**Drainage Service Department**

**Monthly Environmental Monitoring & Auditing report for**

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

**March 2012**

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**APPROVAL SHEET**

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# EXECUTIVE SUMMARY

This is the thirteenth monthly Environmental Monitoring and Audit (EM&A) Report for the drainage improvement works in Shuen Wan, Tai Po under Drainage Services Department Contract No. DC/2009/22 entitled "Drainage Improvement Works in Shuen Wan, Tai Po – Contract 1". This report concludes the impact monitoring for the activities undertaken during the period from 1st of March 2012 to 31st March 2012. The major site activities in this reporting period were mainly pumping station construction, Construction for the proposed transformer Room & Switchroom, Excavation for the proposed flow meter chamber, Excavation for the proposed DN2100 Storm drain and Concreting for the proposed intake structure up to +4.12mPD.

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

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

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

Furthermore, impact monitoring for water quality was conducted. Total 10 abnormal incidents of water quality criteria were recorded in this reporting month. It was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and no particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total suspended solid were believed to be mainly attributed by high water flow rate. The exceedance of DO were believed to be mainly attributed by natural fluctuation; , since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

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

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

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

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

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

It is expected that noise, air and water quality impacts will be resulted from the works. ET has reminded the contractor to provide environmental pollution control measures wherever necessary and to keep a good environmental management at site practice. The recommended mitigation measures proposed for the project as well as implementation status are refer to section 12.3.

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

# 1 Introduction

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

This report presents the results of the environmental monitoring of the project activities conducted within the reporting period from 1st March 2012 to 31st March 2012. This included the noise monitoring, water quality monitoring, hydrological characteristics monitoring, ecological monitoring, visual and landscape monitoring, and regular site inspections once per week for verification of implementation of the mitigation measures as recommended in the Environmental Permit (EP-303/2008) (EP), EM&A Manual (revision 3) and the Contractor's Environmental Management Plan (EMP).

# 2 Construction Stage

## 2.1 Construction activities in the reporting period

Major activities in the reporting period included the followings:

Area A – Construction for the proposed Transformer Room & Switchroom.
Area A – Concreting for the proposed Transformer Room & Switchroom up to +3.95mPD.
Area A – Installation of Void former for the proposed Transformer Room & Switchroom.
Area A – Excavation for the proposed flow meter chamber.
Area A – Laying of blinding layer.
Area A – Excavation for the proposed DN2100 Storm drain.
Area A – Installation of first and second layer of waling for the proposed DN2100 trench.
Area A – Grouting for the proposed concrete structure at the mouth of Wai Ha River.
Area A – Concreting for the proposed intake structure up to +4.12mPD.
Area B – Installation of sheetpiles for Bay 6 & 5.
Area B – Excavation for Bay 6 & 5.
Area B – Installation of first layer of waling for Bay 6 & 5.
Area C – In Maintenance Period.

## 2.2 Construction activities for the coming month

Proposed key construction works in the coming month will include:

Area A (Pumping Station)

1. Erection formwork and falsework for the proposed Stormwater Pumping Station up to +11.85mPD top slab.
2. Steel reinforcement bars fixing for the proposed Stormwater Pumping Station up to +11.85PD top slab.
3. Construction for flow meter chamber.
4. Construction for ground beam for man make slope.
5. Construction discharge chamber for the proposed Stormwater Pumping Station.
6. Installation of multi-part cover and backfilling for desilting chamber.
7. Construction of DN2100 along Ting Kok Road (CH120 to 160)

8. Construction of the proposed intake structure.

Area B (Tung Tsz Nursery)

1. Excavation for the construction of box culvert in Tung Tsz Nursery
2. Construction of box culvert bay 6 and 5
3. Erection of hoarding for stage 2.

Area C (HCA)

1. In Maintenance Period

## 2.3 Environmental Status

Appendix A shows the drawing of the project area.

Locations of the monitoring and control stations with environmental sensitive receivers are presented in Section 3.3, 4.3, and 5.3 for noise, water quality, and hydrological characteristics respectively.

# 3 Noise Monitoring

## 3.1 Monitoring Parameters and Methodology

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

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

In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action plan in Table 3.5.2, shall be carried out. This additional monitoring shall be carried out until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

## 3.2 Monitoring Equipment

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

Noise measurement was not be made in the presence of fog, rain, wind with a steady speed exceeding $5ms^{-1}$ or wind with gust exceeding $10ms^{-1}$. Thus wind speed was checked by the portable wind speed indicator capable of measuring the wind speed in m/s. Table 3.2.1 summarizes the equipment list for noise monitoring

Table 3.2.1 Equipment List for Noise Monitoring

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

## 3.3 Monitoring Locations

According to the Environmental Monitoring and Audit manual, impact noise monitoring for contract 1 was undertaken at two locations during the construction phase of the project. The proposed monitoring locations are summarized in Table 3.3.1. Figure 3.3.1 shows the Noise Monitoring Locations

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

Table 3.3.1 Noise Monitoring Locations during Construction Phase

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

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

monitoring that comprises 3 consecutive $L_{eq\ (5minutes)}$ would be carried out.

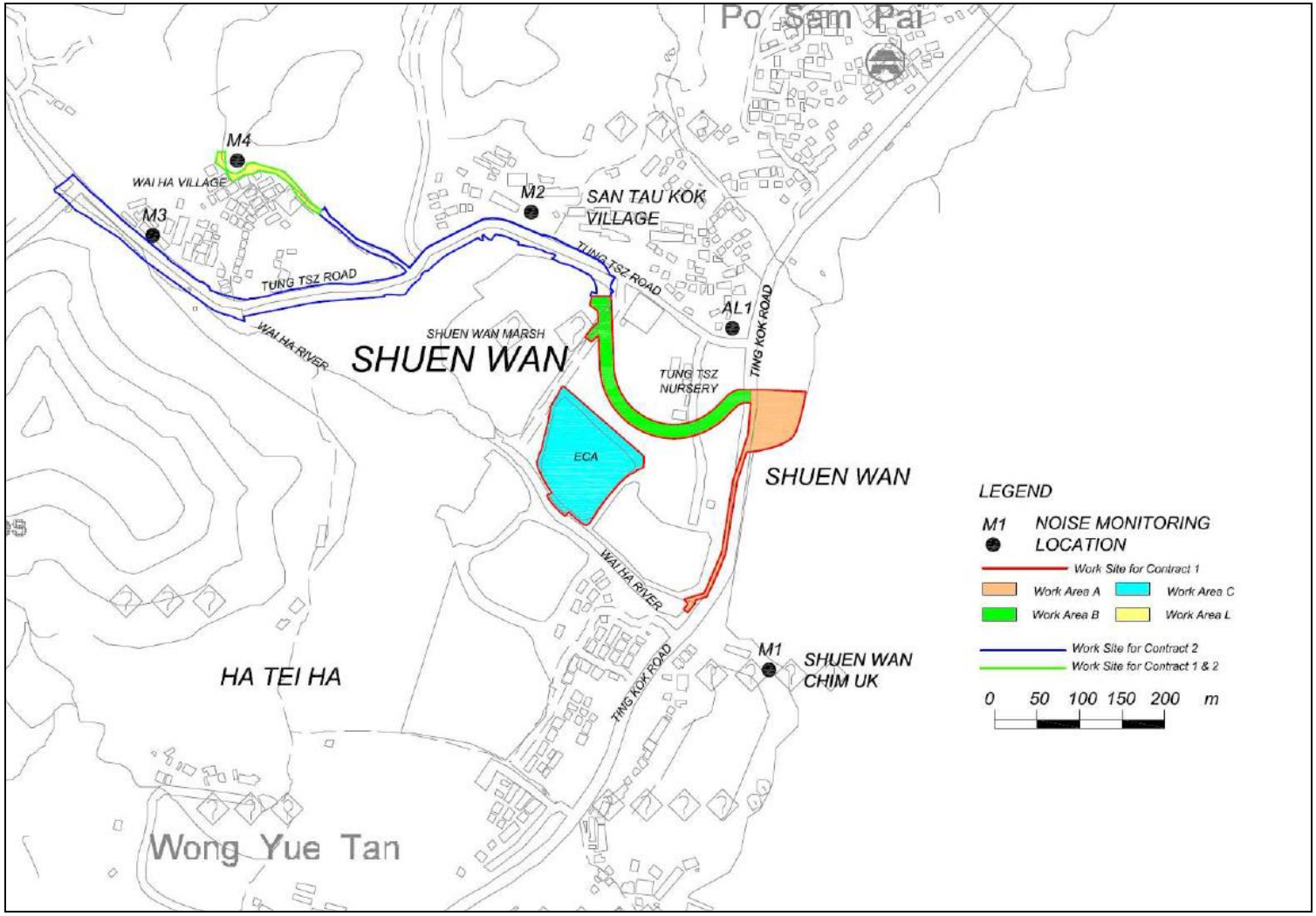


Figure 3.3.1 Impact noise monitoring locations

## 3.4 Monitoring Results and Interpretation

Relevant details of the noise monitoring results are presented in Table 3.4.1. The results of M1, ranged between 51.4dB (A) and 59.8dB (A), and AL1, ranged between 54.6dB (A) and 63.5dB (A), were within the limit levels and therefore, no exceedance was found.

Table 3.4.1 Noise Monitoring Results for the reporting period

| Location | Parameter | Date* | Time | $L_{Aeq}$ dB(A) | Limit dB(A) | Exceedance | Weather |
|---|---|---|---|---|---|---|---|
| M1 | $L_{eq\ 30mins}$ | 7-Mar-12 | 13:20 | 51.4 | 75 | N | Cloudy |
| M1 | $L_{eq\ 30mins}$ | 14-Mar-12 | 11:45 | 52.7 | 75 | N | Cloudy |
| M1 | $L_{eq\ 30mins}$ | 21-Mar-12 | 12:25 | 59.8 | 75 | N | Cloudy |
| M1 | $L_{eq\ 30mins}$ | 28-Mar-12 | 13:20 | 59.0 | 75 | N | Cloudy |
| AL1 | $L_{eq\ 30mins}$ | 7-Mar-12 | 13:58 | 56.3 | 75 | N | Cloudy |
| AL1 | $L_{eq\ 30mins}$ | 14-Mar-12 | 12:23 | 54.6 | 75 | N | Cloudy |
| AL1 | $L_{eq\ 30mins}$ | 21-Mar-12 | 13:04 | 54.9 | 75 | N | Cloudy |
| AL1 | $L_{eq\ 30mins}$ | 28-Mar-12 | 12:46 | 63.5 | 75 | N | Cloudy |

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

## 3.5 Action and Limit level for Construction noise

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

There was no exceedance recorded in the reporting period.

Table 3.5.1 Action and Limit Levels for Construction noise

| Time Period | Action Level | Limit Level |
|---|---|---|
| 0700 – 1900 hours on normal weekdays | When one documented complaint is received | 75dB(A) |
| Remarks: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed. | | |

### 3.6 Monitoring Schedule for the next reporting period

Noise monitoring schedule is proposed to be carried out on 2nd, 12th , 18th and 25th of April 2012.

Table 3.5.2 Event / Action Plan for Construction Noise

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

| | | | | |
|---|---|---|---|---|
| Limit Level | 1. Notify IEC, ER, EPD and Contractor.<br>2. Identify source.<br>3. Repeat measurements to confirm findings.<br>4. Increase monitoring frequency.<br>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented.<br>6. Inform IEC, ER and EPD the causes and actions taken for the exceedances.<br>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.<br>8. If exceedance stops, cease additional monitoring. | 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions.<br>2. Review Contractor's' remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly.<br>3. Supervise the implementation of remedial measures. | 1. Confirm receipt of notification of<br>2. Notify Contractor.<br>3. Require Contractor<br>4. Check remedial measures properly implemented.<br>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. | 1. Take immediate action to avoid f urther exceedance.<br>2. Submit proposals for remedial actions to IEC within 3 working days of notification.<br>3. Implement the agreed proposals.<br>4. Resubmit proposals if problem still not under control.<br>5. Stop the relevant portion of works as determined by the ER until the exceedance is abated. |

# 4 Water Monitoring

## 4.1 Water Quality Monitoring Parameters and methodology

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

## 4.2 Monitoring Equipment

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

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

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

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

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

## 4.3 Monitoring Locations

In accordance with the EM&A Manual (revision 3), monitoring stations for contract 1 were established at two locations, which are summarized in Table 4.3.1.

**Table 4.3.1 – Water Quality Monitoring Stations**

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

As illustrated in Figure 4.3.1, W1 served as the control station while W2 was the monitoring location of water quality.

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

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

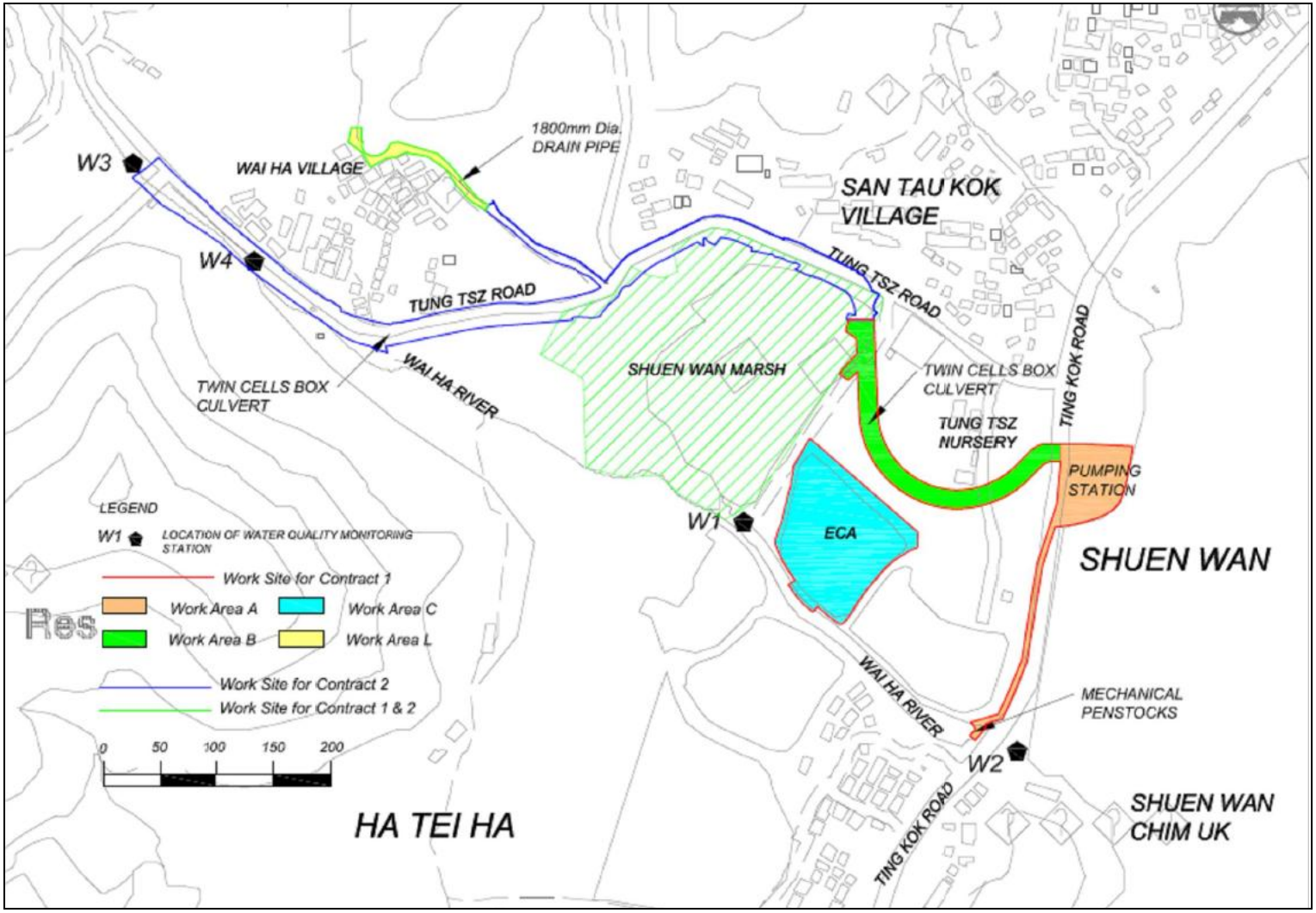


Figure 4.3.1 Water Quality Monitoring Locations

## 4.4 Monitoring Frequency

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

Monitoring were carried out on 2nd, 5th, 7th, 9th, 12th, 14th, 16th, 19th, 21st, 23rd, 26th, 28th and 30th of March 2012.

## 4.5 Monitoring Results and Interpretation

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

There were 10 abnormal incidents of water quality limits (Dissolved Oxygen, Suspended Solid and Turbidity) were recorded in this reporting month according to the established action and limit levels. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and No particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total suspended solid were believed to be mainly attributed by high water flow rate. The exceedance of DO were believed to be mainly attributed by natural fluctuation; , since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.
The water condition of Wai Ha River is presented in photo attached in Appendix N**.**

Details information of these incidents was presented in Section 8

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

| | **Average of Monitoring Results** | | | | | |
|---|---|---|---|---|---|---|
| | *Temperature (°C)* | *Turbidity (NTU)* | *pH* | *Dissolved Oxygen (mg/L)* | *Dissolved Oxygen (%)* | *Suspended Solids (mg/L)* |
| W1 | 18.15 | 3.6 | 7.63 | 7.38 | 75.00 | 2.78 |
| W2 | 18.08 | 9.2 | 7.79 | 7.33 | 74.00 | 7.22 |

Table 4.5.2 Interpretations of abnormal incidents recorded in the reporting month

| **Date** | **Tide** | **Parameter** | **Interpretations** |
|---|---|---|---|
| 2/3/2012 | Flood | Turbidity<br>DO | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 5/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 7/3/2012 | Ebb | Turbidty | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 9/3/2012 | Ebb | Turbidity<br>Suspended Solids | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 14/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 16/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 19/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 21/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 26/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |
| 30/3/2012 | Ebb | Turbidity | Incident was regarded as high river flow rate since river redirected and narrowed was observed. |

Table 4.5.3 Construction work conducted during abnormal incidents period

| Date | Area | Construction works conducted |
|---|---|---|
| 2/3/2012 | A | Stripping of formwork from walls W1, W2, W3, & W8<br>Patching up tie holes on exterior side of wall W5<br>Cement Grouting for between frame of stoplog SL-06D and concrete face face Outlet Structure<br>Stripping off formwork from grouting of frame of stoplogs SL-06C and of penstock SG-stripping off formwork from base slab of Intake Structure |
| | B | Bay 5 – Excavating trench along shoring line of box culvert trench to remove boulders<br>Cleaning up sediments at wheel washing bay |
| | C | In maintenance period |
| 5/3/2012 | A | Patching up tie bolt holes at exterior side of walls W6~W8 (3M/Lab.P.M.)<br>Stripping off formwork from slab opening at +3.5 and +5.15 mPD<br>Backfilling and compacting of soil to formation level of ground beams CB19 & CB21<br>Cutting and bending reinforcement bars for ground beams of Transformer Roon and Switchroom<br>Excavating for 2100∅ pipe trench at Ch.155~160 to +3.7mPD and erecting temporary fencing<br>Manhole survey of FMH1023921<br>Cleaning up works area and breaking up concrete wall of cofferdam inside existing box culvert for Outlet Structure (3 M/Lab. A.M.) |
| | B | Bay 6 – Excavating for box culvert trench at Ch.75~80 down to +1.8mPD<br>Cart away excavated materials to pump station , Area A (12 Truckloads)<br>Bay 5 – Driving sheet piles for shoring of box culvert trench |
| | C | In maintenance period |
| 7/3/2012 | A | Backfilling and compacting to soil formation of ground beams (CB13 & CB15) for Transformer Room<br>Fixing rebars for culunms (CC2, CC2A, CC2B & CC3) at + 5.15 mPD slab<br>Cutting and bending reinforcement bars for columns<br>Backfilling against Walls W4 & W6<br>Excavating for 2100 ∅ pipe trench at Ch.148~151 to +3.7 mPD |

| | | |
|---|---|---|
| | | Fabricating top layer of I-beam walings & Struts for 2100 Ø pipe trench at Ch. 151~160<br>Cart away excavated soil to pump station, Area A (13 Truckloads) |
| | B | General housekeeping |
| | C | In maintenance period |
| 9/3/2012 | A | Backfilling and compacting to soil formation of ground beams (CB14 & CB 16) for Transformer Room<br>Cutting and bending reinforcement bars for ground beams of Transformer Roon and Switchroom<br>Scabbling C.J. for ground beams of Transformer Room and Switchroon connect to walls W6 ~ W8<br>Shuttering for columns CC2 & CC2A (+5.15 &9.05mPD)<br>Excavating for 2100 2100 Ø pipe trench at Ch. 140~143 to 3.7mPD<br>Fabricating top layer of I-beam for shoring of 2100 Ø pipe trench at Ch. 143 ~151<br>Backfilling of sand between sheetpile cofferdam and base slab of Intake Structure, 0~0.5 mPD<br>Breaking up concrete wall of cofferdam for Outlet Structure |
| | B | No activity |
| | C | In maintenance period |
| 14/3/2012 | A | Cutting and bending reinforcement bars for slab and columns of Transformer Room and Switchroom<br>Fixing rebars for ground beams CB03, CB13~CB16 & CB11 of Transformer roon<br>P01 – Setting up the drilling rig and drilling of proof drill hole P01 (+2.35 ~ - 5.65mPD)<br>Fabricating temporary working platform at Ch. 140~150 of 2100 Ø pipe trench<br>Formwork shuttering for interior side of walls of Intake Structure<br>Installing and welding of temporary bar screen at inlet of Outlet Structure |
| | B | No activity |
| | C | In maintenance period |
| 16/3/2012 | A | Drilling and sampling of proof drill P01 (-33.82~-43.07 mPD)<br>Fixing rebars for +5.15 mPD slab and for walls of Switchroom & Switchroom<br>Formwork shuttering for soffit of roof beams RB2 & RB15 for |

| | | |
|---|---|---|
| | | Switchroom<br>Formation shuttering for walls (+ 3.95~5.15mPD) of Transformer Room & Switchroom<br>Dismantling the falsework and stripping off soffit formwork from beams & top slab between walls W2 & W8<br>Patching up tie bolt holes on walls (W2, W3 & W4) between +3.5 and +5.15 mPD)<br>Backfilling against wall W2 & W3.<br>Excavating for 2100 Ø pipe trench at Ch. 132~134 to +3.7mPD<br>Excavating for 2100 Ø pipe trench at Ch. 148~150 to – 0.3mPD<br>Fabricating main beams of steel decking for 2100 Ø pipe trench at Ch. 137~143<br>Carting away excavated soil to pump station, Area A (11 Truckloads)<br>Cutting and bending reinforcement bars for wall and top slab of Intake Structure at pump station |
| | B | Bay 5 – Excavating trench along shoring line at Ch. 53~60 of box culvert trench to remove boulders |
| | C | In maintenance period |
| 19/3/2012 | A | Dismantling rebars of +5.15 mPD floor slab at Switchroom for falsework erection<br>Fixing rebars for bearing walls (+3.95~+5.15 mPD) at Transformer Room & Switchroom<br>Backfilling against wall W4<br>Proof Drilling p02 – Drilling and sampling ( - 5.00~-31.77 mPD)<br>Excavating for 2100 Ø pipe trench at Ch.128~130 to +3.7 mPD<br>Excavating for 2100 Ø pipe at Ch. 155~158 to -0.5 mPD<br>Fabricating steel supports for existing Ø 300 D1 watermain at Ch. 124~130 and top layer of walings for shoring at Ch. 132~137 inside 2100 Ø pipe trench<br>Carting away excavated soil to pump station, Area A (10 Truckloads)<br>Cutting and bending reinforcement bars for walls and top slab of Intake Structure at pump station bending yard<br>Fixing rebars for walls of Intake Struture<br>Formwork shuttering for stplogs (SL07A, SL07C & SL07D) and access opening on top slab of Intake Strcutre |
| | B | General housekeeping |
| | C | In maintenance period |

| | | |
|---|---|---|
| 21/3/2012 | A | Concreting for ground beams and +3.95 mPD base slab of Transformer Room and Switchroom (Total: 182.3 cuM)<br>Erecting falsework at Screen House for roof slab construction<br>Laying concealed conduits on wall formwork of Switchroom and Screen House<br>Proof Drill P02 – Cement grouting for drill hole<br>Excavating for 2100 Ø pipe trench at Ch. 120~124 to +3.7mPD\<br>Fabricating for top layer of I-beam waling at Ch. 124~132 and for imtermediate layer of waling at Ch. 154~160 of 2100 Ø pipe shoring |
| | B | No activities |
| | C | In maintenance period |
| 26/3/2012 | A | Formwork shuttering for bearing wall at base slab of Transformer Room (1-M/Labourer, 1-Carpenter, A.M. only)<br>Fixing Styrofoam on base slab as formwork for + 5.15 mPD floor slab of Switchroom<br>Laying of G.I concealed conduits on wall of Switchroom and Screen house<br>Erecting temporary fencing at Ch. 120~145 of 2100 Ø pipe trench<br>Fabricating immediate layer of waling and struts at Ch. 148~154 for shoring of 2100 Ø pipe trench<br>Excavating for 2100 Ø pipe trench at Ch. 140~145 to -0.3 mPD<br>Cart away excavated materials to pump station, Area A (6 Truckloads) (1 Driver + 1 Dump Truck, p.m. only)<br>Shuttering for exterior side of wall formwork for Intake Structure |
| | B | General housekeeping |
| | C | In maintenance period |
| 30/3/2012 | A | Fixing Styrofoam on base slab as formwork of +5.15 mPD floor slab for transformer Room<br>Erecting scaffolding and shuttering for soffit of roof and beams (RB06, RB15, RB17 & RB32) of Screen House<br>Fabricating immediate layer of I-beam waling & struts at Ch. 130~134 for shoring of 2100 Ø pipe trench<br>Excavating for 2100 Ø pipe trench at Ch. 148~152 to formation level<br>Pre-pour cleaning for walls & top slab of Intake Structure ( 2M/labourers, p.m. only) |
| | B | Bay 6 – Excavating for box culvert trench at Ch. 54~65 down to +1.8 mPD |

| | | |
|---|---|---|
| | C | In maintenance period |

## 4.6 Action and limit level for Water Quality

Based on the criteria stipulated in EM&A manual (revision 3) and baseline water quality monitoring data obtained, the A/L levels are shown in Table 4.6.1, Table 4.6.2. The A/L levels for W1 were ignored since W1 functions as the control station for contract 1. If the water quality monitoring results at any impact stations exceeded the criteria, the actions in accordance with the Event and Action Plan in Table 4.6.3 should be taken.

Table 4.6.1 Action and Limit Levels for Water Quality at All Monitoring Stations

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

Table 4.6.2 Action and Limit Levels for Water Quality at All Monitoring Stations

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

Remarks:

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

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

Table 4.6.3 Event and action Plan for Water Quality

| Event | ET Leader | IEC | ER | Contractor |
|---|---|---|---|---|
| **ACTION LEVEL** | | | | |
| Action level being exceeded by one sampling day | 1. Repeat in-situ measurements to confirm findings;<br>2. Identify reasons for non-compliance and source(s) of impact;<br>3. Inform IEC, Contractor and Engineer;<br>4. Check monitoring data, all plant, equipment and Contractor's working methods;<br>5. Discuss mitigation measures with IEC, Engineer and Contractor;<br>6. Ensure mitigation measures are implemented.<br>7. Repeat measurement on next day of exceedance. | 1. Discuss mitigation measures with ET, Engineer and Contractor;<br>2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly;<br>3. Assess effectiveness of implemented mitigation measures. | 1. Discuss proposed mitigation measures with IEC, ET and Contractor;<br>2. Make agreement on mitigation measures to be implemented;<br>3. Assess effectiveness of implemented mitigation measures. | 1. Inform Engineer and confirm in writing notification of the non-compliance;<br>2. Rectify unacceptable practice;<br>3. Check all plant and equipment;<br>4. Consider changes in working methods;<br>5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days;<br>6. Implement agreed mitigation measures. |

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

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

| | | | | |
|---|---|---|---|---|
| | Engineer and Contractor;<br>6. Ensure mitigation measures are implemented.<br>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. | implemented mitigation measures. | be implemented;<br>4. Assess effectiveness of implemented mitigation measures;<br>5. Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level. | mitigation measures to IEC and Engineer within three working days;<br>6. Implement agreed mitigation measures;<br>7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level. |

## 4.7 Monitoring Schedule for the next reporting period

Water quality monitoring schedule is proposed to be carried out on 2nd, 5th, 10th, 8th, 10th, 12th, 14th, 16th, 18th, 20th, 24th, 23rd, 25th, 27th and 30st of April 2012.

# 5 Hydrological Characteristics Monitoring

## 5.1 Hydrological Characteristics Monitoring Parameters and methodology

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

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

## 5.2 Monitoring Equipment

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

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

## 5.3 Monitoring Locations

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

**Table 5.3.1 – Water Quality Monitoring Stations**

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

As illustrated in Figure 5.3.1, H2 served as the control station while H1 was the monitoring location of hydrological characteristics.

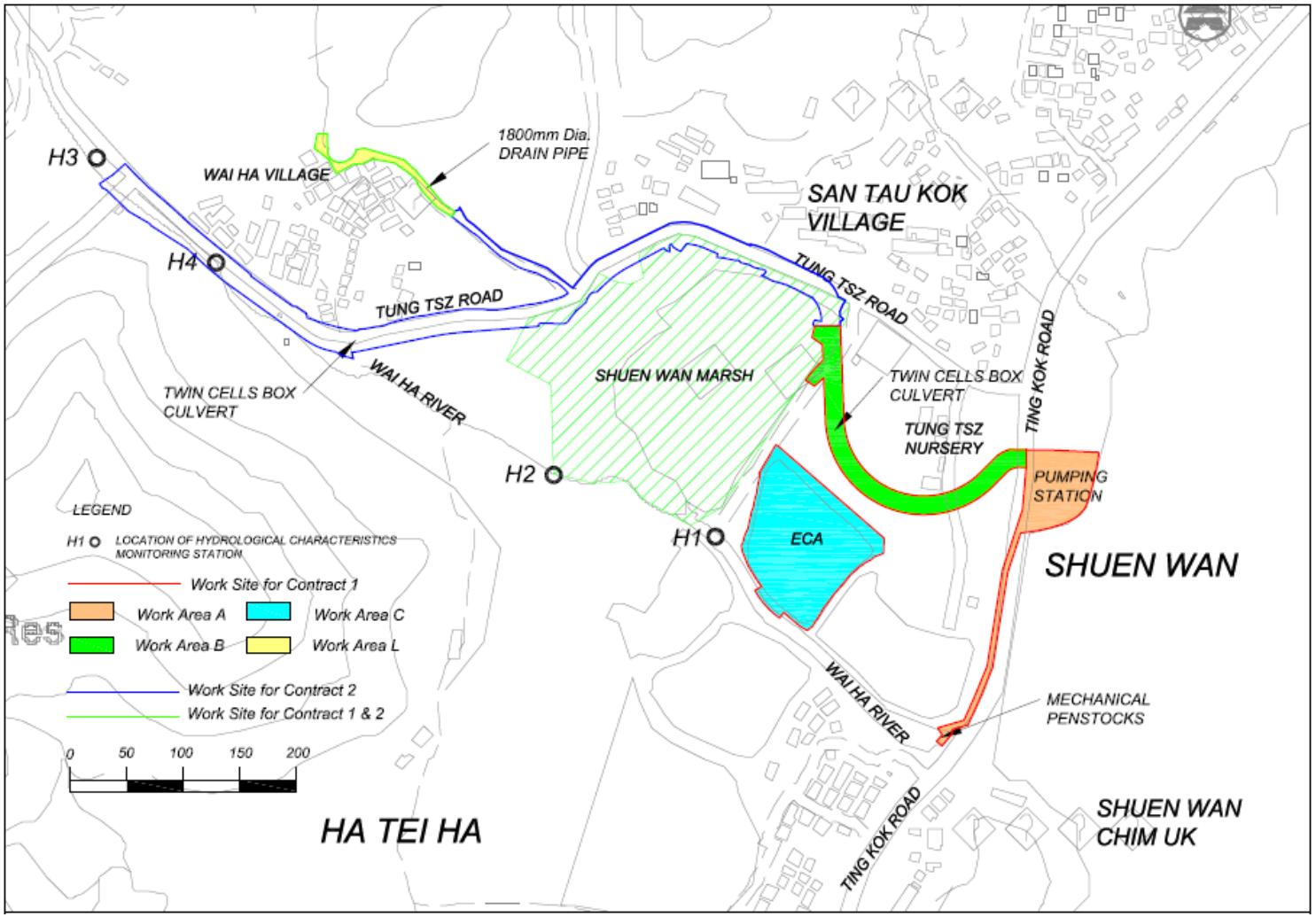


Figure 5.3.1 Hydrological Characteristics Monitoring Locations

## 5.4 Monitoring Frequency

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

Monitoring was carried out on 2nd, 9th, 16th, 23rd and 30th of March 2012.

## 5.5 Monitoring Results and Interpretation

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

Table 5.5 Summary of Water Quality Monitoring Results

| | **Average of Monitoring Results** | |
|---|---|---|
| | Water Depth (m) | Water Flow Rate ($m^3/s$) |
| H1 | ~0.45* | 0.10 |
| H2 | ~0.16* | 0.46 |

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

Details of the monitoring data were presented in Appendix F.

## 5.6 Action and limit level for Hydrological Characteristics

The Action and Limit levels for all monitoring stations are summarized in Table 5.6.1, which would be applied for compliance assessment of hydrological characteristics for this project. If the hydrological characteristics monitoring results at any impact stations exceeded the criteria, the actions in accordance with the Event and Action Plan in Table 5.6.2 should be taken.

Table 5.6.1 Action and Limit Levels for Hydrological Characteristics at All Monitoring Stations

| **Parameters** | **Action** | **Limit** |
|---|---|---|
| Water Depth at Mid-flood (m) | 0.08 | 0.06 |
| Water Depth at Mid-ebb (m) | 0.08 | 0.06 |
| Water Flow Rate ($m^3/s$) | 120% of control station's water flow rate on the same day of measurement | 140% of control station's water flow rate on the same day of measurement |

Table 5.6.2 Event and action Plan for Hydrological Characteristics

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

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

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

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

## 5.7 Monitoring Schedule for the next reporting period

Hydrological characteristics monitoring schedule is proposed to be carried out on 5th, 14th, 20th and 27th of April 2012.

# 6 Ecological Monitoring of ECA

## 6.1 Introduction

The Ecological Monitoring of the Ecological Compensatory Area (ECA) of the Project is conducted to fulfill Clauses 5.2 and 5.4 of EP-303/2008 and the monitoring requirements in accordance with Section 6 of the approved updated EM&A Manual (approved by EPD on 7th November 2011) and the approved updated Habitat Creation Plan (HCP) (approved by EPD on 8th December 2011) of the Project.

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

## 6.2 Ecological Monitoring of ECA

### 6.2.1 Scope of Monitoring

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

During the construction phase of the ECA, monthly monitoring of vegetation health (including the planted, retained and transplanted trees and shrubs, and the proposed planting) and weekly site inspections should be undertaken. Monthly

monitoring of in situ water quality will be carried out once the ECA is filled with water from the nearby Wai Ha River.

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

### 6.2.2 Monitoring Methodology during the construction phase

*Monitoring of vegetation health*

Monthly monitoring of the health condition of the retained and transplanted trees and vegetation will be conducted. Following planting of vegetation in the ECA, monitoring of the growth and health conditions of the planted vegetation in the created habitats (i.e. brackish marsh, mangrove, woodland areas of planted trees and shrubs, and wooded areas with retained and (trans)planted trees) within the ECA is to be conducted during the construction and establishment phases. General health and growth status of the retained trees within the ECA are recorded and recommendation of appropriate tree care will be made to the maintenance party

All planted, retained and transplanted trees and shrubs will be surveyed to update their growth and health status. Any signs of pests and/ or poor growth of

planted, retained and transplanted trees and shrubs will be recorded. Appropriate treatment or removal of pests will be implemented if necessary. Supplemental planting will be arranged if needed.

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

*Monitoring of water quality*

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

management measures.

*Site inspection*

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

### 6.2.3 Monitoring Methodology during the establishment phase

*Monitoring of vegetation health*

Same monitoring methodology as in Section 7.2.2.

*Monitoring of water quality*

Same monitoring methodology as in Section 7.2.2.

*Site inspection*

Site inspection during the establishment phase of the ECA will be conducted twice per month for monitoring the health and condition of the wetland during the establishment period. Any unsatisfied health and habitat criteria of the wetland will be identified and remedial action should be recommended.

Twice monthly establishment phase monitoring has been commenced in November 2011.

*Monitoring of habitat types and vegetation cover*

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

*Monitoring of intertidal fauna*

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

*Monitoring of other fauna*

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

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

### 6.2.4 Monitoring time and weather condition

Site inspection and monitoring of vegetation, fauna groups and water quality should be carried out during day-time with calm weather. Monitoring of birds should commence within one hour of sunrise, when is the peak activity period for birds. Other fauna groups shall be undertaken during the warmer part of the monitoring day.

## 6.3 Monitoring Results

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

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

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

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

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

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

### 6.3.2 Description of vegetations and remarks

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

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

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

The trees transplanted from works area under Contract 1 and 2 to ECA, including 13 *Bombax ceiba,* 2 *Melaleuca quinquenervia* and 1 *Celtis sinensis*, were in fair condition since the transplantation in June, except for Celtis sinensis (Appendix L (B)). However, *Celtis sinensis* (T 250) is in poor condition with injured bark & dehydrated crown. Replacement of this tree is suggested if the condition of the tree can no longer be improved.

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

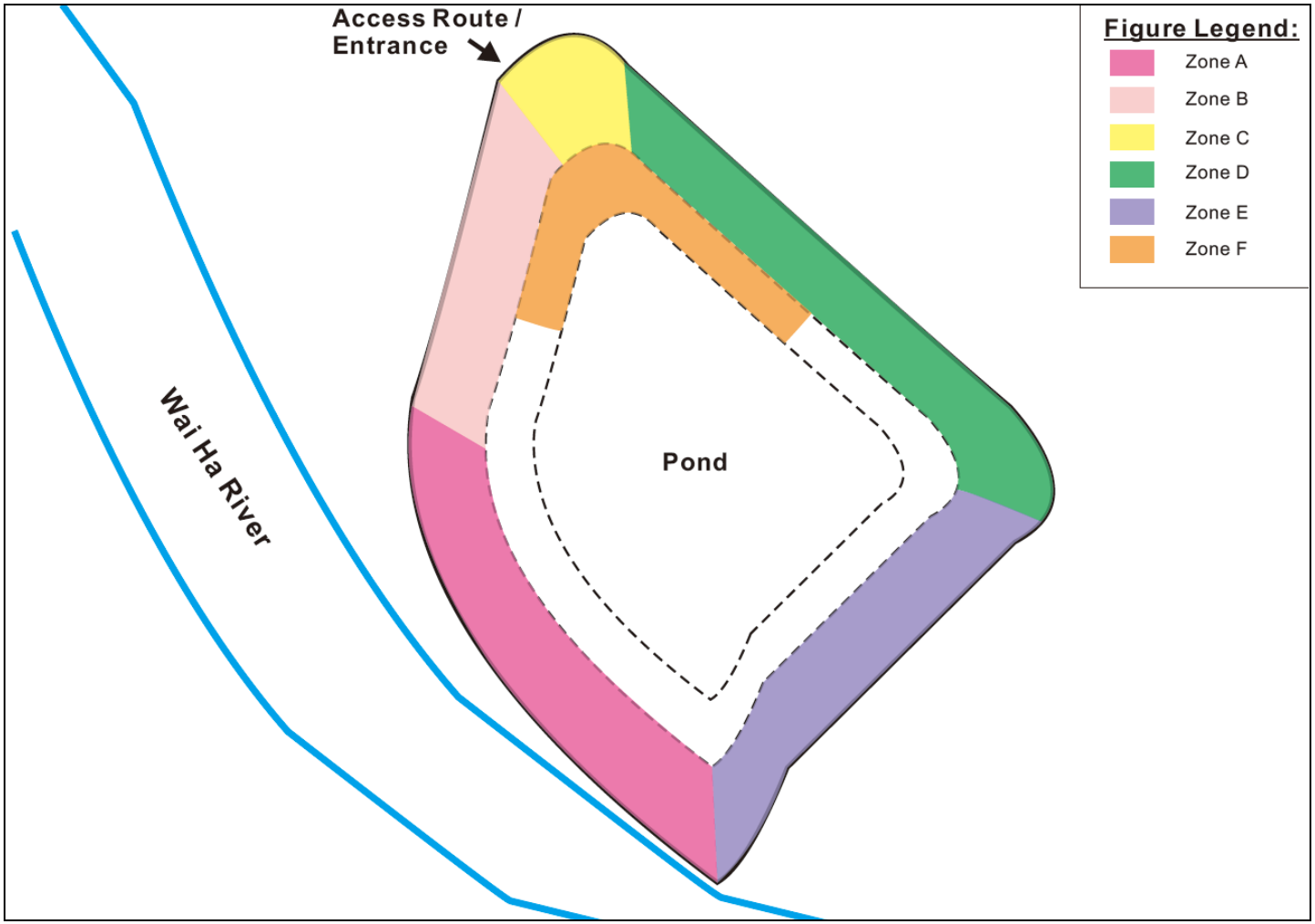


**Figure 6.3.2.1** Landscape floor plan of ECA during establishment phase.

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

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

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

- *Hibiscus tiliaceus*: tag no. 55 - 60; 64 – 77; 238 – 241; 245 – 252; 257 – 261 & 264.
- *Ficus superb var japonica*: tag no. 38, 39
- *Macaranga tanarius*: tag no. 321
- *Celtis sinensis*: tag no. 12, 18, 130

Those planted tree poor condition were caused during trans-location or plantation. It is expect most of them would be recovered and the health condition would be improved in coming growing season. There are some trees in poor condition in terms of dehydrated crown with no foliage. These are:

- *Viburnum odoratissimum:* tag no. 113, 362, 380.
- *Celtis sinensis:* tag no. 132, 135, 222
- *Hibiscus tiliaceus:* tag no.253

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

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

Three specimens of protected species *Pavetta hongkongensis* were transplanted from work area under Contract 2 to ECA at Zone D on 20th December 2011. Weekly monitoring was carried out and their overall conditions are fair so far (**Appendix**

**L(C)**). Representative photographs of the transplanted *P. hongkongenesis* are showed on **Figure 6.3.2.2**.

Figure 2.2a. Specimens 1 & 2.


Figure 2.2b. Specimen 3.

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

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

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

### 6.3.3 Summary

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

### 6.3.4 References

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

### 6.3.5 Monitoring of Water Quality

The point of linkage between the ECA and Wai Ha River at the southern pond bund of the wetland was completed on 30th August 2011. The constructed wetland habitats in the ECA have been filled with the tidal water from Wai Ha River. Monitoring of in situ water quality in the ECA was commenced in September 2011 by the IEC's ecologist. In addition, Ecological water quality monitoring at ECA was conducted on 28/3 with result: Turbidity: 6.16NTU; Temperature: 23.8℃; DO: 6.71mg/L; pH: 5.8.

### 6.3.6 Site Inspections

Twice monthly establishment phase monitoring has been commenced in November 2011. Two site inspections were carried out on 2nd and 16th March 2012. Table 7-1 summarizes the observations and recommendations for each site inspection.

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

| Inspection Dates | Observation | Recommendations |
|---|---|---|
| 2 March 2012 | A routine site inspection on the vegetation performance and general function of the ECA. The site condition was generally good (**Photo 1**), with satisfactory regrowth of the planted wetland herbs *Cyperus malaccensis* and *Bacopa monnieri* (**Photos 2 and 3**).<br><br>Regeneration of new leaves was observed on many planted compensatory trees, such as *Celtis sinensis* and *Viburnum odoratissimum*. A few propagules of mangrove *Kandelia obovata* were observed in the pond, implying that these propagules were transported from the surrounding mangrove habitat to the ECA by tidal movement. As observed, one of these propagules germinated in the intertidal area of the ECA (**Photo 4**).<br><br>The replanted compensatory tree *Celtis sinensis* (Tree No. N13) was found partly fallen again at the southeastern part of the ECA (**Photo 5**). | The Contractor was reminded to replant the fallen tree as soon as possible. As it was not the first time to report this fallen tree in the ECA, the Contractor should ensure that the replanted tree is to be fixed steadily by backfilling appropriate amount of soil into the planting hole. |
| 16 March 2012 | This was the second site inspection in March 2012. The site condition was basically good and no material change from the previous site inspection on 2 March 2012.<br><br>More hydroseeded area was vegetated with the generated grass and the recent rainfall has favored the shrub and tree (especially for the planted compensatory trees *Celtis sinensis*) recovery from the dry season. However, the fallen tree was not yet replanted by the time of this monitoring on 16 March 2012. | The Contractor should replant the fallen tree immediately in accordance with the advice given by the Wetland Specialist. |

**Photo 1.** General view of the ECA.

**Photo 2.** The planted wetland herb *Cyperus malaccensis* regenerated slowly in the marshy area.

**Photo 3.** The planted wetland herb *Bacopa monnieri* regenerated slowly in the marshy area.

**Photo 4.** A propagule from the wild population of *Kandelia obovata* germinated in the intertidal area of the ECA.


**Photo 5.** The replanted compensatory tree Celtis sinensis (Tree No. N13) was found partly fallen again at the southeastern part of the ECA.

## 6.4 Management Activities

### 6.4.1 Ecological Issues/ Management Activities

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

The ECA has been maintained in basically good condition, in which its normal ecological function has been achieved (e.g. wetland-dependent birds such as Little Egret, White Wagtail and Little Ringed-Plover were often observed in the created pond and intertidal area during the routine site inspection). Some of the planted wetland herbs (especially *Cyperus malaccensis* and *Bacopa monnieri*) and the grass at the hydroseeded area have regenerated steadily in the ECA by the end of the dry season.

As observed on 2nd March 2012, the replanted compensatory tree *Celtis sinensis* (Tree No. N13) was partly fallen again at the southeastern part of the ECA. This tree was not replanted by the time of the site inspection conducted by the Wetland Specialist on 16th March 2012, but it was replanted by the Contractor later in the week of 19th March 2012 (as reported in the Landscape & Visual Chapter of this report).

As informed by the Contractor, a total of 41 planted compensatory trees in Area C were replaced by new trees of the same species on 28th and 29th March 2012. A joint site inspection with the Contractor on the health and structure of these newly planted trees will be conducted on 5th April 2012.

## 6.5 Implication of the Survey Findings

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

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

## 6.6 Recommendations

The Contractor should undertake regular monitoring, and maintain frequent and adequate watering of all planted and transplanted terrestrial trees (including the newly planted compensatory trees for the replacement) and shrubs throughout the establishment period of the ECA. The Contractor is advised to provide an appropriate planting programme for replacing the remaining compensatory trees/shrubs showing poor health/dead symptoms. In addition, the replacement trees and shrubs with healthy and structurally balanced form are preferred.

# 7 Landscape and Visual

## 7.1 Introduction

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

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

## 7.2 Scope of Monitoring

### 7.2.1 Monitoring Objectives

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

### 7.2.2 Monitoring during Construction Phase

The following landscape and visual mitigation measure should be implemented during the

construction phase of the project to minimize the potential impacts:

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

### 7.2.3 Monitoring during Operational Phase

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

- Viewing area formation by planting with shrubs, grasses and benches along the area;
- Architectural design of the pump house will help it fit into the existing suburban, natural to semi-natural surroundings;
- Landscape design of pump house by providing sufficient planting around its boundary fence;

- Enhancement planting along Tung Tsz Road with shrubs/ trees of suitable species to help protect the stream and marshes;
- Construction of box culvert should be with at least 1.0m soil depth for enhancement planting;
- Transplanting of existing affected trees to adjacent locations should be carried out;
- Preparation for transplanting is needed to allow sufficient time for root pruning and rootball preparation prior to transplanting; and
- Reinstatement of affected area should be carried out to check that the works areas are properly reinstated.

## 7.3 Landscape and Visual Monitoring Results

### 7.3.1 Monitoring Date(s)

This monthly Landscape and Visual Monitoring (March 2012) was conducted to cover only Areas A, B and C of Contract 1 of the Project. The bi-weekly monitoring was conducted on 9th and 22nd March 2012.

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

The bi-weekly monitoring for Contract 2 was also undertaken on 9th and 22nd March 2012. The monitoring findings and recommendation will be submitted in a separate Monthly EM&A Report under Contract DC/2010/02.

### 7.3.2 Visual Screen

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

*Observation*

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

A section of temporary hoarding has been erected from northwest to southwest parts of Tung Tsz Nursery in Area B (approximately along the works boundary from Trees U42 to U62), whilst line of hoardings have been maintained to the western part of Area B falling within the northwestern part of Tung Tsz Nursery (**Photo 2**).

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

*Recommendation*

No specific recommendation is required.

### 7.3.3 Contaminant/ Sediment Control

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

*Observation*

*Area A*

Provision of dust control measure (such as vehicle wheel washing facilities) was observed at the exit point of Area A.

Used water for washing vehicle wheel and groundwater from the excavated sites were pumped into the silt/sand removal facilities for filtration before discharging into the manhole adjacent to Area A. No unauthorized discharge of contaminated water/ sewerage was observed during the monitoring.

*Area B*

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

.

*Area C*

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

*Recommendation*

No specific recommendation is required.

### 7.3.4 Pollution Control

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

***Observation***

*Area A*

Provision of vehicle wheel washing facilities was observed at the exit point of Area A to reduce the contamination to the surrounding habitats in Plover Cove. Used water for washing vehicle wheel and groundwater from the excavated sites were pumped into the silt/sand removal facilities for filtration before discharging into the manhole adjacent to Area A. The drainage pipes were maintained appropriately to discharge the used water to the manhole at Ting Kok Road. No direct discharge of polluted water into the adjacent Wai Ha River was observed from the works area for building the automatic mechanical penstock at Wai Ha River estuary.

*Area B*

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

*Area C*

The pond of the ECA was observed to be connected to Wai Ha River directly as following the scheme design of Habitat Compensatory Plan (**Photo 3**). No direct discharge of turbid water into the adjacent Wai Ha River was observed.

*Recommendation*

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

### 7.3.5 Liaison with Nursery

As observed in March 2012, active construction works within Tung Tsz Nursery was still mainly restricted within the fenced areas to the southwest of the nursery. Other designed works areas within the nursery have been under the normal operation and maintenance of Tung Tsz Nursery.

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

The works practice and maintenance of trees within the nursery generally follow the

recommendation as stated in *Monthly EM&A Report for February 2012*. Any observed issues related to the liaison with the nursery are highlighted in this section.

*Observation*

As abovementioned in Section "Visual Screen", the temporary hoarding has been erected from northwest to southwest parts of Tung Tsz Nursery in Area B since April 2011. The major construction work within Area B has been restricted within this fenced area.

Regular monitoring for the transplanted tree U58 *Grevillea robusta* was conducted bi-weekly. Tree defects of chlorotic leaves and poor physiological performance were still found. New leaves were observed on the tree branches and even watersprouts on the tree trunk. Health condition of this transplanted tree has remained fairly poor in March 2012 (**Photo 4**) but its structure has still remained in fair condition.

No additional tree transplantation work were reported by the Contractor and observed during the inspections in March 2012.

*Recommendation*

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

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

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

### 7.3.6 Existing Trees within Works Areas

Tree Protection Zones (TPZs) in Areas A and B were demarcated within the construction sites as following the recommendation stated in the *Monthly EM&A Report for February*

*2012*, but observation of temporary storage of construction materials within or close to the TPZs were still recorded in Area A (see details in the following section). Tree tag of U35 in Area B was re-tagged by the time of monitoring in March 2012 (**Photo 5**). The shading net tied on the trunk of U57 has not yet been removed by the Contractor since the tree transplantation in April 2011.

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

*Observation*

*Area A*

TPZs with temporary storage of construction materials were still observed for trees to be transplanted (E16 to E20) at the southwestern part of Area A (**Photos 6-7**). Locations of the construction hoardings, which were erected to form the TPZs, were adjusted by the site workers to facilitate the storage of materials. These construction materials were often placed within or close to the TPZs and there were potential damage to the trunks and roots of these trees to be transplanted.

The tree health of three relocated *Melaleuca quinquenervia* (E22, E33 and E34) on the eastern side of Area A next to the site hoarding was regularly monitored (**Photo 8-9**). Spare foliage with only chlorotic leaves was found on these three trees. Health condition of these trees has remained poor as a result of the transplantation shock and poor transplantation skill in planting them too deep in the soil. The tree tags on E33 and E34 were still missing.

As observed in the monitoring on 22nd March 2012, the tree to be felled E44 (*Macaranga tanarius*) was found injured and with obvious wounds were observed on a scaffold branch (**Photo 10**). Its tree tag was found missing.

No other significant damages on the crowns, trunks and roots of the remaining trees were

observed during the monitoring in March 2012 in Area A.

*Area B*

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

The health conditions of U34 (**Photo 11**), U35 (**Photo 12**) and U37 (**Photo 13**) were found to be very poor, with no leaves in the canopies and dried, loose tree bark.

The planter for a palm to be transplanted (A36) has not yet repaired by the time of the inspections in March 2012. The palm has been supported by two guying ropes to prevent tree failure since the report of broken planter in July 2011 (**Photo 14**). As observed, new roots have been developed from this palm (A36). Broken planters for 3 trees (U54 and two existing trees with no tag next to U54) were observed at their temporary receptor sites within the active works area to the northwest of the nursery (**Photo 15**). Those planters have been surrounded by orange construction nets to prevent further damage to the remained planters since December 2011. No further damage on their planters was observed in March 2012.

The trunk of the retained tree U15, which is located outside the works area of Area B, was found to be mechanically injured (**Photo 16**). The trunk may be crashed by the vehicles using the adjacent access road.

As observed since January 2012, no sprout has been developed from the tree to be transplanted T97 (*Lagerstroemia speciosa*) since the removal of its watersprouts by the government department in December 2011 (**Photo 17**)**.**

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

*Area C*

The existing trees were maintained generally in fair health condition, except that some of the planted *Hibiscus tiliaceus* and *Celtis sinensis* showing poor health conditions (e.g. no leaves and dry tree bark) as a result of the transplantation shock. No branch pruning and tree felling were observed in the monitoring. No significant damages on the crowns, trunks and roots on trees within Area C were observed during the monitoring in March 2012.

No leaves were observed on the transplanted trees T152 (**Photo 18**), T153 (**Photo 19**), T250 (**Photo 20**) and one newly transplanted tree (*Bombax ceiba*) without a tree tag (**Photo 21**). This untagged *Bombax ceiba* (possibly T150) was transplanted from Area A to Area C in November 2011. Fungal infection has been developed along the dry tree bark of the transplanted tree T250. These four trees were suspected dying with poor health condition, possibly due to transplantation shock and as unsuitable species for transplantation.

As observed on 9th March 2012, a planted compensatory tree *Celtis sinensis* (with tree tag numbered N13) was found fallen down at the southeastern part of Area C (**Photo 22**). The Contractor was informed immediately for this fallen tree. It was replanted by the Contractor as observed in the monitoring on 22nd March 2012.

The three transplanted specimens (Tree No.: PH01, PH02 and PH03) of the protected shrub species of conservation interest *Pavetta hongkongensis* have remained in fair health condition (**Photos 23-24**). Regular watering has been maintained as a routine maintenance practice throughout the establishment period

*Recommendations*

*Area A*

Maintenance of proper TPZs with no temporarily stored construction materials has been the major tree management issue in Areas A, B and C. The Contractor should continue notifying the on-site workers not to stockpile soil/construction materials or place construction equipments within and close to the TPZs. Any temporarily stored

construction materials/ equipments should be removed immediately.

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

*Area B*

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

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

The Contractor has to repair the planters of A36, U54 and the two untagged trees adjacent to U54 as soon as possible. In addition, the Contractor should ensure that all planters have been properly maintained. Manual weeding of overgrowth vegetation within the tree planters is recommended.

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

*Area C*

All transplanted trees, planted compensatory trees and the three transplanted individuals of *Pavetta hongkongensis* should be watered regularly (e.g. at least every two days) by the

appointed landscape contractor. Regular check of the health conditions of these trees should be conducted. If these trees are found to be dead specimens for a prolonged period in the wet season, the Contractor should replace these specimens for compensation.

### 7.3.7 Construction Lights

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

*Observation*

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

*Recommendation*

No specific recommendation is required.

## 7.4 Audit Schedule

The next bi-weekly Landscape & Visual Monitoring in April 2012 is scheduled to be conducted in the weeks of 2nd and 16th April, 2012.

## 8 Action taken in Event of Exceedance

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

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

For water quality monitoring, total 10 abnormal incidents of water quality limits (Dissolved Oxygen, Suspended solids and Turbidity) were recorded in this reporting month according to the established level. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and No particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total suspended solid were believed to be mainly attributed by high water flow rate. The exceedance of DO were believed to be mainly attributed by natural fluctuation; , since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.
The water condition of Wai Ha River is presented in photo attached in **Appendix N**.

# 9 Construction waste disposal

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

Table 9.1 is a summary of figures of the construction wastes disposal provided by Contractor.

Table 9.1 Summary of Construction Waste Disposal

| Month | Actual Quantities of Inert C & D Materials Generated Monthly | | | | | | Actual Quantities of C & D Wastes Generated Monthly | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Quantity Generated | Hard Rock and Large Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed as Public Fill | Imported Fill | Metals | Paper/cardboard packaging | Plastics (see note3) | Chemical Waste | Others, e.g. general refuse |
| | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | (in'000kg) | (in'000kg) | (in'000kg) | (in'000kg) | (in'000kg) |
| Year2011 | 11.758 | 0.00 | 9.703 | 0.665 | 0.750 | 0.556 | 0.00 | 0.00 | 0.00 | 0.00 | 0.165 |
| Jan-12 | 0.010 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.005 |
| Feb-12 | 0.130 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mar-12 | 0.125 | 0.00 | 0.125 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
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| | | | | | | | | | | | |
| Total | 12.738 | 0.00 | 10.812 | 0.665 | 0.705 | 0.556 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 |

| Forecast of Total Quantities of C & D Materials to be Generated from the Contract | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Quantity Generated | Hard Rock and Large Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed as Public Fill | Imported Fill | Metals | Paper/cardboard packaging | Plastics (see note3) | Chemical Waste | Others, e.g. general refuse |
| | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | ( in'000m3) | (in'000kg) | (in'000kg) | (in'000kg) | (in'000kg) | (in'000kg) |
| | 37.37 | 8.27 | 12.09 | 0.00 | 25.28 | 2.1 | 10 | 2 | 0.5 | 1 | 1 |

Notes (1) The Performance targets are given in PS Clause 26.23 (14)

(2) The waste flow table shall also include C & D materials that are specified in the Contract to be imported for used at the sites

(3) Plastics refer to plastics bottles/containers, plastic sheets/foam from packaging materials.

(4) The summary table shall be submitted to the Engineer's Representative monthly together with the Waste Flow Table for review and monitoring in accordance with the PS Clause 25.20A(4)

## 10 Status of Permits and Licenses obtained

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

Table 10.1 Status of Permits and Licenses Obtained

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

## 11 Compliant Log

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

Table 11.1 Summary of Formal Complaints received

| | Noise | Water | Ecology | Others |
|---|---|---|---|---|
| Year 2011 | 0 | 0 | 0 | 0 |
| January 2012 | 0 | 0 | 0 | 0 |
| February 2012 | 0 | 0 | 0 | 0 |
| March 2012 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 |

# 12 Site Environmental Audits

## 12.1 Site Inspection

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

Within this reporting period, site inspections were conducted on 3rd, 9th, 15th, 23rd and 31st of March 2012. A detailed checklist of each site inspection together with comments and relevant photos have been filed and kept. The findings from inspection were summarized in Table 12.1.

Table 12.1 Summary results of site inspections findings

| Date | Findings | Identification | Advice from ET | Action taken | Closing date | Remarks |
|---|---|---|---|---|---|---|
| 1, 8, 15, Dec 11 | Construction was waste was observed at Area A | Observation | Contractor was reminded that C & D waste should be stored at proper location. Contractor should assign licensed waste collector to collect and dispose observed waste as soon as possible | Outstanding | - | Part of Construction waste was removed by contractor at 8, 19 and 30 Dec 2011 |
| 15 Dec 2011. 16 & 24 Feb 12. 1 Mar 12 | General wastes were observed at Area A | Observation | Contractor was advised to clean the general wastes or store at proper location for temporary storage. | General waste were cleaned by contractor | 9 Mar 12 | - |

| Date | Findings | Identification | Advice from ET | Action taken | Closing date | Remarks |
|---|---|---|---|---|---|---|
| 24 Feb 12<br>1, 9, 15 Mar 12 | The water inside the wheels' washing facility was quite turbid at the site entrance of Area A | Observation | Contractor was reminded to replace the water regularly. | Waste water was replaced by contractor inside the wheels washing facility | 23 Mar 12 | - |
| 1, 9, 15, 23 Mar 12 | Stagnant water was observed at Area A | Observation | Contractor was reminded to remove stagnant water to prevent mosquito breeding. | Stagnant water was removed by contractor | 30 Mar 12 | |
| 1,9, 15, 23 & 30 Mar 12 | Tree protection zone was not provided at area A | Observation | Contractor was reminded to set up the tree protection fence | Outstanding | | |
| 23 & 30 Mar 12 | Construction materials were observed inside the tree protection zone at Area A | Observation | Contractor was reminded to remove the construction materials. | Outstanding | | |
| 30 Mar 12 | Construction materials were observed at the cycle track of Ting | Observation | Contractor was reminded to clean the construction materials. | Outstanding | | |

| Date | Findings | Identification | Advice from ET | Action taken | Closing date | Remarks |
|---|---|---|---|---|---|---|
| | Kok Road at Area A | | | | | |
| 30 Mar 12 | Haul road was dry and dusty at Area A. | Observation | Contractor was reminded that routine watering should be implemented. | Outstanding | | |

### 12.2 Compliance with legal and Contractual requirement

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

### 12.3 Implementation status and effectiveness of the mitigation measures

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

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

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

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

## 13 Future Key issues and recommendations

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

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

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

# 14 Conclusions

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

Regular site meetings and inspection audits led by the seniors for discussing site environmental matters were held among Project Proponent, Contractor and the ET on weekly basis. Also monthly site meeting and inspection audits with the above parties and IEC were carried out on 31st of March 2012.

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

For water quality monitoring, total 10 abnormal accidents of water quality limits (Dissolved Oxygen, Suspended solids and Turbidity) were recorded in this reporting month according to the established level. ET has arranged site investigations for the abnormal incidents and it was observed that the river was redirected and narrowed for construction of mechanical penstocks; and increases the speed of water current. Proper mitigation measures was implemented by contractor to avoid site water release to the Wai Ha river and No particular observation of defective site activities were found causing water contamination; The exceedance of Turbidity and Total suspended solid were believed to be mainly attributed by high water flow rate. The exceedance of DO were believed to be mainly attributed by natural fluctuation; , since the recorded levels of DO at control station had also exceeded its baseline limit level, the exceedances recorded at were unlikely to be related to the Project.

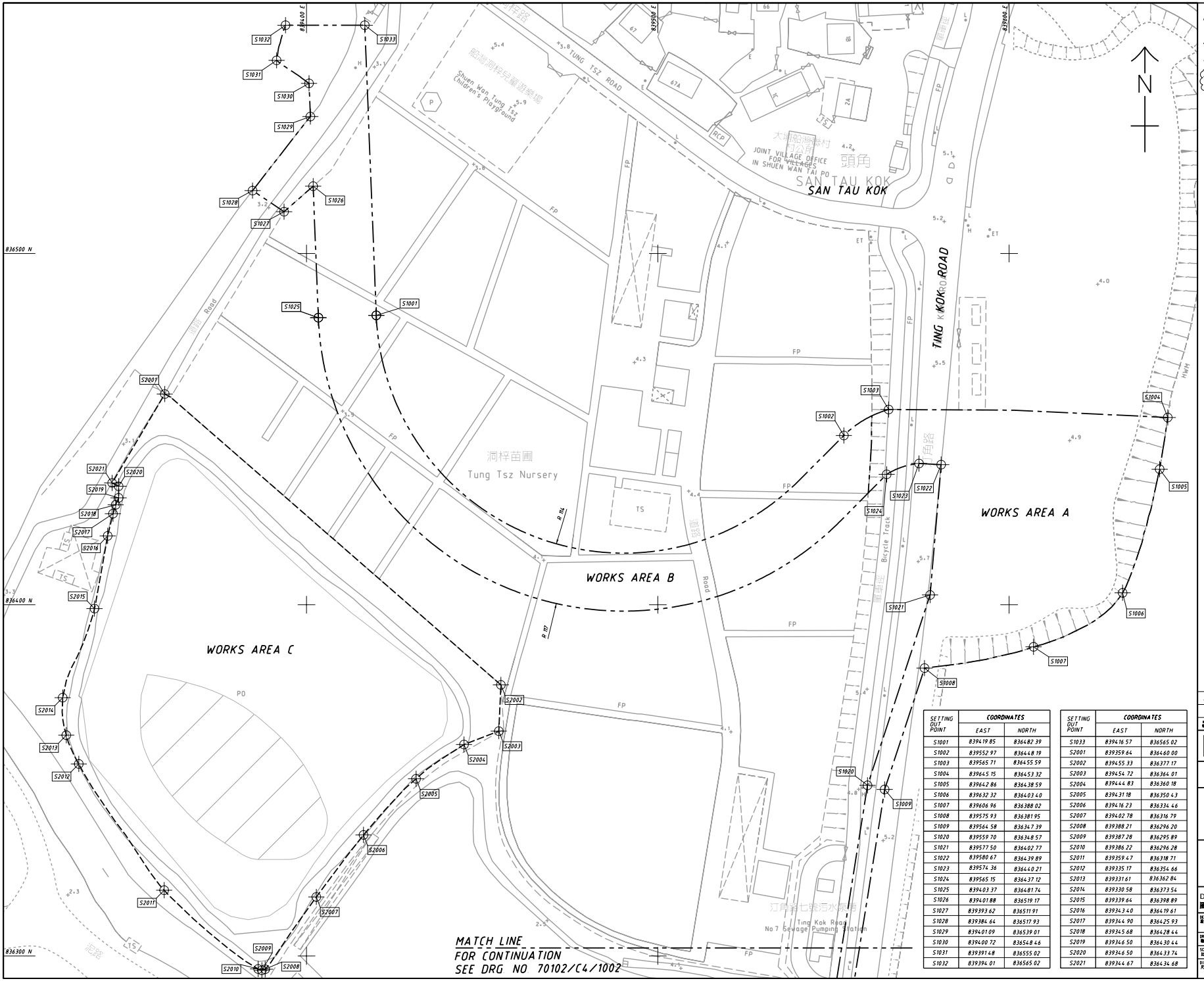
For ecological monitoring survey, all vegetations recorded were in fair condition, with no significance sign of health deterioration for the retained trees. In addition, Ecological water quality monitoring at ECA was conducted on 28/3 with result: Turbidity: 6.16NTU; Temperature: 23.8℃; DO: 6.71mg/L; pH: 5.8.

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

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

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

## Appendix A: Site Location




## NOTES

1. ALL LEVELS ARE IN METRE ABOVE PRINCIPAL DATUM
2. ALL CO-ORDINATES GIVEN ARE IN METRE AND ARE IN ACCORDANCE WITH HK(1980) COORDINATES SYSTEM
3. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED
4. THE PUBLIC CLEANING AREA SHALL BE THE AREAS WITHIN 2.5m BEYOND THE LIMIT OF WORKS AREAS EXCLUDING PRIVATE AREAS △A

## LEGEND

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

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

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

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

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

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

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

SHEET 1 OF 2

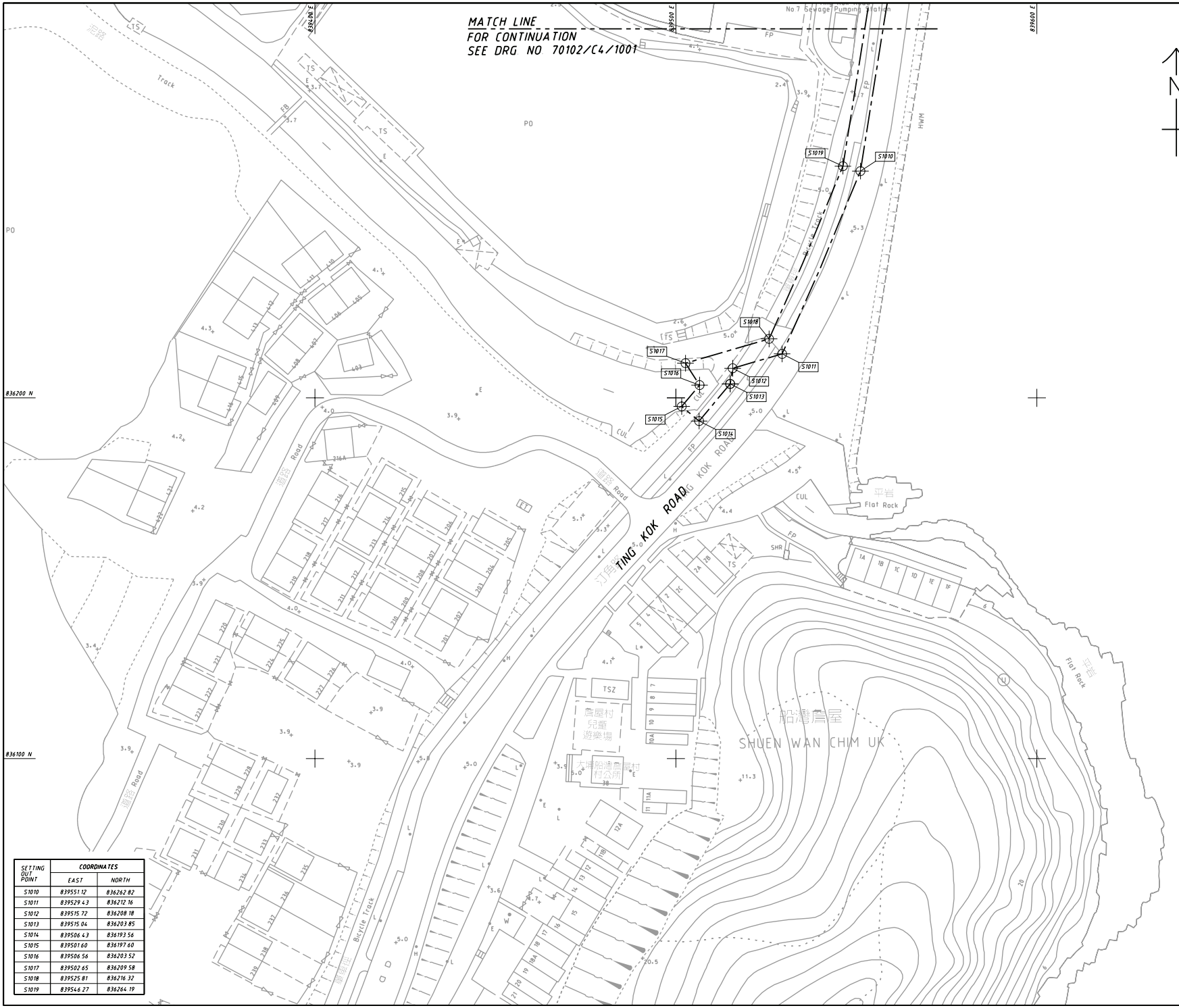
AECOM

DRG.NO. 圖紙編號 70102/C4/1001A

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

2010-2-5 11:54:09

p:\projects\70102\1000\TENDER ADDENDUM NO 2\1001A.dgn




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

NOTE

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

| NO. 號碼 | DESCRIPTION 內容說明 | BY 繪製 | CHECKED 檢查 | DATE 日期 |
|---|---|---|---|---|
| - | TENDER DRAWING | ECY | PRC | YK 09-09 |

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

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

SETTING OUT PLAN FOR WORKS AREA A, B AND C

SHEET 2 OF 2

AECOM

DRG.NO. 圖紙編號 70102/C4/1002

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

2010-2-5 13 32 23

p:\projects\70102\1000\TENDER DRAWING\1002.dgn

## Appendix B: Key Personal Contact information chart

| Post | Name | Contact No. | Contact Fax | e-mail |
|---|---|---|---|---|
| Project Manager | Mr. W. K. Chan | 6821 1136 | 2674 6688 | dc200922jv_pmcwk @yahoo.com.hk |
| Site Agent | Mr. C. L. Wong | 9280 0166 | 2674 6688 | dc200922jv_sa@yaho o.com.hk |
| Environmental Officer / Sub-agent | Mr. K. M. Ma | 9552 1734 | 2674 6688 | dc200922jv_suba@ya hoo.com.hk |
| Environmental Supervisor | Mr. Anthony Chan | 9179 2092 | 2674 6688 | anthony277@hotmail. com |
| Asia Ecological Consultants Ltd. (Wetland Specialist) | Dr. Mike Leven | 2486 2885 | 2471 8389 | mrleven@asiaecol.co m.hk |
| Environmental Pioneers & Solutions Limited (Environmental Team) | Miss. Goldie Fung | 2556 9172 | 2856 2010 | goldiefung@fseng.co m.hk |

## Appendix C: Calibration Certificates for measuring instruments

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

# Calibration Certificate

**Certificate No.** **21289** Page 1 of 3 Pages

**Customer :** Environmental Pioneers and Solutions Limited

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

**Order No. :** Q20468 **Date of receipt :** 2-Mar-12

## Item Tested

**Description** : Digital Sound Level Meter
**Manufacturer** : SVAN
**Model** : 949 **Serial No.** : 8571

## Test Conditions

**Date of Test :** 5-Mar-12 **Supply Voltage** : --
**Ambient Temperature :** (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.
Ref. Document/Procedure: Z01.

## Test Results

All results were within the IEC 651 Type 1 & IEC 804 Type 1 specification after adjustment.
The results are shown in the attached page(s).

Main Test equipment used:

| Equipment No. | Description | Cert. No. | Traceable to |
|---|---|---|---|
| S017A | Multi-Function Generator | 07279 | SCL-HKSAR |
| S024 | Sound Level Calibrator | 15136 | NIM-PRC & SCL-HKSAR |

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

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

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

**Approved by :** Dorothy Cheuk

Date: 7-Mar-12

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

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# Calibration Certificate



Results :

## 1. SPL Accuracy

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

IEC 651 Type 1 Spec. : ± 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 | 84.0 | 0.0 | |
| | 74.0 | 74.0 | 0.0 | |
| | 64.0 | 64.0 | 0.0 | |
| | 54.0 | 54.0 | 0.0 | |

Uncertainty : ± 0.1 dB

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# Calibration Certificate



3.2 Differential level linearity

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

Uncertainty : ± 0. 1 dB

## 4. Frequency Weighting

A weighting

| Frequency | Attenuation (dB) | IEC 651 Type 1 Spec. |
|---|---|---|
| 31.5 Hz | -40.4 | - 39.4 dB, ± 1.5 dB |
| 63 Hz | -27.2 | - 26.2 dB, ± 1.5 dB |
| 125 Hz | -17.0 | - 16.1 dB, ± 1 dB |
| 250 Hz | -9.4 | - 8.6 dB, ± 1 dB |
| 500 Hz | -2.6 | - 3.2 dB, ± 1 dB |
| 1 kHz | 0.0 (Ref) | 0 dB, ± 1 dB |
| 2 kHz | +1.8 | + 1.2 dB, ± 1 dB |
| 4 kHz | +1.8 | + 1.0 dB, ± 1 dB |
| 8 kHz | -0.4 | - 1.1 dB, + 1.5 dB ~ -3 dB |
| 16 kHz | -6.3 | - 6.6 dB, + 3 dB ~ - ∞ |

Uncertainty : ± 0.1 dB

## 5. Time Averaging

| Applied Burst duty Factor | Applied Leq. Value (dB) | UUT Reading (dB) | IEC 804 Type 1 Spec. |
|---|---|---|---|
| continuous | 50.0 | - - | -- |
| 1/10 | 50.0 | 50.2 | ± 0.5 dB |
| $1/10^2$ | 50.0 | 49.8 | |
| $1/10^3$ | 50.0 | 50.1 | ± 1.0 dB |
| $1/10^4$ | 50.0 | 49.9 | |

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 001 hPa.
4. *Out of specification.

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

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

# Calibration Certificate

**Certificate No.** **21290** Page 1 of 2 Pages

**Customer :** Environmental Pioneers and Solutions Limited

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

**Order No. :** Q20468 **Date of receipt :** 2-Mar-12

## Item Tested

**Description :** Sound Level Calibrator

**Manufacturer :** Svantek

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

## Test Conditions

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

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

## Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

## Test Results

All results were within the IEC 942 Class 1 specification.

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

Main Test equipment used:

| Equipment No. | Description | Cert. No. | Traceable to |
|---|---|---|---|
| S014 | Spectrum Analyzer | 13535 | NIM-PRC & SCL-HKSAR |
| S024 | Sound Level Calibrator | 15136 | NIM-PRC & SCL-HKSAR |
| S041 | Universal Counter | 15610 | SCL-HKSAR |
| S206 | Sound Level Meter | 16338 | SCL-HKSAR |

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

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

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

**Approved by :** Dorothy Cheuk

Date: 7-Mar-12

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. 21290**



Results :

## 1. Level Accuracy

| UUT Nominal Value (dB) | Measured Value (dB) | IEC 942 Class 1 Spec. |
|---|---|---|
| 94 | 94.10 | ± 0.3 dB |
| 114 | 114.18 | |

Uncertainty : ± 0.1 dB

## 2. Frequency

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

Uncertainty : ± 3.6 x $10^{-6}$

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

**4. Total Harmonic Distortion** : < 0.8 %
IEC 942 Class 1 Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The above measured values are the mean of 3 measurements.
3. The uncertainty claimed is for a confidence probability of not less than 95%.
4. Atmospheric Pressure : 1001 hPa.

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

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# ALS Technichem (HK) Pty Ltd

## *REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION*

| | | | |
|---|---|---|---|
| **CONTACT:** | MR ALLEN CHAN | **WORK ORDER:** | HK1200205 |
| **CLIENT:** | ENVIRONMENTAL PIONEERS & SOLUTIONS LTD | **AMENDMENT:** | 1 |
| **ADDRESS:** | FLAT 19A, CHAI WAN INDUSTRIAL CENTRE BUILDING, 20 LEE CHUNG STREET, CHAI WAN, HONG KONG. | **LABORATORY:** | HONG KONG |
| | | **DATE RECEIVED:** | 04/01/2012 |
| | | **DATE OF ISSUE:** | 02/02/2012 |
| **PROJECT:** | -- | | |

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal aceptance criteria of ALS will be followed.

| | |
|---|---|
| Scope of Test: | Conductivity, Dissolved Oxygen, Salinity, Temperature and Turbidity |
| Description: | Multi-meter |
| Brand Name: | DKK-TOA |
| Model No.: | WQC-24 |
| Serial No.: | 682337 |
| Equipment No.: | -- |
| Date of Calibration: | 10 January, 2012 |

### NOTES

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

### ISSUING LABORATORY: HONG KONG


**Address**

ALS Technichem (HK) Pty Ltd

11/F Chung Shun Knitting Centre
1-3 Wing Yip Street
Kwai Chung
HONG KONG

**Phone:** 852-2610 1044
**Fax:** 852-2610 2021
**Email:** hongkong@alsglobal.com


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong


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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**Work Order:** HK1200205
**Amendment:** 1
**Date of Issue:** 02/02/2012
**Client:** ENVIRONMENTAL PIONEERS & SOLUTIONS LTD

Description: Multi-meter
Brand Name: DKK-TOA
Model No.: WQC-24
Serial No.: 682337
Equipment No.: --
Date of Calibration: 10 January, 2012 Date of next Calibration: 10 April, 2012

**Parameters:**

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

| Expected Reading (uS/cm) | Displayed Reading (uS/cm ) | Tolerance (% ) |
|---|---|---|
| 146.9 | 141.0 | -4.0 |
| 6667 | 6490 | -2.7 |
| 12890 | 12700 | -1.5 |
| 58670 | 59000 | 0.6 |
| | Tolerance Limit (%) | 10.0 |

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

| Expected Reading (mg/L) | Displayed Reading (mg/L) | Tolerance (mg/L) |
|---|---|---|
| 5.58 | 5.45 | -0.13 |
| 6.79 | 6.63 | -0.16 |
| 8.62 | 8.48 | -0.14 |
| | Tolerance Limit (±mg/L) | 0.20 |

**Salinity** **Method Ref: APHA (21st edition), 2520B**

| Expected Reading (ppt) | Displayed Reading (ppt) | Tolerance (%) |
|---|---|---|
| 0 | 0.0 | -- |
| 10 | 10.2 | 2.0 |
| 20 | 20.7 | 3.5 |
| 30 | 30.7 | 2.3 |
| | Tolerance Limit (±%) | 10.0 |

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**Work Order:** HK1200205
**Amendment:** 1
**Date of Issue:** 02/02/2012
**Client:** ENVIRONMENTAL PIONEERS & SOLUTIONS LTD

Description: Multi-meter
Brand Name: DKK-TOA
Model No.: WQC-24
Serial No.: 682337
Equipment No.: --
Date of Calibration: 10 January, 2012 Date of next Calibration: 10 April, 2012

**Parameters:**

**Temperature**

**Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.**

| Expected Reading (°C ) | Displayed Reading (°C ) | Tolerance (°C ) |
|---|---|---|
| 14.0 | 14.4 | 0.4 |
| 20.5 | 20.3 | -0.2 |
| 34.0 | 34.5 | 0.5 |
| | Tolerance Limit (°C) | 2.0 |

**Turbidity**

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

| Expected Reading (NTU) | Displayed Reading (NTU) | Tolerance (%) |
|---|---|---|
| 0 | 0.6 | -- |
| 4 | 4.3 | 7.5 |
| 40 | 43.8 | 9.5 |
| 80 | 87.8 | 9.8 |
| 400 | 430.1 | 7.5 |
| 800 | 837.2 | 4.7 |
| | Tolerance Limit (±%) | 10.0 |

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

## Appendix D: Construction Noise Monitoring Data

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

## Noise Monitoring Data Sheet

| | | | |
|---|---|---|---|
| Monitoring Location | | M1 | AL1 |
| Monitoring Method | | Façade | Façade |
| Date of Monitoring | | 7/3/2012 | 7/3/2012 |
| Weather Condition | | Cloudy | Cloudy |
| Measurement Start Time (hh:mm) | | 13:20 | 13:58 |
| Measurement Time Length (mins) | | 30 mins | |
| SLM Model & S/N | | SVAN 949 | |
| Wind Speed (m/s) | | 0.9 | 0.42 |
| Measurement Results | $L_{eq}$ (dB(A)) | 51.4 | 56.3 |
| | $L_{10}$ (dB(A)) | 58.3 | 59.7 |
| | $L_{90}$ (dB(A)) | 49.2 | 42.8 |
| Major Construction Noise Source(s) During Monitoring | | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities |
| Other Noise Source(s) During Monitoring | | – Background Noise<br>– Traffic Noise | – Background Noise<br>– Traffic Noise |

| | Name | Signature | Date |
|---|---|---|---|
| Perpared by: | Lai Chi Hang |  | 7/3/2012 |

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

## Noise Monitoring Data Sheet

| | | | |
|---|---|---|---|
| Monitoring Location | | M1 | AL1 |
| Monitoring Method | | Façade | Façade |
| Date of Monitoring | | 14/3/2012 | 14/3/2012 |
| Weather Condition | | Cloudy | Cloudy |
| Measurement Start Time (hh:mm) | | 11:30 | 13:05 |
| Measurement Time Length (mins) | | 30 mins | |
| SLM Model & S/N | | SVAN 949 | |
| Wind Speed (m/s) | | 0.56 | 0.98 |
| Measurement Results | $L_{eq}$ (dB(A)) | 52.7 | 54.6 |
| | $L_{10}$ (dB(A)) | 56.1 | 57.2 |
| | $L_{90}$ (dB(A)) | 43.3 | 45.6 |
| Major Construction Noise Source(s) During Monitoring | | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities |
| Other Noise Source(s) During Monitoring | | – Background Noise<br>– Traffic Noise | – Background Noise<br>– Traffic Noise |

| | Name | Signature | Date |
|---|---|---|---|
| Perpared by: | Lai Chi Hang |  | 14/3/2012 |

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

## Noise Monitoring Data Sheet

| | | | |
|---|---|---|---|
| Monitoring Location | | M1 | AL1 |
| Monitoring Method | | Façade | Façade |
| Date of Monitoring | | 21/3/2012 | 21/3/2012 |
| Weather Condition | | Cloudy | Cloudy |
| Measurement Start Time (hh:mm) | | 13:40 | 13:04 |
| Measurement Time Length (mins) | | 30 mins | |
| SLM Model & S/N | | SVAN 949 | |
| Wind Speed (m/s) | | 0.33 | 0.74 |
| Measurement Results | $L_{eq}$ (dB(A)) | 59.8 | 54.9 |
| | $L_{10}$ (dB(A)) | 59.9 | 58.1 |
| | $L_{90}$ (dB(A)) | 48.2 | 42.6 |
| Major Construction Noise Source(s) During Monitoring | | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities |
| Other Noise Source(s) During Monitoring | | – Background Noise<br>– Traffic Noise | – Background Noise<br>– Traffic Noise |

| | Name | Signature | Date |
|---|---|---|---|
| Perpared by: | Lai Chi Hang | | 21/3/2012 |

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

## Noise Monitoring Data Sheet

| | | | |
|---|---|---|---|
| Monitoring Location | | M1 | AL1 |
| Monitoring Method | | Façade | Façade |
| Date of Monitoring | | 28/3/2012 | 28/3/2012 |
| Weather Condition | | Sunny | Sunny |
| Measurement Start Time (hh:mm) | | 13:20 | 14:00 |
| Measurement Time Length (mins) | | 30 mins | |
| SLM Model & S/N | | SVAN 949 | |
| Wind Speed (m/s) | | 0.98 | 0.24 |
| Measurement Results | $L_{eq}$ (dB(A)) | 59.0 | 63.5 |
| | $L_{10}$ (dB(A)) | 62.5 | 66.1 |
| | $L_{90}$ (dB(A)) | 49.2 | 48.4 |
| Major Construction Noise Source(s) During Monitoring | | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities | The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities |
| Other Noise Source(s) During Monitoring | | – Background Noise<br>– Traffic Noise | – Background Noise<br>– Traffic Noise |

| | Name | Signature | Date |
|---|---|---|---|
| Perpared by: | Lai Chi Hang |  | 28/3/2012 |

## Appendix E: Water Quality Monitoring Data

**Remark:**

Red highlighting: The value is exceeding limit level.

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

**Environmental Pioneers and Solutions Limited**

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

**Date of Sampling :** 2/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 9:23 | 8:57 | |
| Tide Mode | Mid-flood | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.12 | 7.16 | |
| Salinity (ppt) | 0.1 | 4 | |
| Temperature ($^{o}$C) | 19.3 | 18.1 | |
| Turbidity (NTU) | 6.0 | 11.7 | 11.7 |
| DO (mg/L) | 7.47 | 7.16 | |
| DO Saturation (%) | 79% | 75% | |
| Suspended Solids (mg/L) | 1.0 | 3.4 | 3.4 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang | | 2/3/2012 |

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

**Date of Sampling :** 5/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 11:40 | 11:14 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.21 | 7.29 | |
| Salinity (ppt) | 0.2 | 7.1 | |
| Temperature ($^{o}$C) | 20.5 | 20.4 | |
| Turbidity (NTU) | 1.2 | 9.8 | 9.8 |
| DO (mg/L) | 7.19 | 6.89 | |
| DO Saturation (%) | 78% | 72% | |
| Suspended Solids (mg/L) | 1.2 | 2.2 | 2.2 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 5/3/2012 |

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

**Date of Sampling :** 7/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 13:00 | 12:41 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.27 | 7.38 | |
| Salinity (ppt) | 4 | 10.6 | |
| Temperature ($^{o}$C) | 20.5 | 21.2 | |
| Turbidity (NTU) | 33.10 | 17.0 | 17.0 |
| DO (mg/L) | 7.26 | 7.02 | |
| DO Saturation (%) | 78% | 76% | |
| Suspended Solids (mg/L) | 3.2 | 3.6 | 3.6 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 7/3/2012 |

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

**Date of Sampling :** 9/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 13:07 | 12:41 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.40 | 7.78 | |
| Salinity (ppt) | 16.9 | 20.1 | |
| Temperature ($^{o}$C) | 18.1 | 18.9 | |
| Turbidity (NTU) | 8.7 | 21.8 | 21.8 |
| DO (mg/L) | 7.89 | 7.43 | |
| DO Saturation (%) | 80% | 72% | |
| Suspended Solids (mg/L) | 13.0 | 7.0 | 7.0 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 9/3/2012 |

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

**Date of Sampling :** 12/3/2012

**Weather :** Rainy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 14:30 | 14:55 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Normal | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.98 | 8.02 | |
| Salinity (ppt) | 19.5 | 22.7 | |
| Temperature ($^{o}$C) | 16.6 | 16.6 | |
| Turbidity (NTU) | 1.0 | 1.4 | 1.4 |
| DO (mg/L) | 8.76 | 8.57 | |
| DO Saturation (%) | 89% | 88% | |
| Suspended Solids (mg/L) | 1.6 | 6.0 | 6.0 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 12/3/2012 |

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

**Date of Sampling :** 14/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 16:00 | 16:31 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.86 | 8.12 | |
| Salinity (ppt) | 13.5 | 26.1 | |
| Temperature ($^{o}$C) | 18.4 | 17.2 | |
| Turbidity (NTU) | 6.0 | 7.1 | 7.1 |
| DO (mg/L) | 7.91 | 8.00 | |
| DO Saturation (%) | 80% | 81% | |
| Suspended Solids (mg/L) | 2.6 | 2.6 | 2.6 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 14/3/2012 |

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

**Date of Sampling :** 16/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 12:38 | 12:07 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 8.05 | 8.10 | |
| Salinity (ppt) | 23.3 | 24.9 | |
| Temperature ($^{o}$C) | 19.1 | 18.8 | |
| Turbidity (NTU) | 8.7 | 7.4 | 7.4 |
| DO (mg/L) | 7.41 | 7.64 | |
| DO Saturation (%) | 80% | 83% | |
| Suspended Solids (mg/L) | 2.2 | <1 | <1 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 16/3/2012 |

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

**Date of Sampling :** 19/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 11:46 | 11:15 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.44 | 7.56 | |
| Salinity (ppt) | 1.6 | 11.2 | |
| Temperature ($^{o}$C) | 20.6 | 21.4 | |
| Turbidity (NTU) | 10.2 | 7.6 | 7.6 |
| DO (mg/L) | 7.41 | 6.98 | |
| DO Saturation (%) | 79% | 75% | |
| Suspended Solids (mg/L) | 3.00 | 2.00 | 2.00 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang | | 19/3/2012 |

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

**Date of Sampling :** 21/3/2012

**Weather :** Cloudy

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 12:19 | 11:55 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Turbid | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.53 | 7.82 | |
| Salinity (ppt) | 15.8 | 21.2 | |
| Temperature ($^{o}$C) | 20.4 | 21 | |
| Turbidity (NTU) | 11.4 | 10.0 | 10.0 |
| DO (mg/L) | 7.48 | 7.55 | |
| DO Saturation (%) | 80% | 82% | |
| Suspended Solids (mg/L) | 3.20 | 8.40 | 8.40 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 21/3/2012 |

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

**Date of Sampling :** 23/3/2012

**Weather :** Sunny

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 13:40 | 13:08 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Normal | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.48 | 7.70 | |
| Salinity (ppt) | 5.1 | 14.5 | |
| Temperature ($^{o}$C) | 24.5 | 23.7 | |
| Turbidity (NTU) | 2.7 | 2.7 | 2.7 |
| DO (mg/L) | 6.84 | 7.04 | |
| DO Saturation (%) | 79% | 80% | |
| Suspended Solids (mg/L) | 2.20 | 5.40 | 5.40 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang |  | 23/3/2012 |

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

**Date of Sampling :** 26/3/2012

**Weather :** Sunny

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 14:04 | 14:31 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 8.06 | 8.25 | |
| Salinity (ppt) | 19.7 | 21.9 | |
| Temperature ($^{o}$C) | 20.6 | 21.5 | |
| Turbidity (NTU) | 2.0 | 4.6 | 4.6 |
| DO (mg/L) | 7.24 | 7.13 | |
| DO Saturation (%) | 86% | 83% | |
| Suspended Solids (mg/L) | 4.6 | 4.4 | 4.4 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi Hang | | 26/3/2012 |

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

**Date of Sampling :** 28/3/2012

**Weather :** Sunny

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 13:57 | 13:30 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Normal | |
| Water Depth (m) | <1 | <1 | |
| pH value | 8.10 | 8.21 | |
| Salinity (ppt) | 23.1 | 26.1 | |
| Temperature ($^{o}$C) | 22.2 | 22 | |
| Turbidity (NTU) | 2.0 | 1.0 | 1.0 |
| DO (mg/L) | 7.14 | 6.81 | |
| DO Saturation (%) | 88% | 83% | |
| Suspended Solids (mg/L) | 3.8 | 1.8 | 1.8 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi hang |  | 28/3/2012 |

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

**Date of Sampling :** 30/3/2012

**Weather :** Sunny

| **Monitoring Location** | **W1** | **W2** | |
|---|---|---|---|
| Time (hhmm) | 16:00 | 16:45 | |
| Tide Mode | Mid-ebb | | |
| River Condition | Normal | Turbid | |
| Water Depth (m) | <1 | <1 | |
| pH value | 7.68 | 8.07 | |
| Salinity (ppt) | 16.5 | 22.7 | |
| Temperature ($^{o}$C) | 23 | 22.9 | |
| Turbidity (NTU) | 3.4 | 3.4 | 3.4 |
| DO (mg/L) | 6.53 | 6.89 | |
| DO Saturation (%) | 74% | 78% | |
| Suspended Solids (mg/L) | 1.2 | 10.0 | 10.0 |

Remark or Observation :

| | **Name** | **Signature** | **Date** |
|---|---|---|---|
| **Prepared By :** | Lai Chi hang | | 30/3/2012 |

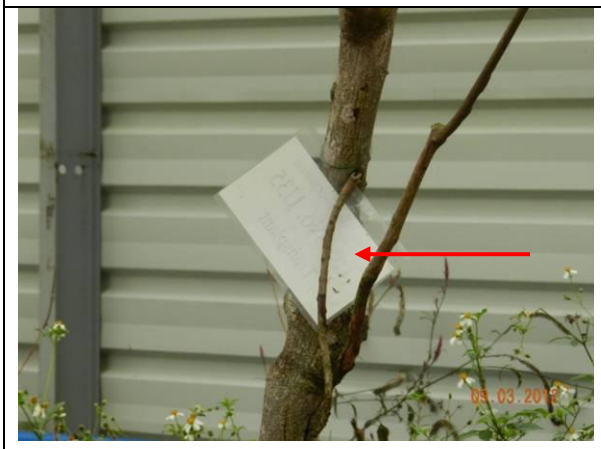
## Appendix F: Hydrological Characteristics Monitoring Data

| Location | Position | Tide | Date** | Time | Weather | Water Depth (m)* | Water Flow (m/s) | Water Flow ($m^3/s$) |
|---|---|---|---|---|---|---|---|---|
| H1 | Mid | Flood | 2-Mar-2012 | 9:23 | Foggy | 0.6 | 0.18 | 0.228 |
| H1 | Mid | Flood | 9-Mar-2012 | | | | | 0.000 |
| H1 | Mid | Flood | 16-Mar-2012 | | | | | 0.000 |
| H1 | Mid | Flood | 23-Mar-2012 | | | | | 0.000 |
| H1 | Mid | Flood | 30-Mar-2012 | 9:44 | Cloudy | 0.6 | 0.06 | 0.075 |
| H2 | Mid | Flood | 2-Mar-2012 | 10:00 | Foggy | 0.18 | 0.06 | 0.377 |
| H2 | Mid | Flood | 9-Mar-2012 | | | | | 0.000 |
| H2 | Mid | Flood | 16-Mar-2012 | | | | | 0.000 |
| H2 | Mid | Flood | 23-Mar-2012 | | | | | 0.000 |
| H2 | Mid | Flood | 30-Mar-2012 | 10:30 | Cloudy | 0.12 | 0.06 | 0.377 |
| H1 | Mid | Ebb | 2-Mar-2012 | | | | | 0.000 |
| H1 | Mid | Ebb | 9-Mar-2012 | 13:07 | Foggy | 0.24 | 0.36 | 0.450 |
| H1 | Mid | Ebb | 16-Mar-2012 | 12:38 | Foggy | 0.36 | 0.18 | 0.225 |
| H1 | Mid | Ebb | 23-Mar-2012 | 13:40 | Sunny | 0.24 | 0.06 | 0.075 |
| H1 | Mid | Ebb | 30-Mar-2012 | 16:00 | Sunny | 0.67 | 0.30 | 0.375 |
| H2 | Mid | Ebb | 2-Mar-2012 | | | | | 0.000 |
| H2 | Mid | Ebb | 9-Mar-2012 | 13:30 | Foggy | 0.06 | 0.18 | 1.130 |
| H2 | Mid | Ebb | 16-Mar-2012 | 13:00 | Foggy | 0.06 | 0.12 | 0.754 |
| H2 | Mid | Ebb | 23-Mar-2012 | 14:12 | Sunny | 0.06 | 0.18 | 1.130 |
| H2 | Mid | Ebb | 30-Mar-2012 | 17:30 | Sunny | 0.12 | 0.06 | 0.377 |

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

**: Only one mid-tide is within working hours of construction activity on 9 Mar, 16 Mar and 23 Mar 12.

## Appendix G: Landscape and Visual Monitoring Photos

| | |
|---|---|
|  |  |
| Photo 1 – **A temporary hoarding was establish to surround the work at Wai Ha River estuary.** | Photo 2 – **A temporary hoarding was established to surround Area B within Tung Tsz Nusery.** |
|  |  |
| Photo 3 – **No polluted water was observed in the pond of the ECA and the adjacent Wai Ha River.** | Photo 4 – **Overall view of the transplanted tree U58 *Grevillea robusta*. New leaves were observed on the tree branches.** |
|  |  |
| Photo 5 – **Tree tag of U35 in Area B was re-tagged by the time of monitoring in March 2012.** | Photo 6 – **Temporary stored construction materials were observed within the TPZs in Area A.** |

| | |
|---|---|
|  |  |
| Photo 7 – **Temporary stored construction materials were observed within the TPZs in Area A.** | Photo 8 – **E22 was in poor health condition after the relocation in Area A.** |
|  |  |
| Photo 9 – **E33 and E34 were in poor health condition after relocation in Area A.** | Photo 10 – **A scaffold branch of E44 in Area A was found injured.** |
|  |  |
| Photo 11 – **Declining health condition of U34 in Area B.** | Photo 12 – **Declining health condition of U35 in Area B.** |

| | |
|---|---|
|  |  |
| Photo 13 – Declining health condition of U37 in Area B. | Photo 14 – Planter of A36 was still found broken in Area B. |
|  |  |
| Photo 15 – Broken planters of U54 and two untagged trees (as indicated) next to U54 in Area B. | Photo 16 – The trunk of the retained tree U15 was found to be mechanically injured. |
|  |  |
| Photo 17 – No sprout was observed on the remaining tree part of T97 in Area B. | Photo 18 – Poor condition of the transplanted tree T152 in Area C. |

| | |
|---|---|
|  |  |
| Photo 19 – **Poor condition of the transplanted tree T153 in Area C.** | Photo 20 – **Poor condition of the transplanted tree T250 in Area C.** |
|  |  |
| Photo 21 – **Poor health condition of the transplanted, untagged tree in Area C.** | Photo 22 – **A planted compensatory tree *Celtis sinensis* (Tree Tag no.: N13) was found fallen down in the monitoring on 9th March 2012. This tree was replanted by the Contractor later in March 2012.** |
|  |  |
| Photo 23 – **The protected shrubs *Pavetta hongkongensis* (PH01 and PH02) showed fair health condition in Area C.** | Photo 24 – **The protected shrub *Pavetta hongkongensis* (PH03) showed fair health condition in Area C.** |

**Appendix H:**

**A)**

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

**B)**

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

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

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| ***A*** | | ***Noise Impact*** | | | | | |
| S 3.30 | 2.18 | Good Site Practice:<br>▪ Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program<br>▪ Silencers or mufflers on construction equipment shall be utilized and shall be properly maintained during the construction program<br>▪ Mobile plant, if any, shall be sited as far from NSRs as possible<br>▪ Machines and plant (such as | To minimize construction noise impacts | Contractor | Works areas | Construction phase | EIAO-TM<br>NCO |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | trucks) that may be in intermittent use shall be shut down between work periods or shall be throttled down to a minimum<br><br>▪ Plant known to emit noise strongly in one direction shall, wherever possible, be orientated so that the noise is directed away from the nearby NSRs<br><br>▪ Material stockpiles and other structures shall be effectively utilized, wherever practicable, in screening noise from on-site construction activities. | | | | | |
| S 3.31 - 3.32 | 2.19 | Use of quieter PME | To minimize construction noise impacts | Contractor | Works areas | Construction phase | EIAO-TM<br>NCO |
| S 3.33 – 3.34 | 2.20-2.21 | Use of temporary noise barrier | To minimize construction noise impacts | Contractor | Works areas as shown in Figure | Construction phase | EIAO-TM<br>NCO |

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

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | ▪ Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather;<br><br>▪ Use of frequent watering for particularly dusty static construction areas and areas close to ASRs;<br><br>▪ Tarpaulin covering of all dusty vehicle loads transported to, from and between site location;<br><br>▪ Establishment and use of vehicle wheel and body washing facilities at the exit points of the site;<br><br>▪ Routing of vehicles and | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | positioning of construction plant should be at the maximum possible distance from ASRs.<br><br>▪ Stockpiled excavated materials should be covered with tarpaulin, and should be removed off-site within 24 hours to avoid any odour nuisance arising. | | | | | |
| ***C*** | | ***Water Quality Impact*** | | | | | |
| S5.29 | 4.5 | Construction Site Run-off and Drainage:<br><br>▪ Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public | To minimize water quality impacts | Contractor | Works sites | Construction phase | ProPECC PN 1/94 Construction Site Drainage |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | sewers/drains.<br><br>▪ Temporary ditches shall be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond. No site run-off shall enter the fishponds at Shuen Wan.<br><br>▪ Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the Water Pollution Control Ordinance. The design of silt removal facilities shall be based on the guidelines provided in ProPECC PN 1/94. All drainage | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.<br><br>▪ Water pumped out from excavated pits shall be discharged into silt removal facilities.<br><br>▪ During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means.<br>Other measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed. | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ▪ Exposed soil areas shall be minimized to reduce potential for increased siltation and contamination of runoff.<br><br>▪ Earthwork final surfaces shall be well compacted and subsequent permanent work or surface protection shall be immediately performed to reduce the potential of soil erosion.<br><br>▪ Open stockpiles of construction materials or construction wastes on-site shall be covered with tarpaulin or similar fabric during rainstorms. | | | | | |
| S5.30 | 4.7 | Further precautionary measures during rainy season: | To minimize water quality impacts to the designated Conservation Area | Contractor | Works areas near the Conservation Area | Rainy seasons during construction | EIAO-TM Water Pollution Control Ordinance |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ▪ For the construction of the box culvert next to the existing channel of the Wai Ha River, sand bags should be deployed around the boundary of the works trench to prevent muddy water ingress into the adjacent CA or Wai Ha River. Sand bags should also be used to surround the excavated trench. Generally, the sand bags will be placed up to a height of 300mm to provide adequate allowance for the built-up water level during rainstorm event. With sand bags in place, surface runoff will be intercepted and flow to Wai Ha River or collected by the existing drainage system as usual.<br>▪ For the construction of the box | | | | phase | (WPCO) |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | culvert in the extreme northeast corner of Shuen Wan Marsh Conservation Area sand bags should be deployed along the limit of the works area to prevent muddy water ingress into the CA. Sand bags should be placed to a height of at least 300mm from ground level and +2.5 mPD (whichever is greater) to provide adequate allowance for the built-up water level during rainstorm events. Unpolluted surface runoff within the works area should then be collected and directed into the existing drainage system.<br>▪ Sheet-piles, which would be installed around the works trench near the Conservation Area, would | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | be extended above ground level for about 2m to serve as hoardings to isolate the works site.<br>▪ Tarpulin sheets would be used to cover the excavation areas during heavy rainstorms. This would prevent the ingress of rainwater into the trench minimising the risk of muddy water getting into Wai Ha River and the adjacent Conservation Area.<br>▪ Any concrete washing water would be contained inside the works site surrounded by the extended sheet piles. A pump sump at the bottom of the trench would be provided to pump any excess water during concrete washing. | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ▪ Stockpiling the excavated materials adjacent to the Conservation Area would not be allowed. The excavated materials would be either removed off site immediately after excavation, or stockpile at location(s) away from the Conservation Area. The stockpile locations shall be approved by the site engineer. | | | | | |
| S5.31-S5.32 | 4.8-4.9 | General Construction Activities:<br>▪ Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering the Wa Ha River and fish ponds at Shuen Wan. Stockpiles of cement and other construction materials should be kept covered | To minimize water quality impacts | Contractor | Works sites | Construction phase | EIAO-TM<br>WPCO |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
|---|---|---|---|---|---|---|---|
| | | when not being used.<br>▪ Oils and fuels should only be used and stored in designated areas which have pollution prevention facilities. To prevent spillage of fuels and solvents to nearby water bodies, all fuel tanks and storage areas should be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund should be drained of rainwater after a rain event. | | | | | |
| S5.33 | 4.10 | Sewage from Construction workforce:<br>▪ Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A | To minimize water quality impacts | Contractor | Works sites | Construction phase | EIAO-TM<br>WPCO |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | licensed contractor would be responsible for appropriate disposal and maintenance of these facilities. | | | | | |
| S5.34 | 4.11 | River Channel Excavation Works:<br>▪ The excavation works within the upstream end of the existing river channel of the Wai Ha River for the construction of the proposed box culvert shall be carried out in dry condition. Containment measures such as bunds and barriers shall be used within the affected length of the river channel and the excavation works restricted to within an enclosed dry section of the channel. The excavation works within Wai Ha River shall be restricted to the period from October | To minimize water quality impacts | Contractor | Works sites | Construction phase | EIAO-TM<br>WPCO |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | to April. | | | | | |
| ***D*** | | ***Waste Management Implications*** | | | | | |
| S6.20 – 6.22 | 5.5 | Good site practices:<br>▪ Nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility.<br>▪ Training of site personnel in proper waste management and chemical waste handling procedures.<br>▪ Provision of sufficient waste disposal points and regular | To reduce waste management impacts | Contractor | Works sites | Construction phase | ETWB TCW No.19/2005<br>ETWB TCW No.31/2004 |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | collection for disposal.<br><br>▪ Appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.<br><br>▪ Separation of chemical waste for special handling and appropriate treatment at the Chemical Waste Treatment Facility.<br><br>▪ Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors.<br><br>▪ A Waste Management Plan | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | should be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No. 15/2003 for details.<br><br>▪ A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed. | | | | | |
| S6.23-6.24 | 5.7 | Waste reduction measures:<br><br>▪ Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.<br><br>▪ To encourage collection of aluminium cans by individual collectors, separate labelled bins | To achieve waste reduction | Contractor | Works sites | Construction phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | shall be provided to segregate this waste from other general refuse generated by the work force.<br><br>▪ Any unused chemicals or those with remaining functional capacity shall be recycled.<br><br>▪ Maximising the use of reusable steel formwork to reduce the amount of C&D material.<br><br>▪ Proper storage and site practices to minimise the potential for damage or contamination of construction materials.<br><br>▪ Plan and stock construction materials carefully to minimise amount of waste generated and | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | avoid unnecessary generation of waste. | | | | | |
| S6.25-6.26 | | Construction & Demolition (C&D) Material:<br>▪ Excavated material with suitable characteristics/size should be reused on-site as fill material as far as practicable, such as for backfilling of the box culvert and drainage pipe works.<br>▪ Suitable areas should be designated within the works site boundaries for temporary stockpiling of C&D material.<br>▪ Within stockpile areas, the following measures should be taken to control potential environmental | To minimize off-site disposal of C&D material<br>To minimize environmental impacts during the handling of C&D material | Contractor | Works sites | Construction phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | impacts or nuisance:<br>- covering material during heavy rainfall;<br>- locating stockpiles to minimize potential visual impacts; and<br>- minimizing land intake of stockpile areas as far as possible.<br>▪ When disposing C&D material at a public filling area, the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | unsuitable by the Filling Supervisor. | | | | | |
| S6.27 | | Chemical waste:<br>▪ Contractor should register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.<br>▪ Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately.<br>▪ Appropriate labels should be securely attached on each chemical waste container indicating the | To minimize environmental impacts during the handling, transportation and disposal of chemical waste | Contractor | Works sites | Construction phase | EIAO-TM<br>Waste Disposal (Chemical Waste) (General) Regulation |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc.<br>▪ The Contractor should use a licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licenced facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. | | | | | |
| S6.28 | | General refuse:<br>▪ It should be stored in enclosed bins or compaction units separate from C&D material.<br>▪ A reputable waste collector | To minimize environmental impacts during the handling and transportation of general refuse | Contractor | Works sites | Construction phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | should be employed by the contractor to remove general refuse from the site, separately from C&D material.<br>▪ An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material. | | | | | |
| ***E*** | | ***Ecological Impact*** | | | | | |
| S. 7.95 | 6.6 | ▪ Sheet-pilings, which will be installed around the trench of excavation, should be extended above ground level for ~2m to act as hoarding to isolate the works site.<br>▪ The trenching works for the construction of the proposed box culvert should be carried out in phases, with a trench length of not | To minimize the impacts on the stream and natural river bank | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | more than 120m in each phase.<br>The trench should be backfilled and compacted with suitable materials upon completion of each phase of the construction works. | | | | | |
| S7.117 | 6.6 | ▪ The construction of intercept point of twin cell box culvert at the upstream of Wai Ha River should be confined to only one side of the river bank.<br>▪ To restore and enhance the ecological value of the stream, the affected river bank should be reinstated to its original condition or lined with rock-filled gabion.<br>▪ Planting pits should be provided in the gabion bank to allow the re-establishment of riparian vegetation. | To minimize the impacts on the stream and natural river bank | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ▪ The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed. | | | | | |
| S 7.118 | 6.7 | ▪ All works carried out within the the river channel of Wai Ha River should be carried out from October to April, with construction carried out by land-based plant.<br>▪ Works within river/stream channels should be restricted to an enclosed dry section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body. | To minimise sedimentation/ water quality impacts | Contractor | Whole Site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ▪ Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimize the risk of sedimentation and pollution of river water.<br>▪ The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions.<br>▪ To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet. | | | | | |
| S 7.119 | 6.8 | ▪ The construction of the proposed box-culvert would have the potential to directly impact a few | To protect plant species of conservation interest | Contractor/ qualified botanist/horticu | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | individual of a plant species of conservation interest (Hong Kong Pavetta, *Pavetta hongkongensis*). The affected individuals should be transplanted to a suitable nearby habitats prior to the construction phase.<br>▪ A detailed vegetation survey of the affected species of conservation interest should be conducted by a suitably qualified botanist/ecologist to identify the affected individuals in order to provide details for transplantation scheme.<br>▪ Transplantation should be supervised by a suitably qualified botanist/horticulturalist. A detailed transplantation methodology should be formulated during the detailed design stage of this Project. | | lturalist | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| S 7.120 | 6.9 | ▪ Noise mitigation measures such as the use of quieter construction plant and temporary noise barriers should be implemented to minimize disturbance to habitats adjacent to the works areas.<br>▪ Temporary noise barriers should be used during the construction of the box-culvert along Tung Tsz Road, the floodwater pumping station, the mechanical gate, and drainage pipe to minimize potential construction phase disturbance to ardeids and avifauna foraging in marsh habitat.<br>▪ Noise generating construction works near the Shuen Wan Egretry SSSI should be avoided as far as practicable during the breeding season (March to June) of the | To minimise disturbance impacts. | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | ardeids.<br>▪ Works near the SSSI (i.e. installation of mechanical gate) should be restricted to be executed outside the breeding season by provision of special conditions in the contract document.<br>▪ Hoardings with minimum height of 2m should be set up along the south side of the proposed box culvert works area adjacent to the marsh, extending at least 20m at both ends, throughout the construction period. | | | | | |
| S 7.121 | 6.10 | ▪ Placement of equipment or stockpile in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural or | To minimise disturbance to habitats. | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | moderate-high ecological value habitats. | | | | | |
| S 7.121 | 6.10 | ▪ Construction activities should be restricted to work areas that would be clearly demarcated. The work areas should be reinstated after completion of the works. | To minimise disturbance to natural habitats outside works area. | Contractor | Whole site | Construction Phase | EIAO-TM |
| S 7.121 | 6.10 | ▪ Waste skips should be provided to collect general refuse and construction wastes. The wastes would be disposed of timely and properly off-site. | To minimise disturbance to habitats. | Contractor | Whole site | Construction Phase | EIAO-TM |
| S 7.121 | 6.10 | ▪ General drainage arrangements should include sediment and oil traps to collect and control construction site run-off. | To minimise sedimentation/ water quality impacts | Contractor | Whole site | Construction Phase | EIAO-TM |
| S 7.121 | 6.10 | ▪ Open burning on works sites is illegal, and should be strictly prohibited. | To prevent accidental hill-fires. | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| S 7.122 | 6.11 | ▪ De-silting should be limited to the dry season. | To minimise sedimentation/ water quality impacts | Maintenance parties of the channel | Whole site | Operation Phase | EIAO-TM |
| S 7.122 | 6.11 | ▪ Waste material produced during de-silting should be disposed of in a timely and appropriate manner. | To minimise sedimentation/ water quality impacts | Maintenance parties of the channel | Whole site | Operation Phase | EIAO-TM |
| S 7.123 | 6.12 | ▪ Planting of trees should be provided within the project area to compensate for the unavoidable loss of approximately 0.08ha secondary woodland habitat due to the Project.<br>▪ Planting of trees and other vegetation within project area along the banks of Wai Ha River and Tung Tsz Road should be carried out to provide compensation for unavoidable tree-felling and loss of riparian vegetation resulting from the | To compensate the loss of vegetation | Contractor | Whole site | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | Project.<br>▪ The compensatory planting should make use of native plant species with flowers/fruits attractive to wildlife. | | | | | |
| S 7.124 | 6.13 | ▪ Compensation would be required for the loss of a small area of marsh habitat (about 0.30ha) within the CA resulting from the construction of the box-culvert.<br>▪ An existing low ecological value recreational fishpond on government land adjacent to the marsh would be used as a proposed area (about 0.8ha) for the compensation for the marsh as well as secondary woodland habitats loss (0.08ha).<br>▪ The pond should be enhanced by removing boardwalks around the | To compensate the loss of marsh habitat and enhance the quality compensatory habitat | Contractor / qualified ecologist | The recreational fish pond located to the southwest of the existing Tung Tsz Nursery | Construction Phase | EIAO-TM |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| | | existing pond, and restoring vegetation along the pond bunds, and it would be re-profiled to provide areas of shallow water (approximately 15-50cm deep), creating a suitable foraging habitat for avifauna, particularly ardeids and other waders.<br>▪ Screen planting of shrubs and trees along the south-eastern bund of the pond should be implemented to minimise disturbance to avifauna and other wildlife from the adjacent recreational fishpond. The enhanced pond is expected to provide a moderate-high ecological value wetland habitat. | | | | | |

| EIA Ref. | EM&A Ref. | Recommended Mitigation Measures | Objectives of the Recommended Measure & Main Concern to Address | Who to implement the measure? | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? |
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| ***F*** | | ***Landscape and Visual*** | | | | | |
| Table 8.4 | 7.6 | Visual screen, contaminant/ liaison with nursery, protection of existing trees with works area and construction light are used or practiced to mitigate the impacts during construction phase. | To mitigate the landscape | Contractor | Whole site | Construction | EIAO-TM |
| Table 8.4 | 7.7 | Viewing area formation, architectural design for pump house, landscape design for pump house, enhancement planting along Tung Tsz Road, sufficient soil depth for enhancement planting, transplanting of trees to adjacent locations, preparation for transplanting and reinstatement of affected area are practiced to mitigate the impacts during operational phase. | To mitigate the landscape and visual impacts during the operational phase. | Contractor | Whole site | Detail Design / Operational Phase | EIAO-TM |

B) Implementation status of environmental protection and mitigation

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

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

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

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

| EM&A Ref. | Recommended Mitgation Measures | Objectives of the Recommended Measure & main concern to Address | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? | Implementation status |
|---|---|---|---|---|---|---|
| 5.5 | A recording system for the amount of wastes generated, recycled and disposed should be proposed | To reduce waste management impacts | Works areas | Construction phase | ETWB TCW No. 19/2005 ETWB TCW NO. 31/2004 | Implemented |
| 5.9 | Adopt a trip ticket system for the disposal of C&D materials | | | | | Implemented |
| 5.11 | All general refuse should be segregated and stored in enclosed bins or compaction units | | | | | Implemented |
| 5.10 | Contractor should be a required to register with the EPD as a Chemical Waste Producer and to follow the guidelines states in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. | To minimize the environmental impacts associated with the handling, transportation and disposal of chemical waste. | Work site | Construction phase | EIAO-TM Waste Disposal (Chemical Waste)(General) Regulation | Implemented |
| | Good quality containers compatible with the chemical wastes should be used, and Incompatible chemicals should be stored separately.<br><br>Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. | | | | | Not applicable |

| EM&A Ref. | Recommended Mitgation Measures | Objectives of the Recommended Measure & main concern to Address | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? | Implementation status |
|---|---|---|---|---|---|---|
| 5.5 | A recording system for the amount of wastes generated, recycled and disposed should be proposed | To reduce waste management impacts | Works areas | Construction phase | ETWB TCW No. 19/2005 ETWB TCW NO. 31/2004 | Implemented |
| 6.6 | Sheet-pilings, which will be installed around the trench of excavation, should be extended above ground level for ~2m to act as hoarding to isolate the works site.<br><br>The trenching works for the construction of the proposed box culvert should be carried out in phases, with a trench length of not more than 120m in each phase. The trench should be backfilled and compacted with suitable materials upon completion of each phase of the construction works. | To minimize the impacts on the steam and natural river bank. | Whole site | Construction phase | EIAO-TM | Implemented |
| 6.6 | The construction of intercept oint of twin cell box culvert at the upstream of Wai Ha River should be confined to only one side of the river bank.<br><br>To restore and enhance the ecological value of the stream, the affected river bank should be reinstated to its original condition or lined with rock-filled gabion.<br><br>Planting pits should be provided in the gabion bank to allow the re-establishment of riparian vegetation. | To minimize the impacts on the steam and natural river bank. | Whole site | Construction phase | EIAO-TM | No applicable |

| EM&A Ref. | Recommended Mitgation Measures | Objectives of the Recommended Measure & main concern to Address | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? | Implementation status |
|---|---|---|---|---|---|---|
| | The existing natural riverbed and substrates should be retained and the natural pool-riffle sequence should be re-created in the new channel bed. | | | | | |
| 6.7 | All works carried out within the the river channel of Wai Ha River should be carried out from October to April, with construction carried out by land-based plant.<br><br>Works within river/stream channels should be restricted to an enclosed dry section of the river, with containment measures such as bunds and barriers used within the river to minimize the impacts upon the downstream water body.<br><br>Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimize the risk of sedimentation and pollution of river water.<br><br>The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions.<br><br>To minimize leakage and loss of sediments during excavation in narrow channels, tightly sealed closed grab excavators should be deployed where material to be handled is wet. | To minimize sedimentation/<br><br>water quality impacts | Whole site | Construction phase | EIAO-TM | No applicable |

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

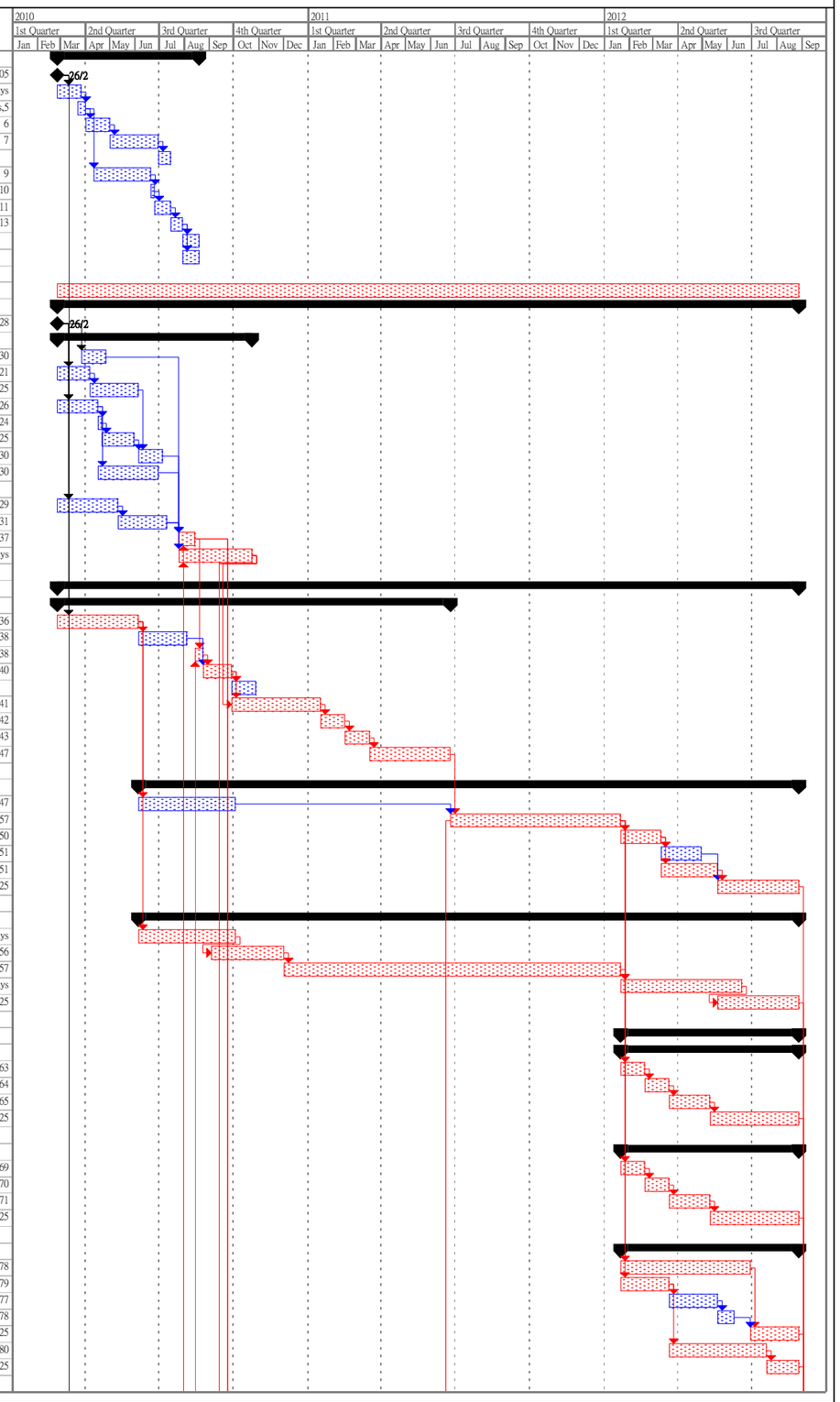
| EM&A Ref. | Recommended Mitgation Measures | Objectives of the Recommended Measure & main concern to Address | Location of the measure | When to implement the measure? | What requirements or standards for the measure to achieve? | Implementation status |
|---|---|---|---|---|---|---|
| 6.13 | Construction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

## Appendix I: Construction programme

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

Master Programme ( Rev. 6)

| ID | ID no. in Rev. 5 | ID no. in Rev. 4 | ID no. in Rev. 3 | ID no. in Rev. 2 | Task Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **1** | **1** | **1** | 1 | **Preliminary Works (Area I - Pak Shek Kok)** | **175 days** | **Fri 26/2/10** | **Thu 19/8/10** | | |
| 2 | 2 | 2 | 2 | 2 | Commencement of Works | 0 days | Fri 26/2/10 | Fri 26/2/10 | | 3,83,88,105 |
| 3 | 3 | 3 | 3 | 3 | Design & Construction of Site Hoarding | 30 days | Fri 26/2/10 | Sat 27/3/10 | 2 | 4FS-5 days |
| 4 | 4 | 4 | 4 | 4 | Site Clearance | 10 days | Tue 23/3/10 | Thu 1/4/10 | 3FS-5 days | 8FS+10 days,5 |
| 5 | 5 | 5 | 5 | 5 | Design of Engineer's Site Office | 30 days | Fri 2/4/10 | Sat 1/5/10 | 4 | 6 |
| 6 | 6 | 6 | 6 | 6 | Construction of Engineer's Site Office | 60 days | Sun 2/5/10 | Wed 30/6/10 | 5 | 7 |
| 7 | 7 | 7 | 7 | 7 | Engineer's Site Office - Setup the Internal Finishing / Furniture/ Equipment | 15 days | Thu 1/7/10 | Thu 15/7/10 | 6 | |
| 8 | 8 | 8 | 8 | 8 | Construction of Contractor's Accommodation | 70 days | Mon 12/4/10 | Sun 20/6/10 | 4FS+10 days | 9 |
| 9 | 9 | 9 | 9 | 9 | Installation of Sewerage Storage Tank | 5 days | Mon 21/6/10 | Fri 25/6/10 | 8 | 10 |
| 10 | 10 | 10 | 10 | 10 | Contractor Accommodation - Setup the Internal Finishing / Furniture / Equipment | 20 days | Sat 26/6/10 | Thu 15/7/10 | 9 | 11 |
| 11 | 11 | 11 | 11 | 11 | Establishment of Vehicular Gate, Storage Area | 15 days | Fri 16/7/10 | Fri 30/7/10 | 10 | 12,13 |
| 12 | 12 | 12 | 12 | 12 | Establishment of Welfare Facilities for Workers | 20 days | Sat 31/7/10 | Thu 19/8/10 | 11 | |
| 13 | 13 | 13 | 13 | | Temporary Drainage System | 20 days | Sat 31/7/10 | Thu 19/8/10 | 11 | |
| 14 | | | | | | | | | | |
| 15 | 15 | 15 | 15 | 15 | **Time for Completion of Section I** | 915 days | Fri 26/2/10 | Tue 28/8/12 | | |
| 16 | **16** | **16** | **16** | 16 | **Section I (Area A,B - Shuen Wan)** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 17 | 17 | 17 | 17 | 17 | Commencement of Works | 0 days | Fri 26/2/10 | Fri 26/2/10 | | 19FS+30 days,35,111,22,20,28 |
| 18 | **18** | **18** | **18** | 18 | **Preliminary Works** | **240 days** | **Fri 26/2/10** | **Sat 23/10/10** | | |
| 19 | 19 | 19 | 19 | 19 | Seek clarification regarding Environmental Permit | 30 days | Sun 28/3/10 | Mon 26/4/10 | 17FS+30 days | 30 |
| 20 | 20 | 20 | 20 | 20 | Design of TTA Scheme for Site Access | 40 days | Fri 26/2/10 | Tue 6/4/10 | 17 | 21 |
| 21 | 21 | 21 | 21 | 21 | Submission of TTA to TMLG for Approval | 60 days | Wed 7/4/10 | Sat 5/6/10 | 20 | 25 |
| 22 | 22 | 22 | 22 | 22 | Site Clearance | 50 days | Fri 26/2/10 | Fri 16/4/10 | 17 | 23,26 |
| 23 | 23 | 23 | 23 | 23 | Project Signboard | 5 days | Sat 17/4/10 | Wed 21/4/10 | 22 | 24 |
| 24 | 24 | 24 | 24 | 24 | Hoarding Erection | 40 days | Thu 22/4/10 | Mon 31/5/10 | 23 | 25 |
| 25 | 25 | 25 | 25 | 25 | Establish Site Access | 30 days | Sun 6/6/10 | Mon 5/7/10 | 24,21 | 30 |
| 26 | 26 | 26 | 26 | 26 | Ground Investigation | 75 days | Sat 17/4/10 | Wed 30/6/10 | 22 | 30 |
| 27 | | | | | | | | | | |
| 28 | 28 | 28 | 28 | 28 | Tree Survey | 75 days | Fri 26/2/10 | Tue 11/5/10 | 17 | 29 |
| 29 | 29 | 29 | 29 | 29 | Submission of Tree Survey Record | 60 days | Wed 12/5/10 | Sat 10/7/10 | 28 | 30,31 |
| 30 | 30 | 30 | 30 | 30 | Tree Felling | 20 days | Mon 26/7/10 | Sat 14/8/10 | 29,139,25,26,19 | 94,99,37 |
| 31 | 31 | 31 | 31 | 31 | Tree Transplanting | 90 days | Mon 26/7/10 | Sat 23/10/10 | 29,139 | 94FS-30 days,99FS-30 days,40FS-30 days |
| 32 | | | | | | | | | | |
| 33 | **33** | **33** | **33** | 33 | **Pumping Station** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 34 | **34** | **34** | **34** | 34 | **Piling Works** | **485 days** | **Fri 26/2/10** | **Sat 25/6/11** | | |
| 35 | 35 | 35 | 35 | 35 | Submission of Method Statement | 100 days | Fri 26/2/10 | Sat 5/6/10 | 17 | 46,54,36 |
| 36 | 36 | 36 | 36 | | Material Ordering & Delivery to Site | 60 days | Sun 6/6/10 | Wed 4/8/10 | 35 | 38 |
| 37 | 37 | 37 | 37 | 36 | Ground Preparation for Piling | 10 days | Sun 15/8/10 | Tue 24/8/10 | 139,30 | 38 |
| 38 | 38 | 38 | 38 | 37 | Preliminary Pile | 35 days | Wed 25/8/10 | Tue 28/9/10 | 37,36 | 39,40 |
| 39 | 39 | 39 | 39 | 39 | Loading Test | 30 days | Wed 29/9/10 | Thu 28/10/10 | 38 | |
| 40 | 40 | 40 | 40 | 38 | Working Piles | 110 days | Wed 29/9/10 | Sun 16/1/11 | 38,31FS-30 days | 41 |
| 41 | 41 | 41 | | | Loading Test for working piles | 30 days | Mon 17/1/11 | Tue 15/2/11 | 40 | 42 |
| 42 | 42 | 42 | 41 | 40 | Sheetpiling | 30 days | Wed 16/2/11 | Thu 17/3/11 | 41 | 43 |
| 43 | 43 | 43 | 42 | 41 | Excavation to Pile Cut Off Level / Shoring | 100 days | Fri 18/3/11 | Sat 25/6/11 | 42 | 47 |
| 44 | | | | | | | | | | |
| 45 | **45** | **45** | **44** | 43 | **Main Structure of Pumping Station** | **815 days** | **Sun 6/6/10** | **Tue 28/8/12** | | |
| 46 | 46 | 46 | 45 | 44 | Temporary Works Submission | 120 days | Sun 6/6/10 | Sun 3/10/10 | 35 | 47 |
| 47 | 47 | 47 | 46 | 45 | Reinforced Concrete Works | 210 days | Sun 26/6/11 | Sat 21/1/12 | 46,43 | 118SS+80 days,75,48,68,62,74,57 |
| 48 | 48 | 48 | 47 | 46 | Roofing | 50 days | Sun 22/1/12 | Sun 11/3/12 | 47 | 49,50 |
| 49 | 49 | 49 | 48 | 47 | Manmade Slope | 50 days | Mon 12/3/12 | Mon 30/4/12 | 48 | 51 |
| 50 | 50 | 50 | 49 | 48 | Internal Finishing Works | 70 days | Mon 12/3/12 | Sun 20/5/12 | 48 | 51 |
| 51 | 51 | 51 | 50 | 49 | External Finishing Works | 100 days | Mon 21/5/12 | Tue 28/8/12 | 50,49 | 125 |
| 52 | | | | | | | | | | |
| 53 | **53** | **53** | **52** | 51 | **E & M** | **815 days** | **Sun 6/6/10** | **Tue 28/8/12** | | |
| 54 | 54 | 54 | 53 | 52 | Submission of E & M Design | 120 days | Sun 6/6/10 | Sun 3/10/10 | 35 | 55FS-30 days |
| 55 | 55 | 55 | 54 | 53 | Approval of E & M Design | 90 days | Sat 4/9/10 | Thu 2/12/10 | 54FS-30 days | 56 |
| 56 | 56 | 56 | 55 | 54 | Fabrication & Delivery of Plant & Material | 415 days | Fri 3/12/10 | Sat 21/1/12 | 55 | 57 |
| 57 | 57 | 57 | 56 | 55 | Plumbing & E&M works | 150 days | Sun 22/1/12 | Tue 19/6/12 | 56,47 | 58FS-30 days |
| 58 | 58 | 58 | 57 | 56 | Final Testing Works | 100 days | Mon 21/5/12 | Tue 28/8/12 | 57FS-30 days | 125 |
| 59 | | | | | | | | | | |
| 60 | **60** | **60** | **59** | 58 | **External Structure** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 61 | **61** | **61** | **60** | 59 | **Pumping Station to Outfall Structure** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 62 | 62 | 62 | 61 | 60 | Installation of Cofferdam & Site Hoarding Phase 2 | 30 days | Sun 22/1/12 | Mon 20/2/12 | 47 | 63 |
| 63 | 63 | 63 | 62 | 61 | Excavation | 30 days | Tue 21/2/12 | Wed 21/3/12 | 62 | 64 |
| 64 | 64 | 64 | 63 | 62 | Constrcution of 2nos. of 1500mm dia. Drainage Pipes | 50 days | Thu 22/3/12 | Thu 10/5/12 | 63 | 65 |
| 65 | 65 | 65 | 64 | 63 | 2 nos. of Outfall Structures | 110 days | Fri 11/5/12 | Tue 28/8/12 | 64 | 125 |
| 66 | | | | | | | | | | |
| 67 | **67** | **67** | **66** | 65 | **Tide Level Monitoring Chamber** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 68 | 68 | 68 | 67 | 66 | Installation of Cofferdam & Site Hoarding Phase 2 | 30 days | Sun 22/1/12 | Mon 20/2/12 | 47 | 69 |
| 69 | 69 | 69 | 68 | 67 | Excavation | 30 days | Tue 21/2/12 | Wed 21/3/12 | 68 | 70 |
| 70 | 70 | 70 | 69 | 68 | Construction of Pipe & Tide Level Monitoring Chambers | 50 days | Thu 22/3/12 | Thu 10/5/12 | 69 | 71 |
| 71 | 71 | 71 | 70 | 69 | Outfall Structure | 110 days | Fri 11/5/12 | Tue 28/8/12 | 70 | 125 |
| 72 | | | | | | | | | | |
| 73 | **73** | **73** | **72** | 71 | **External Misc. Works** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 74 | 74 | 74 | 73 | 72 | Boundary Wall & Fencing | 160 days | Sun 22/1/12 | Fri 29/6/12 | 47 | 78 |
| 75 | 75 | 75 | 74 | 73 | 3nos. of Flow Measurement chambers and Pipes | 60 days | Sun 22/1/12 | Wed 21/3/12 | 47 | 76,79 |
| 76 | 76 | 76 | 75 | 74 | Surface Drainage System & Catchpits | 60 days | Thu 22/3/12 | Sun 20/5/12 | 75 | 77 |
| 77 | 77 | 77 | 76 | 76 | Concrete Pavement | 20 days | Mon 21/5/12 | Sat 9/6/12 | 76 | 78 |
| 78 | 78 | 78 | 77 | 77 | Landscaping Works | 60 days | Sat 30/6/12 | Tue 28/8/12 | 77,74 | 125 |
| 79 | 79 | 79 | 78 | | 225mm dia. Sewer Across Ting Kok Road and Connection to Existing Manholes | 120 days | Thu 22/3/12 | Thu 19/7/12 | 75 | 80 |
| 80 | 80 | 80 | | | Sewer Manhole SM1 | 40 days | Fri 20/7/12 | Tue 28/8/12 | 79 | 125 |
| 81 | | | | | | | | | | |



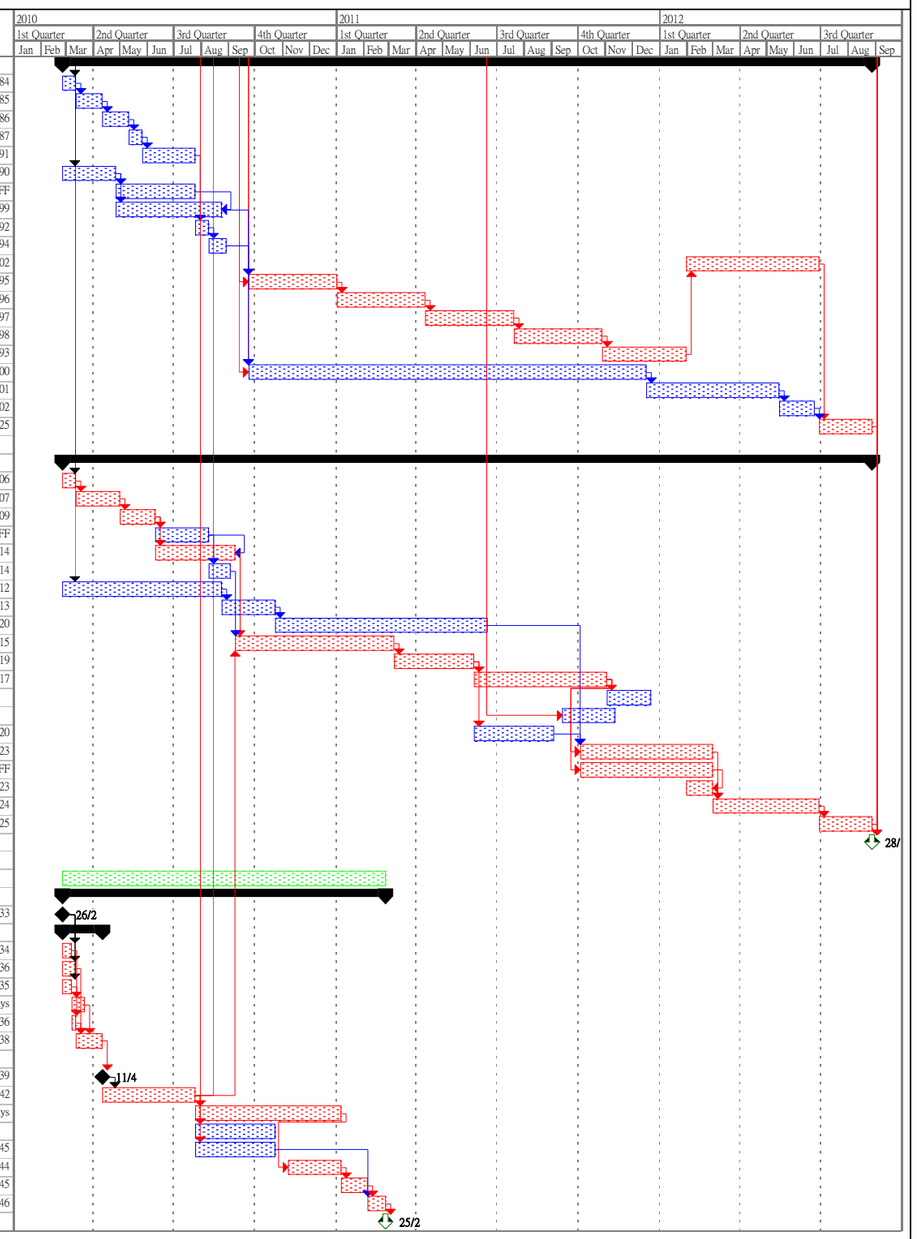

Master Programme - Rev. 6
Data Date: 2010-2-26

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

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

Master Programme ( Rev. 6)

| ID | ID no. in Rev. 5 | ID no. in Rev. 4 | ID no. in Rev. 3 | ID no. in Rev. 2 | Task Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|---|---|---|---|
| 82 | **82** | **82** | **80** | 79 | **Twin Cell Box Culvert** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 83 | 83 | 83 | 81 | 80 | Liaison with LCSD | 15 days | Fri 26/2/10 | Fri 12/3/10 | 2 | 84 |
| 84 | 84 | 84 | 82 | 81 | Determination of Box Culvert Alignment | 30 days | Sat 13/3/10 | Sun 11/4/10 | 83 | 85 |
| 85 | 85 | 85 | 83 | 82 | Record Survey | 30 days | Mon 12/4/10 | Tue 11/5/10 | 84 | 86 |
| 86 | 86 | 86 | 84 | 83 | Condition Survey of Existing Structure | 15 days | Wed 12/5/10 | Wed 26/5/10 | 85 | 87 |
| 87 | 87 | 87 | 85 | 84 | Submission of Method Statement to LCSD | 60 days | Thu 27/5/10 | Sun 25/7/10 | 86 | 91 |
| 88 | 88 | 88 | 86 | 85 | Design of Temporary Traffic Arrangement | 60 days | Fri 26/2/10 | Mon 26/4/10 | 2 | 89,90 |
| 89 | 89 | 89 | 87 | 86 | Submission of TTA to TMLG for Approval | 90 days | Tue 27/4/10 | Sun 25/7/10 | 88 | 90FF |
| 90 | 90 | 90 | 88 | 87 | Excavation Permit | 120 days | Tue 27/4/10 | Tue 24/8/10 | 88,89FF | 99 |
| 91 | 91 | 91 | 89 | 88 | Temporary Removal of Structure and Facilities / Reprovision | 15 days | Mon 26/7/10 | Mon 9/8/10 | 87 | 92 |
| 92 | 92 | 92 | | | Provision of Temporary Irrigation Pipes | 20 days | Tue 10/8/10 | Sun 29/8/10 | 91 | 94 |
| 93 | 93 | 93 | 91 | 89 | Box Culvert at Chainage 0 - 25 | 150 days | Wed 1/2/12 | Fri 29/6/12 | 98 | 102 |
| 94 | 94 | 94 | 92 | 90 | Box Culvert at Chainage 25 - 75 | 100 days | Fri 24/9/10 | Sat 1/1/11 | 31FS-30 days,30,92 | 95 |
| 95 | 95 | 95 | 93 | 91 | Box Culvert at Chainage 75 - 125 | 100 days | Sun 2/1/11 | Mon 11/4/11 | 94 | 96 |
| 96 | 96 | 96 | 94 | 92 | Box Culvert at Chainage 125 - 175 | 100 days | Tue 12/4/11 | Wed 20/7/11 | 95 | 97 |
| 97 | 97 | 97 | 95 | 93 | Box Culvert at Chainage 175 - 225 | 100 days | Thu 21/7/11 | Fri 28/10/11 | 96 | 98 |
| 98 | 98 | 98 | 96 | 94 | Box Culvert at Chainage 225 - 275 | 95 days | Sat 29/10/11 | Tue 31/1/12 | 97 | 93 |
| 99 | 99 | 99 | 97 | 95 | Box Culvert at Chainae 275 - 300 | 450 days | Fri 24/9/10 | Sat 17/12/11 | 90,31FS-30 days,30 | 100 |
| 100 | 100 | 100 | 98 | 96 | Box Culvert at Chainage 300 - 350 (Including Outfall & Desilting Chamber) | 150 days | Sun 18/12/11 | Tue 15/5/12 | 99 | 101 |
| 101 | 101 | 101 | 99 | | 1200mm dia. Drainage Pipe | 40 days | Wed 16/5/12 | Sun 24/6/12 | 100 | 102 |
| 102 | 102 | 102 | 100 | 97 | Reinstallation and Reinstatement of Existing Structure, Facilities and Trees | 60 days | Sat 30/6/12 | Tue 28/8/12 | 93,101 | 125 |
| 103 | | | | | | | | | | |
| 104 | **104** | **104** | **102** | 99 | **Dia. 2100mm Drainage Pipe** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 105 | 105 | 105 | 103 | 100 | Record Survey | 15 days | Fri 26/2/10 | Fri 12/3/10 | 2 | 106 |
| 106 | 106 | 106 | 104 | 101 | Site Investigation (Trial Pit) | 50 days | Sat 13/3/10 | Sat 1/5/10 | 105 | 107 |
| 107 | 107 | 107 | 105 | 102 | Design of Temporary Traffic Arrangement | 40 days | Sun 2/5/10 | Thu 10/6/10 | 106 | 108,109 |
| 108 | 108 | 108 | 106 | 103 | Submission of TTA to TMLG for Approval | 60 days | Fri 11/6/10 | Mon 9/8/10 | 107 | 110,109FF |
| 109 | 109 | 109 | 107 | 104 | Excavation Permit | 90 days | Fri 11/6/10 | Wed 8/9/10 | 107,108FF | 114 |
| 110 | 110 | 110 | 108 | | Liaison with HyD / LCSD for Planter Removal | 25 days | Tue 10/8/10 | Fri 3/9/10 | 108 | 114 |
| 111 | 111 | 111 | 109 | 105 | E&M Design of Penstocks | 180 days | Fri 26/2/10 | Tue 24/8/10 | 17 | 112 |
| 112 | 112 | 112 | 110 | 106 | Submission for Approval | 60 days | Wed 25/8/10 | Sat 23/10/10 | 111 | 113 |
| 113 | 113 | 113 | 111 | 107 | Fabrication & Delivery of Penstocks | 240 days | Sun 24/10/10 | Mon 20/6/11 | 112 | 120 |
| 114 | 114 | 114 | 112 | 108 | MH 04 to MH 05 | 180 days | Thu 9/9/10 | Mon 7/3/11 | 109,139,110 | 115 |
| 115 | 115 | 115 | 113 | 109 | MH 03 to MH 04 | 90 days | Tue 8/3/11 | Sun 5/6/11 | 114 | 116,119 |
| 116 | 116 | 116 | 114 | 110 | Intake to MH 03 | 150 days | Mon 6/6/11 | Wed 2/11/11 | 115 | 120FS-30 days,121FS-30 days,117 |
| 117 | 117 | 117 | 115 | 115 | Reinstatement of Existing Planter | 50 days | Thu 3/11/11 | Thu 22/12/11 | 116 | |
| 118 | 118 | 118 | 116 | 111 | MH 05 to MH 06 | 60 days | Wed 14/9/11 | Sat 12/11/11 | 47SS+80 days | |
| 119 | 119 | 119 | | | Temporary Drainage Management Plan | 90 days | Mon 6/6/11 | Sat 3/9/11 | 115 | 120 |
| 120 | 120 | 120 | 118 | 112 | Intake (As required in Dry Season) | 150 days | Tue 4/10/11 | Thu 1/3/12 | 116FS-30 days,113,119 | 123 |
| 121 | 121 | 121 | 119 | 113 | Modification of Existing Outlet Structure of Wai Ha River | 150 days | Tue 4/10/11 | Thu 1/3/12 | 116FS-30 days | 122FF |
| 122 | 122 | 122 | 120 | 114 | Installation of 4 nos of Mechanical Penstocks | 30 days | Wed 1/2/12 | Thu 1/3/12 | 121FF | 123 |
| 123 | 123 | 123 | 121 | | E & M Works | 120 days | Fri 2/3/12 | Fri 29/6/12 | 122,120 | 124 |
| 124 | 124 | 124 | 122 | | Misc. Works & Reinstatement | 60 days | Sat 30/6/12 | Tue 28/8/12 | 123 | 125 |
| 125 | 125 | 125 | 123 | 116 | **Completion of Section I** | 0 days | Tue 28/8/12 | Tue 28/8/12 | 78,124,102,51,58,65,71,80 | |
| 126 | | | | | | | | | | |
| 127 | 127 | 127 | 125 | 118 | **Time for Completion of Section II** | 365 days | Fri 26/2/10 | Fri 25/2/11 | | |
| 128 | **128** | **128** | **126** | 119 | **Section II (Area C - Ecological Compensation Area at Shuen Wan)** | **365 days** | **Fri 26/2/10** | **Fri 25/2/11** | | |
| 129 | 129 | 129 | 127 | 120 | Commencement of Works | 0 days | Fri 26/2/10 | Fri 26/2/10 | | 131,132,133 |
| 130 | **130** | **130** | **128** | 121 | **Preliminary Works** | **45 days** | **Fri 26/2/10** | **Sun 11/4/10** | | |
| 131 | 131 | 131 | 129 | 122 | Site Clearance | 10 days | Fri 26/2/10 | Sun 7/3/10 | 129 | 134 |
| 132 | 132 | 132 | 130 | 123 | Hoarding Erection | 15 days | Fri 26/2/10 | Fri 12/3/10 | 129 | 136 |
| 133 | 133 | 133 | 131 | 124 | Pumping Water out of Pond | 10 days | Fri 26/2/10 | Sun 7/3/10 | 129 | 135 |
| 134 | 134 | 134 | 132 | 125 | Check actual Tidal against Predicted Tidal Level | 15 days | Mon 8/3/10 | Mon 22/3/10 | 131 | 136FS-10 days |
| 135 | 135 | 135 | 133 | 126 | Survey Existing Pond Bed | 5 days | Mon 8/3/10 | Fri 12/3/10 | 133 | 136 |
| 136 | 136 | 136 | 134 | 127 | Design of of Ecological Compensation Area | 30 days | Sat 13/3/10 | Sun 11/4/10 | 135,134FS-10 days,132 | 138 |
| 137 | | | | | | | | | | |
| 138 | 138 | 138 | 136 | 129 | Submission of Design of Ecological Compensation Area to EPD for Approval | 0 days | Sun 11/4/10 | Sun 11/4/10 | 136 | 139 |
| 139 | 139 | 139 | 137 | 130 | Refer to Permit Requirement plus 15 weeks for Approval and Commencement of Works | 105 days | Mon 12/4/10 | Sun 25/7/10 | 138 | 140,114,30,31,37,141,142 |
| 140 | 140 | 140 | 138 | 131 | Fill of Pond to Designed Level | 165 days | Mon 26/7/10 | Thu 6/1/11 | 139 | 143FS-60 days |
| 141 | 141 | 141 | 139 | 132 | Transplanting | 90 days | Mon 26/7/10 | Sat 23/10/10 | 139 | |
| 142 | 142 | 142 | | | Temporary Drainage Management Plan | 90 days | Mon 26/7/10 | Sat 23/10/10 | 139 | 145 |
| 143 | 143 | 143 | 141 | 133 | Planting Works at Upper Level | 60 days | Mon 8/11/10 | Thu 6/1/11 | 140FS-60 days | 144 |
| 144 | 144 | 144 | 142 | 134 | Planting Works at Lower Level | 30 days | Fri 7/1/11 | Sat 5/2/11 | 143 | 145 |
| 145 | 145 | 145 | 143 | 135 | Setting up Water Circulation System | 20 days | Sun 6/2/11 | Fri 25/2/11 | 144,142 | 146 |
| 146 | 146 | 146 | 144 | 136 | **Completion of Section II** | 0 days | Fri 25/2/11 | Fri 25/2/11 | 145 | |




Master Programme - Rev. 6
Data Date: 2010-2-26

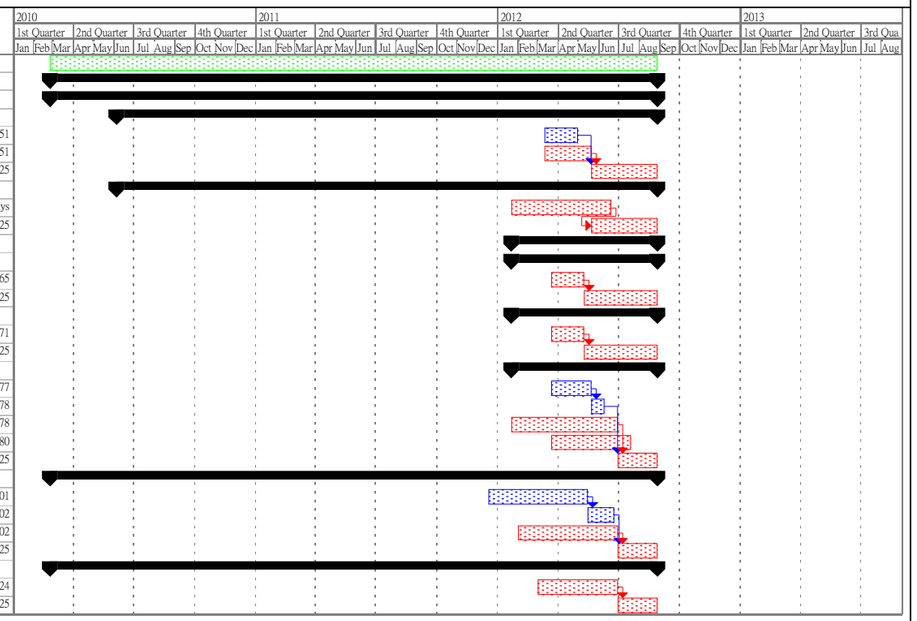
Task | Progress | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary
Critical Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Deadline

## Appendix J: Three month rolling programme

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

Master Programme ( Rev. 6)

| ID | ID no. in Rev. 5 | ID no. in Rev. 4 | ID no. in Rev. 3 | ID no. in Rev. 2 | Task Name | Duration | Start | Finish | Predecessors | Successors |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 15 | 15 | 15 | 15 | **Time for Completion of Section I** | 915 days | Fri 26/2/10 | Tue 28/8/12 | | |
| 16 | **16** | **16** | **16** | 16 | **Section I (Area A,B - Shuen Wan)** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 33 | **33** | **33** | **33** | 33 | **Pumping Station** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 45 | **45** | **45** | **44** | 43 | **Main Structure of Pumping Station** | **815 days** | **Sun 6/6/10** | **Tue 28/8/12** | | |
| 49 | 49 | 49 | 48 | 47 | Manmade Slope | 50 days | Mon 12/3/12 | Mon 30/4/12 | 48 | 51 |
| 50 | 50 | 50 | 49 | 48 | Internal Finishing Works | 70 days | Mon 12/3/12 | Sun 20/5/12 | 48 | 51 |
| 51 | 51 | 51 | 50 | 49 | External Finishing Works | 100 days | Mon 21/5/12 | Tue 28/8/12 | 50,49 | 125 |
| 53 | **53** | **53** | **52** | 51 | **E & M** | **815 days** | **Sun 6/6/10** | **Tue 28/8/12** | | |
| 57 | 57 | 57 | 56 | 55 | Plumbing & E&M works | 150 days | Sun 22/1/12 | Tue 19/6/12 | 56,47 | 58FS-30 days |
| 58 | 58 | 58 | 57 | 56 | Final Testing Works | 100 days | Mon 21/5/12 | Tue 28/8/12 | 57FS-30 days | 125 |
| 60 | **60** | **60** | **59** | 58 | **External Structure** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 61 | **61** | **61** | **60** | 59 | **Pumping Station to Outfall Structure** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 64 | 64 | 64 | 63 | 62 | Constrcution of 2nos. of 1500mm dia. Drainage Pipes | 50 days | Thu 22/3/12 | Thu 10/5/12 | 63 | 65 |
| 65 | 65 | 65 | 64 | 63 | 2 nos. of Outfall Structures | 110 days | Fri 11/5/12 | Tue 28/8/12 | 64 | 125 |
| 67 | **67** | **67** | **66** | 65 | **Tide Level Monitoring Chamber** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 70 | 70 | 70 | 69 | 68 | Construction of Pipe & Tide Level Monitoring Chambers | 50 days | Thu 22/3/12 | Thu 10/5/12 | 69 | 71 |
| 71 | 71 | 71 | 70 | 69 | Outfall Structure | 110 days | Fri 11/5/12 | Tue 28/8/12 | 70 | 125 |
| 73 | **73** | **73** | **72** | 71 | **External Misc. Works** | **220 days** | **Sun 22/1/12** | **Tue 28/8/12** | | |
| 76 | 76 | 76 | 75 | 74 | Surface Drainage System & Catchpits | 60 days | Thu 22/3/12 | Sun 20/5/12 | 75 | 77 |
| 77 | 77 | 77 | 76 | 76 | Concrete Pavement | 20 days | Mon 21/5/12 | Sat 9/6/12 | 76 | 78 |
| 74 | 74 | 74 | 73 | 72 | Boundary Wall & Fencing | 160 days | Sun 22/1/12 | Fri 29/6/12 | 47 | 78 |
| 79 | 79 | 79 | 78 | | 225mm dia. Sewer Across Ting Kok Road and Connection to Existing Manholes | 120 days | Thu 22/3/12 | Thu 19/7/12 | 75 | 80 |
| 78 | 78 | 78 | 77 | 77 | Landscaping Works | 60 days | Sat 30/6/12 | Tue 28/8/12 | 77,74 | 125 |
| 82 | **82** | **82** | **80** | 79 | **Twin Cell Box Culvert** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 100 | 100 | 100 | 98 | 96 | Box Culvert at Chainage 300 - 350 (Including Outfall & Desilting Chamber) | 150 days | Sun 18/12/11 | Tue 15/5/12 | 99 | 101 |
| 101 | 101 | 101 | 99 | | 1200mm dia. Drainage Pipe | 40 days | Wed 16/5/12 | Sun 24/6/12 | 100 | 102 |
| 93 | 93 | 93 | 91 | 89 | Box Culvert at Chainage 0 - 25 | 150 days | Wed 1/2/12 | Fri 29/6/12 | 98 | 102 |
| 102 | 102 | 102 | 100 | 97 | Reinstallation and Reinstatement of Existing Structure, Facilities and Trees | 60 days | Sat 30/6/12 | Tue 28/8/12 | 93,101 | 125 |
| 104 | **104** | **104** | **102** | 99 | **Dia. 2100mm Drainage Pipe** | **915 days** | **Fri 26/2/10** | **Tue 28/8/12** | | |
| 123 | 123 | 123 | 121 | | E & M Works | 120 days | Fri 2/3/12 | Fri 29/6/12 | 122,120 | 124 |
| 124 | 124 | 124 | 122 | | Misc. Works & Reinstatement | 60 days | Sat 30/6/12 | Tue 28/8/12 | 123 | 125 |

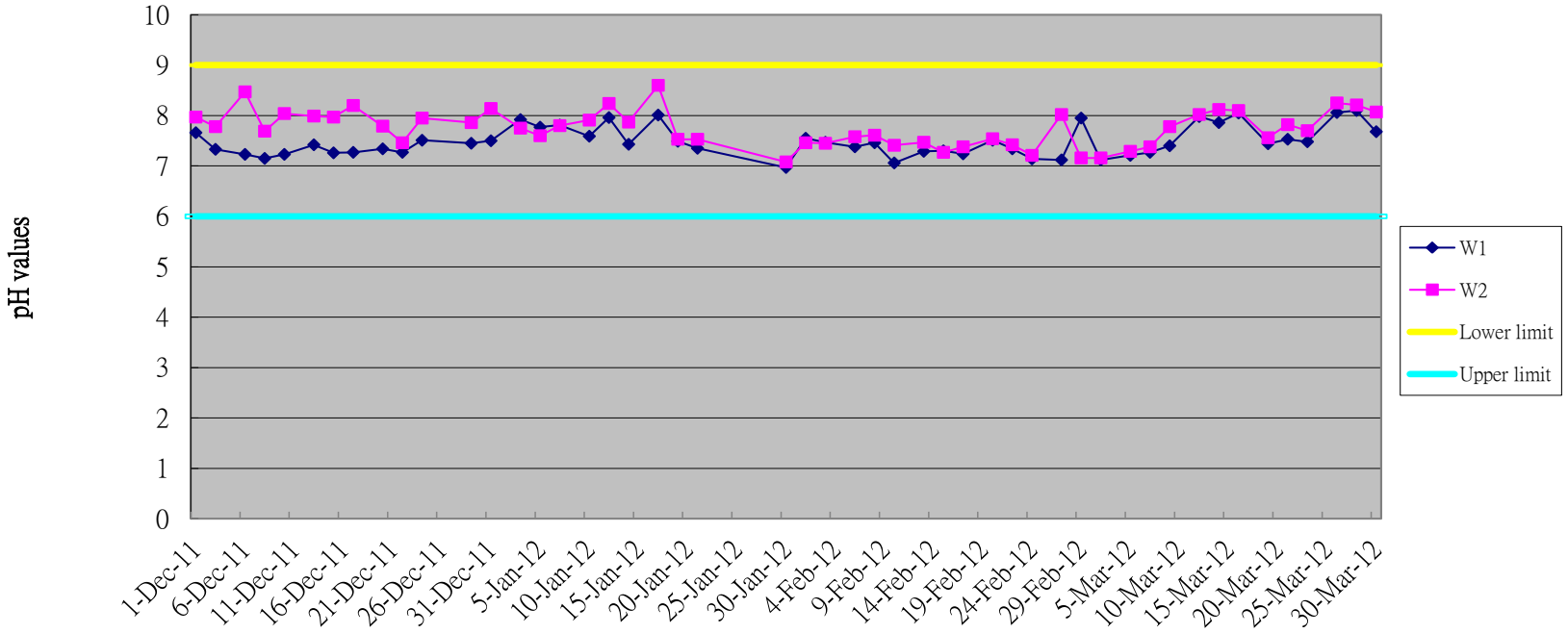



Master Programme - Rev. 6
Data Date: 2010-2-26

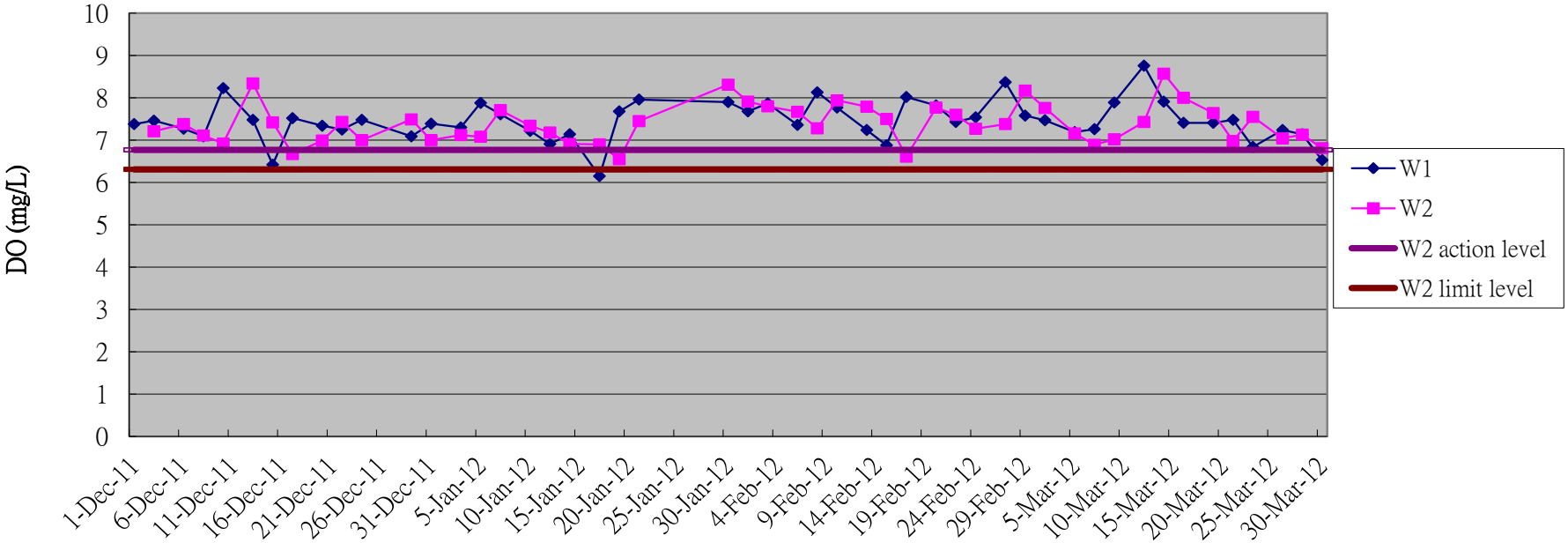
Task | Progress | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary
Critical Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Deadline

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

Graphical plots of pH values W1&W2

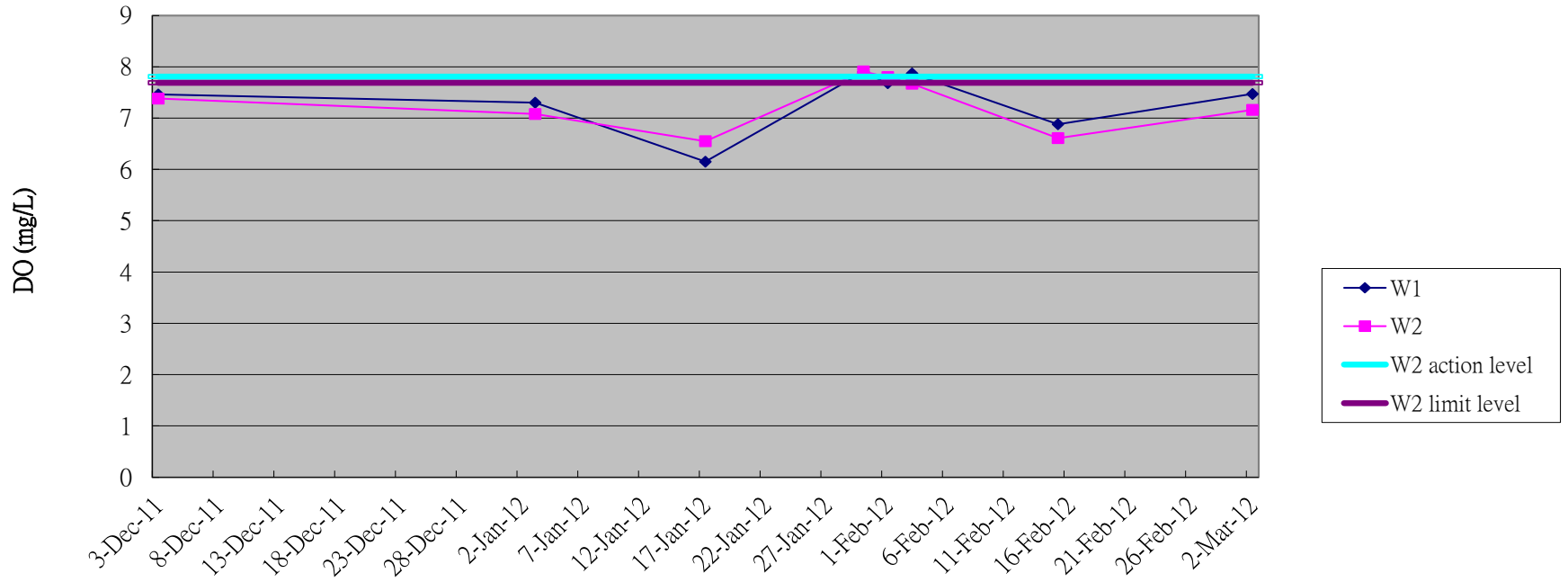


Graphical plots of DO (ebb tide) for W1&W2

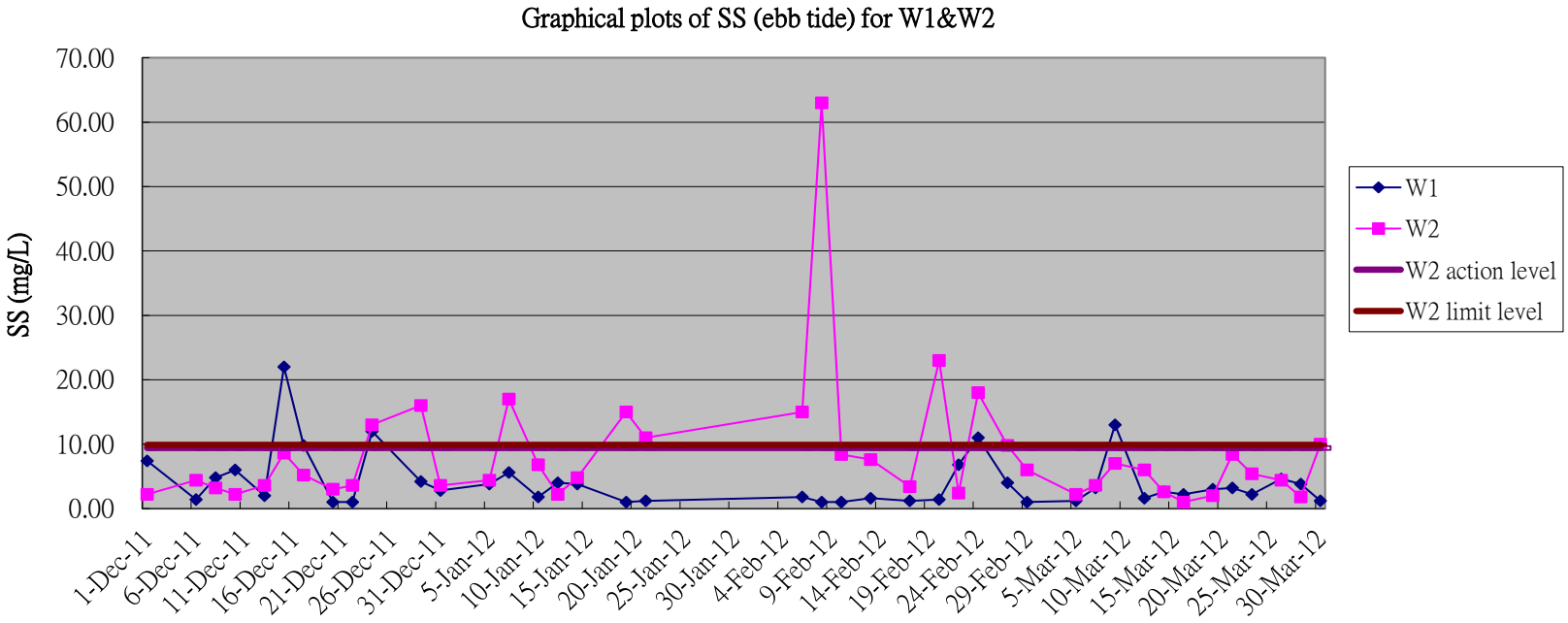



Remarks: Action level: 5 percentile of baceline data
Limit level: 1 percentile of baceline data

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

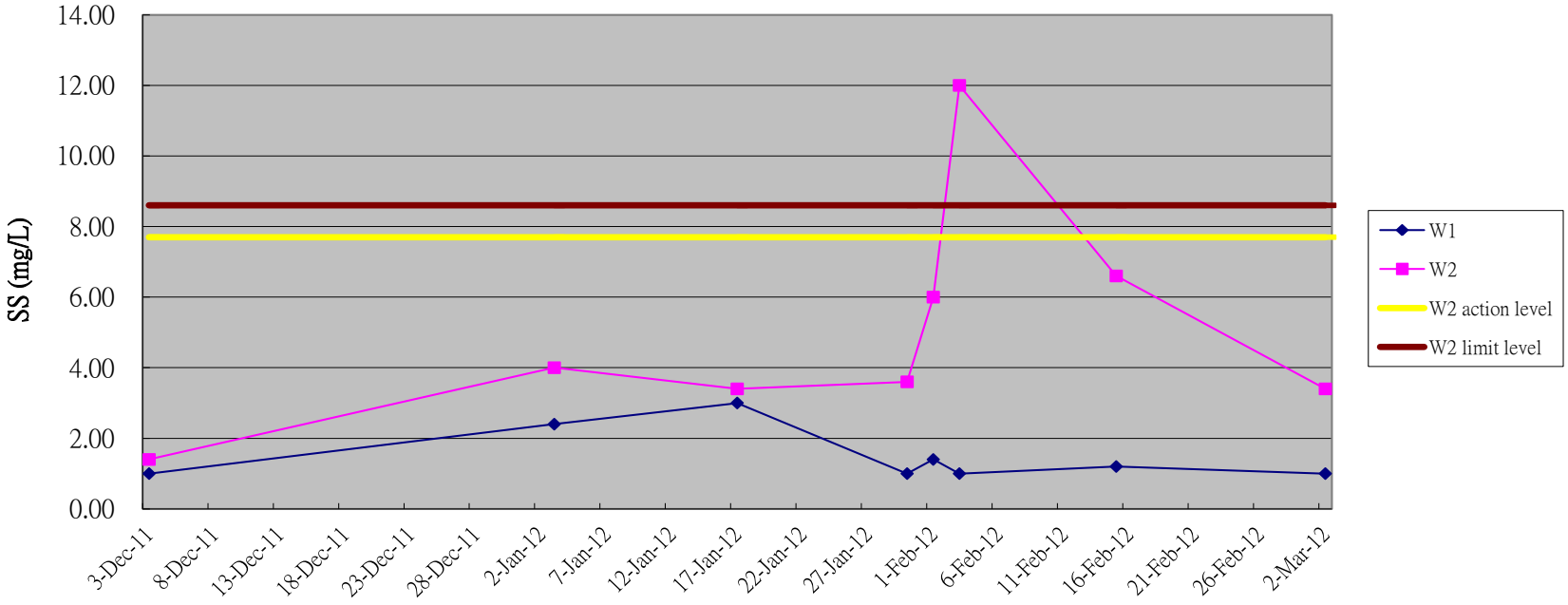



Remarks: Action level: 5 percentile of baceline data
Limit level: 1 percentile of baceline data



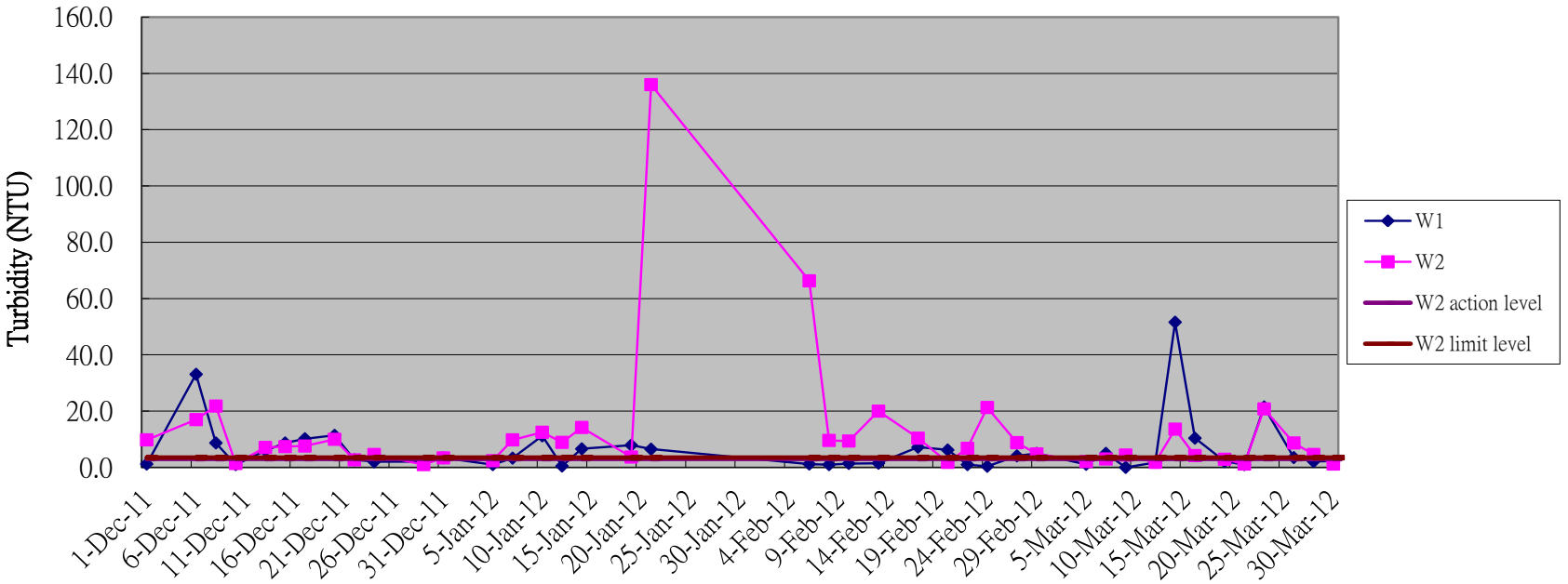

Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's SS
Limit level is 99% of baseline data or 130% of upsteam control station's SS

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



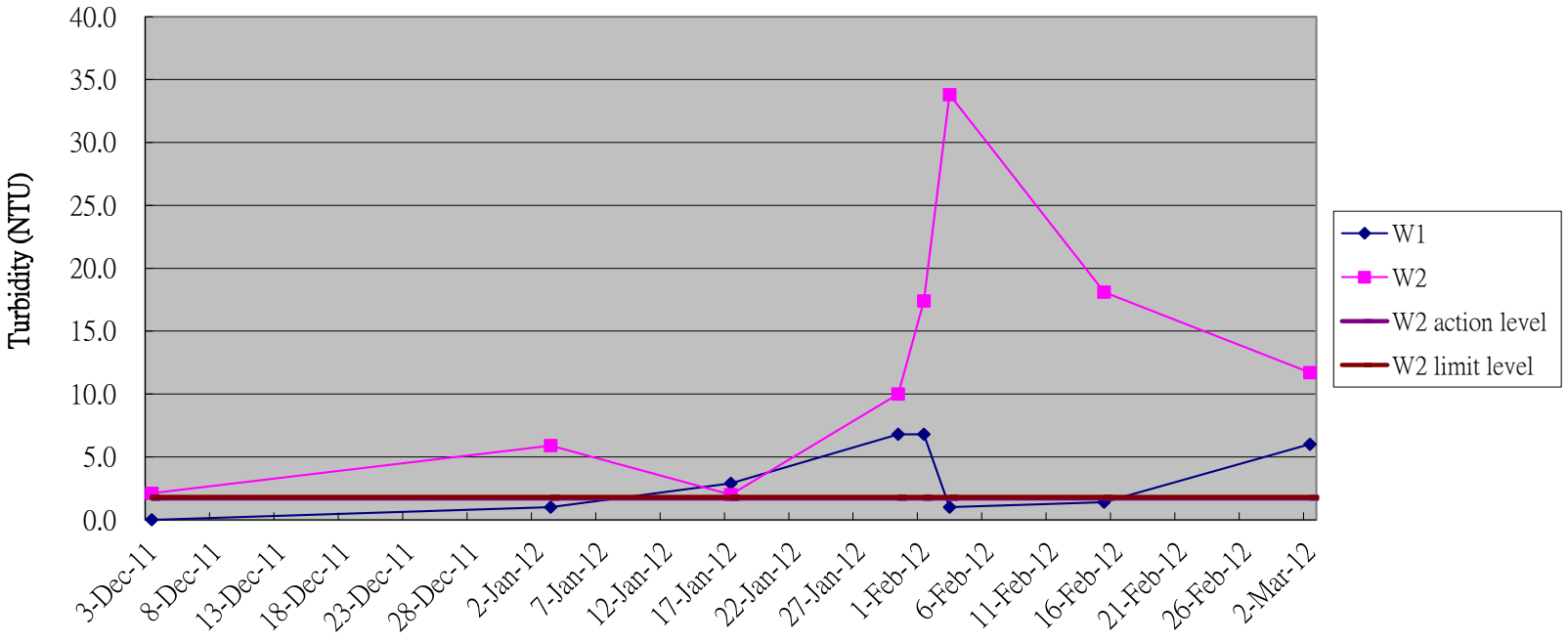

Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's SS
Limit level is 99% of baseline data or 130% of upsteam control station's SS

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



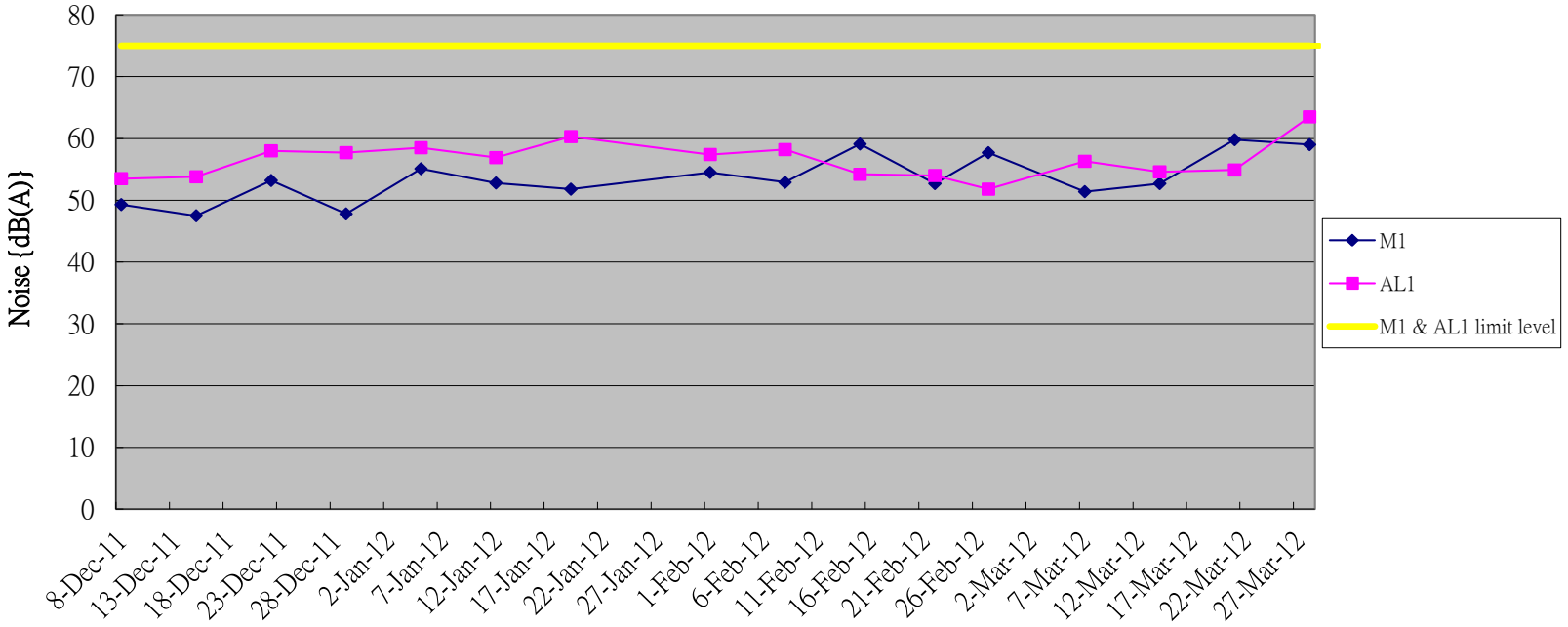

Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's Turbidity
Limit level is 99% of baseline data or 130% of upsteam control station's Turbidity

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



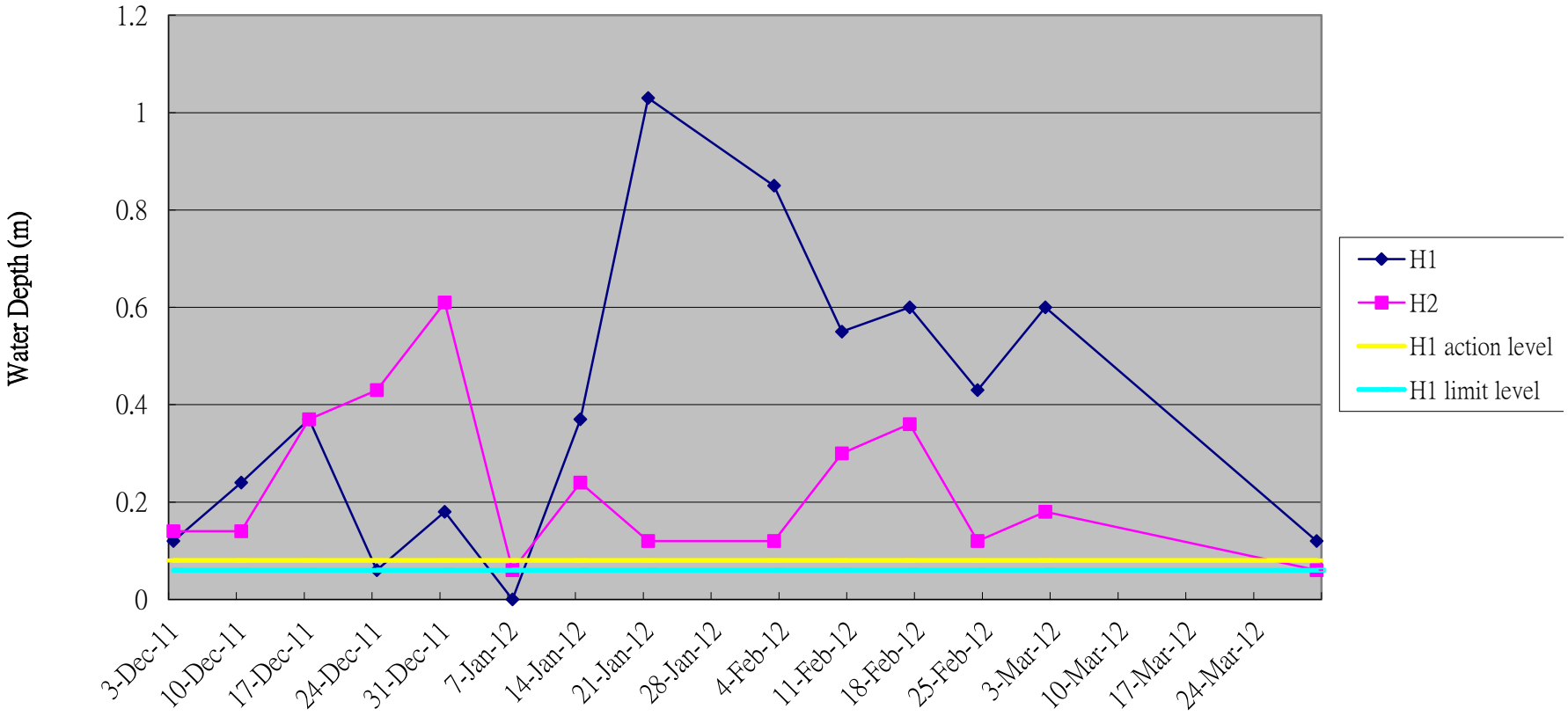

Remarks: Action limit is 95% of baseline data or 120% of upsteam control station's Turbidity
Limit level is 99% of baseline data or 130% of upsteam control station's Turbidity

Graphical plots of Noise for M1 & AL1



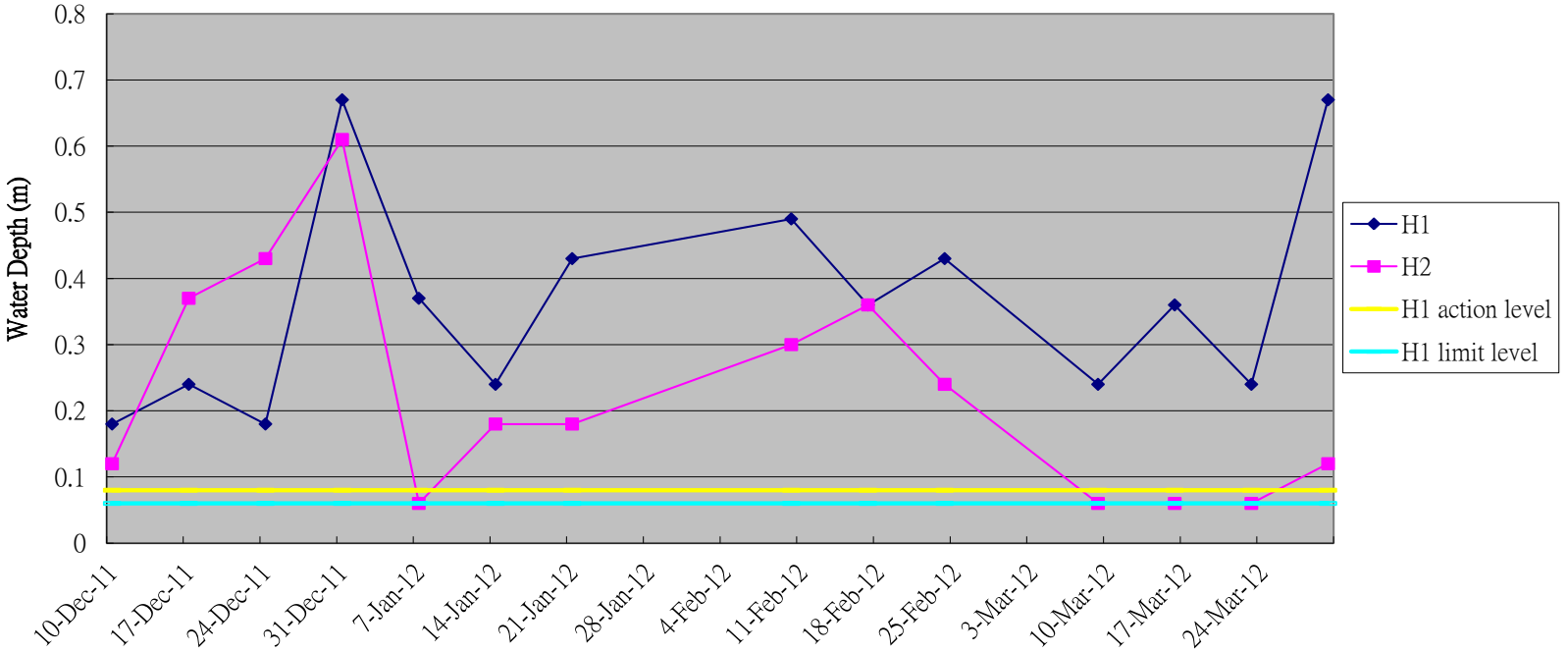

Remarks: Action limit is when one documented complaint is received

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



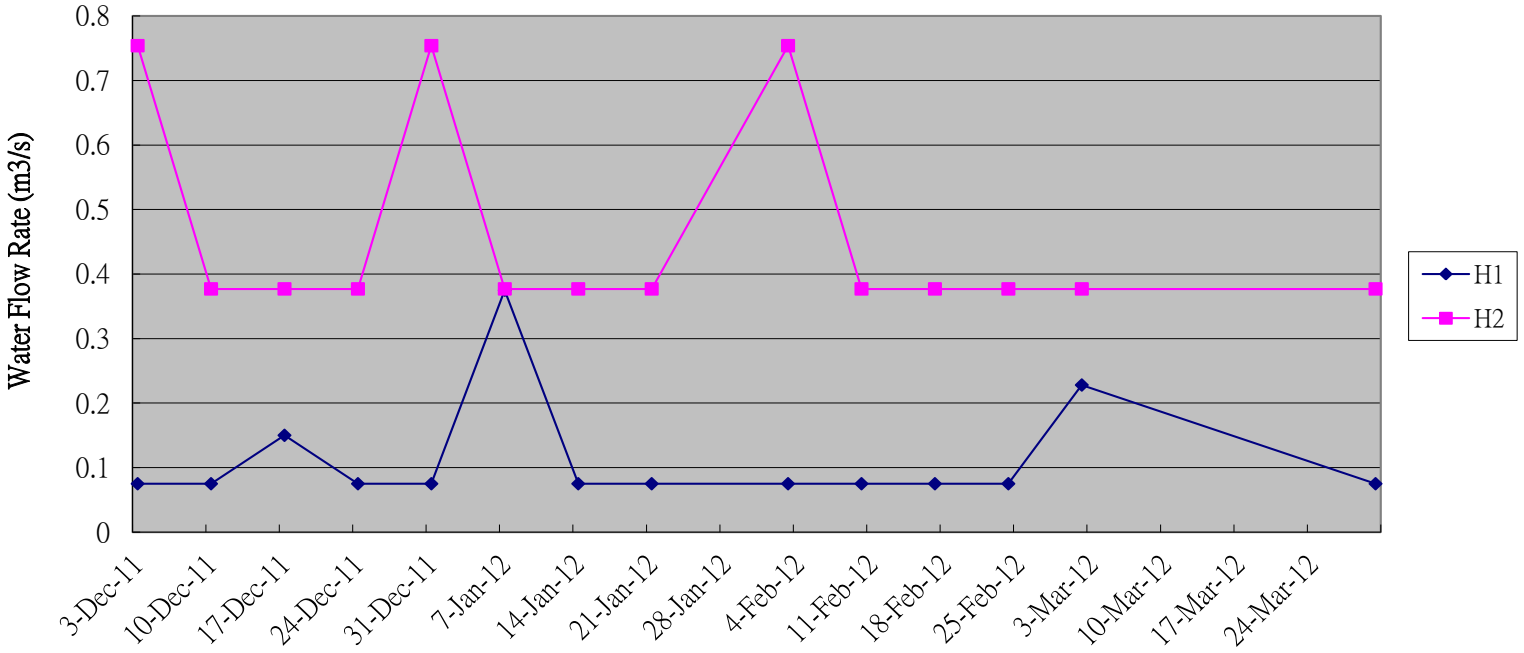

Remarks: Action level: 80% of baseline water depth.
Limit level: 60% of baseline water depth.

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



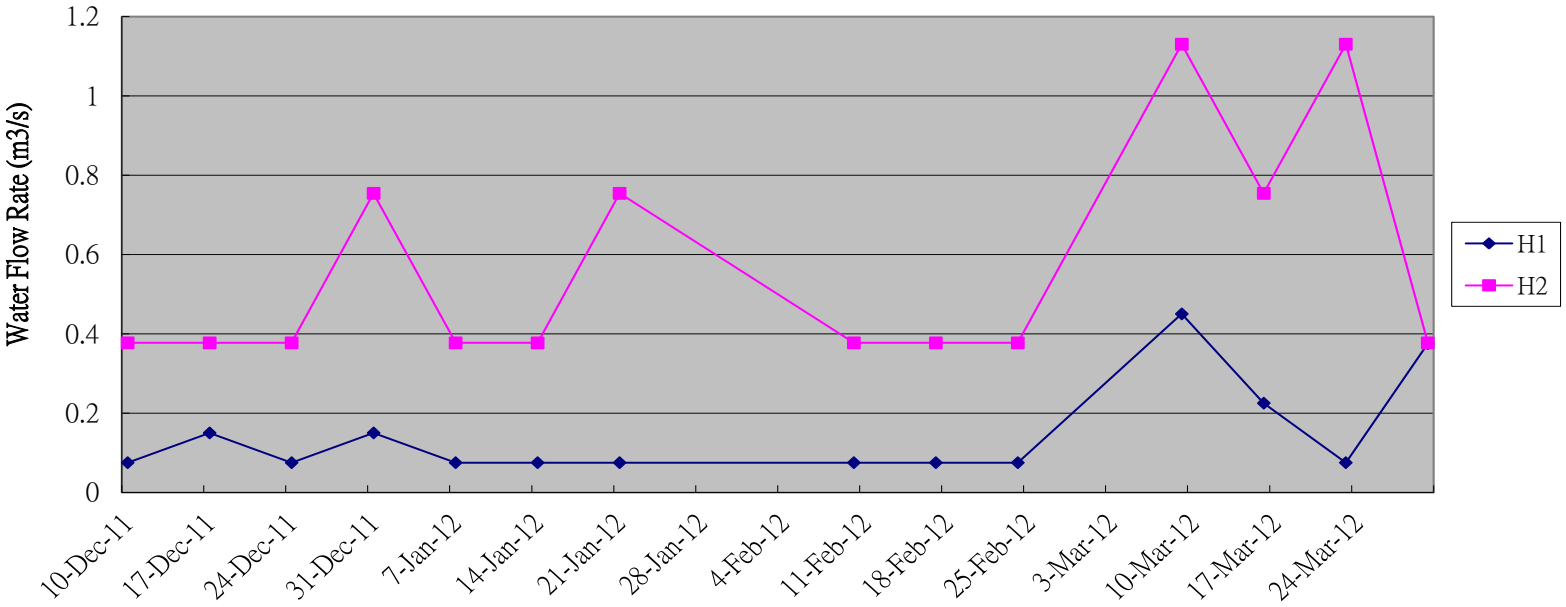

Remarks: Action level: 80% of baseline water depth.
Limit level: 60% of baseline water depth.

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




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

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




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

Appendix L.

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

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

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

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

| **Species** | ***Status in Hong Kong** | **Growth form** | **[1]Status in ECA** | **[2]Relative abundance** | **Condition** |
|---|---|---|---|---|---|
| *Bidens bipinnata* | E | Herbs | S | + | Fair |
| *Panicum maximum* | E | Herbs | S | + | Fair |
| *Celtis sinensis* | N | Trees | S | + | Fair |
| *Terminalia catappa* | E | Trees | R | + | Fair |
| *Cocculus orbiculatus* | N | Climbers | R | + | Fair |
| *Mangifera indica* | E | Trees | R | + | Fair |
| *Dimocarpus longan* | E | Trees | R | + | Fair |
| *Michelia x alba* | E | Trees | R | + | Fair |
| *Oxalis corniculata* | N | Herbs | S | + | Fair |
| *Stephania longa* | N | Climbers | S | + | Fair |
| *Leucaena leucocephala* | E | Shrubs | S | + | Fair |
| *Amaranthus viridis* | N | Herbs | S | + | Fair |
| *Solanum nigrum* | N | Herbs | S | + | Fair |
| *Paspalum dialatum* | E | Perennial Herb | S | + | Fair |
| *Mikania micrantha* | E | Climbing Herb | S | + | Fair |
| *Macaranga tanarius* | N | Tree | R | + | Fair |
| *Cassia surattensis* | E | Shrub or Small Tree | S | + | Fair |
| *Conyza sumatrensis* | E | Herb | S | + | Fair |
| *Sansevieria trifasciata Prain* | E | Perennial Herb | S | + | Fair |
| *Alocasia odora* | N | Perennial Herb | S | + | Fair |
| *Livistona chinensis* | E | Tree Palm | S | + | Fair |
| *c.f. Ulothrix* sp. | **N** | Algae | S | + | Fair |
| *Enteromorpha* sp. | **N** | Algae | S | + | Fair |
| **Total number of species** | **23** | | | | |

**Key:** [1]Status in ECA: [2]Relative abundance:

*Status in Hong Kong
E = Exotic
N = Native

R = retained
S = naturally colonized

+ = Present
++ = Common
+++ = Abundant

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

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

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

| Specimen No. | Species Name | Growth Form | Height (m) | Date of transplantation | Condition | Remarks |
|---|---|---|---|---|---|---|
| PH01 | *Pavetta hongkongensis* | Tree / Shrub | 2 | 20th Dec 2011 | Fair | |
| PH02 | *Pavetta hongkongensis* | Tree / Shrub | 2 | 20th Dec 2011 | Fair | |
| PH03 | *Pavetta hongkongensis* | Tree / Shrub | 1 | 20th Dec 2011 | Fair | |

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

Appendix M: Ecological monitoring report

# Agreement No. DP/01/2010
# Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (Report 7a for Mar 2012)

Prepared for:

**Drainage Services Department**

Prepared by:
**ENVIRON Hong Kong Limited**

Date:
**Apr 2011**

Reference Number:
R2477_V1.0

# Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (Report 7a for Mar 2012)

Prepared by:

Justin Ye
Assistant Environmental Consultant

Approved by:

Tony Cheng
Project Manager

**ENVIRON Hong Kong Limited**
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**26 Harbour Road, Wan Chai, Hong Kong**
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Fax: (852) 3548 6988
Email: hkinfo@environcorp.com

*Q:\Projects\DSDSHUWNEM00\Report\Bi-Monthly Construction Phase Ecological Monitoring Report\201203\7a*

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# 1. Introduction

## 1.1 Project description

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

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

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

The outline of this ecological monitoring report was as follow:

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

This is the report No. 7 ecological monitoring conducted on 18th March 2012 within the works boundary under Contract 1 and area within 100 m from the works boundary.

# 2. Highlights of this report

- Field survey was conducted on 18th March 2012
- Construction activities of Contract 1 was continued since March 2011
- Lower number of species was observed within the works area under Contract 1, in particular stream ecological monitoring point 2 (SEMP 2) due to recent river diversion for Ecological Compensatory Area (ECA) construction.
- Habitats in the 100 m buffer area retain its natural condition.

# 3. Summary of construction activities for the month

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

- **Pumping station (Area A):**
  - Construction for the proposed Transformer Room & Switchroom.
  - Concreting for the proposed Transformer Room & Switchroom up to +3.95mPD.
  - Installation of Void former for the proposed Transformer Room & Switchroom.
  - Excavation for the proposed flow meter chamber.
  - Laying of blinding layer.
  - Excavation for the proposed DN2100 Storm drain.
  - Installation of first and second layer of waling for the proposed DN2100 trench
  - Grouting for the proposed concrete structure at the mouth of Wai Ha River.
  - Concreting for the proposed intake structure up to +4.12mPD.

- **Tung Tsz Nursery Community Garden (Area B)**
  - Installation of sheetpiles for Bay 6 & 5.
  - Excavation for Bay 6 & 5.
  - Installation of first layer of waling for Bay 6 & 5.

- **ECA (Area C)**
  - In maintenance stage

# 4. Monitoring Methodology

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

## 4.1 Vegetation survey

Vegetation survey was performed along the designated transects (Figure 1) for ecological monitoring as described in the project specifications to monitor the vegetation health which could be adversely influenced by any bad site practice. Qualitative data of plants within the works boundary and wetland vegetation in the 100 m buffer area of Contract 1 adjacent to construction site and wetland was recorded. Riparian vegetation including aquatic and emergent at 4 stream ecological monitoring points (hereinafter referred to as “SEMP”) under Contract 1 ( i.e. SEPM 1 &2; Figure 2 & 3) along the affected stream channel and riparian habitat was recorded in terms of species, relative abundance and average heights.

Any signs of damages and adverse health problems directly caused the works were recorded and reported. Nomenclature and protection status of the species followed those documented in the AFCD website (www.hkbiodiversity.net) and Hong Kong Herbarium (2004).

### 4.2 Avifauna

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

### 4.3 Herpetofauna

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

### 4.4 Butterflies and Odonata

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

### 4.5 Mammals

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

### 4.6 Aquatic fauna

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

# 5. Monitoring data

## 5.1 Vegetation survey

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

## 5.2 Birds watch

A total of 19 bird species were recorded in the current survey under Contract 1(Table 3). In the work area under Contract 1, 6 bird species were recorded in which none are considered to be of conservation concern. A total of 18 bird species were recorded in the 100m buffer area in which one wetland dependent species *Ardeola bacchus* is recognized as being regional conservation concern, though it is common in suitable habitats in Hong Kong (Viney et al., 2005).

## 5.3 Herpetofauna

It is not recorded in the current survey.

## 5.4 Butterflies

A total of 3 butterfly species were recorded during surveys (Table 4). However, none of the species are of the conservation concern.

## 5.5 Odonata

Only 1 odonata species were recorded during the surveys (Table 5). The species Wandering glider (*Pantala flavescens*) was found within the work boundaries under Contract 2 & along the river bank in the 100m buffer area.

### 5.6 Mammal

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

### 5.7 Aquatic fauna

Under Contract 1 (i.e. SEMP 1 & 2), a total of 9 fish species, 2 crustaceans, 1 bivalve and 1 snail were recorded and most of them were residing in brackish environments (Table 6). Some river works were carried out in SEMP 1 as showed in Figure 2. Overall, no protected or rare species were recorded.

## 6. Remedial measures adopted to the adverse condition

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

## 7. Record of complains and remedial measures

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

## 8. Review of the monitoring results

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

## 9. Forecast of works programme and monitoring requirements

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

**Area A (Pumping Station)**

- Erection formwork and falsework for the proposed Stormwater Pumping Station up to +11.85mPD top slab.
- Steel reinforcement bars fixing for the proposed Stormwater Pumping Station up to +11.85PD top slab.
- Construction for flow meter chamber.

- Construction for ground beam for man make slope.
- Construction discharge chamber for the proposed Stormwater Pumping Station.
- Installation of multi-part cover and backfilling for desilting chamber.
- Construction of DN2100 along Ting Kok Road (CH120 to 160)
- Construction of the proposed intake structure.

**Area B (Tung Tsz Nursery)**

- Excavation for the construction of box culvert in Tung Tsz Nursery
- Construction of box culvert bay 6 and 5
- Erection of hoarding for stage 2.

**Area C (ECA)**

- In Maintenance Period

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

# 10. Comments and summary

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

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**Figure**

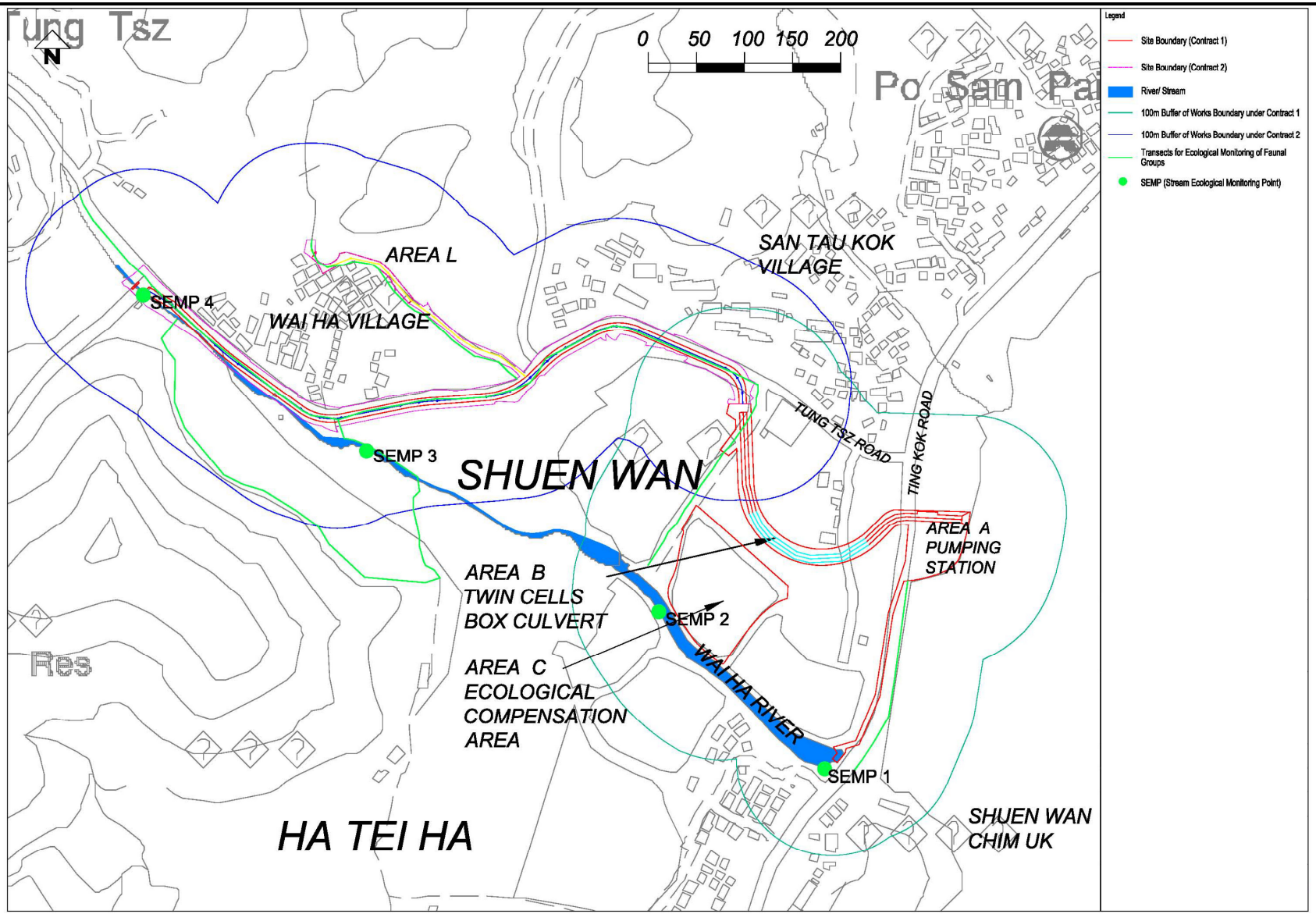


**Figure:** 1

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

ENVIRON

Drawn by: IT

Checked by: JY

**Project**: Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (Mar 2012, Report 7a)

Rev.: 1.0

Date: Mar 2012

| | |
|---|---|
| **Figure:** 2 | ENVIRON |
| **Title:** SEMP 1, the first sampling point of Wai Ha River under Contract 1. | Drawn by: IT |
| | Checked by: JY |
| **Project**: Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (Mar 2012, Report 7a) | Rev.: 1.0 |
| | Date: Mar 2012 |

| | |
|---|---|
| **Figure:** 3 | ENVIRON |
| **Title:** SEMP 2, the second sampling point along Wai Ha River under Contract 1. | Drawn by: IT |
| | Checked by: JY |
| **Project:** Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 1 (Mar 2012, Report 7a) | Rev.: 1.0 |
| | Date: Mar 2012 |

**Table**

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

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

*Key:
E = Exotic
N = Native
n/a = not available

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

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

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

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

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

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

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

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

***Key:**
**E = Exotic**
**N = Native**

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

| Species | Common name | Habitat | Conservation status in Hong Kong | Work area: Contract 1 | 100m buffer area |
|---|---|---|---|---|---|
| *Acridotheres cristatellus* | Crested Myna | | | 3 | 4 |
| *Amaurornis phoenicurus* | White-breasted Water hen | W | | | 1 |
| *Ardea cinerea* | Grey Heron | W | | | 2 |
| *Ardeola bacchus* | Chinese Pond Heron | W | PRC (RC) | | 2 |
| *Casmerodius alba* | Great Egret | W | | | 1 |
| *Copsychus saularis* | Oriental Magpie Robin | | | 1 | 1 |
| *Egretta garzetta* | Little Egret | W | | | 3 |
| *Eudynamys scolopacea* | Common Koel | | | | 1 |
| *Garrulax perspicillatus* | Masked Laughing thrush | | | | 5 |
| *Hirundo rustica* | Barn Swallow | W | | 3 | 3 |
| *Motacilla alba* | White Wagtail | | | | 1 |
| *Orthotomus sutorius* | Common Tailorbird | | | | 1 |
| *Passer montanus* | Eurasian Tree Sparrow | | | 2 | ~ 10 |
| *Prinia flaviventris* | Yellow-bellied Prinia | | | | 1 |
| *Pycnonotus jocosus* | Red-whiskered Bulbul | | | | 3 |
| *Pycnonotus sinensis* | Chinese Bulbul | | | | 3 |
| *Streptopelia chinensis* | Spotted Dove | | | 2 | 4 |
| *Sturnus nigricollis* | Black-collared Starling | | | 2 | |
| *Zosterops japonicus* | Japanese White-eye | | | | 6 |
| **Total number of species:** | | | | **6** | **18** |

*** Key:**

GC= Global Concern

W = Wetland dependent spices

| | Species | Common name | Habitat | Conservation status in Hong Kong | Work area: Contract 1 | 100m buffer area |
|---|---|---|---|---|---|---|

LC = Local Concern

NT = Near Threatened

RC = Regional Concern

PRC = Potential Regional Concern

**Table 4.** Relative abundance of butterfly species recorded under Contracts 1 in impact monitoring survey during March 2012.

| **Species** | **Common name** | **Conservation status in Hong Kong** | **Work area: Contract 1** | **100m Buffer area of Contract 1** |
|---|---|---|---|---|
| *Pieris canidia* | Indian Cabbage White | Common | ++ | ++ |
| *Mycalesis mineus* | Dark-brand Bush Brown | Common | + | ++ |
| *Delias pasithoe* | Red-base Jezebel | Common | + | + |

Key:

+ : Species exists in the survey area

++ : Species common in the survey area

+++ : Species abundant in the survey area

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

| **Species** | **Common name** | **Conservation status in Hong Kong** | **Work area: Contract 1** | **100m Buffer area of Contract 1** |
|---|---|---|---|---|
| *Pantala flavescens* | Wandering Glider | Common | + | + |

Key:

+ : Species exists in the survey area

++ : Species common in the survey area

+++ : Species abundant in the survey area

**Table 6.** Relative abundance of aquatic species recorded in Wai Ha River within the 100 m buffer of works boundary under Contracts 1 in the impact monitoring survey during March 2012.

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

**Key:**

Relative abundance:
+ : Species exists in the survey area
++ : Species common in the survey area
+++ : Species abundant in the survey area

[1] Life-cycle characteristics:
M = Marine vagrant
F = Freshwater species

[2]Origin:
N = Native
I = Introduced; / = not available

Appendix N. Photo of Wai Ha River in March 2012

| | |
|---|---|
|  |  |
| **Photo 1**. Wai Ha River at W2 | **Photo 2**. Wai Ha River at W2 |
| | |
|  |  |
| **Photo3.** Wai Ha River at W1 | **Photo4.** Wai Ha River at W1 |
| | |
|  |  |
| **Photo 5** | **Photo 6** |
| **Photo 5 & 6. The barrier was installed to avoid site water release to the river** | |