation”. The environmental permit number is “EP-237/2005/B”. The report concludes the impact monitoring for the activities undertaken during the period of 1 June 2011 to 30 June 2011. Reconstruction of EVA on top of the PNH Box Culvert, landscaping works and railing installation were major site activities being carried out within this reporting month.

Noise, water quality and ecological monitoring were performed. Results obtained were checked against the previously established Action / Limit (A/L) levels. Additionally, the implementation status of environmental mitigation measures, event / action plan and environmental complaint handling procedures were inspected during weekly site environmental audit.

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

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

Refer to EPD memo received on 4 May 2011, post-construction water quality monitoring was completed on 1 June 2011. Therefore, the test results of 1 June 2011 was only included.

Furthermore, Total 2 non-compliance events of water quality criteria were recorded in this reporting period. For the non-compliance events, no particular observation of defective site activities were found causing water contamination and such conditions were believed to be mainly attributed by natural fluctuation.

During ecological monitoring survey, no White-shouldered Starling was recorded breeding in the watch tower. There was no sign of disturbance from the Project to the watch tower. The watch tower may not be suitable for birds as nesting habitat. In addition, no disturbance on the flora and fauna in the river channels were observed during the ecological monitoring.

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

Future site activities to be carried out will be mainly Reconstruction of EVA on top of the PNH and Landscaping works. It is expected that environmental impact in different aspects will be resulted from the works. With reference to the EM&A manual and mitigation measure report, mitigation measures are proposed to be taken, if necessary.

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

1. Introduction

This is the thirty-fifth monthly Environmental Monitoring and Audit (EM&A) Report for “Drainage Improvement in Southern Lantau Investigation” project (Environmental Permit No. EP-237/2005/B)

2. Project Information

2.1 Construction program

Majority of construction works of “Drainage Improvement in Southern Lantau Investigation” project were completed in May 2011. The project comprises the following:

- Completion of Landscaping Box Culvert Area, Footpaths, Ngan Shui Street-road surface and VO reconstruction of EVA at Pak Ngan Heung River;
- Completion of Box A-Footpaths, VO25-Addition u-channel & gabion walls and VO23-Ltt river banks improvement at LTT River
- Removal of suplurs boulder in river bank at Tai Tei Tong (TTT) River

Appendix A shows the construction program and location plan of the project.

2.2 Project organization

The Main Contractor, Yick Hing Construction Company Limited, has commissioned Environmental Pioneers & Solutions Limited and Ecosystems Limited as the Environmental Team, which comprises the environmental team leader, the ecologists and the environmental technicians to undertake the environmental monitoring and audit work for this project.

The environmental management structure and is shown in Fig 2.2.1.

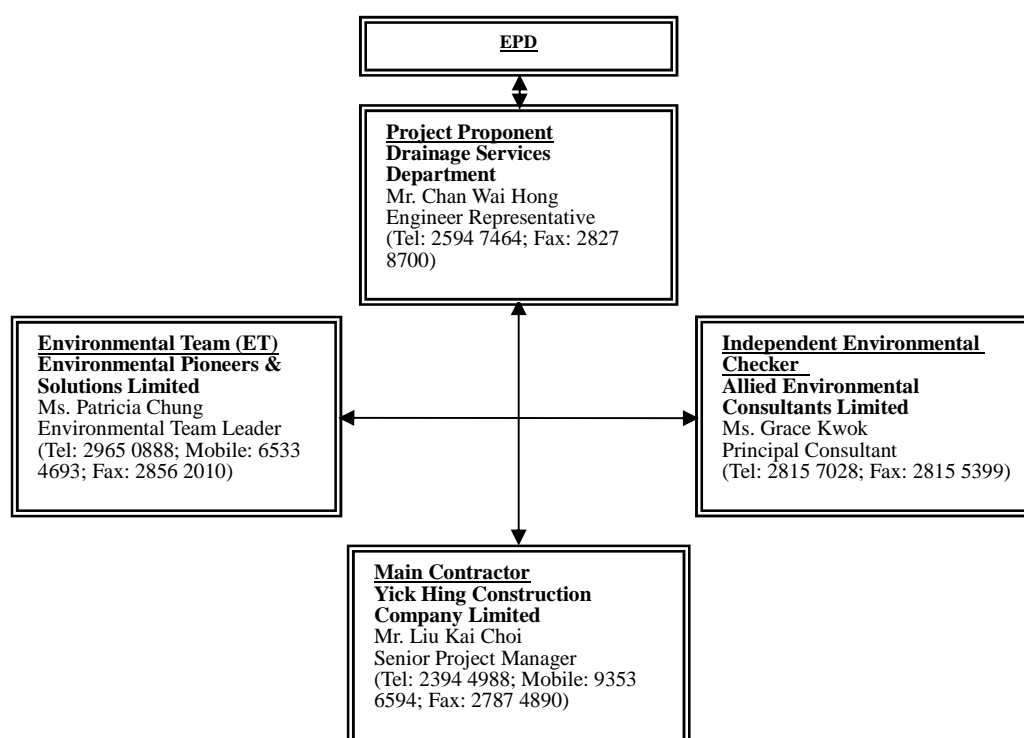


Figure. 2.2.1 Environmental Management structure for the project

2.3 Key personal contact information chart

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

3. Construction Stage

3.1 Construction activities in the reporting month

Major activities in the reporting month included the followings:

1. Landscaping works.
2. Site cleaning works.
3. Installation of railing.

3.2 Construction activities for the coming month

Proposed key construction works in the coming month will include:

1. Installation of railing installation..
2. Landscaping works.

3.3 Environmental Status

Appendix A shows the drawing of the project area.

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

4. Noise Monitoring

4.1 Monitoring Parameters and Methodology

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

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

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

4.2 Monitoring Equipment

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

Noise measurement was not be made in the presence of fog, rain, wind with a steady speed exceeding $5ms^{-1}$ 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 4.2.1 summarizes the equipment list for noise monitoring

Table 4.2.1 Equipment List for Noise Monitoring

Equipment	Manufacturer & Model No.	Precision Grade	Qty
Digital sound level meter	Model 949 Serial No: 8571	IEC 651 Type 1 IEC 804 Type 1	1
Windscreen	Microtech gefell model W2	N/A	1
Sound level calibrator	Model: SV30A	IEC 942 Type 1	1
Wind speed indicator	Kestrel K1000	N/A	1
Remarks: Calibration details for the sound level meter is given in Appendix C for reference			

4.3 Monitoring Locations

According to the Baseline Monitoring Report issued in May 2008 for the captioned project, four locations were alternative from the locations proposed in EM&A manual, were designated for baseline noise monitoring. For the data validation, impact noise monitoring was undertaken in the same locations during the construction phase of the project. The proposed monitoring locations are summarized in Table 4.3.1. Figure 4.3.1 shows the Noise Monitoring Locations

Noise measurement in each monitoring locations were taken at a point 1m from the exterior of the selected premises and at a height with no disturbance to the dweller and least obstructed view.

Table 4.3.1 Noise Monitoring Locations during Construction Phase

Identification No.	Noise Monitoring Locations
N1	No. 73, Village House, Ling Tsui Tau Tsuen (ground level)
N2	No. 31, Village House, Ling Tsui Tau Tsuen (ground level)
N3	Fence wall outside No. 5 village house adjacent to Luk Tei Tong River Outlet (ground level)
N4	No. 23, Village House, Tai Tei Tong River (ground level)

In accordance with the requirements in the EM&A manual, 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 (ie. 1900-2300, 2300-0700 of next day and Sundays / general holiday), impact monitoring that comprises 3 consecutive $L_{eq(5minutes)}$ would be carried out.

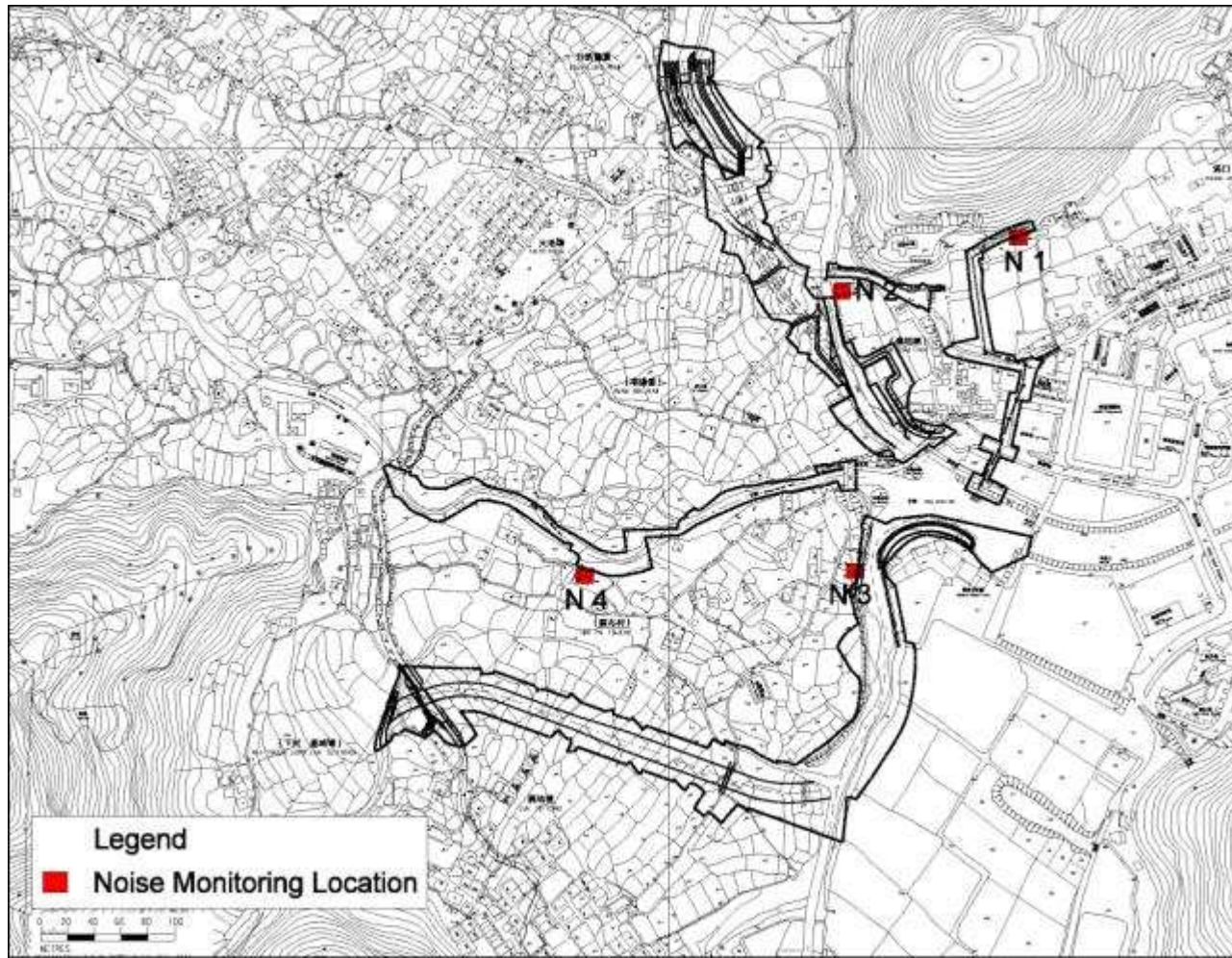


Figure 4.3.1 Impact noise monitoring locations

4.4 Monitoring Results and Interpretation

Relevant details of the noise monitoring results are presented in Table 4.4.1. The results, ranged between 47.2(A) and 68.0(A), were within the limit levels and therefore, no exceedance was found.

Table 4.4.1 Noise monitoring results

Table 4.4.1 Noise Monitoring Results for the reporting month							
Location	Parameter	Date	Time	L _{Aeq} dB(A)	Limit dB(A)	Exceedance	Weather
N1	Leq30min	1-June-11	14:35	51.9	75	N	Sunny
N1	Leq30min	8-Jun-11	16:50	45.3	75	N	Sunny
N1	Leq30min	13-June-11	15:10	52.9	75	N	Sunny
N1	Leq30min	20-Jun-11	15:30	55.4	75	N	Sunny
N1	Leq30min	27-Jun-11	15:20	62.2	75	N	Sunny
N2	Leq30min	1-June-11	14:00	47.7	75	N	Sunny
N2	Leq30min	8-Jun-11	16:15	47.2	75	N	Sunny
N2	Leq30min	13-June-11	14:35	55.8	75	N	Sunny
N2	Leq30min	20-Jun-11	15:00	49.6	75	N	Sunny
N2	Leq30min	27-Jun-11	14:40	64.4	75	N	Sunny
N3*	Leq30min	1-June-11	12:35	58.4	75	N	Sunny
N3*	Leq30min	8-Jun-11	14:45	56.3	75	N	Sunny
N3*	Leq30min	13-June-11	13:07	67.4	75	N	Sunny
N3*	Leq30min	20-Jun-11	13:40	68.0	75	N	Sunny
N3*	Leq30min	27-Jun-11	13:30	61.3	75	N	Sunny
N4	Leq30min	1-June-11	11:55	51.1	75	N	Sunny
N4	Leq30min	8-Jun-11	15:35	50.0	75	N	Sunny
N4	Leq30min	13-June-11	14:00	66.1	75	N	Sunny
N4	Leq30min	20-Jun-11	14:23	61.0	75	N	Sunny
N4	Leq30min	27-Jun-11	13:55	66.3	75	N	Sunny

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

Remark*: The equivalent noise level of N3 is corrected by +3 dB from the raw data result due to the fact that free field measurement was carried out in the location.

4.5 Action and Limit level for Construction noise

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

There was no exceedance recorded in the reporting month.

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.		

Table 4.5.2 Event / Action Plan for Construction Noise

EVENT	ACTION			
	ET	IC(E)	ER	Contractor
Action Level	<ol style="list-style-type: none"> 1. Notify IC(E) and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IC(E), ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IC(E); 2. Implement Noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IC(E), ER, EPD and Contractor; 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 IC(E), ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures 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 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IC(E) 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

4.6 Noise Mitigation Measures

The following mitigation measures were observed from the weekly site inspection in the reporting month:

- Use of quiet powered mechanical equipment (PME)
- Implementation of the following good site practices:
 - Silencers or mufflers on construction equipment;
 - Mobile plant, if any, should be sited as far from noise sensitive receivers as possible; and
 - Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.

5. Water Monitoring

5.1 Water Quality Monitoring Parameters and methodology

Turbidity in Nephelometric Turbidity Unit (NTU), Dissolved Oxygen (DO) in mg/L and Suspended Solids (SS) in mg/L are required to measure in this project. Turbidity, DO was measured in-situ while water samples were delivered to Accredited HOKLAS Laboratory for analysis of SS.

Other relevant data such as monitoring location, time, water depth, temperature, salinity, weather conditions and any other special phenomena and work underway at the construction site were recorded during sampling.

According to the requirement of the EM&A manual, two consecutive measurements for parameters of DO concentration, DO saturation and Turbidity are required to be taken at each monitoring location. When the difference in value between the first and second reading of DO or Turbidity is more than 25%, the reading would be discarded and further reading would be taken.

5.2 Monitoring Equipment

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

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

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

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

Detailed calibration records of the multimeter were shown in Appendix C for reference.

5.3 Monitoring Locations

Seven locations included a control station in upstream of each stream/ river, a monitoring station at the end of each stream/ river of the works area and a monitoring station at Silver River were proposed for the impact water quality monitoring. Water samples were collected at mid-depth of each proposed monitoring stations for measurements and sample collection. The Location Plan is shown in Figure 5.3.1 for reference.

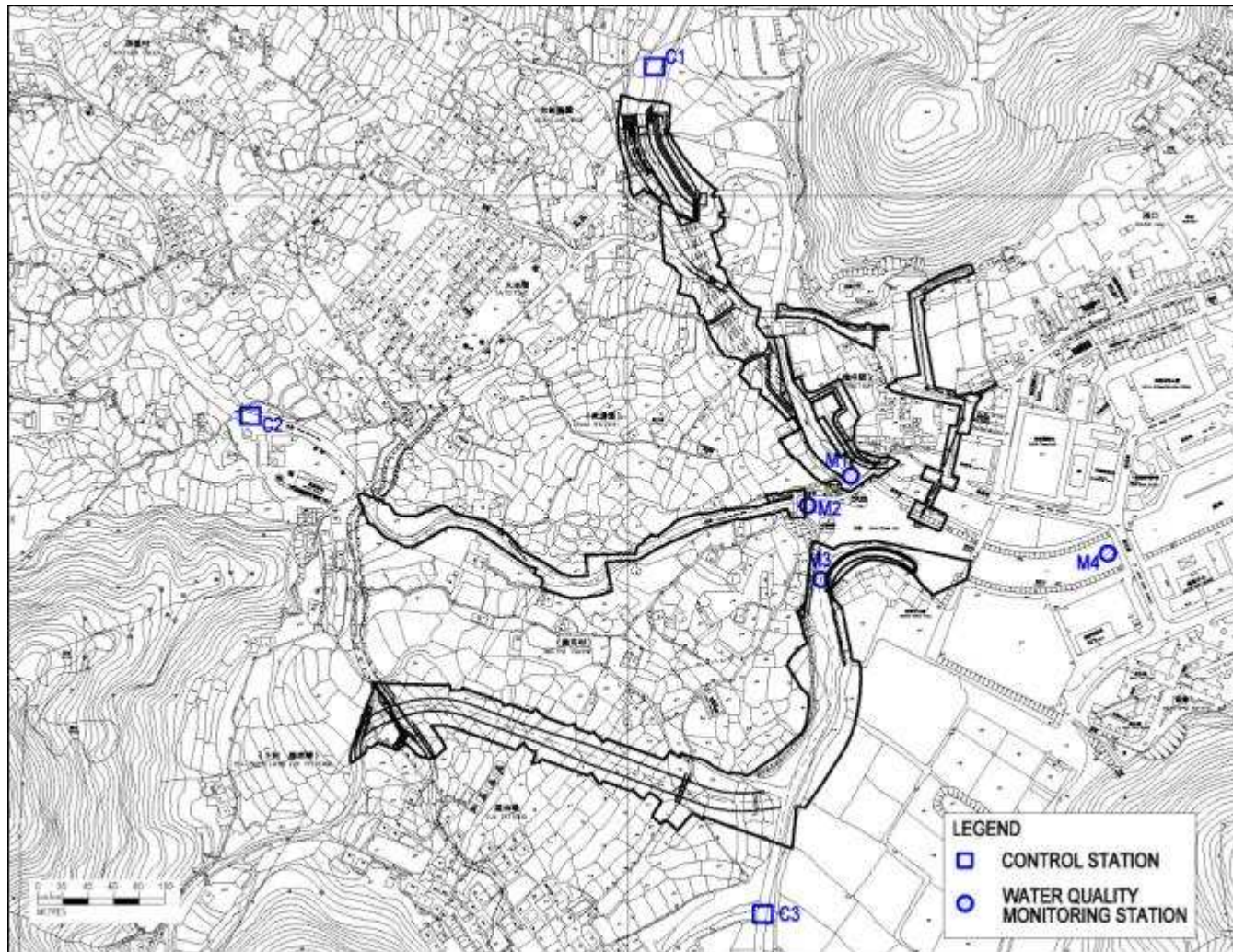


Figure 5.3.1 Water Quality Monitoring Locations

5.4 Monitoring Frequency

Impact water quality monitoring was undertaken three days per week and at ebb tides during the course of the construction river works. Upon the completion of the construction works, the monitoring exercises at the designated monitoring stations will be continued for four weeks in the same manner as the impact monitoring.

5.5 Monitoring Results and Interpretation

Water quality monitoring was carried out one time in this reporting month. Detailed on-site measurements and laboratory analysis reports including QA/QC results are shown in Appendix F1 and F2 respectively, while Table 5.5.1 presents consolidated results throughout the reporting month.

Total 2 non-compliance events of water quality limits (Turbidity and Suspended Solids) were recorded in this reporting month according to the established level. ET has arranged site investigations for the exceedance events.

For other non-compliance events, no particular observations of defective site activities were found causing the exceedance and such conditions were believed to be attributed by natural fluctuation.

Detailed information of the exceedance events and action taken were presented in Section 7.

Table 5.5.1 Water quality monitoring results in June 2011

	M1			M2			M3			M4		
	MIN	MAX	Average	MIN	MAX	Average	MIN	MAX	Average	MIN	MAX	Average
Turbidity (NTU)	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4
DO (mg/l)	7.5	7.5	7.5	7.7	7.7	7.7	6.3	6.3	6.3	0.4	0.4	0.4
Suspended Solid (mg/l)	4.5	4.5	4.5	1.2	1.2	1.2	3.3	3.3	3.3	2.0	2.0	2.0

	C1			C2			C3		
	MIN	MAX	Average	MIN	MAX	Average	MIN	MAX	Average
Turbidity (NTU)	0.0	0.0	0.0	0.0	0.0	0.0	28.1	28.1	28.1
DO (mg/l)	8.3	8.3	8.3	8.4	8.4	8.4	6.2	6.2	6.2
Suspended Solid (mg/l)	2.2	2.2	2.2	1.4	1.4	1.4	24.8	24.8	24.8

* Remarks: Detection limit for Turbidity, DO and SS are 1 NTU, 0.1 mg/L and 1 mg/L respectively.

5.6 Action and limit level for Water Quality

Based on the criteria stipulated in EM&A manual Section 4.8 and baseline water quality monitoring data obtained, the A/L levels are shown in Table 5.6.1 and Table 5.6.2. If the water quality monitoring results at any impact stations exceeded the criteria, the actions in accordance with the Event and Action Plan in Table 5.6.3 should be taken.

Table 5.6.1 Water quality criteria for monitoring

Parameters	Action	Limit
DO in mg/L (mid-depth)	- 5%-ile of baseline data	- 4mg/L
SS in mg/L (mid-depth)	- 95%-ile of baseline data; or - 120% of control station's SS on the same day of measurement	- 99%-ile of baseline; or - 130% of control station's SS on the same day of measurement
Turbidity in NTU (mid-depth)	- 95%-ile of baseline data; or - 120% of control station's turbidity on the same day of measurement	- 99%-ile of baseline; or - 130% of control station's turbidity on the same day of measurement

Table 5.6.2 Action and Limit Levels established according to baseline data

Parameters	Monitoring locations							
	M1		M2		M3		M4	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
Turbidity (NTU)	15.2	16.9	5.3	6.5	16.8	26.0	16.2	18.0
DO (mg/L)	5.7	4.0	6.2	4.0	5.9	4.0	5.9	4.0
SS (mg/L)	12.2	12.8	3.1	4.2	12.4	17.7	13.9	15.2

Remarks:

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

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

Table 5.6.3 Event and action Plan for Water Quality

EVENT	ACTION			
	ET	IC(E)	ER	Contractor
Action Level being exceed by one sampling day	<ol style="list-style-type: none"> Repeat in <i>situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E) and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E) and Contractor; Repeat measurement on next day of exceedance. 	<ol style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals in mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Discuss with IC(E) on the proposed mitigation measures; make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IC(E) and propose mitigation measures to IC(E) and ER; Implement the agreed mitigation measures.
Action level being exceed by more than two consecutive sampling days	<ol style="list-style-type: none"> Repeat in <i>situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E) and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E) and Contractor; Ensure mitigation measures are implemented; prepare to increase the monitoring frequency to daily Repeat measurement on next day of exceedance 	<ol style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals in mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Discuss with IC(E) on the proposed mitigation measures; make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IC(E) and propose mitigation measures to IC(E) and ER within three working days; Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> Repeat in <i>situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E) and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E) and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit Level 	<ol style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals in mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Discuss with IC(E) on the proposed mitigation measures; make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET and IC(E) and propose mitigation measures to IC(E) and ER; Implement the agreed mitigation measures.

5.7 Water Quality Mitigation Measures

Construction Run-off and Drainage

The site practices outlined in ProPECC PN 1/94 ‘Construction Site Drainage’ should be followed as far as practicable during both construction and operation phase of the drainage improvement works in order to minimize surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge.

As recommended in the final EM&A manual, attention would be paid especially construction run-off and drainage, general construction activities, sewage discharged from construction workforce and river channel excavation works.

Contractor was recommended to provide sufficient water treatment facilities for accumulated site water and excavation activities carried out nearby river channel. Earth bunds should be provided to the construction site in / next to the river channel to form an enclosed, dry environment to minimize water quality impact.

5.8 Water Monitoring Schedule for the Next reporting period

Post-construction phase water quality monitoring has been completed on 1 June 2011. Therefore, no any water quality monitoring will be conducted in June.

As major construction activities, especially site cleaning works has been carried out by the end of May 2011. EDP has approved the post-construction phase water quality monitoring which was finished on 1 June 2011.

6. Ecology Monitoring

6.1 Ecological Monitoring Parameters

According to the Final EM&A Manual, a specific ecological monitoring programme of the improved section of PNH and LTT Rivers is recommended. The monitoring parameters required to measure in this project and survey methodology are described below:

- (1) Avifauna species and abundance: Birds will be surveyed quantitatively using transect count method. Birds within the river channel and on the riverbank will be identified and their abundance will be recorded.
- (2) Aquatic macroinvertebrate community species composition and abundance: Survey on aquatic fauna will focus on determination of the diversity and abundance of stream aquatic communities. Sampling methods, such as active searching, direct observation, netting, and kick sampling, will be determined according to the site conditions during field survey.
- (3) Fish community species composition and abundance: Sampling methods, such as active searching, direct observation, and hand netting, will be determined according to the site conditions during field survey.
- (4) Adult odonate community species composition and abundance: Adult dragonfly will be surveyed quantitatively using transect count method. Adult dragonflies within the river channel and on the riverbank will be identified and their abundance will be recorded. Species requiring close examination will be netted.
- (5) Aquatic, emergent and riparian vegetation community species composition and abundance: The area will be walked through. Plant species composition and their relative abundance will be recorded.
- (6) Surveys of White-shouldered Starling *Sturnus sinensis* will be conducted at the disused watchtowers next to LTT river. Breeding of the White-shouldered Starlings will be determined by checking signs of attempt to breed or sign of breeding which include carrying nesting materials, to-and-fro movement of adults carrying food, presence of recently fledged juveniles, etc. The number of breeding pairs and the site observation will be recorded whenever possible.

Water Quality Monitoring along LTT and PNH River as well as LTT bypass channel was carried out. Water quality monitoring will include Turbidity in Nephelometric Turbidity Unit (NTU), Dissolved Oxygen (DO) in mg/L and Suspended Solids (SS) in mg/L are required to measure in this project. Moreover, additional water monitoring parameters will be taken for the purposes of ecological monitoring of water quality in this project. The added information will include: BOD, Ammonia, Nitrate and Phosphate concentrations. Turbidity, DO, pH and water flow will be measured in-situ while water samples will be delivered to Accredited HOKLAS Laboratory accredited laboratory and the analyses followed the standard methods according to APHA Standard Methods for the Examination of Water and Wastewater, 20th Edition, or equivalent for analysis of SS, BOD, Ammonia, Nitrate and Phosphate concentrations.

Other relevant data such as monitoring location, time, water depth, temperature, salinity, weather conditions and any other special phenomena and work underway at the construction site will be recorded during sampling.

According to the requirement of the EM&A manual, two consecutive measurements for parameters of DO concentration, DO saturation and Turbidity are required to be taken at each monitoring. When the difference in value between the first and second reading of DO or Turbidity is more than 25%, the reading will be discarded and further reading will be taken.

6.2 Monitoring Equipment and Methodology

Turbidity, DO, Salinity, pH and Temperature will be measured by a instrument complied with the following requirements:

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

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

Suspended solid was determined by the water samples collected from the

monitoring locations for further analysis in accredited HOKLAS laboratory. Water samples were contained by polythene bottles, packed in ice (cooled in 4°C without frozen) and delivered to the laboratory for analysis as soon as possible after collection. Duplicate samples from each independent sampling event were undertaken during impact monitoring.

6.3 Monitoring Locations

According to the Final EM&A Manual, the improved section of the river channels will be divided into 50m long sections, and ecological survey will be carried out in each of the 50m sections. A total of nine sections will be divided for the two rivers which include:

- Two sections for existing upstream of PNH river (i.e. the proposed 80m long trapezoidal channel)
- Two sections for existing downstream of PNH river (i.e. the proposed 100m long rectangular channel)
- Five sections for existing Luk Tei Tong River (i.e. the proposed 240m long trapezoidal channel)

The disused watchtowers are located at the confluence of the three rivers and next to LTT river.

The Location Plan for ecological is shown in Figure 6.1 for reference.

The improved sections of the river channels require to carrying out water quality monitoring for the ecological purpose. The sampling points for impact monitoring was undertaken in the same place as the baseline monitoring proposed, where include:

- Three points for existing of PNH river
- Three points for existing of Luk Tei Tong River

The Location Plan for ecological water monitoring is shown in Figure 6.2 for reference.

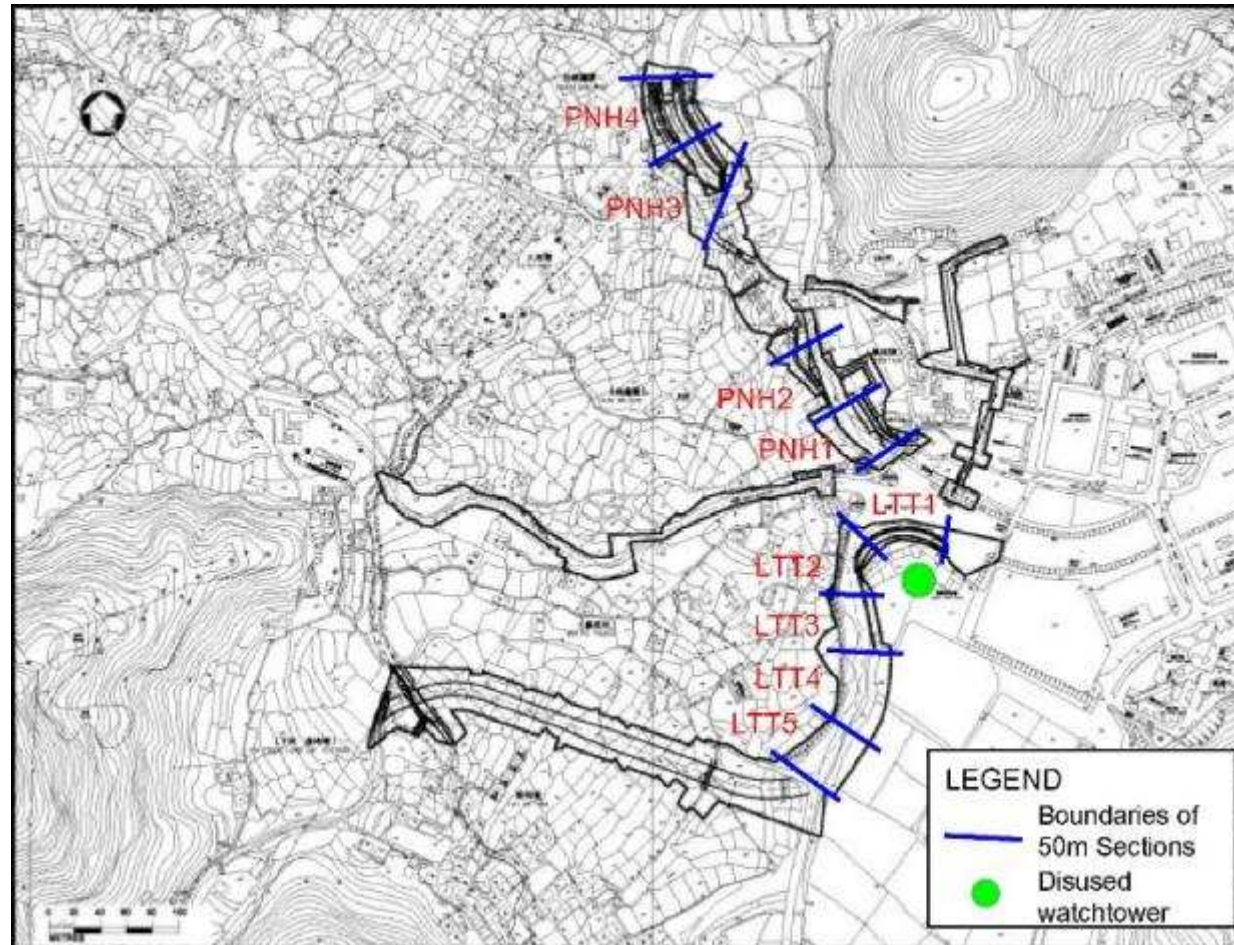


Figure 6.1 Ecological Monitoring Locations

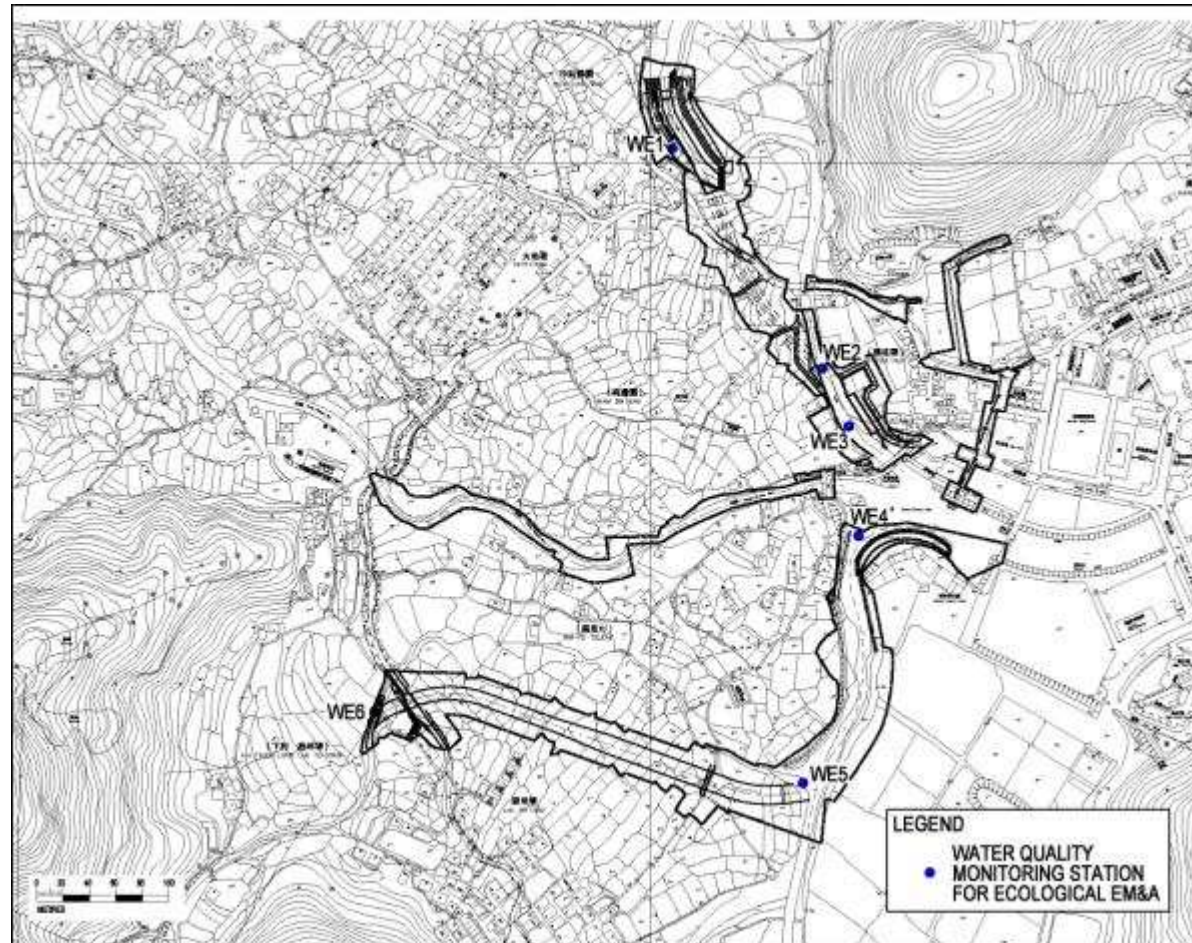


Figure 6.2 Ecological Water Quality monitoring locations

6.4 Monitoring Frequency

As proposed, ecological impact monitoring was carried out once for each monitoring location in the reporting month.

6.5 Monitoring results

Pak Ngan Heung Stream N and S sections

Vegetation

Surveys were conducted on 30 June 2011. During the current monitoring session, construction of new rock gabion wall was completed, and soft landscape works are underway. Temporary works areas beyond both sides of gabions were planted with tree and shrub seedlings.

The walk through survey recorded a total of 43 species, including 16 trees, 3 shrub, 17 herb and 3 grass species (Appendix D1) on PNH N section. 29 of the species recorded are natives, while 14 were exotics. Remnants of vegetation including native trees (e.g. *Macaranga tanarius*) and grasses species (e.g. *Microstegium ciliatum*) were still seen along the east stream bank. A number of ruderal species colonised the sandy substrate occasionally deposited among stream bed rocks and gabions. These include *Mikania micrantha*, *Bidens pilosa* and *Emilia sonchifolia*. No species of conservation interest was recorded. No quantitative surveys were carried out on both PNH3 and PNH4 due to vegetation clearance and construction works on stream banks as part of the site clearance works under the project.

Vegetation was only found on remnants of the old concrete bank along PNH S section. A total of 6 species recorded, 3 of which were native and 2 were exotic. It was composed of isolated individuals of mangrove (*Kandelia obovata*), exotic shrub (*Lantana camara*) and native trees (*Ficus supbera*) (Appendix D2). No species of conservation interest was recorded.

Terrestrial Fauna

Surveys were conducted on 24 June 2011.

Two species of birds were recorded in the proposed work area of the Pak Ngan Heung River (Table 6.5.2). Both are common in Hong Kong.

Table 6.5.2 Avifauna in Pak Ngan Heung

Common names	Latin names	PNH 1	PNH 2	PNH 3	PNH 4	Commonness & distribution
Little Egret	<i>Egretta garzetta</i>	1	2			CW
Magpie Robin	<i>Copsychus saularis</i>				1	CW
Japanese White-eye	<i>Zosterops japonica</i>				2	CW

CW = common and widespread

Five species of dragonfly were recorded in the proposed work area of the Pak Ngan Heung River (Table 6.5.3) in June 2011. All are very common in Hong Kong (Wilson 2004).

Table 6.5.3 Dragonfly in Pak Ngan Heung River

Common names	Latin names	PNH 1	PNH 2	PNH 3	PNH 4	Commonness & distribution
Green Skimmer	<i>Orthetrum sabina</i>		2			C
Pied Skimmer	<i>Pseudothemis zonata</i>			1		C
Wandering Glider	<i>Pantala flavescens</i>	6	2			C
Crimson Dropwing	<i>Trithemis aurora</i>				2	A
Indigo Dropwing	<i>Trithemis festiva</i>			1	1	A

A = abundant

Aquatic fauna and fish

The construction works for the fish ladder inside PNH3 have been finished, and the flow in this section was restored. 6 species of fish and 4 crustacean

were recorded in the 4 sections at PNH. All are common and widespread in Hong Kong. Though Predaceous Chub was observed, the another one fish species of conservation concern reported in the EIA report, i.e. Flagtail *Kuhlia marginata*, was not recorded in PNH during the present monthly monitoring survey.

Table 6.5.4 Aquatic Invertebrates and fish in Pak Ngan Heung

Common names	Scientific names	PNH 1	PNH 2	PNH3	PNH4
Invertebrates					
Atyid shrimp	<i>Caridina elongata</i>				++
Palaemonid shrimp	<i>Macrobrachium hainanensis</i>		+	+	+
Crab	<i>Varuna litterata</i>		+		
Mitten Crab	<i>Eriocheir japonica</i>				+
Fish					
Mosquito fish	<i>Gamusia affinis</i>				+
Goby	<i>Rhinogobius duospilus</i>				+
Barcheek Goby	<i>Rhinogobius giurinus</i>				
Swordtail	<i>Xiphophorus hellerii</i>				
Six-banded Barb	<i>Puntius semifasciolatus</i>				
Unidentified Cichlid fish					
Tilapia		++	+++		
Predaceous Chub	<i>Parazacco spilurus</i>			++	+
Jarbua Terapon	<i>Terapon jarbua</i>	+	+		
Common Silver-biddy	<i>Gerres oyena</i>				
Mullet	<i>Mugil cephalus</i>	+++	+++		
Broken-band Hillstream Loach	<i>Liniparhomaloptera disparis</i>				

+ = Occasional, less than 5 individuals were found; ++ = Common, 5 – 20 individuals were found; +++ = Abundant, more than 20 individuals were found.

Luk Tei Tong Stream Section

Vegetation

Surveys were conducted on 30 June 2011. During the current survey, construction of concrete channel bank and rock gabions are completed, and soft landscape works are underway. Some remnants of vegetation and mangroves remained at both LLT1 and LLT2 respectively, while a few grass, herb and climber colonised the gabion of LLT3 and LLT4. A portion of the sediments and associated weedy vegetation between the mangrove at LLT2 and the gabion was gone, probably washed away by recent rainstorm. The mangrove stands remained intact.

The walk through survey recorded a total of 20 species, including 8 tree, 3 herb and 4 grass species (Appendix D3). 12 species recorded are natives, while 8 were exotics. No quantitative survey was carried out due to sporadic occurrence of colonised vegetation on the new gabion banks.

Terrestrial Fauna

The proposed work area of Luk Tei Tong River was divided into 5 sections. All recorded avifauna and dragonfly species are common in Hong Kong

Surveys were conducted on 24 June 2011.

A total of seven species of birds were recorded in these sections (Table 6.5.6). All are common in Hong Kong.

Table 6.5.6 Avifauna in Luk Tei Tong River

Common names	Latin names	LTT 1	LTT 2	LTT 3	LTT 4	LTT 5	Commonness & distribution
Little Egret	<i>Egretta garzetta</i>	2					CW
Great Egret	<i>Casmerodius albus</i>	1					CL
Chinese Bulbul	<i>Pycnonotus sinensis</i>				2		CW
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>				2		CW

Magpie Robin	<i>Copsychus saularis</i>					3	CW
Rufous-backed Shrike	<i>Lanius schach</i>			1			CW
Crested Myna	<i>Acridotheres cristatellus</i>					4	CW

CW = common and widespread, CL = common/uncommon and localised

Six species of dragonfly were recorded in the Luk Tei Tong Riber in June 2011 (Table 6.5.7). All are common/very common in Hong Kong (Wilson 2004)

Table 6.5.7 Dragonfly in Luk Tei Tong River

Common names	Latin names	LTT	LTT	LTT	LTT	LTT	Commonness & distribution
		1	2	3	4	5	
Green Skimmer	<i>Orthetrum sabina</i>	1					C
Wandering Glider	<i>Pantala flavescens</i>	12			5		A
Variegated Flutterer	<i>Rhyothemis variegata</i>	3				6	C
Crimson Dropwing	<i>Trithemis aurora</i>		1				A
Indigo Dropwing	<i>Trithemis festiva</i>					1	A

A = abundant, C = common

Aquatic invertebrates and fish

4 species of fish, 1 species of crustacean and 4 species of mollusks were recorded in the 5 sections at LTT. All are common and widespread in Hong Kong. The two fish species of conservation concern reported in the EIA report, i.e. Flagtail *Kuhlia marginata* and Predaceous Chub *Parazacco spilurus* were not recorded in LTT during the present monitoring as well as the baseline monitoring survey.

Table 6.5.8 Aquatic invertebrates and fish in Luk Tei Tong River

Common names	Scientific names	LTT1	LTT2	LTT3	LTT4	LTT5
Invertebrates						
Mangrove clam	<i>Geloina erosa</i>					
Rock oyster	<i>Saccostrea cuculata</i>	+++	+++			
Snail	<i>Melanoides tuberculata</i>				++	++

Snail	<i>Terebralia</i> sp.					
Snail	<i>Nerita</i> sp.	+++	+++			
Snail	<i>Littoraria articulata</i>	++	++			
Crab	<i>Varuna litterata</i>					
Fiddler crab	<i>Uca lactea</i>					
Fiddler crab	<i>Uca arcuata</i>					
Fiddler crab	<i>Uca crassipes</i>					
Crab	<i>Perisesarma bidens</i>					
Mangrove mud crab	<i>Scylla paramamosain</i>	+		+		
Mitten crab	<i>Eriocheir japonica</i>					
Fish						
Common mudskipper	<i>Periophthalmus cantonensis</i>		+			
Tilapia		++	+++	+		
Jarboa terapon	<i>Terapon jarbua</i>		+			
Mullet	<i>Mugil cephalus</i>	++	+++	+		
Common Silver-biddy	<i>Gerres oyena</i>					
Barcheek Goby	<i>Rhinogobius giurinus</i>					

+ = Occasional, less than 5 individuals were found; ++ = Common, 5 – 20 individuals were found; +++ = Abundant, more than 20 individuals were found.

Disused Watchtowers

Surveys were conducted on 24 June 2011.

There was no sign (e.g., adults carrying food or nesting materials) of use of the watchtower as nesting habitat by White-shouldered Starling.

White-shouldered Starling was not observed during the June 2011 monitoring. No bird of other species was observed entering the watchtower.

Since the monitoring surveys commenced in August 2008, no bird was observed entering the watchtower. It seems the birds do not prefer the watchtower as nesting habitat.

Ecological Water Quality Monitoring (EWQM)

Last EWQM was conducted on 27 May 2011. Monitoring results were satisfactory, which were shown in the previous report.

The water base monitoring was completed. The letter references refer to Appendix K.

6.6 Action and Limit level for Monitoring of White-shouldered Starlings

A simple Event and Action Plan is shown in Table 6.6.1. Should the Event occur, action in accordance with the Action Plan should be carried out.

There was no recorded event in the reporting month.

Table 6.6.1 Event / Action Plan for Monitoring of White-shouldered Starlings

EVENT	ACTION	
	ET Leader	Contractor
Identification of disturbance to breeding White-shouldered Starlings	1. Increase frequency of monitoring to twice weekly	1. Check all construction actions and working methods
	2. Notify Site Engineer	2. Submit proposals for remedial action to prevent abandonment of the breeding site.
	3. Review construction activities of previous week.	3. Implement remedial action.
	4. Identify any changes in construction activities in previous week	4. Liaise with ET regarding effectiveness of remedial actions.
	5. Discuss remedial actions with Site Engineer	

6.7 Ecological monitoring Schedule

The next ecological surveys are scheduled on 28 July 2011.

7. Action taken in Event of Exceedence

If the measurements (Noise, Water, 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 period there was no exceedance for noise, ecological measurements recorded; therefore no actions were taken.

Total 2 non-compliance events of water quality limits (Turbidity, Suspended Solids and DO) were recorded in this reporting month according to the established level. ET has arranged site investigations for the exceedance events and observed that th no particular observations of defective site activities were found causing the exceedance and such conditions were believed to be attributed by natural fluctuation.

8. 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.

Contractor has completed the registration of Waste Producer under the Waste Disposal (Chemical Waste)(General) Regulation. The Waste Producer Number, WPN 5213-950-Y2443-03 was assigned by EPD on 12 Aug 2008. The Contractor would be responsible for the implementation of any mitigation measure to minimize waste or redress problems arising from the waste materials.

Table 8.1 is a summary of figures of the construction wastes disposal provided by Contractor.

Table 8.1 Summary of Construction Waste Disposal

Month	Amount of Construction Waste disposed		
	Inert Waste (to Public Fill)	Non-inert Waste (to Landfill)	Chemical Waste (to treatment plant)
1 st to 31 st May 11	0	0	Nil
Total	36467.26 (ton)	247.43 (ton)	0

9. Status of Permits and Licenses obtained

Table 9.1 is the updated status of environmental related permits/ license obtained for the construction activities

Table 9 .1 Status of Permits and Licenses Obtained

Description	License / Permit No.#	Date of Issue	Date of Expiry	Remarks
Environmental Permit	EP-237/2005/A	05 Mar 2007	--	Issued
Varied Environmental Permit	EP-237/2005/B	23 April 2009	--	Issued
Registration of C&D Waste Producer	7006521	--	--	Issued
Chemical Waste Producer	5213-950-Y2443-03	12 Aug 2008	--	Issued
Construction Noise Permit	N/A	N/A	N/A	N/A
Effluent Discharge License	EP890/W2/XG032 EP890/W2/XG033 EP890/W2/XG034 EP890/W2/XG035 EP890/W2/XG036 EP890/W2/XG037 EP890/W2/XG038 EP890/W2/XG039 EP890/W2/XG040 EP890/W2/XG041	23 Oct 2008	31 Oct 2013	Issued

The contractor implemented various environmental mitigation measures as recommended in the Environmental Permit and Final Mitigation Measures Report. The implemented schedule is presented in Appendix H.

10. Complaint Log

There was no formal complaint received during the reporting month.

	Noise	Water	Ecology	Cultural	Others
May 2011	0	0	0	0	0
Total	0	1	0	0	1

11. Site Environmental Audits

Site Inspection

With an intention to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented, regular environmental site inspections have been scheduled.

Within the reporting month, site inspections were conducted on 8, 13 and 20, 27 June 2011

A detailed checklist of each site inspection together with comments, relevant photos and maps have been filed and kept. A summary of observation and follow-up action is shown in Table 11.1

Table 11.1 Summary of site inspection

Date	Observations	Advice from ET	Action taken	Closing Date
Nov 10 & 31 Dec 10	Open stockpile of earth material was observed at PNH fish ladder site	Contractor was advised to provide tarpaulin covering to earthy stockpile to prevent erosion and dust generation	Open stockpile of earth material was cleaned.	4 April 11
4, 13, 20, 27 May 11	C&D wastes, site materials and general wastes were observed within site area	Contractor should remove wastes and site materials from the concerned area as soon as possible as works finished	To be followed during next reporting period.	ongoing
18 Mar 11, 4 April 11	Stockpile of earthy Materials were observed without protective measure	Contractor should provide tarpaulin cover to the stockpiles to prevent dust generation	Still outstanding. To be followed during the next reporting period	Ongoing
14, 17 & 27 Jan 11; 9 Feb 11 4 April 11 27 May 11	Site surface was observed to be dry and dusty	Contractor was advised to provide regular water spraying to dusty static area for dust suppression	Follow up action was unsatisfactory and to be followed with the improvement during next reporting period	Ongoing
24, 29 Mar 11	Refer to the complaint received. Orange meshes were still observed and deposited within LTT bypass channel.	Contractor was recommended to remove those meshes acting as identification of site boundary since it is not necessary at this stage.	Materials forming the fencings were segregated for further disposal and reuse as disposal by Contractor	30 Mar 11

11.2 Compliance with legal and Contractual requirement

ET leader has reviewed the progress and programme of the works to check any relevant environmental laws has not violated.

11.3 Environmental Complaint and follow up actions

During this reporting period, there was no documented complaint received. Therefore, follow up actions for the environmental complaint is not required.

Findings of monthly survey was still pending therefore relevant was not provided in this reporting month.

12. Future key issues

Landscaping and installation of railing would be major site activities to be carried out in the upcoming month. Although environmental impact arisen from those activities would be expected to be minimal, Contractor was still reminded to pay serious attention to the following key issues:

- Dust generation due to handling of earthy material and dusty site surface.
- Housekeeping of site, such as stockpiling of C&D waste and earthy material.
- Removal of wastes as part of site clearance and evacuation.

Contractor was recommended to provide tarpaulin coverings to all earthy stockpiles on site. Dusty static area should be dampened regularly to avoid dust generation.

Contractor should also prevent excessive storage of wastes on site. Wastes should be collected and disposed to designated public fill.

13. Conclusions

Reconstruction of EVA on top of the PNH Box Culvert, landscaping works and railing installation 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 27 May 11.

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

For post-construction water quality monitoring, total 2 non-compliance events of water quality limits (Turbidity, Suspended Solids and DO) were recorded in this reporting month according to the established level. ET has arranged site investigations for the exceedance events and observed that no particular observations of defective site activities were found causing the exceedance and such conditions were believed to be attributed by natural fluctuation.

During ecological monitoring survey, no White-shouldered Starling was recorded breeding in the watch tower. The breeding season of White-shouldered Starling in this year has not begun. The absence of nesting of White-shouldered Starling in the watch tower did not seem to be related to construction works in Luk Tei Tong River. A bird species nests in village houses should be to certain extent disturbance tolerant.

No bird was observed entering the watchtower since the monitoring surveys commenced in August 2008. Also, no breeding was recorded in the baseline survey in September 2007. It appears that the birds do not prefer to roost or nest in the watch tower

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 and Environmental Permit requirement.

Appendix A

Construction

Programmer and

Location plan

Appendix B Key Personal Contact information chart

Organization Name	Role	Title	Name	Telephone	Fax Number
Drainage Service Department	Project Proponent	Engineering Representative	Mr. Chan Wai Hong	2594 7464	2827 8700
Allied Environmental Consultants Limited	Independent Environmental Checker (IEC)	Principal Consultant	Ms. Grace Kwok	2815 7028	2815 5399
Yick-Hing Construction Company Limited	Main Contractor	Senior Project Manager	Mr. Liu Kai Choi	2394 4988	2787 4890
Environmental Pioneers & Solutions Limited	Environmental Team (ET)	Environmental Team Leader	Ms. Patricia Chung	2965 0888	2856 2010

Appendix C

Calibration Certificates for Measuring Equipments



Calibration Certificate

Certificate No. **11495**

Page 1 of 2 Pages

Customer : Environmental Pioneers and Solutions Limited

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

Order No. : Q10260

Date of receipt : 15-Mar-11

Item Tested

Description : Sound Level Calibrator

Manufacturer : Svantek

Model : SV30A

Serial No. : 7908

Test Conditions

Date of Test : 17-Mar-11

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

Test Results

All results were within the IEC 942 Class 1 specification.

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

Main Test equipment used:

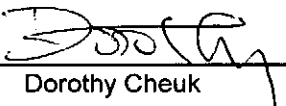
<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	03926	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR
S041	Universal Counter	04461	SCL-HKSAR
S206	Sound Level Meter	04462	SCL-HKSAR

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

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

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

Calibrated by : 
P. F. Wong

Approved by : 
Dorothy Cheuk

Date: 21-Mar-11

This Certificate is issued by:

Hong Kong Calibration Ltd.

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

Tel: 2425 8801 Fax: 2425 8646



Calibration Certificate

Certificate No. 11495

Page 2 of 2 Pages

Results :

1. Level Accuracy

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

Uncertainty : ± 0.1 dB

2. Frequency

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

Uncertainty : ± 3.6 x 10⁻⁶

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 -----



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:

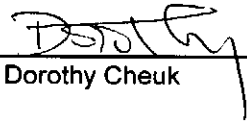
<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S017A	Multi-Function Generator	07279	SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR

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

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

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

Calibrated by : 
P. F. Wong

Approved by : 
Dorothy Cheuk

Date: 21-Mar-11

This Certificate is issued by:
Hong Kong Calibration Ltd.

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

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Calibration Certificate

Certificate No. 11494

Page 2 of 3 Pages

Results :

1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Level Range	Octave Filter	Weight	Response		
105 dB	OFF	A	Fast	94.0	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

Certificate No. 11494

Page 3 of 3 Pages

3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
130	84.0	84.1	-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 -----

Appendix D1 Plant species recorded at Pak Ngan Heung River (N)

<i>Species</i>	Habit	Native	Relative	Occurrence	
			Abundance	PNH3	PNH4
<i>Acacia confusa</i>	tree	no	occasional		+
<i>Achyranthes aspera</i>	herb	yes	scarce		+
<i>Ageratum conyzoides</i>	herb	yes	scarce		+
<i>Alangium chinensis</i>	tree	yes	scarce		+
<i>Alocasia macrorrhiza</i>	herb	yes	occasional		+
<i>Amaranthus viridis</i>	herb	yes	scarce		+
<i>Annona squamosa</i>	tree	no	scarce		+
<i>Bidens pilosa</i>	herb	no	occasional		+
<i>Bridelia tomentosa</i>	tree	yes	scarce		+
<i>Celosia argentea</i>	herb	yes	scarce		+
<i>Celtis sinensis</i>	tree	yes	scarce		+
<i>Cinnamomum camphora</i>	tree	yes	scarce		+
<i>Cleistocalyx operculata</i>	tree	yes	scarce		+
<i>Colocasia esculenta</i>	herb	no	scarce		+
<i>Conyza canadensis</i>	herb	no	scarce		+
<i>Dimocarpus longan</i>	tree	no	occasional		+
<i>Emilia sonchifolia</i>	herb	yes	scarce		+
<i>Euphorbia hirta</i>	herb	no	scarce	+	+
<i>Ficus hispida</i>	tree	yes	scarce		+
<i>Ficus microcarpa</i>	tree	yes	scarce		+
<i>Ficus superba</i>	tree	yes	occasional		+
<i>Gardenia jasminoides</i>	shrub	yes	occasional		+
<i>Hedychium coronarium</i>	herb	no	occasional		+
<i>Ipomoea cairica</i>	climber	no	scarce		+
<i>Liquidambar formosana</i>	tree	yes	occasional		+
<i>Lygodium japonicum</i>	fern	yes	scarce		+
<i>Macaranga tanarius</i>	tree	yes	occasional		+
<i>Mallotus paniculatus</i>	tree	yes	occasional		+
<i>Microcos paniculata</i>	shrub	yes	scarce		+
<i>Microstegium ciliatum</i>	grass	yes	common		+
<i>Mikania micrantha</i>	climber	no	occasional	+	+
<i>Mimosa pudica</i>	herb	no	scarce		+
<i>Neyraudia reynaudiana</i>	grass	yes	scarce		+

			Relative	Occurrence	
<i>Species</i>	Habit	Native	Abundance	PNH3	PNH4
<i>Panicum maximum</i>	grass	no	scarce		+
<i>Paspalum conjugatum</i>	herb	no	scarce	+	+
<i>Phyllanthus sp.</i>	shrub	yes	scarce		+
<i>Pogostemon auricularius</i>	herb	yes	scarce		+
<i>Polygonum hydropiper</i>	herb	yes	scarce		+
<i>Rhus hypoleuca</i>	tree	yes	scarce		+
<i>Scleria sp.</i>	herb	yes	scarce		+
<i>Sterculia lanceolata</i>	tree	yes	scarce		+
<i>Urena lobata</i>	herb	yes	scarce	+	+
<i>Wedelia trilobata</i>	climber	no	scarce		+

Appendix D2 Plant species recorded at Pak Ngan Heung River (S)

			Relative	Occurrence	
Species	Habit	Native	Abundance	PNH1	PNH2
<i>Ficus microcarpa</i>	tree	yes	scarce		+
<i>Ficus superba</i>	tree	yes	occasional		+
<i>Ipomoea cairica</i>	climber	yes	occasional		+
<i>Kandelia obovata</i>	tree	yes	scarce	+	
<i>Lantana camara</i>	shrub	no	scarce		
<i>Panicum maximum</i>	grass	no	common		+

Appendix D3 Plant species recorded at Luk Tei Tong River

Species	Habit	Native	Relative Abundance	Occurrence				
				LTT1	LTT2	LTT3	LTT4	LTT5
<i>Acanthus ilicifolius</i>	shrub	yes	scarce		+			
<i>Bidens pilosa</i>	herb	no	scarce	+		+		
<i>Pueraria phaseoloides</i>	climber	yes	scarce			+		
<i>Celtis sinensis</i>	tree	yes	scarce	+				
<i>Ficus hispida</i>	tree	yes	scarce	+				
<i>Ficus microcarpa</i>	tree	yes	scarce	+				
<i>Ficus superba</i>	tree	yes	scarce	+				
<i>Hibiscus tiliaceus</i>	tree	yes	scarce	+				
<i>Ipomoea cairica</i>	climber	no	scarce	+				
<i>Kandelia obovata</i>	tree	yes	occasional		+			
<i>Leucaena leucocephala</i>	tree	no	scarce	+				
<i>Macaranga tanarius</i>	tree	yes	scarce	+				
<i>Mikania micrantha</i>	climber	no	scarce	+				
<i>Neyraudia reynaudiana</i>	grass	yes	scarce	+				
<i>Oxalis corymbosa</i>	herb	yes	scarce	+		+		
<i>Panicum maximum</i>	grass	no	scarce	+				
<i>Rhynchelytrum repens</i>	grass	no	scarce					
<i>Saccharum arundinaceum</i>	grass	yes	scarce	+				
<i>Solanum nigrum</i>	herb	no	scarce	+				
<i>Wedelia trilobata</i>	climber	no	scarce			+		

Appendix E

Construction Noise Monitoring Data Sheet



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N1	N2
Description of Location		Façade	Façade
Date of Monitoring		1/6/2011	
Measurement Start Time (hhmm)		14:35	14:00
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		1.3	1.8
Measurement Results	L90 (dB(A))	39.8	41.0
	L10 (dB(A))	53.3	49.8
	Leq (dB(A))	51.9	47.7
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Public noise 2. Traffic noise	1. Public noise 2. Traffic noise
Remarks			

Name & Designation

Signature

Date:

Prepared by: Allen Chan Allen 1/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N3	N4
Description of Location		Freefield	Facade
Date of Monitoring		1/6/2011	
Measurement Start Time (hhmm)		12:35	11:55
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		1.2	0.8
Measurement Results	L90 (dB(A))	39.6	44.7
	L10 (dB(A))	57.9	52.5
	Leq (dB(A))	55.4	51.1
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Helicopter 2. Bicycle 3. Motor bicycle	1. Helicopter 2. Birds
Remarks			

Name & Designation

Signature

Date:

Prepared by: Allen Chan Allen 1/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N1	N2
Description of Location		Façade	Façade
Date of Monitoring		8/6/2011	
Measurement Start Time (hhmm)		16:50	16:15
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.1	0.3
Measurement Results	L90 (dB(A))	40.4	40.0
	L10 (dB(A))	48.1	48.5
	Leq (dB(A))	45.3	47.2
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise 2. Traffic noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

8/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N3	N4
Description of Location		Freefield	Facade
Date of Monitoring		8/6/2011	
Measurement Start Time (hhmm)		14:45	15:35
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.6	0.1
Measurement Results	L90 (dB(A))	43.2	43.1
	L10 (dB(A))	57.3	51.8
	Leq (dB(A))	53.3	50.0
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Public noise 2. Traffic noise	1. Background noise
Remarks			

Name & Designation

Signature

Date:

Prepared by: Allen Chan Allen 8/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N1	N2
Description of Location		Façade	Façade
Date of Monitoring		13/6/2011	
Measurement Start Time (hhmm)		15:10	14:35
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.1	0.3
Measurement Results	L90 (dB(A))	41.3	42.8
	L10 (dB(A))	56.8	58.9
	Leq (dB(A))	52.9	55.8
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise 2. Traffic noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

13/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N3	N4
Description of Location		Freefield	Facade
Date of Monitoring		13/6/2011	
Measurement Start Time (hhmm)		13:07	14:00
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.3	0.1
Measurement Results	L90 (dB(A))	54.2	52.0
	L10 (dB(A))	69.2	66.8
	Leq (dB(A))	64.4	66.1
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

13/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N1	N2
Description of Location		Façade	Façade
Date of Monitoring		20/6/2011	
Measurement Start Time (hhmm)		15:30	15:00
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.2	0.1
Measurement Results	L90 (dB(A))	55.4	42.7
	L10 (dB(A))	56.6	50.4
	Leq (dB(A))	55.4	49.6
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise 2. Traffic noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

20/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N3	N4
Description of Location		Freefield	Facade
Date of Monitoring		20/6/2011	
Measurement Start Time (hhmm)		13:40	14:23
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.2	0.1
Measurement Results	L90 (dB(A))	49.8	55.4
	L10 (dB(A))	70.4	64.0
	Leq (dB(A))	65.0	61.0
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

20/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N1	N2
Description of Location		Façade	Façade
Date of Monitoring		27/6/2011	
Measurement Start Time (hhmm)		15:20	14:40
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.2.	0.4
Measurement Results	L90 (dB(A))	47.0	57.5
	L10 (dB(A))	64.9	67.7
	Leq (dB(A))	62.2	64.4
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise 2. Traffic noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

27/6/2011



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

Construction Noise Monitoring Data Sheet

Monitoring Location		N3	N4
Description of Location		Freefield	Facade
Date of Monitoring		27/6/2011	
Measurement Start Time (hhmm)		13:00	13:55
Measurement Time Length (mins.)		30 mins	
Noise Meter Model/ Identification		ACO Japan, model 6224	
Calibrator Model/ Identification		Castle Group, GA607	
Wind Speed (m/s)		0.2	0.4
Measurement Results	L90 (dB(A))	43.1	56.5
	L10 (dB(A))	64.3	69.9
	Leq (dB(A))	58.3	66.3
Weather condition:		Sunny	
Major Construction Noise Source(s) During Monitoring		No construction work has been carried out during monitoring.	No construction work has been carried out during monitoring.
Other Noise Source(s) During Monitoring		1. Background noise 2. Traffic noise	1. Background noise
Remarks			

Name & Designation

Signature

Date:

Prepared by:

Allen Chan

Allen

27/6/2011

Appendix F1

Water Quality

Monitoring Data Sheet

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

Date of Sampling: 1/6/2011 Sunny

Monitoring Location	M1			M2			M3			M4			C1			C2			C3		
Time (hhmm)	1200			1210			1220			1150			1240			1250			1300		
Tide Mode	mid-ebb			mid-ebb			mid-ebb			mid-ebb			mid-ebb			mid-ebb			mid-ebb		
River Condition	normal			normal			normal			normal			normal			normal			normal		
Water Depth (m)	<1			<1			<1			1.3			<1			<1			<1		
pH value	7.13			6.67			6.94			6.69			7.84			7.34			6.50		
Temperature (oC)	27.4			26.8			30.9			27.8			27.9			28.7			32.0		
Salinity (ppt)	7.0			7.0			21.2			1.8			0.0			0.0			9.0		
Turbidity (NTU)	0.4	0.4	Average 0.4	0.0	0.0	Average 0.0	0.0	0.0	Average 0.0	0.4	0.4	Average 0.4	0.0	0.0	Average 0.0	0.0	0.0	Average 0.0	28.1	28.1	Average 28.1
DO (mg/l)	7.46	7.48	Average 7.47	7.66	7.68	Average 7.67	6.37	6.28	Average 6.33	6.79	6.79	Average 6.79	8.31	8.31	Average 8.31	8.38	8.39	Average 8.39	6.14	6.16	Average 6.15
DO Saturation (%)	99	99	Average 99	100	100	Average 100	96	96	Average 96	98	98	Average 98	105	105	Average 105	106	106	Average 106	89	89	Average 89

Name: Allen Chan Signature: Allen Date: 1/6/2011

remark or observation: _____

Appendix F2

Water Quality

Monitoring Lab report



TEST REPORT ON ENVIRONMENTAL ANALYSIS OF WATER AND WASTEWATER

Page 1 of 1

Report No. : GCC110600031 Date of Issue : 14-06-2011

Client* : Environmental Pioneers & Solutions Limited Date Received : 08-09-2008

Client Address* : 8/F, Chaiwan Industrial Centre Building, 20 Lee Chung Street, Chaiwan, HK.
 DSD Contract No. DC/2006/11 - Drainage Improvement in Southern Lantau & Construction of

Project* : Mui Wo Village Sewerage Phase 1

Test Location : G/F, 20 Pak Kung Street, Hung Hom, Kowloon. Date Started : 01-06-2011

W.O. No.* : -- Sample Type* : River Water Date Completed : 02-06-2011

GCE Serial No. : WQM062011 GCE Reg. No. : GCE 081096 Test Unit No. : CH 08258

Analysis Description	Test Method	Units	Quality Control Results				
			Method Blank	QC 500 mg/L	QC Duplicate	RPD%	Spike 25 mg/L
Suspended Solids (SS)	APHA 20ed 2540 D	mg/L	< 1.0	499	496	0.6	28.6
Acceptance Criteria			< 2.5 mg/L	475 ≤ Control Limit ≤ 514		≤ ±5%	21 ≤ R ≤ 29

TEST RESULTS	Sample ID	C1	C1 Duplicate	C2	C2 Duplicate	C3	C3 Duplicate		
	Sampling Date/Time	01 June 2011 / 12:40		01 June 2011 / 12:50		01 June 2011 / 13:00			
	LOD	Units							
Suspended Solids (SS)	1	mg/L	2.4	2.0	1.1	1.6	25.2	24.4	

TEST RESULTS	Sample ID	M1	M1 Duplicate	M2	M2 Duplicate	M3	M3 Duplicate	M4	M4 Duplicate
	Sampling Date/Time	01 June 2011 / 12:00		01 June 2011 / 12:10		01 June 2011 / 12:20		01 June 2011 / 11:50	
	LOD	Units							
Suspended Solids (SS)	1	mg/L	4.4	4.5	1.1	1.2	3.6	3.3	2.0

* : Information provided by client

Note : This laboratory has no responsibility on sampling and all the test results relate only to the sample tested as received.

Remarks : --

----- End -----

Tested By : C.S. CHAN

Approved Signatory : 

Name : GU CHIN

Checked By : GU CHIN

Post : Chemist

Environmental Pioneers and Solutions Limited

DC/2006/11 - DRAINAGE IMPROVEMENT IN SOUTHERN LANTAU

Master Schedule of EM&A works in June 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			6/1	6/2	6/3	6/4
			WQM at: 12:09			
6/5	6/6	6/7	6/8	6/9	6/10	6/11
			Noise Monitoring			
6/12	6/13	6/14	6/15	6/16	6/17	6/18
	Noise Monitoring					
6/19	6/20	6/21	6/22	6/23	6/24	6/25
	Noise Monitoring					
6/26	6/27	6/28	6/29	6/30		
	Noise Monitoring					

Noise Monitoring Locations: Total 4 Locations as N1, N2, N3 and N4

Water Quality Monitoring (WQM) Locations: Total 7 Locations as M1, M2, M3, M4, C1, C2 and C3

Appendix H Implementation Status of environmental protection / mitigation measures

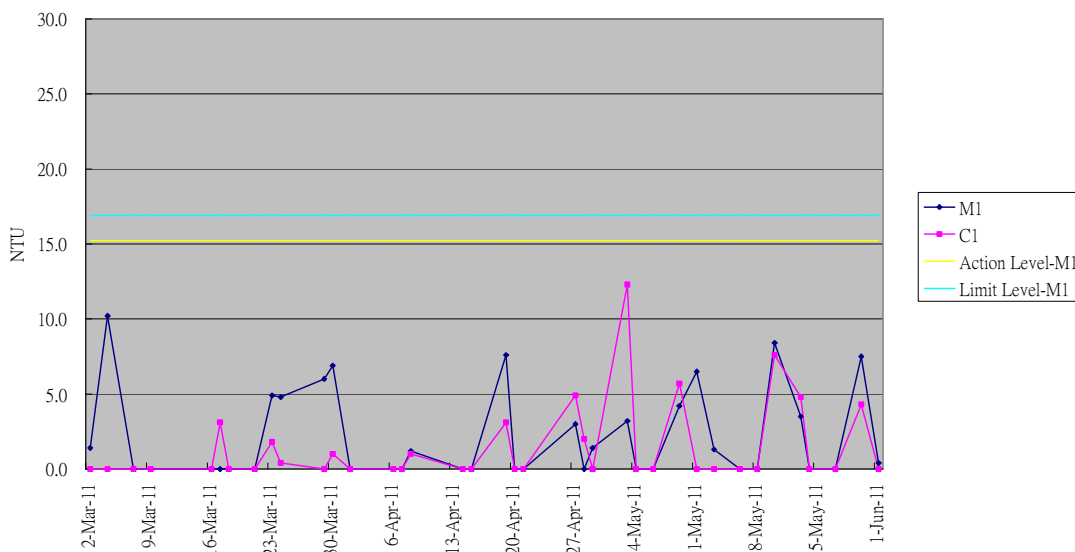
Environmental Aspect	Protection / Mitigation Measures	Implementation status	Follow-up action
Air Quality	Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage.	Implemented	-
	Use of frequent watering for particular dusty static construction areas and areas close to ASRs.	Implemented	-
	Tarpaulin covering of all dusty vehicle loads transported to and from and between site location;	Deficiencies found	-
	Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.	Implemented	-
	Routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs.	Implemented	-
Noise	Use of quiet powered mechanical equipment (PME)	Implemented	-
	Adoption of movable noise barriers and temporary noise barriers	Implemented	-
	Application of good site practices mentioned in EM&A manual Clause 3.8.1	Implemented	-
Water Quality	Before commencing any site formation works, all sewer and drainage connections should be sealed to prevent debris, soil, sand etc. from entering public sewers/drains.	Implemented	-
	Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond. No site run-off should enter the freshwater marshes at Luk Tei Tong.	Implemented	-
	Sand/ silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/ silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance.	Implemented	-
	Water pumped out from foundation excavations should be discharged into silt removal facilities.	Implemented	-
	During rainstorms, exposed slope surface should be covered by a tarpaulin or the means.	Implemented	-
	Exposed soil areas should be minimized to reduce potential for increased siltation and contamination of runoff.	Implemented	-
	Exposed soil surfaces should be protected by paving or fill material as soon as possible to reduce potential of soil erosion.	Implemented	-
	Open stockpiles of construction materials or construction wastes on-site of more than 50m ³ should be covered with tarpaulin or similar fabric during rainstorms.	Implemented	-
	Oils and fuels should only be used and stored on designated areas which have pollution prevention facilities.	Implemented	-
	Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site.	Not available	-
	The excavation and widening works for the drainage improvements to the Pak Ngan Heung River, Tai Tei Tong River, Luk Tei Tong River and Luk Tei Tong By-pass Channel should be carried out in sections (approximately 300–400 m in length) and in dry condition.	Implemented	-

Environmental Aspect	Protection / Mitigation Measures	Implementation status	Follow-up action
	Maintenance desilting of the re-profiled river channels of the Pak Ngan Heung River, Tai Tei Tong River, Luk Tei tong River and Luk Tei Tong By-pass Channel, temporary barrier walls should be used to provide a dry zone for desilting work.	Not applicable at this stage	-
Ecology	Existing natural habitats should be retained as far as practicable	Implemented	-
	Boundary of working areas should be identified to prevent loss of vegetation	Implemented	-
	All existing trees / plant should be well protected within the site or transplanted properly	Implemented	-
	Turf removal from the Luk Tei Tong marsh due to the construction of Luk Tei Tong Bypass Channel shall be minimized	Implemented	-
	Turf from the Luk Tei Tong marsh shall be properly removed, stored, maintained and reused for lining the riverbed of the Luk Tei Tong Bypass Channel	Implemented	-
Chemical and Solid Waste	Chemical wastes should be properly stored in a proper store as per statutory requirements (i.e. on a hard standing, within an enclosed and locked area)	Implemented	-
	Chemical waste stores should be provided with fire precaution facilities (i.e. fire extinguisher, no smoking warning etc).	Implemented	-
	Chemical wastes should be properly stored in corrosion resistant containers placed inside the store and labelled with warning signs in English and Chinese.	Implemented	-
	Chemical wastes should be disposed of by licensed chemical waste collector with supporting delivery records.	Implemented	-
	All containers for fuel, diesel and fluid chemical (in use) and oil filled stationery plants located with proper drip pans.	Implemented	-
	Construction wastes should be managed and disposed to the designated public fill and landfill areas in acceptable manner.	Deficiencies found	
	All waste disposals managed in a proper manner i.e. trip ticket system implementation.	Implemented	-

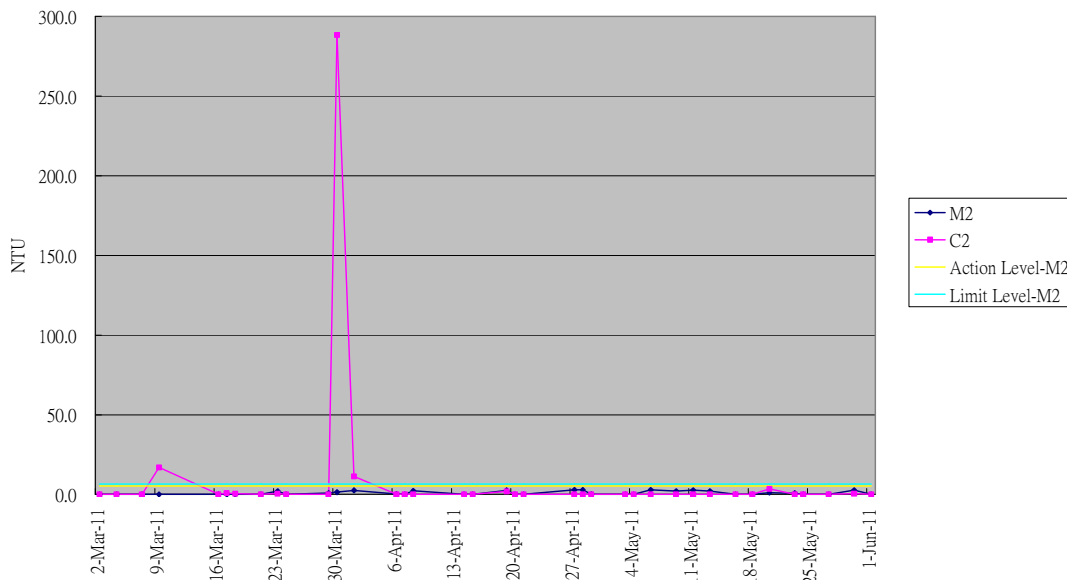
Appendix I

Graphical plot of water
quality monitoring
results (SS, DO,
turbidity)

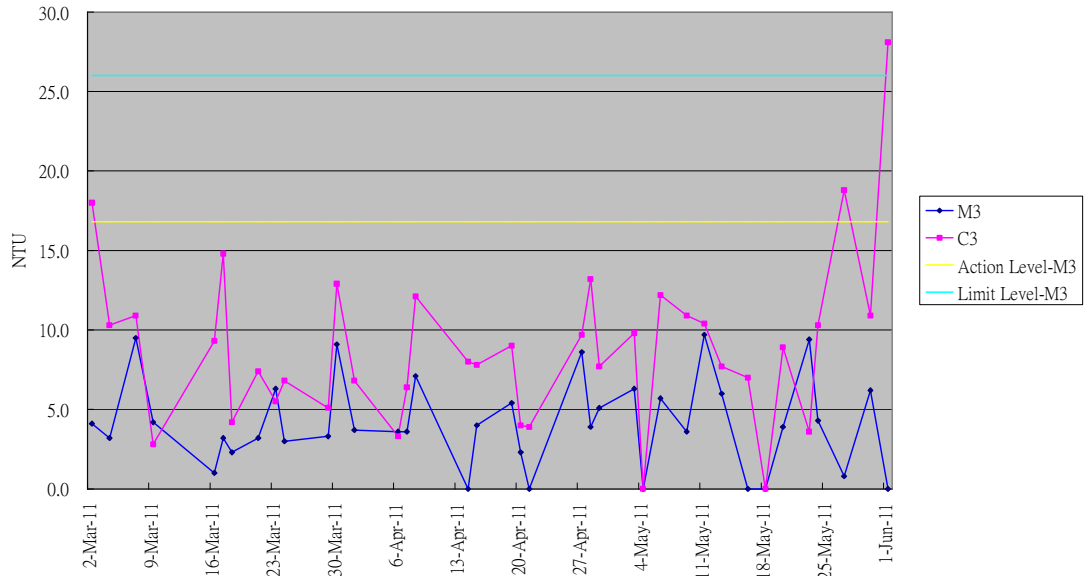
Graphical Plot of Turbidity Trend M1&C1(Mar 11 - June 11)



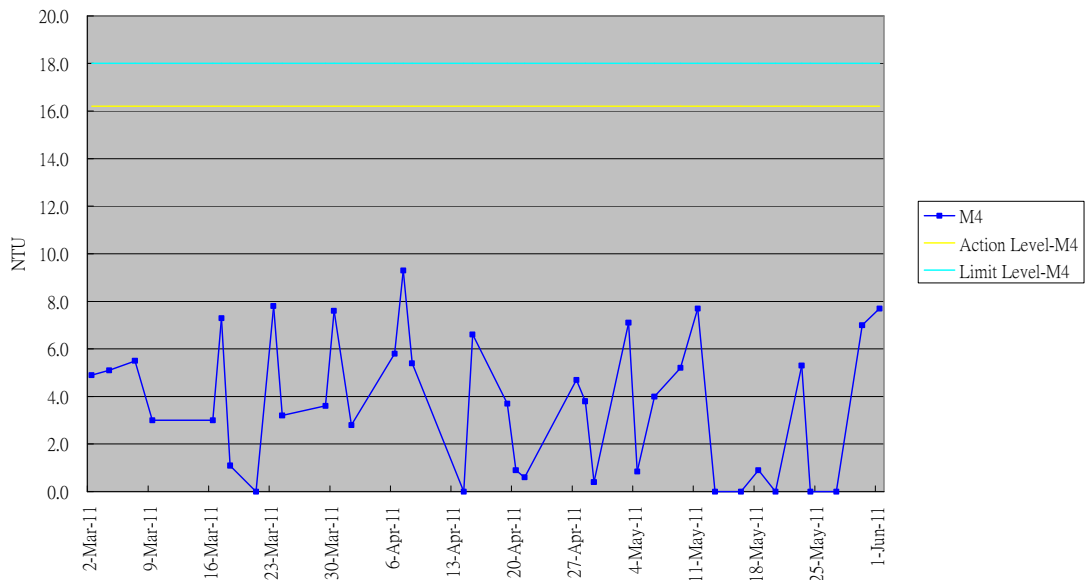
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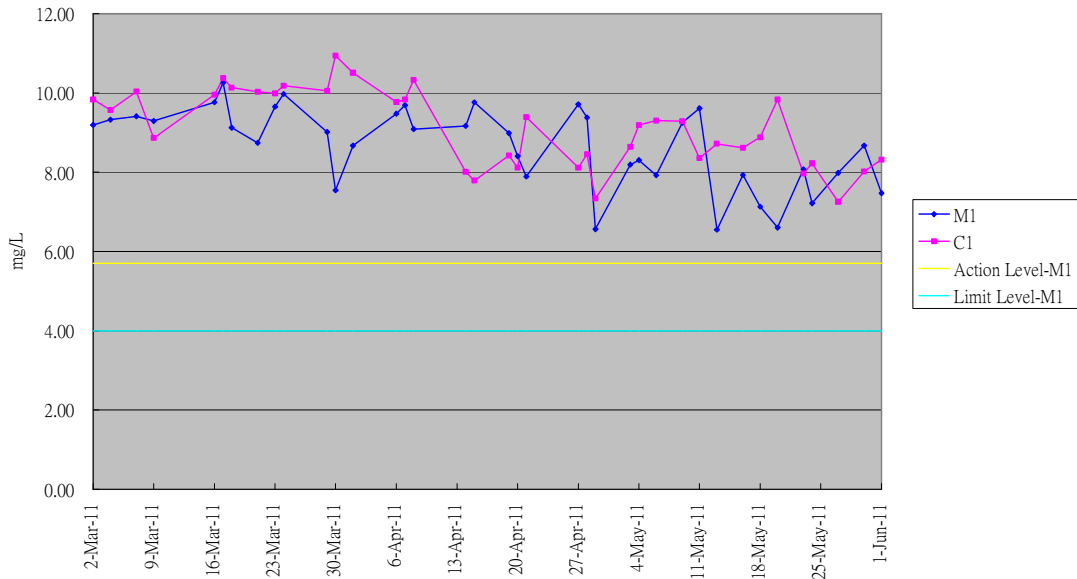
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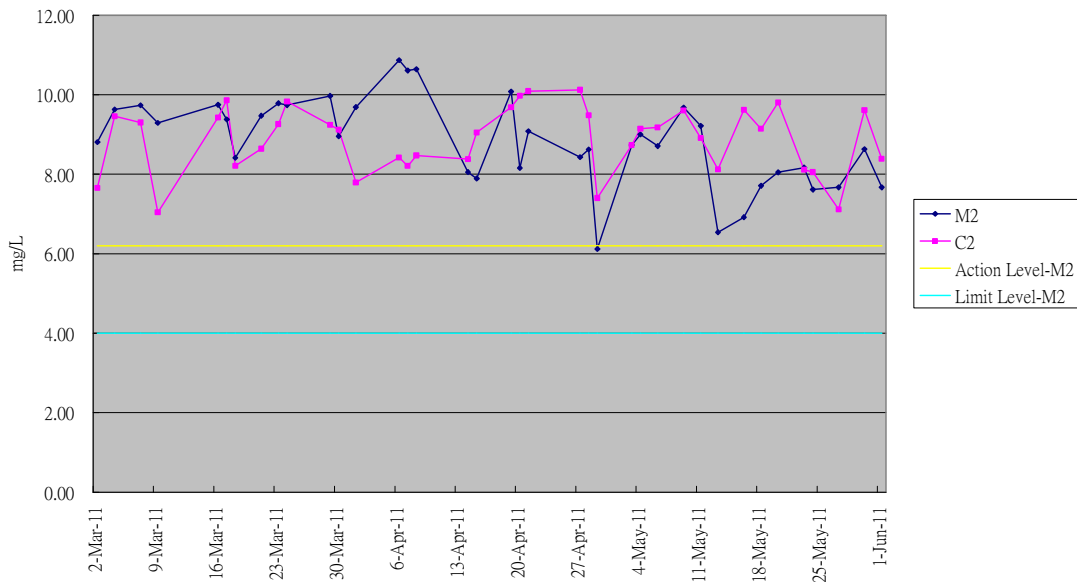
Graphical Plot of Turbidity Trend M4 (Mar 11 - June 11)



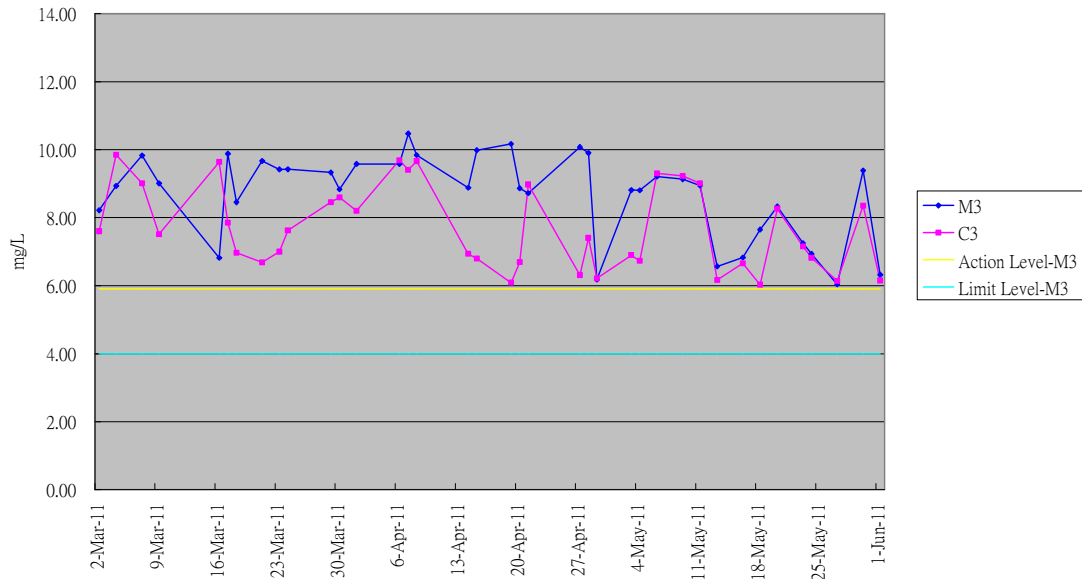
Graphical Plot of Dissolved Oxygen Trend M1&C1 (Mar 11 - June 11)



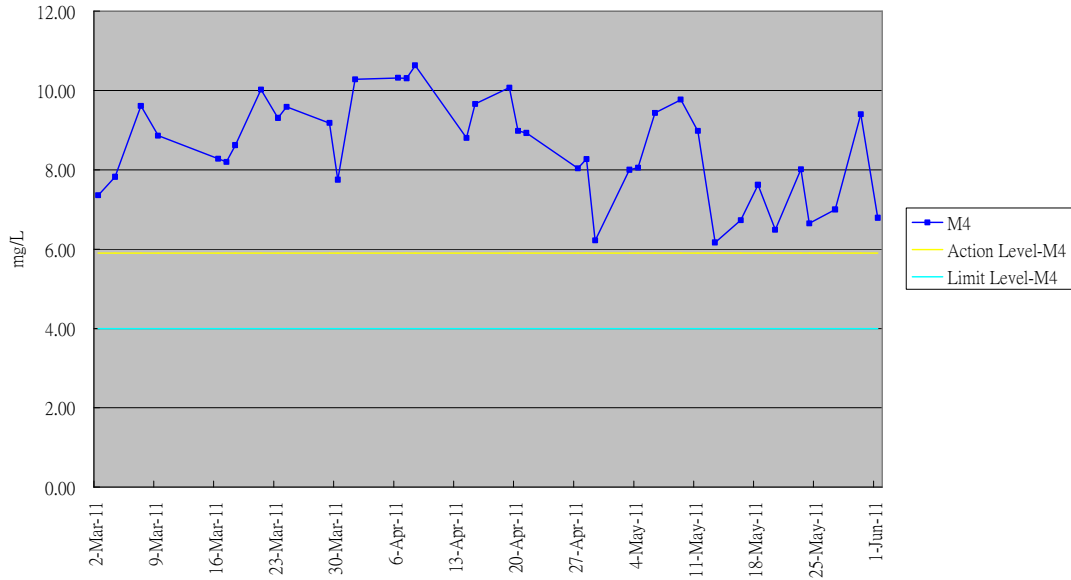
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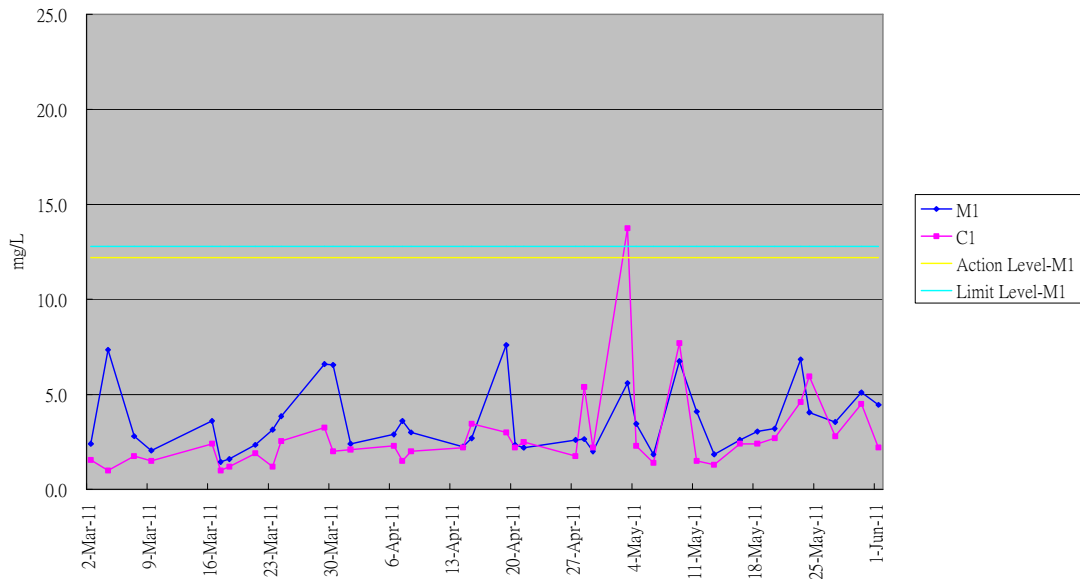
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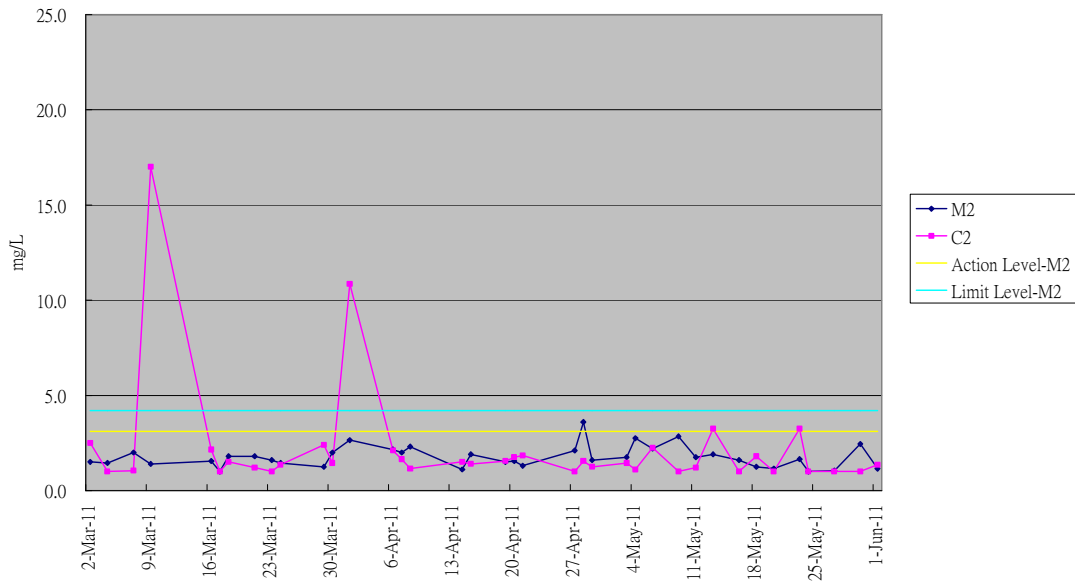
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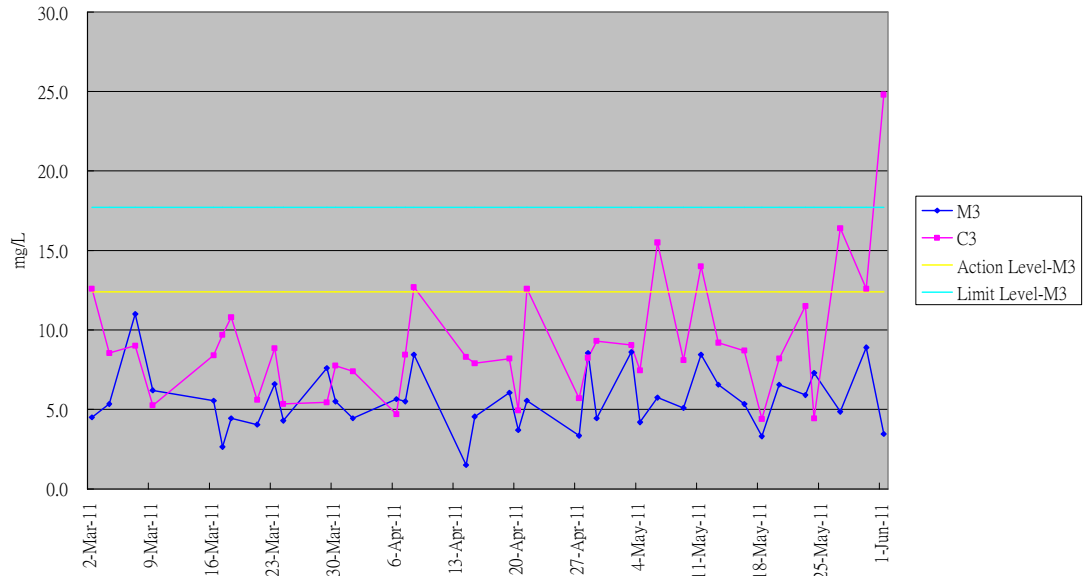
Graphical Plot of Suspended Soild M1&C1 (Mar 11 - June 11)



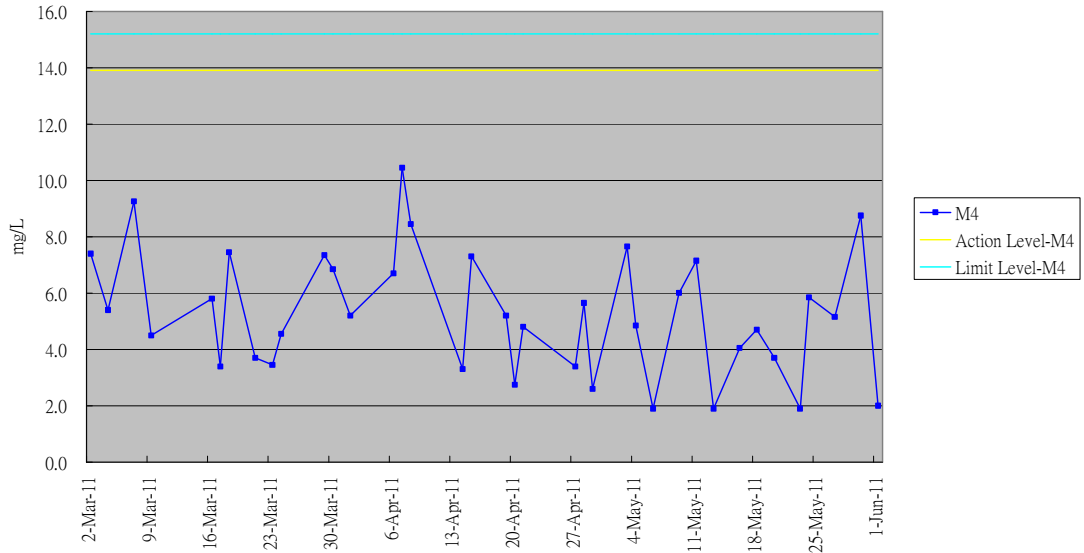
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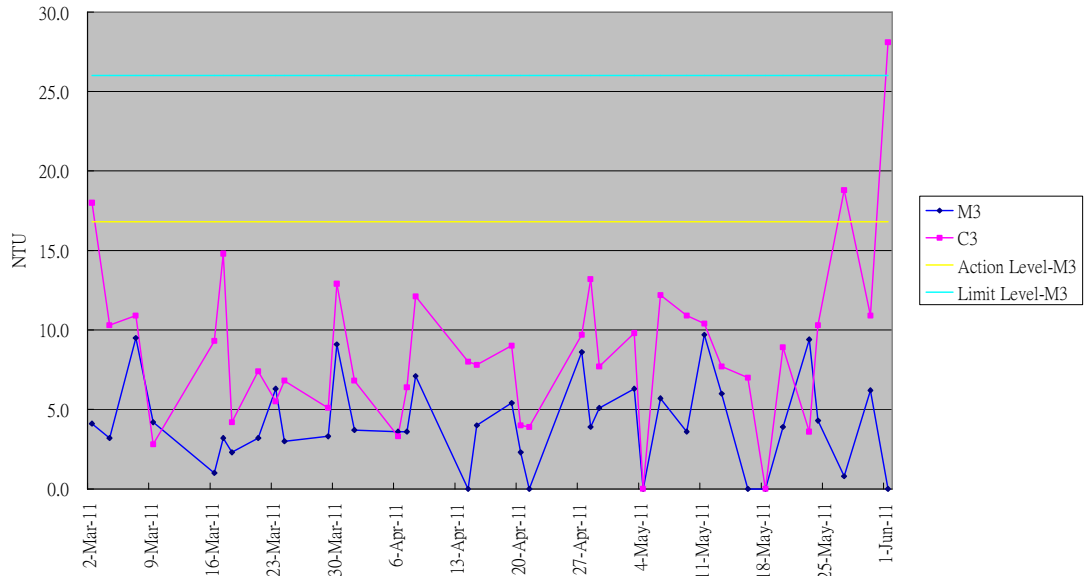
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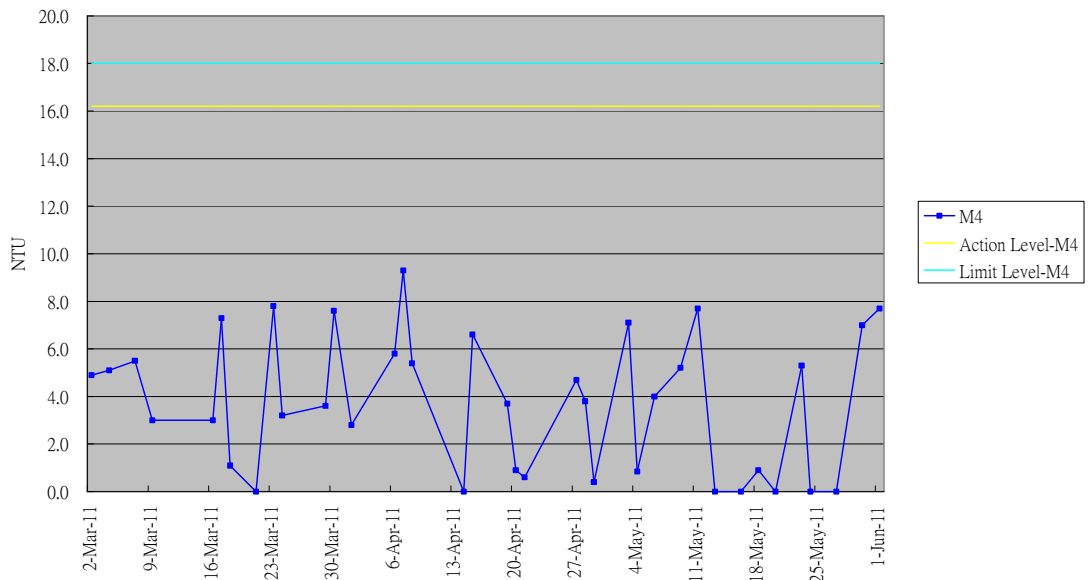
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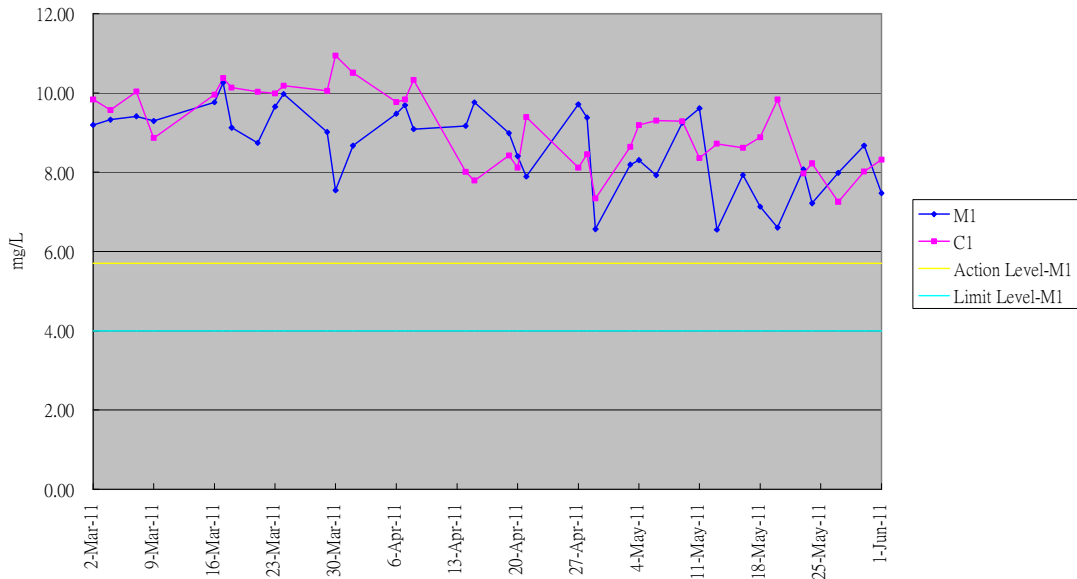
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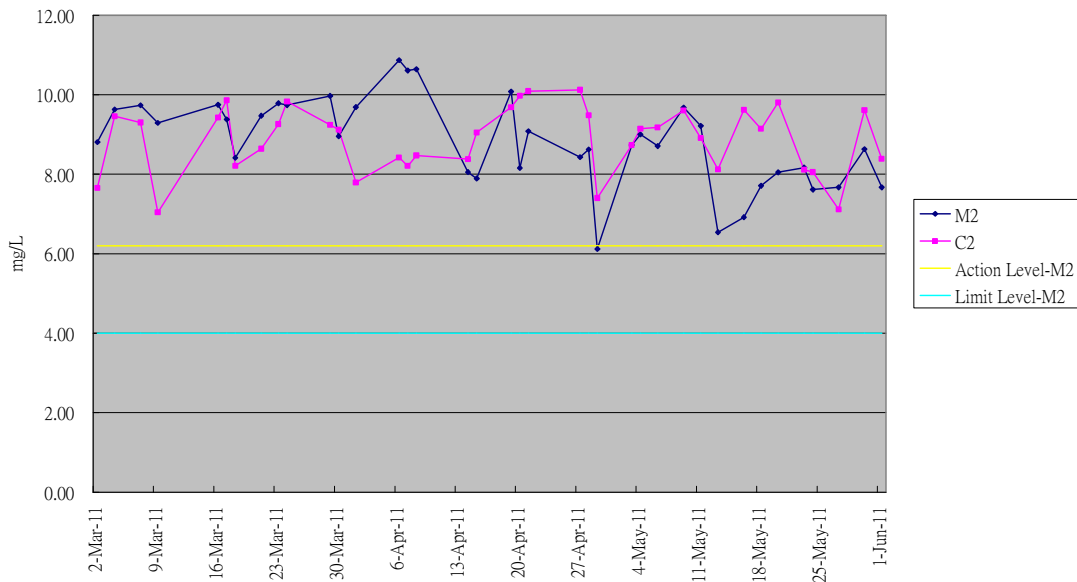
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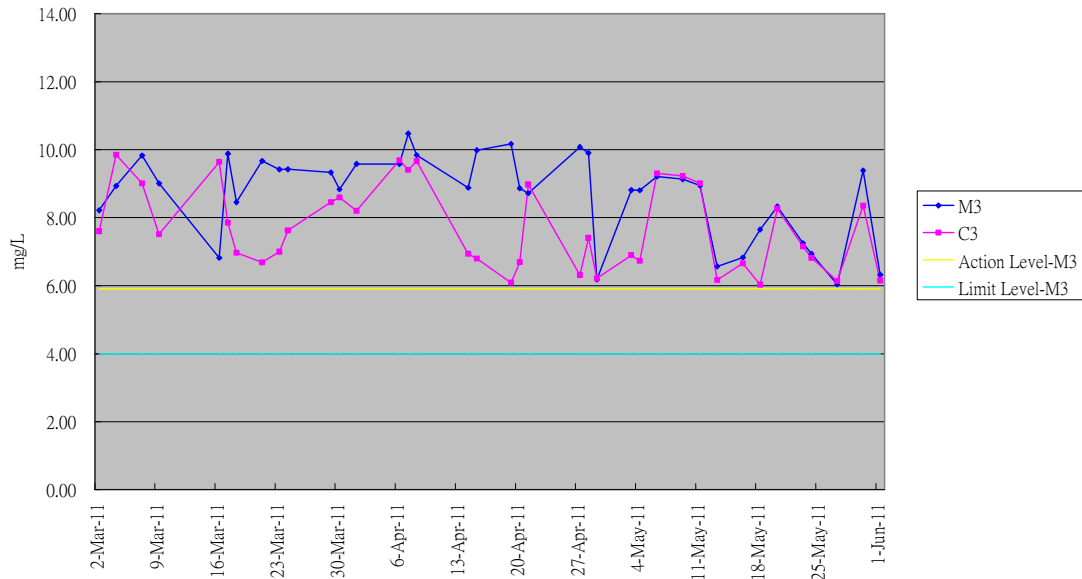
Graphical Plot of Dissolved Oxygen Trend M1&C1 (Mar 11 - June 11)



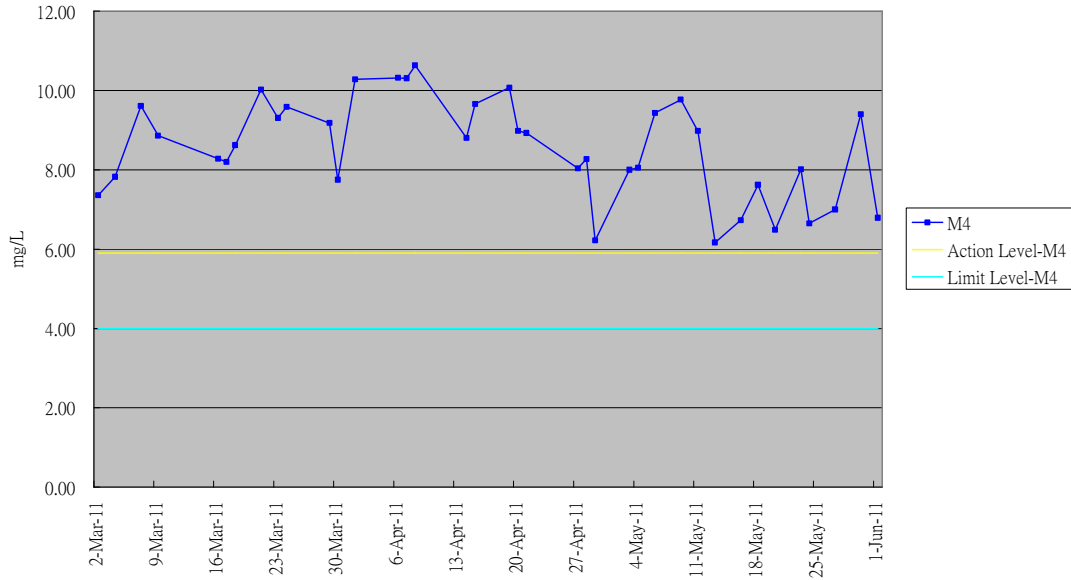
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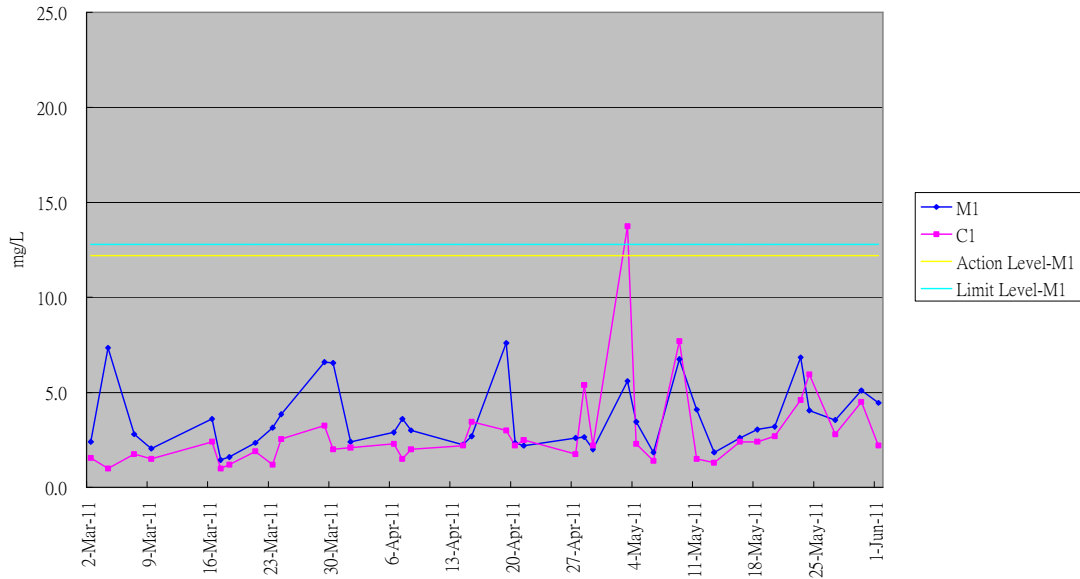
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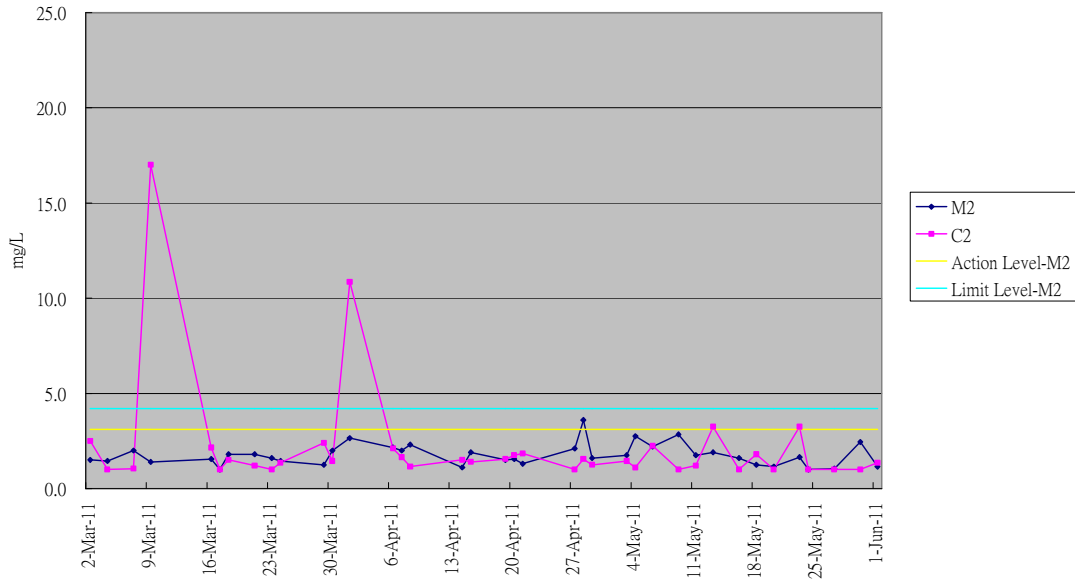
Graphical Plot of Dissolved Oxygen Trend M4 (Mar 11 - June 11)



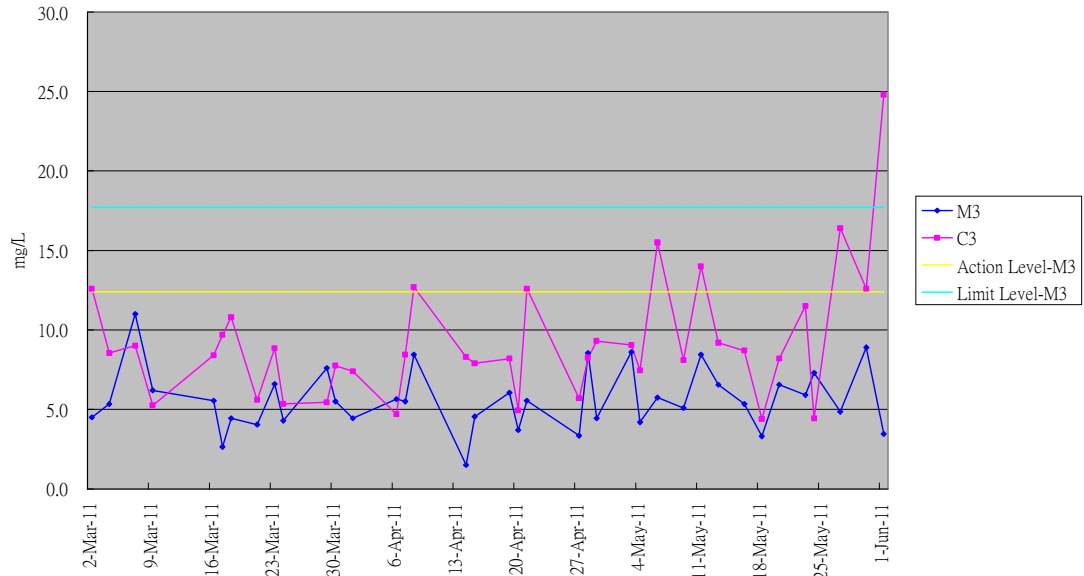
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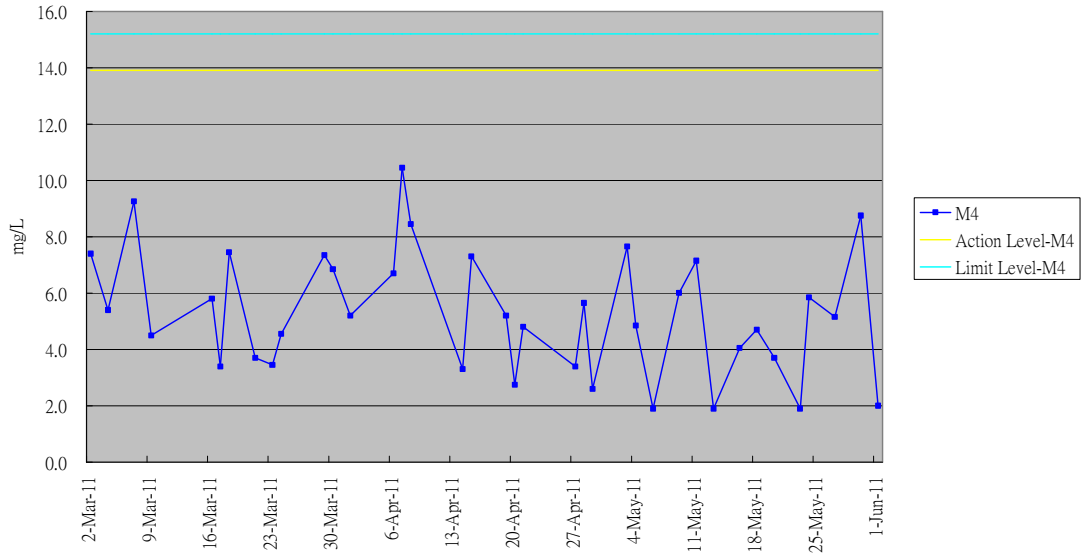
Graphical Plot of Suspended Soild M2&C2 (Mar 11 - June 11)



Graphical Plot of Suspended Soild M3&C3 (Mar 11 - June 11)

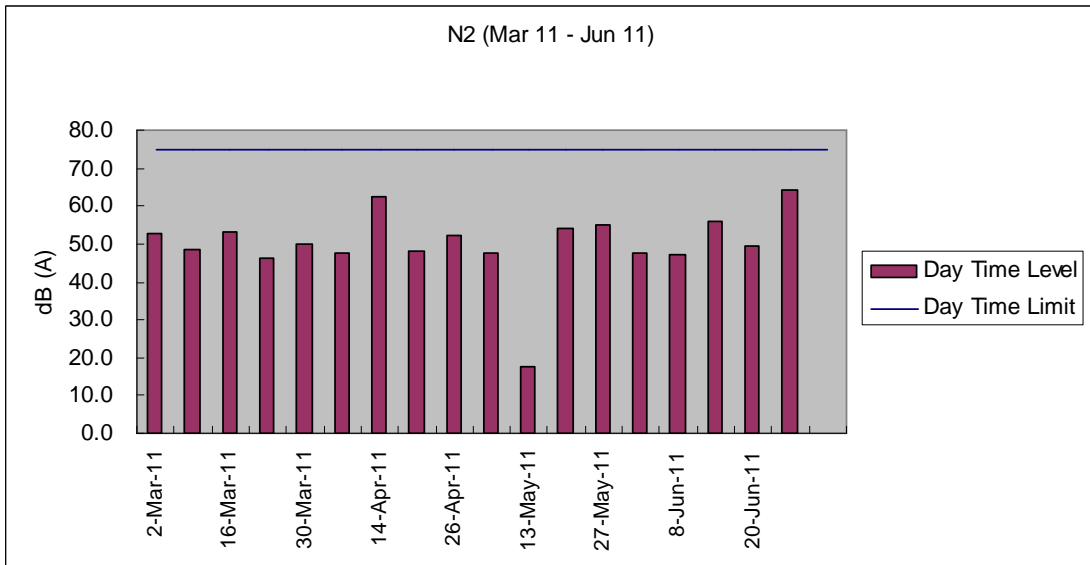
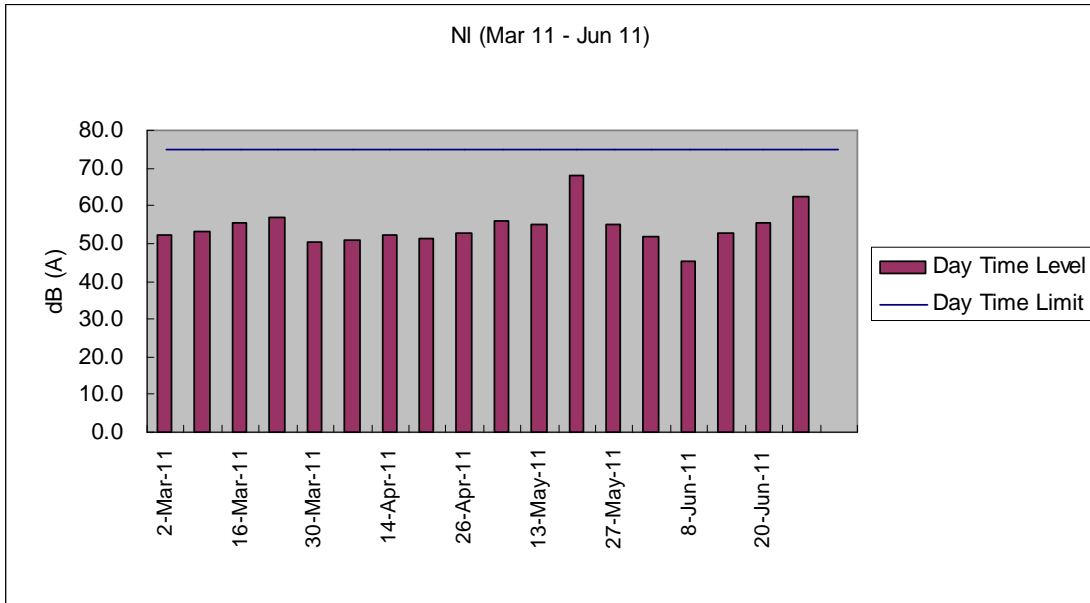


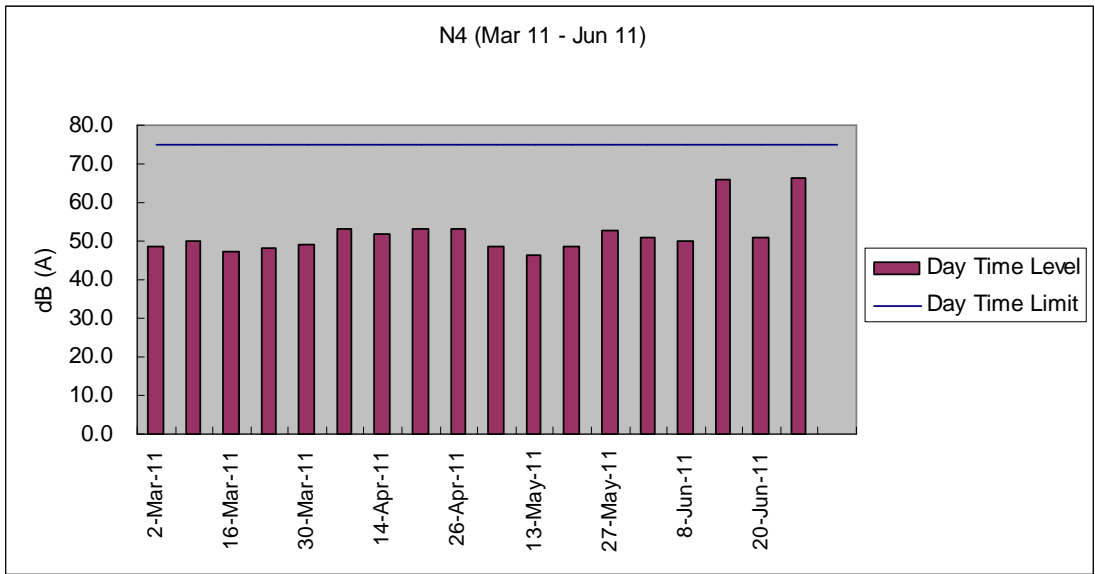
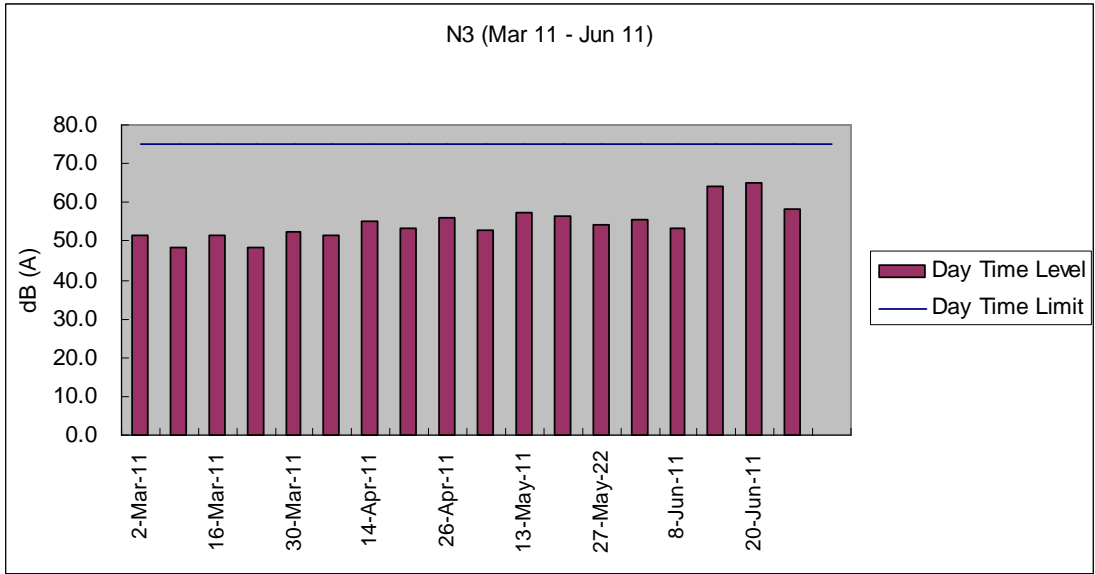
Graphical Plot of Suspended Soild M4 (Mar 11 - June 11)



Appendix J

Graphical plot of noise
monitoring results





Appendix H

Letter Reference

Urgent by Fax**MEMO**

From Director of Environmental Protection Ref. (9) In EP2/N9/I/97 Pt.10 Tel. No. 2835 1153 Fax. No. 2591 0558 Email simonho@epd.gov.hk Date 4 May 2011	To CE/DP, DSD (Attn.: Mr. W.H. CHAN) Your Ref. () In DP/8/4128CD/DC0611/17 Dated 2.3.2011 Fax. No. 2827 8700 Total Pages 1
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**Environmental Impact Assessment (EIA) Ordinance (Cap. 499)
 Environmental Permit No. EP-237/2005/B
 Drainage Improvement in South Lantau**

**(DC/2006/11 – Drainage Improvement in South Lantau
 and Construction of Mui Wo Village Sewerage Phase 1)**

Proposal of Post-construction Environmental Monitoring


I refer to your memo dated 2 March 2011 enclosing a proposal to conduct post-construction phase environmental monitoring for water for the captioned Project pursuant to the environmental monitoring and audit (EM&A) requirements under the Environmental Permit No. EP-237/2005/B.

2. With respect to requirements of post-construction water quality impact monitoring, section 4.7.1 of the Final EM&A Manual states that "*Upon completion of the construction works, the monitoring exercise at the designated monitoring locations shall be continued for four weeks in the same manner as the impact monitoring.*"

3. A joint site visit was carried out by EPD, DSD, AFCD, Environmental Team and Independent Environmental Checker on 19 April 2011. It was observed during the site visit that construction works at or near the waterbodies for the captioned Project have been substantially completed although two broken gabion meshes were observed at Bottleneck A of Tai Tei Tong River. Subsequently, you have confirmed in your email dated 29 April 2011 that the two broken gabion have been repaired.

4. Based on the above, I have no objection to your proposal to proceed with conducting the post-construction water quality monitoring for the captioned Project in accordance with the requirements of the EM&A Manual.

5. I would also like to reiterate that DSD is required to obtain an environmental permit for operational phase of the Project before completion of construction works to avoid non-compliance with statutory requirements of the EIA Ordinance.


 (Simon M K Ho)
 Environmental Protection Officer
 for Director of Environmental Protection

c.c. Internal – E(RS)52

Urgent by Post

MEMO

From Chief Engineer/Drainage Projects, DSD
Ref. () in DP/8/4128CD/DC0611/17
Tel. No. 2594 7464
Fax. No. 2827 8700
Email
Date 2 March 2011

To Director of Environmental Protection
(Attn.: Mr. Matthew W C CHAN)
Email
Your Ref. () In EP2/N9/I/97 III
dated Fax. No. 2591 0558
Total Pages 1 + attachment

PWP Item No. 4128CD
Drainage Improvements in Southern Lantau

DC/2006/11 – Drainage Improvement in Southern Lantau
and Construction of Mui Wo Village Sewerage Phase 1

Environmental Impact Assessment (EIA) Ordinance, Cap. 499
Environmental Permit No. 237/2005/B

Proposal of Post-construction Phase Environmental Monitoring

We refer to the captioned environmental permit (EP).

2. The construction works for Section 1 (i.e. drainage improvement works at Tai Tei Tong River) and Section 3 (i.e. drainage improvement works Pak Ngan Heung River and Luk Tei Tong River) of the captioned Contract have been substantially completed.
3. In accordance with Clause 25.32E of the Particular Specifications, our contractor, Yick Hing Construction Company Limited submit herewith their proposal of "Post-construction Phase Environmental Monitoring". The submission has been certified by the Environmental Team Leader and verified by the Independent Environmental Checker (IEC). Please note that one copy of the proposal has also been sent to D of AFC direct.
4. For the environmental auditing to be carried out by our IEC, Allied Environmental Consultants Limited, there will be no change to the auditing procedure and frequency. They will continue to carry out regular as well as random site inspections and submit the monthly IEC reports until the end of the 12-month maintenance period of the whole Contract.


(W H CHAN)

for Chief Engineer/ Drainage Projects
Drainage Services Department

c.c. EPD - Environmental Compliance Division, Regional Office (South), Islands
(Attn: Miss Connie H Y Wong) (with enclosure)
D of AFC (Attn: Ms. Josephine KY Yang) (with enclosure)

Internal

IOW/D4 (Mr. LEUNG Wing-nin) (with enclosure) (via E/D4)



益興建築有限公司

Yick Hing Construction Company Limited

香港九龍佐敦道5號至秀商業大廈2樓

2nd Floor, Ultragrace Commercial Building, 5 Jordan Road, Kowloon, Hong Kong.
Tel : (852) 2394 4988 Fax : (852) 2787 4890

Quality Management
Certified to ISO 9001
Environmental Management
Certified to ISO 14001
Occupational Health and
Safety Management
Certified to OHSAS 18001

Our Ref: DC/2006/11/1B/L1700

22 February 2011

By Post

The Engineer's Representative
Drainage Project Division
Drainage Services Department
44 / F Revenue Tower
5 Gloucester Road,
Wan Chai, Hong Kong

→ GR

Attention: Mr. W. H. Chan

Dear Sir,

**Contract No. DC/2006/11 – Drainage Improvement in Southern Lantau and
Construction of Mui Wo Village Sewerage Phase I
Request for Post-Construction Phase Monitoring for Environmental Monitoring and
Audit Programme**

We would write to request for the Post-Construction Phase Monitoring for Environmental Monitoring and Audit Programme since the major works of this contract has been substantial completed especially for Pak Ngan Heung River, Tai Tei Tong River and Luk Tei Tong River.

Hence, we would submit herewith the Proposal for Post-construction Phase Monitoring prepared by our Environmental Team, Environmental Pioneers and Solutions Limited and Ecosystems Limited for your acceptance. Besides, please noted that Allied Environmental Consultants Limited has already verified and have no further comments to this proposal as per enclosed reference letter 849/11-0011 dated 21 February 2011.

We would propose to commence this post-construction monitoring for water on 7 March 2011 if you have no objection. Thank you for your attention.

Yours faithfully,
For and on behalf of
Yick Hing Construction Co., Ltd.


James Law

Site Agent

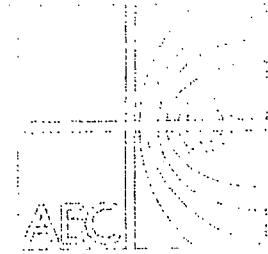
JL/cw

Encl.

c.c.	Mr. W.N. Leung (IOW/DSD)	w/e	By Hand
	Mr. K.C.Liu (SPM/Yick Hing)	w/e	By Hand
	Ms. WONG Ho-ying Connie, EPD	w/e	By Fax 2960 1760
	Ms. Patricia Chung & Mr. Jimmy Cheng, EPSL	w/e	By Fax 2856 2010

Allied Environmental Consultants Limited
Acousticians & Environmental Engineers

19/F., Kwan Chart Tower, 6 Tonnochy Road, Wan Chai, Hong Kong
Tel.: (852) 2815 7028 Fax: (852) 2815 5399 Email: info@aechk.com



沛然環境評估
工程顧問有限公司

Our Ref: 849/11-0011

21 February 2011

By Post and Fax (2827 8700)

Drainage Project Division
Drainage Services Department
44/F., Revenue Tower
5 Gloucester Road
Hong Kong

Attn.: Mr. Patrick Chan

Dear Sir,

**RE: CONTRACT No. DC/2006/11
DRAINAGE IMPROVEMENT IN SOUTHERN LANTAU
VERIFICATION OF THE PRELIMINARY PROPOSAL FOR POST CONSTRUCTION PHASE
MONITORING**

We refer to the Preliminary Proposal for Post Construction Phase Monitoring from your Environmental Team received on 8 and 18 February 2011 via emails accordingly. Please be advised that we have no further comment on the aforesaid proposal and hereby verify the proposal in accordance with Condition 4.1 of the Environmental Permit EP-237/2005/B.

Should you have any queries, please do not hesitate to contact the undersigned or our Miss Winnie Ma at 2815 7028.

Yours faithfully,

Grace Kwok
Independent Environmental Checker

GK/wm

Cc IOW – Mr. Leung Wing Nin (Fax: 2984 1509)
Yick Hing – Mr. K C Liu (Fax: 2787 4890)
EPSL – Ms Patricia Chung (Fax: 2856 2010)

FAXED
DATE: 21/2/2011



DC/2006/11

Drainage Improvement in Southern Lantau

Environmental Monitoring and Audit Programme

Proposal for Post-construction phase monitoring

Prepared by

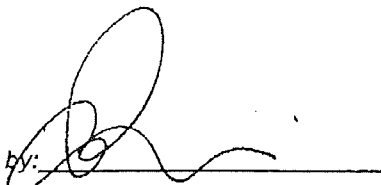
Environmental Pioneers and Solutions Limited

and

Ecosystems Limited

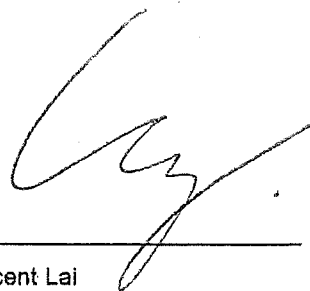
(Environmental Team)

Prepared by:



Patricia Chung

ET leader



Vincent Lai

Ecologist Representative

Introduction

Yick Hing Construction Company Limited (hereafter as the Contractor) appointed Environmental Pioneers & Solutions Limited and Ecosystems Limited as Environmental Team (hereafter as ET) for implementation of Environmental Monitoring and Auditing (EM&A) Programme for the Drainage Improvement Works in Southern Lantau since March 2008 in accordance with the requirements laid down in Particular Specification (PS) Section 25.32 (1)S of this Project.

As major construction activities will be completed by the end of January 2011, the application for substantial completion submitted by the contractor has been approved by the Project Proponent / Permit Holder, Drainage Services Department (DSD). Based on the abovementioned issues, the post construction phase monitoring for the Project should be commenced.

Future Site Activities to be Carried out

As reported by Contractor, major construction activities for drainage improvement along Pak Ngan Heung River, Tai Tei Tong River and Luk Tei Tong River were finished. Only land-based construction activities, such as defects rectification, landscaping works and site clearance will be continued. And therefore the contractor expects that the water quality impacts arising would be reduced substantially as no river-based activities will be carried out in the future.

The application for substantial completion by Contractor was approved and certified by DSD base on the following documents:

- (1) Substantial for Section 1 of the Works, Dated 25th August 2010
- (2) Substantial for Section 3 of the Works, Dated 23rd December 2010
- (3) Relevant sections of Particular Specification of this Project

The above documents are attached in Appendix A for reference.

A joint site inspection with representatives from Environmental Protection Department (EPD), DSD, Contractor, Independent Environmental Checker (IEC) and ET was held on 27th January 2011 to check the site condition and tidiness to further confirm the commencement of Post-construction phase monitoring. No river-based construction activities were observed during inspection.

Photos taken for the site conditions during recent routine site inspections carried out in January 2011 and February 2011 were shown at the following for information.

Fig.1 – Condition of confluence area of PNHR, TTTR and LTTR

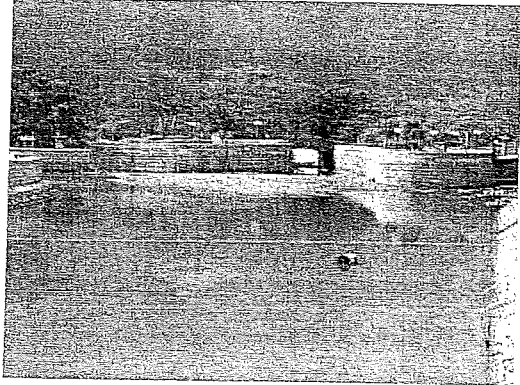


Fig.2 – Condition of PNHR (downstream area)

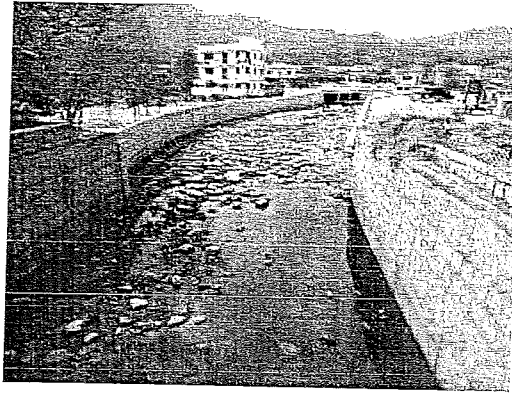


Fig.3 – Condition of PNHR, fish ladder section

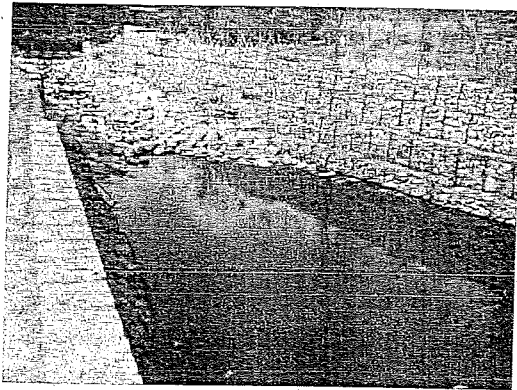


Fig.4 – Condition of TTTR, downstream area

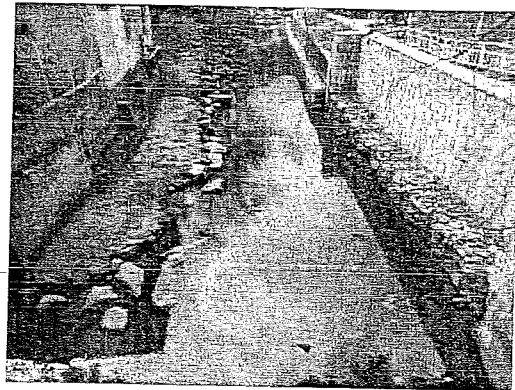


Fig.5 – Condition of TTTR, section nearby bottleneck B

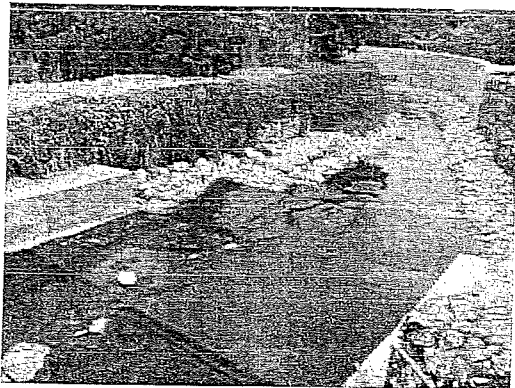


Fig.6 – Condition of TTTR, section nearby bottleneck A

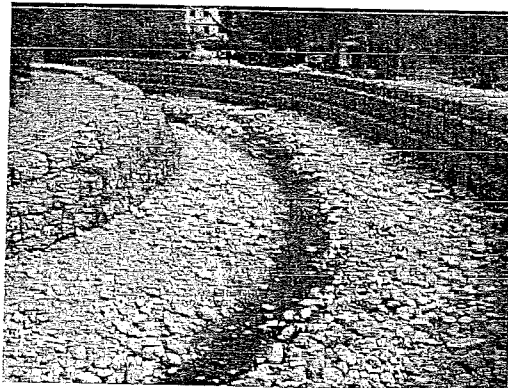


Fig.7 – Condition of LTTR, downstream area

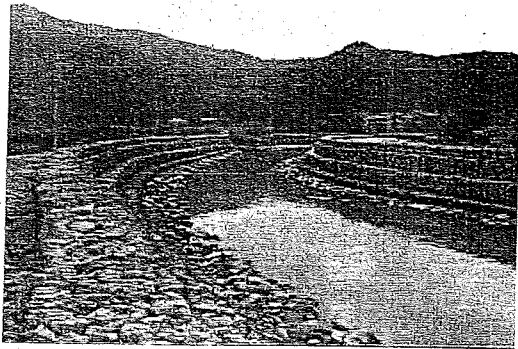
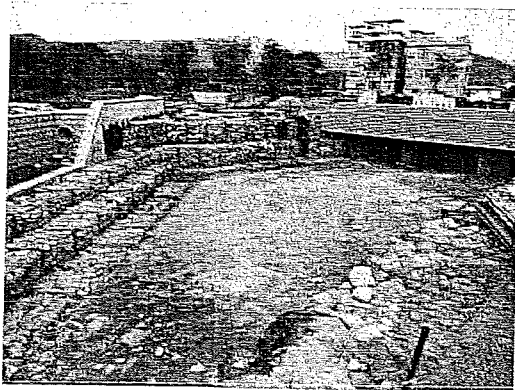


Fig.8 – Condition of LTTR, inlet of bypass channel



Outstanding works being / to be carried out

Fig.9 - Landscaping works at PNH, fish ladder section

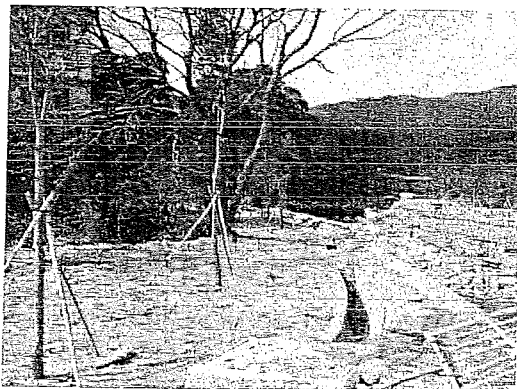


Fig.10 – Landscaping works at LTTR, downstream area

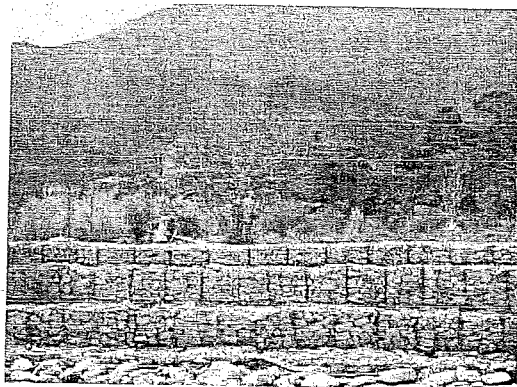


Fig.11 – Site clearance to be carried out at PNH maintenance ramp



Fig.12 – Site clearance to be carried out at inlet of LTT bypass channel

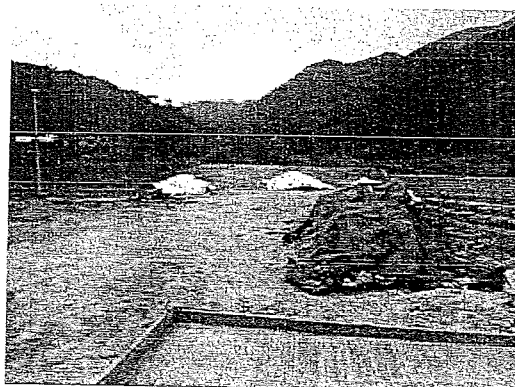
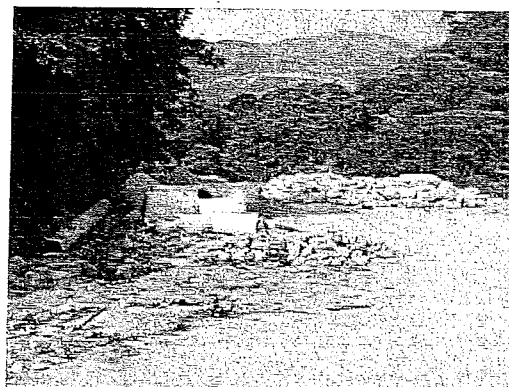


Fig.13 – Site clearance to be carried out at TTTR bottleneck A



Fig.14 – Site clearance to be carried out at PNH fish ladder



Proposed Changes of EM&A Programme

After the joint site inspection with EPD, DSD and IEC on 27th January 2011, ET has prepared this proposal for their further considerations.

According to PS Section 25.32E (8) and EM&A manual Section 4.7.1, ET has reviewed the monitoring parameters as well as the EM&A programme. It is suggested that changes of the programme would be mainly focused on conducting water quality monitoring for 4 weeks during post-construction phase to ensure the restoration of ambient water quality in the rivers. The other parts of the programme would be maintained unchanged. As informed by the contractor, the remaining land-based site activities are expected to be finished by early March 2011 including:

- Landscaping works;
- rectification for public access, at section of PNH river (on top of box culvert);
- and removal of wastes and excessive construction materials for evacuation.

The post-construction phase water quality monitoring is suggested to start from March 2011. All relevant requirements of EM&A manual such as sampling locations, methodology, event / action plan as well as the action / limit levels for water quality monitoring shall not be changed during the post-construction phase monitoring.

Another joint inspection is proposed to be held at the end of March 2011 to review for any further change of EM&A programme that should be made due to completion of remaining works. Proposal for such changes will be prepared by ET and , verified by IEC for submission EPD for their approval.

Appendix A

**Letter Correspondent for
Substantial Completion of Project Works**



Drainage Services Department
Drainage Projects Division
44/F, Revenue Tower, 5 Gloucester Road,
Wan Chai, Hong Kong

渠務署
排水工程處
香港灣仔告士打道5號
稅務大樓44樓

來函編號 Your Ref:

本署編號 Our Ref: () in DP/8/4128CD/DC0611

電話 Tel: (852) 2594 7450

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1159

Urgent by Post

✂ August 2010

Yick Hing Construction Company Limited
2/F, Ultragrace Commercial Building
5 Jordan Road
Kowloon, Hong Kong

(Attn: Mr. Edward Yuen)

Dear Sirs,

Contract No. DC/2006/11
Drainage Improvement in Southern Lantau
and Construction of Mui Wo Village Sewerage Phase 1

Substantial Completion for Section 1 of the Works

In accordance with Clause 53 of the General Conditions of Contract, I hereby certify that Section 1 of the Works was substantially completed on 1 December 2009.

Yours faithfully,

(CHAN Kin-kwong)
The Engineer

Drainage Projects Division
Drainage Services Department

Encl.

- c.c. D of A
- CTA(F), DEVB
- AD/P&D, DSD
- SE/CA, DSD
- STA, DSD
- SSO(Q)
- Acct. Sec.
- IOW/D4 (Mr. LEUNG Wing-nin) By fax 2984 1509
- Yick Hing site agent (Mr. James Law) By fax 2984 9703
- SE/DP5, E/D4 - to note in file only

我們的抱負是提供世界級的污水和雨水處理排放服務，以促進香港的可持續發展。

Our mission is to provide world-class wastewater and stormwater drainage services enabling the sustainable development of Hong Kong.





Drainage Services Department
Drainage Projects Division
44/F, Revenue Tower, 3 Gloucester Road,
Wan Chai, Hong Kong

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來函編號 Your Ref: DC/2006/11/1B/L1640
本署編號 Our Ref: DP/8/4128CD/DC06/11/
電話 Tel: (852) 2594 7400
傳真 Fax: (852) 2827 3710

Yick Hing Construction Company Limited
4/F, Ultragrace Commercial Building
5 Jordan Road
Kowloon, Hong Kong

Urgent by Fax (2787 4890)

23 December 2010

(Attn: Mr. Edward Yuen)

Dear Sirs,

Contract No. DC/2006/11
Drainage Improvement in Southern Lantau
and Construction of Mui Wo Village Sewerage Phase 1

Substantial Completion for Section 3 of the Works

In accordance with Clause 17 of the General Conditions of Contract, I hereby certify that
Section 3 of the Works was substantially completed on 31 October 2010.

Yours faithfully,

(CHAN Kin-kwong)

The Engineer

Drainage Projects Division
Drainage Services Department

- c.c. D of A
- CIA(F), DEVB
- AD/P&D, DSD
- SE/CA, DSD
- STA, DSD
- SSO(Q)
- Acct. Sec.
- IOW/D4 (Mr. LEUNG Wing-mui) E; fax 2984 1509
- Yick Hing site agent (Mr. Jeffrey LAU) E; fax 2984 5163
- SE/DP5, E/D4 -- to note in file only

- (f) Construction of about 350m drainage improvement works at Cheung Sha Sheung Tsuen and Lo Uk Tsuen, and about 85m flood wall at Pui O Ham Tin San Tsuen; and
- (g) the construction of peripheral drainage system associated with items (a) – (f) above;

Sewerage Works

- (h) Construction of approximately 3.3 kilometres gravity sewers of diameter ranging from 160mm to 400mm diameter at Tung Wan Tau, Chung Hau, Tai Tei Tong and Pak Ngan Heung.

Others

- (i) provisioning of hard and soft landscaping works to the above works;
- (j) the implementation of environmental mitigation measures;
- (k) reprovisioning of footpath and emergency vehicular access;
- (l) archaeological monitoring;
- (m) The construction of other ancillary works associated with items (a) to (l) above.

- (2) The Site is divided into the following Portions (the exact portioning of Site refers to the relevant contract Drawings):

-
- (a) Portion D1 – Area along Pak Ngan Heung River
 - (b) Portion D2 – Area at Ling Tsui Tau
 - (c) Portion D3 – Area at Ling Tsui Tau
 - (d) Portion D4 – Area along Tai Tei Tong River
 - (e) Portion D5 – Area at Luk Tei Tong
 - (f) Portion D6 – Area near Pui O River at Ham Tin San Tsuen
 - (g) Portion D7 – Area along South Lantau Road near Lo Uk Tsuen
 - (h) Portion D8 – Area near Cheung Sha Sheung Tsuen
 - (i) Portion D9 – *Part* of the emergency vehicular access (EVA) at Mui Wo as shown in Drawing No.

DDN/128CD2/1002

- (j) Portion S1 – Area in Chung Hau, Mui Wo
 - (k) Portion S2A – Area in Tai Tei Tong, Mui Wo
 - (l) Portion S2B – Area in Tai Tei Tong, Mui Wo
 - (m) Portion S3A – Area in Tung Wan Tau, Mui Wo
 - (n) Portion S3B – Area in Tung Wan Tau, Mui Wo
 - (o) Portion S4 – Area in Pak Ngan Heung, Mui Wo
 - (q) Portions WS-A and WS-B – Works Area A (i.e. WA5 plus WA7 as shown in Appendix 1.6) and Work Area B (i.e. WA3 as shown in Appendix 1.6)
- (3) During the course of the Contract, works may be carried out by others on the same Site including but not limited to the following:-
- (a) Watermain connection and diversion by Water Supplies Department. In particular, the watermains replacement works at Tai Tei Tong;
 - (b) Telephone and electricity supply diversion works;
 - (c) Public lighting works;
 - (d) Paving work within and in vicinity of Portion S3A and Portion S3B of the Site at Tung Wan Tau, Mui Wo by Civil Engineering and Development Department;
 - (e) Construction and diversion works by other utility undertakings; and
- The Contractor is required to provide attendance on these other contractors working concurrently on the Site as stipulated in the Contract Documents. The detailed requirement of such attendance shall be agreed by the Engineer.
- (4) The Contractor's attention is drawn in particular to the following in association with the above works:
- (a) The requirement for environmental control, mitigation and monitoring measures as stipulated in the PS Clauses;
 - (b) Waste management;
 - (c) Settlement monitoring for construction of embankment and the requirements for embankment filling according to monitoring results as stipulated in the PS Clauses;

- (d) Temporary works for excavation to form the embankment of the main drainage channels adjacent to existing structures and watercourses;
- (e) Requirements for water diversion and implementation of interim flood protection measures; and
- (f) Maintenance of existing flows of all rivers, drainage systems, nullahs, watercourses and village sewerage.

SECTIONS OF WORKS

Sections of Works

1.57

The Works shall be divided into the following Sections:

SECTION 1

(1) Completion of Section 1 of the Works means completion of the Works within Portions D2, D3 and D4 of the Site, including the landscape softworks, landscape hardworks but excluding establishment works.

SECTION 3

(2) Completion of Section 2 of the Works means completion of the Works within Portions D6, D7 and D8 of the Site, including the landscape softworks, landscape hardworks but excluding establishment works.

(3) Completion of Section 3 of the Works means completion of the main drainage improvement works including the drainage channels, box culverts, retaining walls, gabion walls and embankments within Portions D1 and D5 of the Site, excluding the landscaping works.

(4) Completion of Section 4 of the Works means completion of the remaining Works within Portions D1 and D5 of the Site, including the landscape softworks, landscape hardworks but excluding establishment works.

(5) Completion of Section 5 of the Works means completion of the Works within Portion S1 of the Site.

(6) Completion of Section 6 of the Works means completion of the Works within Portion S2A and Portion S2B of the Site.

(7) Completion of Section 7 of the Works means completion of the Works within Portions S3A and Portion S3B of the Site.

(8) Completion of Section 8 of the Works (Section subject to Excision) means completion of the Works within Portion S4 of the Site.

(9) Completion of Section 9 of the Works means completion of the preservation and protection of existing trees, pursuant to GS/PS Section 26.

Appendix B

**Specific Conditions in Particular Specification and
Environmental Monitoring and Audit Manual**

more frequent monitoring as specified in the Event and Action Plan in the EM&A Manual shall be carried out. This additional monitoring shall be continued until the recorded levels are rectified or proved to be irrelevant to the construction activities.

- (3) The ET shall conduct noise monitoring in accordance with the EM&A Manual at the designated monitoring stations on weekly basis when noise generating activities are underway.
- (4) The ET shall conduct water quality monitoring in accordance with the EM&A Manual at the designated monitoring stations three days per week during the course of construction works.
- (5) The ET shall carry out a specific monitoring of improved sections of Pak Ngan Heung and Luk Tei Tong Rivers on a monthly basis to provide data on the aquatic/riparian communities in the channels during the construction phase, in accordance with procedures and requirements as stipulated in the EM&A Manual.
- (6) The ET shall carry out a specific monitoring of the White-shouldered Starlings at disused Watchtowers on monthly basis during construction phase in accordance with the procedures and requirements as stipulated in the EM&A Manual.
- (7) The ET shall carry out specific vibration monitoring of the existing retaining wall and associated structures of the Yuen Compound during the construction of rubble seawall and retaining wall at the Luk Tei Tong River. Archaeological watching brief shall be carried out during excavation works of the proposed U-channel at Ling Tsui Tau Village. The detailed monitoring requirements are stipulated in PS clauses 25.37 and 25.38.

*Environmental
monitoring –
post-construction
phase monitoring*

25.32E (8)

Upon completion of construction works of the rivers, the Contractor shall conduct a post-construction water quality monitoring for four weeks in the same manner as the impact monitoring to confirm the restoration of ambient water quality in the rivers.

(9)

A specific ecological monitoring programme of improved sections of Pak Ngan Heung and Luk Tei Tong Rivers shall be conducted every two months for a period of 1 year to provide data on the re-establishment of aquatic/riparian communities in the channels, and allow an assessment of the relative success of mitigation measures to be made. Ecological

monitoring of the Luk Tei Tong Bypass Channel and along a strip of existing marsh habitat adjacent to the Channel alignment (i.e. as Reference Site) shall also be conducted 6 times a year for 1 year after the completion of the construction works to confirm that the proposed Channel design has provided suitable compensation for impacts to Luk Tei Tong Marsh. The monitoring shall be made in accordance with the procedures and requirements as stipulated in the EM&A Manual. If the post-construction phase monitoring demonstrates that re-colonization is unsuccessful, the Contractor shall implement the contingency plan in accordance with the EM&A Manual at his own cost.

- | | | | |
|---|--------|-----|---|
| <i>Environmental audit – legal and contractual requirements</i> | 25.32F | (1) | The Contractor shall comply with all contractual and legal requirements for environmental and pollution control. The Contractor shall submit construction method statements to ET Leader for review if sufficient provision of environmental protection and mitigation measures has been included. |
| <i>Reporting of EM&A</i> | 25.35 | (1) | The ET shall be responsible for preparing monthly EM&A Report for submission to the Contractor, Engineer, IEC and EPD. The EM&A Report shall be in a format agreed by the Engineer and meet the requirements as set out in the EP and EM&A Manual, as detailed in PS Appendices 25.1 and 25.2. |
| | | (2) | The Contractor shall, within 6 weeks after the commencement of construction of the Works, set up a dedicated Internet web site and notify EPD in writing the Internet address where the environmental monitoring data and project information is to be placed. All environmental monitoring data described in Condition 5.1 of the EP shall be made available to the public via the abovementioned dedicated Internet web site in the shortest possible time and in any event no later than 2 weeks after the relevant environmental monitoring data are collected or become available, unless otherwise agreed with EPD. |
| <i>Environmental Permit</i> | 25.36 | (1) | The proposed works at Pak Ngan Heung River, Ling Tsui Tau, Tai Tei Tong River, Luk Tei Tong River and Luk Tei Tong (2) By-pass River is classified as a Designated Project under the Environmental Impact Assessment Ordinance (Cap.499) (EIAO). Its construction and operation shall be governed by an Environmental Permit (EP) issued by Environmental Protection Department (EPD). The Contractor shall |

- 4.6.3 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IC(E) and EPD on an appropriate set of data to be used as baseline reference.
- 4.6.4 Baseline monitoring schedule shall be faxed to EPD one week prior to the commencement of baseline monitoring.
- 4.7 **Impact Monitoring**
- 4.7.1 During the course of the construction works, impact monitoring shall be undertaken three days per week, at ebb tides, with sampling / measurement at the designated monitoring stations. Upon completion of the construction works, the monitoring exercise at the designated monitoring locations shall be continued for four weeks in the same manner as the impact monitoring.
- 4.7.2 Two consecutive measurements of DO concentration, DO saturation and turbidity will be taken at mid-depth at each location. The monitoring probes shall be retrieved out of water after the first measurement and then redeployed for the second measurement. Where the difference in value between the first and second readings of DO or turbidity is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken. Water samples for SS measurement shall be collected at the same mid-depth.
- 4.7.3 The water quality monitoring schedule shall be faxed to EPD on or before the first day of the monitoring month. EPD shall be notified immediately of any changes in schedule by fax.
- 4.8 **Event and Action Plan for Water Quality**
- 4.8.1 The water quality criteria, namely Action and Limit levels, are shown in Table 4.1. These criteria should be applied to ensure that any deterioration of water quality is readily detected and timely action is taken to rectify the situation. Should the monitoring results of the water quality parameters at any designated monitoring station exceed the water quality criteria, the actions in accordance with the Event and Action Plan in Table 4.2 shall be carried out.

Table 4.1 Action and Limit Levels for Water Quality

Parameters	Action	Limit
DO in mg/L (mid-depth)	5 %-ile of baseline data	4 mg/L
SS in mg/L (mid-depth)	95 %-ile of baseline data or 120% of control station's SS on the same day of measurement	99 %-ile of baseline or 130% of control station's SS on the same day of measurement
Turbidity in NTU (mid-depth)	95 %-ile of baseline data or 120% of control station's turbidity on the same day of measurement	99 %-ile of baseline or 130% of control station's turbidity on the same day of measurement

- Notes: 1. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
2. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

