PROJECT NO.: TCS/00553/11

CONTRACT NO. DC/2009/22
DRAINAGE IMPROVEMENT WORKS IN SHUEN WAN (OPERATION PHASE)

CONTRACT NO. DC/2010/02
DRAINAGE IMPROVEMENT WORKS IN SHUEN WAN AND SHEK WU WAI

MONTHLY ENVIRONMENTAL MONITORING AND AUDIT REPORT (NO.45) – MARCH 2015

PREPARED FOR
KWAN LEE-KULY JOINT VENTURE

Quality Index

Date	Reference No.	Prepared By	Certified by
5 May 2015	TCS00553/11/600/R0428v2	Ben Tam (Environmental Consultant)	T.W. Tam (Environmental Team Leader)

Ver.	Date	Description
1	14 April 2015	First submission
2	5 May 2015	Amended against the IEC's comments on 15 April 2015

Ref.: DSDSHUWNEM00_0_0701L.15 5 May 2015

Drainage Services Department
Drainage Projects Division
44 & 45/F., Revenue Tower
5 Gloucester Road,
Wan Chai, Hong Kong

By Fax (2827 8700) and Post

Attention: Mr. H.K.Chan and Mr. Max Tai

Dear Sirs,

Re: Agreement No. DP 01/2010
Services as Independent Environmental Checker for the Drainage Improvement Works in Sha Tin and Tai Po under Contract No. DC/2009/22 & DC/2010/02
Monthly Environmental Monitoring and Audit Report for March 2015

Reference is made to Environment Team's submission of the Monthly Environmental Monitoring and Audit Report for March 2015 by Email on 5 May 2015 (entitled "DC/2010/02 – Monthly Impact EM&A Report (Contract 2) No.45 – March 2015").

Please be informed that we have no comment on the captioned report. We write to verify the captioned submission in accordance with Condition 5.4 of EP-303/2008.

Thank you very much for your kind attention and please do not hesitate to contact Mr. Tony Cheng (3465 - 2822) should you have any queries.

Yours sincerely,

Tony Cheng
Independent Environmental Checker

c.c.	AUES	Attn: Mr. T. W. Tam	By Fax: 2959 6079
	Kwan Lee-Kuly JV	Attn: Mr. W. K. Chan	By Fax: 2674 6688

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ENVIRON Hong Kong Limited 英環香港有限公司
Room 2403 Jubilee Centre, 18 Fenwick Street, Wan Chai, Hong Kong. Tel: 852 3465 2888 Fax: 852 3465 2899
www.environcorp.com

EXECUTIVE SUMMARY

ES.01. This is **45th** Monthly Environmental Monitoring and Audit (EM&A) Report for designated works of *DSD Contract No. DC/2009/22* (hereafter "Contract 1") and *DC/2010/02* (hereafter "Contract 2") - *Drainage Improvement in Shuen Wan* under Environmental Permit No.EP-303/2008, covering a period from **1 to 31 March 2015** (hereinafter 'the Reporting Period').

ES.02. In the Reporting Period, the EM&A programme for Contract 1 was conducted in Operation Phase and Contract 2 was continually performed in Construction Phase, which based on EPD, RE, IEC and ET agreement in December 2014. Moreover, Contract 2 has taken over all relevant EM&A programme for the project as ordered by DSD.

ENVIRONMENTAL MONITORING AND AUDIT ACTIVITIES

ES.03. Environmental monitoring activities for the Project under the Construction and Operation Phases of EM&A programme in the Reporting Period are summarized in the following table.

Environmental Aspect	Monitoring Parameters / Inspection	Contract 1	Contract 2
		Operation Phase	Construction Phase
Construction Noise	$L_{eq\ (30min)}$ Daytime – M1, M2, M3, M4 & AL1	NA	**25 Occasions**
Water Quality	Local Stream Water Sampling (W1, W2, W3 and W4	NA	**13 days**
	Hydrological characteristics measurement – H1, H2, H3 and H4	**4 days**	**4 days**
Inspection / Audit	Regular weekly site inspection by the RE and Main Contractor	NA	**4 events**
	Independent Environmental inspection by the ET	NA	**3 events**
	Joint Site Inspection with EPD, the RE, IEC, Main Contractor and ET	NA	**1 event**
Ecological	Ecological Monitoring	NA	**1 event**
Landscape & Visual	Inspection by a registered Landscape Architect	**1 event**	**2 events**

ES.04. In Reporting Period, ecological monitoring for Contracts 2 was conducted on 26 March 2015.

ES.05. No noise exceedance and complaint (which is an Action Level exceedance) was received in this Reporting Period.

ES.06. In Reporting Period, no exceedance of Suspended Solids was recorded in W1, W2 and W4. However, there were 42 and 45 exceedances of dissolved oxygen and turbidity were respectively recorded. Investigation result concluded that the exceedances were not project related.

ES.07. The hydrological characteristics of water depth and water flow rate as compared baseline monitoring period, the currently water depth and volumetric flow rate has insignificant change.

ES.08. In Reporting Period, landscape and visual inspection of the Contract 1 operation phase was undertaken on **2nd March 2015**. Construction phase landscape and visual inspection for Contract 2 was carried out on **2nd** and **16th March 2015**. The Contracts 1 and 2 of Landscape & Visual Reports had signed by the Registered Landscape Architect.

SITE INSPECTION

ES.09. In the Reporting Period, one joint site inspection was carried out by EPD, the RE, IEC, Main Contractor of Contract 2 and ET on 24 March 2015. Except dated 24 March 2015 of joint

site inspection, the regular weekly environmental inspection performed by the Contractor and RE was carried out on **5**, **12**, **19** and **31 March 2015**. Moreover. ET was undertaken independent site inspection on **3**, **10** and **18 March 2015**.

ES.10. For the joint site inspection, EPD accepted that EM&A Programme of Contract 2 of operation phase can commenced in April 2015.

ENVIRONMENTAL COMPLAINT

ES.11. No written or verbal complaint was recorded in this Reporting Period.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

ES.12. No environmental summons or successful prosecutions were recorded in this Reporting Period.

REPORTING CHANGE

ES.13. No report changes were made in this Reporting Period.

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1.0 INTRODUCTION

PROJECT BACKGROUND

1.01 ***Kwan Lee-Kuly Joint Venture*** (hereinafter 'KLKJV') has been awarded by Drainage Services Department (hereinafter 'DSD') of the Contract No. DC/2010/02 - Drainage Improvement in Shuen Wan and Shek Wu Wai (hereinafter 'the Project'). For the Project, construction works at Tung Tsz Road Shuen Wan is part of the Drainage Improvement works amongst Shatin and Tai Po and it is defined as a "Designated Project" which controlled under Environmental Permit EP-303/2008. On the other hand, Shek Wu Wai San Tin is a non-designated project work.

1.02 The Works at Tung Tsz Road Shuen Wan was divided two DSD Contracts i.e. DC/2009/22 (hereinafter called the "Contract 1") and DC/2010/02 (hereinafter called the "Contract 2"). The Project site boundary is shown in ***Appendix A***. The construction works of Contract 1 was commenced in ***August 2010*** and finished in ***November 2014***. Moreover, the construction works of Contract 2 was commencement in ***May 2011*** and still not yet finished in this reporting period. Hence, EM&A program implemented for Contract 1 is Operation Phase and Contract 2 is Construction Phase which based on EPD, RE and IEC with the ET of Contract 2 agreement in ***December 2014***.

1.03 As instructed by DSD, Action-United Environmental Services and Consulting (AUES) as the Environmental Team (ET) of Contract 2 would take over all relevant EM&A programmes of the Project since ***November 2014***.

1.04 This is the **45th** Monthly EM&A Report for Contract 1 and Contract 2 presenting the relevant monitoring results and inspection findings during the Reporting Period from ***1*** to ***31 March 2015***.

REPORT STRUCTURE

1.05 The Monthly Environmental Monitoring and Audit (EM&A) Report is structured into the following sections:-.

SECTION 1	INTRODUCTION
SECTION 2	PROJECT ORGANIZATION AND WORKS PROGRESS AND SUBMISSION
SECTION 3	EM&A PROGRAM REQUIREMENT FOR THE PROJECT
SECTION 4	IMPACT MONITORING RESULTS
SECTION 5	SITE INSPECTIONS
SECTION 6	ENVIRONMENTAL COMPLAINTS AND NON-COMPLIANCE
SECTION 7	IMPLEMENTATION STATUES OF MITIGATION MEASURES
SECTION 8	CONCLUSIONS AND RECOMMENDATION

2.0 PROJECT ORGANIZATION AND WORKS PROGRESS AND SUBMISSION

PROJECT ORGANIZATION AND MANAGEMENT STRUCTURE

2.01 Organization structure and contact details of relevant parties with respect to on-site environmental management are shown in ***Appendix B***.

WORKS PROGRESS

2.02 Since Contract 1 has entered Operation phase, so the Areas of Contract 1 has no construction activity. For Contract 2, general site tidiness, the reconstruction refuse collection point finishing works and landscape establishment were undertaken in this reporting period. The master construction programs of Contract 2 are enclosed in ***Appendix C***.

SUMMARY OF ENVIRONMENTAL SUBMISSIONS

2.03 Summary of the relevant permits, licences, and/or notifications on environmental protection for this Project in this Reporting Period is presented in ***Table 2-1***.

Table 2-1 Status of Environmental Licenses and Permits

Item	Description	License/Permit Status
1	Air Pollution Control (Construction Dust)	Notified EPD on 17 October 2011
2	Chemical Waste Producer Registration (WPN5213-727-K2972-02)	Approved on 28 October 2011
3	Water Pollution Control Ordinance (Discharge License) WT00009528-2011	Valid to 31 July 2016
4	Billing Account for Disposal of Construction Waste (Account No.: 7012838)	Effective

3.0 EM&A PROGRAM REQUIREMENT

3.01 EM&A requirements of the Construction and Operation Phases to according the PP, EIAR, Environmental Permit EP303/2008 (hereinafter 'the EP'), and the associated updated EM&A Manual, is presented in below sub-section.

MONITORING PARAMETERS

3.02 According to the updated EM&A Manual of the Project, the Construction and Operation Phases monitoring requirement has showed in ***Table 3-1***.

Table 3-1 Summary of Monitoring Parameters for the Project

Environmental Aspect	Construction Phase	Operation Phase
Construction Noise Monitoring	• A-weighted equivalent continuous sound pressure level (30min) (hereinafter 'Leq(30min)' during the normal working hours	No requirement
Water Quality Monitoring	• In Situ Measurement - Temperature, Dissolved Oxygen, Dissolved Oxygen Saturation, pH and Turbidity • Laboratory Analysis - Suspended Solids	No requirement
Hydrological Characteristics Monitoring	• In-situ measurement including water flow and depth	• In-situ measurement including water flow and depth
(*) Ecological Monitoring and Audit	• Monitor and audit the proper implementation of mitigation measures stipulated in EIA report and the updated EM&A Manual	• Monitor and inspect including the vegetation, fauna (includes avifauna, herpetofauna, odonate and butterfly) and Stream (includes fish and macroinvertebrates)
(#) Landscape and Visual Monitoring	• Inspect and audit the implementation and maintenance of landscape and visual mitigation measures	• Inspect and audit the implementation and maintenance of landscape and visual mitigation measures

Remarks:
(*) the monitoring is carried out by IEC
(#) The monitoring is carried out by the registered Landscape Architect

MONITORING LOCATIONS

3.03 Monitoring locations have been proposed in the updated EM&A Manual. Graphic plot to show in ***Appendix D*** and summarized in ***Table 3-2***.

Table 3-2 Designated Monitoring Locations of the EM&A Programme

Aspect	Location ID	Address
Construction Noise	M1	14, Shuen Wan Chim Uk
	AL1	Joint Village Office for Villages in Shuen Wan, Tai PO
	M2	150, San Tau Kok
	M3	31, Wai Ha
	M4	Block 15, Treasure Spot Garden
Water Quality	(#) W1	Between the Shuen Wan Marsh and ECA • Co-ordinates: E839301, N836386 • Existing River Bed Level: +1.75mPD).

Aspect	Location ID	Address
	W2	Between Tolo Harbour and Proposed Penstock • Co-ordinates: E839542, N836184 • Exiting River Bed Level: +1.48mPD)
	(*) W3	Upstream of Tung Tze Shan Road • Co-ordinates: E838760, N836714 • Exiting River Bed Level: +5.08mPD)
	W4	Wai Ha Village 29D • Co-ordinates: E838865, N836621 • Exiting River Bed Level: +4.05mPD)
Hydrological	H1	Between the Shuen Wan Marsh and ECA • Coordinates: E839306, N836379)
	H2	Route 10 Sam Kung Temple • Coordinates: E839163, N836433
	H3	Upstream of Tung Tze Shan Road • Coordinates: E838760, N836714
	H4	Wai Ha Village 29D • Coordinates: E838865, N836621
Ecology	Areas within 100m of the works boundary under Contract 1 and Contract 2	
Landscape & Visual	As within and adjacent to the construction sites and works areas under the Contract 1 and Contract 2	

MONITORING FREQUENCY OF CONSTRUCTION PHASE

3.04 According to the updated EM&A Manual, frequency and duration of the Construction Phase monitoring are summarized below.

Construction Noise

Frequency: Once a week during 0700-1900 on normal weekdays for $L_{eq(30min)}$

If the construction work undertake at restricted hour, the monitoring frequency of construction noise will be conducted in accordance with the related Construction Noise Permit requirement.

Duration: Throughout the construction period when the major construction activities are undertaken

Water Quality

Frequency: Three times a week. The interval between 2 sets monitoring are not less than 36 hours

Duration: throughout construction phase of Contract 2 to underway (in accordance with the Updated EM&A Manual Section 4.27).

Hydrological Characteristics

Frequency: Once per week at mid-flood and mid-ebb tides

Duration: During the construction phase of Contract 2 to undertake; and one year after the construction is complete as operation phase monitoring (in accordance with the Updated EM&A Manual Section 4.32).

Ecology

3.05 In according with Section 6.17 of the Updated EM&A Manual, ecological monitoring should be conducted by the Independent Environmental Checker (hereinafter 'IEC'). Monitoring programme details should be agreed with the Agriculture, Fisheries and Conservation Department (AFCD). Moreover, the IEC should submit reports on the findings of each monitoring trip, and a final report summarizing the monitoring results over the entire monitoring period to AFCD and Environmental Protection Department (EPD). Hence, no monitoring or surveying should be carried out by ET of the Project.

Landscape & Visual

3.06 According to Section 7.4 of the Updated EM&A Manual, site inspection bi-weekly should be performed to check the implementation and maintenance of landscape and visual mitigation measures whether to full realize.

MONITORING FREQUENCY OF OPERATION PHASE

Hydrological Characteristics

Frequency: Once per week at mid-flood and mid-ebb tides

Duration: One year after the construction is complete as operation phase monitoring (in accordance with the Updated EM&A Manual Section 4.32).

Ecology

3.07 In according with Section 6.17 of the Updated EM&A Manual, the Operation Phase ecological monitoring would be to conduct by the Independent Environmental Checker (hereinafter 'IEC'). Regular checking and monitoring by quarter month would be performed for one year duration

Landscape & Visual

3.08 According to Section 7.5 of the Updated EM&A Manual, all landscape and visual mitigation measures would be monitored quarterly during the first year of the Operation Phase to check on the effectiveness of the mitigations.

MONITORING EQUIPMENT

Noise Monitoring

3.09 Sound level meter in compliance with the *International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1)* specifications shall be used for noise monitoring. The sound level meter shall be checked with an acoustic calibrator. The wind speed shall be check with a portable wind speed meter, which capable to measure wind speed in m/s.

Water Quality Monitoring

3.10 **Dissolved Oxygen and Temperature Measuring Equipment** – The instrument should be a portable and weatherproof dissolved oxygen (DO) measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring DO level in the range of 0 – 20mg L-1 and 0 – 200% saturation; and temperature of 0 – 45 degree Celsius.

3.11 **pH Meter** – The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1 pH in arrange of 0 to 14.

3.12 **Turbidity (NTU) Measuring Equipment** – The instrument should be a portable and weatherproof turbidity measuring instrument using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU.

3.13 **Water Sampling Equipment** – A water sampler should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

3.14 **Water Depth Detector** – A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. The unit can either be hand held or affixed to the bottom of the work boat.

3.15 **Sample Containers and Storage** – Water samples for SS should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen).

3.16 **Suspended Solids Analysis** – Analysis of suspended solids shall be carried out in a HOKLAS or

other international accredited laboratory.

Hydrological Characteristics

3.17 **Water Depth Detector** - A portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station.

3.18 **Stream water flow Equipment** –A portable, battery-operated flow meter should be used for the determination of water flow rate at each designated monitoring location and record in m^3/s.

3.19 The monitoring equipment using for the Project's EM&A program were proposed by the ET and verified by the IEC prior commencement of the monitoring. Details of the equipment used for impact monitoring are listed in ***Table 3-3***.

Table 3-3 Monitoring Equipment Used in EM&A Program

Equipment	Model
Construction Noise	
Integrating Sound Level Meter	B&K Type 2238
Calibrator	B&K Type 4231
Portable Wind Speed Indicator	Testo Anemometer
Water quality	
Water Depth Detector	Eagle Sonar
Water Sampler	A transparent PVC cylinder / bucket
Thermometer & DO meter	YSI DO Meter 550A or YSI Professional Plus or YSI Sonde6820 / 650MDS
pH meter	YSI pH10N or YSI Professional Plus or YSI Sonde 6820 / 650MDS
Turbidimeter	Hach 2100Q or YSI Sonde 6820 / 650MDS
Sample Container	High density polythene bottles (provided by laboratory)
Storage Container	'Willow' 33-litre plastic cool box
Suspended Solids	HOKLAS-accredited laboratory (ALS Technichem (HK) Pty Ltd)
Hydrological Characteristics	
Water flow meter	GLOBAL WATER model FP211
Water Depth Detector	Eagle Sonar or an appropriate steel ruler or rope with appropriate weight

MONITORING METHODOLOGY

Noise Monitoring

3.20 Noise measurements were taken in terms of the A-weighted equivalent sound pressure level (L_{eq}) measured in decibels (dB). Supplementary statistical results (L_{10} and L_{90}) were also obtained for reference.

3.21 Sound level meter as listed in ***Table 3-3*** are complied with the *International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1)* specifications, as recommended in Technical Memorandum (TM) issued under the *Noise Control Ordinance (NCO)*.

3.22 During the monitoring, all noise measurements were performed with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (L_{eq}). $Leq_{(30min)}$ in six consecutive $Leq_{(5min)}$ measurements were used as the monitoring parameter for the time period between 0700-1900 hours on weekdays; and also $Leq_{(15min)}$ in three consecutive $Leq_{(5min)}$ measurements is used as monitoring parameter for other time periods (e.g. during restricted hours), if necessary.

3.23 During the course of measurement, the sound level meter is mounted on a tripod with a height of 1.2m above ground and placed at the assessment point and oriented such that the microphone is pointed to the site with the microphone facing perpendicular to the line of sight. The windshield

is fitted for all measurements. The assessment point is normally set as free-field situation for the measurement.

3.24 Prior to noise measurement, the accuracy of the sound level meter is checked by an acoustic calibrator which generated a known sound pressure level at a known frequency. The checking was performed before and after the noise measurement.

Water Quality

3.25 Water quality monitoring are conducted at the depth below:-

- Three depths: 1m below water surface, 1m above river bed and at mid-depth when the water depth exceeds 6m, or
- If the water depth is between 3m and 6m, two depths: 1m below water surface and 1m above river bed, and or
- If the water depth is less than 3m, 1 sample at mid-depth is taken

3.26 Water depths are determined prior to measurement and sampling, using a portable battery operated depth detector, brand named 'Eagle Sonar', if the depths exceed 1.5 meter. If the depth between 1.5 meter and 1 meter, plastic tape measurement tied with appropriate weight are used the depth estimation. For the depth well below 1 meter, an appropriate steel ruler or rope with appropriate weight are used for the depth measurement.

3.27 A transparent PVC cylinder, with a capacity of not less than 2 litres, is used for water sampling. The water sampler is lowered into the water body at a predetermined depth. The trigger system of the sampler is activated with a messenger and opening ends of the sampler are closed accordingly then the sample of water is collected. If the water depth is less than 500mm, a water bucket is be used as a water sampler to minimize the possibility of the latching system disturbing sediment during water sampling

3.28 A portable YSI DO Meter 550A or YSI Professional Plus is used for in-situ DO measurement. The DO meter is capable of measuring DO in the range of 0 - 20 mg/L and 0 - 200 % saturation and checked against water saturated ambient air on each monitoring day prior to monitoring. Although the DO Meter automatically compensates ambient water temperature to a standard temperature of 20^0C for ease of comparison of the data under the changing reality, the temperature readings of the DO Meter are be recorded in the field data sheets. The equipment calibration is performed on quarterly basis.

3.29 A portable YSI pH10N Meter or or YSI Professional Plus is used for in-situ pH measurement. The pH meter is capable of measuring pH in the range of 0 – 14 and readable to 0.1. Standard buffer solutions of pH 7 and pH 10 are used for calibration of the instrument before and after measurement. The equipment calibration is performed on quarterly basis.

3.30 A portable Hach 2100Q Turbidity Meter is be used for in-situ turbidity measurement. The turbidity meter is capable of measuring turbidity in the range of 0 – 1000 NTU. The equipment calibration is performed on quarterly basis.

3.31 Water samples are contained in screw-cap PE (Poly-Ethylene) bottles, which are provided and pretreated and 'PE' (Poly-Ethylene) sampling bottles provided and pre-treated according to corresponding analytical requirements. Where appropriate, the sampling bottles are rinsed with the water to be contained. Water sample is then transferred from the sampler to the sample bottles.

3.32 One liter or 500 mL water sample are collected from each depth for SS determination. The collected samples are stored in a cool box maintained at 4^0C and delivered to laboratory upon completion of the sampling by end of each sampling day.

3.33 All water samples are analyzed with Suspended Solids (SS) as specified in the updated *EM&A Manual* by a local HOKLAS-accredited testing laboratory (ALS Technichem (HK) Pty Ltd HOKLAS registration no. 66). SS are determined by the laboratory upon receipt of the water

samples using HOKLAS accredited analytical method. The detection limits and testing method are shown below in ***Table 3-4***. The certificate of ALS Technichem (HK) Pty Ltd is provided in ***Appendix E***.

Table 3-4 Testing Method and Detection limit of Suspended Solids

Determinant	Testing Method	Detection Limit
Suspended solid	Determination use HOKLAS accredited analytical methods namely ALS Method EA-025 (based on APHA 2540 D)	2mg/L

Hydrological Characteristics

3.34 A portable, water flow meter, brand named "*GLOBAL WATER model FP211*" are used to determine the water current flow at the designated monitoring stations. A water flow velocity is measured at mid depth of current water body or 0.5m below water level.

3.35 Water depths are determined prior to measurement, using a portable battery operated depth detector, brand named 'Eagle Sonar', if the depths exceed 1.5 meter. If the depth between 1.5 meter and 1 meter, plastic tape measurement tied with appropriate weight are used the depth estimation. For the depths well below 1 meter, an appropriate steel ruler or rope with appropriate weight are used for the depth measurement.

OTHERS MONITORING IMPLEMENTATION FOR THE PROJECT

Ecology

3.36 Ecological monitoring and reporting should be performed by IEC. Site survey will be carried out during the construction and 1-year establishment period of the Ecological Compensatory Area. These monitoring events include regular check on the retained and transplanted trees and shrubs, monitoring on fauna groups and aquatic fauna. No equipment and procedure are presented in the EM&A Monthly Report.

Landscape and Visual

3.37 A registered Landscape Architect as member of the ET is employed by the Contractor to undertake site inspection. Site inspection will undertake once every three months during the first year of the Operation Phase to check on the effectiveness of the mitigations.

DETERMINATION OF ACTION/LIMIT (A/L) LEVELS

3.38 The re-established performance criteria for construction noise, water quality and hydrological, namely Action and Limit levels is used for the Project are listed in ***Tables 3-5, 3-6,*** and ***3-7***.

Table 3-5 Action and Limit Levels for Construction Noise

Location	Time Period	Action Level in dB(A)	Limit Level in dB(A)
M1, AL1, M2, M3, M4	Daytime 0700 – 1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)
	1900 – 2300 on all days and 0700 – 2300 on general holidays (including Sundays		60/65/70 dB(A)**
	2300 – 0700 on all days		45/50/55 dB(A)**

Note: * *Reduces to 70dB(A) for schools and 65dB(A) during the school examination periods.*

** *To be selected based on the Area Sensitivity Rating of A/B/C, and the conditions of the applicable CNP(s) must be followed*

Table 3-6 Action and Limit Levels for Water Quality

Parameter	Performance Criteria	Impact Station		
		W1	W2	W4
DO Concentration (mg/L)	Action Level	7.27	7.26	9.27

Parameter	Performance Criteria	Impact Station		
		W1	W2	W4
	Limit Level	4.00	4.00	4.00
pH	Action Level	NA	NA	NA
	Limit Level	6 - 9	6 - 9	6 - 9
Turbidity (NTU)	Action Level	4.77	2.46	3.32
	Limit Level	5.26	3.42	4.52
Suspended Solids (mg/L)	Action Level	9.73	8.89	6.98
	Limit Level	10.77	9.75	7.66

Notes:

- *The proposed Action/Limit Levels of DO are established to be used 5%-ile/1%-ile of all the baseline data;*
- *The proposed Action/Limit Levels of Turbidity and SS are established to be used 95%-ile/99%-ile of all the baseline data;*
- *For DO, non-compliance of the water quality limits occur is when monitoring result lower than the action/limit levels;*
- *For turbidity and SS, non-compliance of the water quality limits occurs is when monitoring result higher than the limits; and*
- *For pH, non-compliance of the quality limit occur is when monitoring result lower than 6 and higher than 9; and*
- *All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered necessary*

Table 3-7 Action and Limit Levels for Hydrological Characteristics

Parameter	Acceptance Criteria	Monitoring Station	
		H1	H2
Water Depth (m)	Action Level	0.08 (80% of baseline water depth)	0.40 (80% of baseline water depth)
	Limit Level	0.06 (60% of baseline water depth)	0.30 (60% of baseline water depth)
Volumetric Flow Rate (Q), m^3/s	Action Level	120% of control station's water flow rate on the same day of measurement	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	140% of control station's water flow rate on the same day of measurement

3.39 The locations H3 and H4 are a reference measurement point in order to monitor any changes in the hydrological characteristics of Wai Ha River arising from the work Contract 2 to affect the Shuen Wan Marsh.

3.40 Should non-compliance of the environmental quality criteria occurs, remedial actions will be triggered according to the Event and Action Plan enclosed in ***Appendix F***.

EQUIPMENT CALIBRATION

3.41 The sound level meter and calibrator are calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme in yearly basis.

3.42 All the water quality monitoring equipment such as the DO, pH and Turbidity meters are calibrated by HOKLAS accredited laboratory of three month intervals.

3.43 A portable, water flow meter, brand named "*GLOBAL WATER model FP211*" is calibrated in yearly basis.

3.44 All updated calibration certificates of the monitoring equipment used for the impact monitoring program in this Reporting Period are attached in ***Appendix E***.

METEOROLOGICAL INFORMATION

3.45 The meteorological information is obtained from Tai Po and Shatin Stations of the Hong Kong Observatory (HKO) and the summary is shown ***Appendix H***.

DATA MANAGEMENT AND DATA QA/QC CONTROL

3.46 The impact monitoring data are handled by the ET's systematic data recording and management, which complies with in-house Quality Management System. Standard Field Data Sheets (FDS) are used in the impact monitoring program.

3.47 The monitoring data recorded in the equipment e.g. noise meter and Multi-parameter Water Quality Monitoring System are downloaded directly from the equipment at the end of each monitoring day. The downloaded monitoring data are input into a computerized database properly maintained by the ET. The laboratory results are input directly into the computerized database and QA/QC checked by personnel other than those who input the data. For monitoring activities require laboratory analysis, the local laboratory follows the QA/QC requirements as set out under the HOKLAS scheme for all laboratory testing.

4.0 MONITORING RESULTS OF CONTRACT 2 OF CONSTRUCTION PHASE

4.01 The monitoring schedule had been issued to relevant parties before each Reporting Period which presented in ***Appendix G***. The works undertaken during the Reporting Period are illustrated in ***Appendix C.*** The monitoring results are presented in the following sub-sections.

RESULTS OF CONSTRUCTION NOISE MONITORING

4.02 In this Reporting Period, the noise monitoring results at the all designated locations M1, AL1, M2, M3 and M4 are summarized in ***Table 4-1***. The detail monitoring data are presented in ***Appendix I***. The graphical plot is shown in ***Appendix J***.

Table 4-1 Summary of Construction Noise ($L_{Aeq30min}$) Monitoring Results, dB(A)

Date	M1(*)	AL1(*)	M2(*)	M3(*)	M4(*)
3-Mar-15	60	62	55	54	53
10-May-15	60	68	62	59	48
16-Mar-15	60	61	57	55	51
23-Mar-15	62	63	59	57	50
30-Mar-15	61	62	62	59	51
Limit Level	**75 dB(A)**				

Remarks:
(*) *The monitoring is undertaken under free field situation. A façade correction of +3 dB(A) has been added according to acoustical principles and EPD guidelines*

4.03 The sound meter was set in a free field situation at the all designated monitoring locations, therefore a façade correction of +3 dB(A) has been added according to acoustical principles and EPD guidelines.

4.04 No noise complaint (which is an Action Level exceedance) was received in this Reporting Period. As shown in ***Table 4-1,*** all the noise monitoring result are well below 75dB(A) and no Action or Limit Level exceedance was triggered during this Reporting Period. The graphical plot is shown in ***Appendix J***.

RESULTS OF LOCAL STREAM WATER QUALITY MONITORING

4.05 In this Reporting Period, **13** sampling days were performed at all designated measurement points for local stream water quality monitoring. The monitoring results including in-situ measurements and laboratory testing results are provided in ***Appendix I***. The graphical plots are shown in ***Appendix J***.

4.06 Monitoring results of 3 key parameters: dissolved oxygen (DO), turbidity and suspended solids in this Reporting Period, are summarized in ***Tables 4-2, 4-3 and 4-4***.

Table 4-2 Water Quality Results Summary for Dissolved Oxygen (DO), mg/L

Sampling date	W1 (ebb)	W1 (flood)	W2	W3	W4
3-Mar-15	***6.12***	***5.77***	***5.76***	7.19	***7.80***
5-Mar-15	7.40	***6.81***	***6.91***	6.95	***7.23***
7-Mar-15	***7.13***	***6.77***	***6.96***	7.43	***7.66***
10-Mar-15	***7.27***	7.57	***7.06***	7.22	***7.80***
12-Mar-15	7.73	7.30	***7.14***	7.47	***8.61***
14-Mar-15	7.34	***6.94***	***6.64***	7.29	***8.37***
16-Mar-15	***6.84***	***6.52***	***6.06***	7.58	***7.76***
18-Mar-15	***6.99***	***6.35***	***5.97***	7.77	***8.09***
20-Mar-15	***6.02***	***6.12***	***5.55***	7.24	***8.16***
23-Mar-15	7.45	***7.19***	7.85	7.58	***8.08***
25-Mar-15	***7.08***	***6.91***	***6.82***	7.81	***8.16***
27-Mar-15	***7.24***	7.66	***7.02***	7.39	***8.04***
30-Mar-15	***6.44***	***6.32***	***6.19***	7.10	***7.34***

Remarks: *Bold and Italic is indicated exceeded Action Level*

Table 4-3 Water Quality Results Summary for Turbidity, NTU

Sampling date	W1 (ebb)	W1 (flood)	W2	W3	W4
3-Mar-15	4.50	4.19	**5.72**	4.60	***3.76***
5-Mar-15	**8.05**	**7.42**	**7.52**	6.26	**6.19**
7-Mar-15	**7.78**	**7.02**	**7.26**	5.46	**5.56**
10-Mar-15	**7.21**	**8.21**	**5.93**	2.72	2.70
12-Mar-15	**5.57**	**6.54**	**7.46**	10.30	***3.43***
14-Mar-15	**8.60**	**10.30**	**11.98**	8.69	***3.94***
16-Mar-15	**10.00**	**16.00**	**26.00**	4.40	2.90
18-Mar-15	**8.25**	**8.65**	**8.62**	4.82	2.96
20-Mar-15	**11.80**	**13.45**	**12.40**	3.58	3.11
23-Mar-15	**14.55**	**11.55**	**9.00**	10.70	**8.47**
25-Mar-15	**9.26**	**9.80**	**10.95**	5.52	**4.88**
27-Mar-15	**13.35**	**10.55**	**12.20**	8.03	**7.06**
30-Mar-15	**6.80**	***5.00***	**5.09**	2.54	3.09

- *Bold and Italic is indicated exceeded Action Level*; *Bold with underline is indicated exceeded Limit Level*

Table 4-4 Water Quality Results Summary for Suspended Solids (SS), mg/L

Sampling date	W1 (ebb)	W1 (flood)	W2	W3	W4
3-Mar-15	2.0	4.0	<2.0	2.0	<2.0
5-Mar-15	5.0	6.0	2.0	<2.0	<2.0
7-Mar-15	2.0	6.0	7.5	<2.0	<2.0
10-Mar-15	6.0	8.0	7.0	2.0	3.0
12-Mar-15	5.0	4.0	4.5	5.0	6.0
14-Mar-15	6.0	4.0	5.5	6.0	6.0
16-Mar-15	4.0	5.0	7.5	6.0	6.0
18-Mar-15	5.0	5.0	4.5	8.0	6.0
20-Mar-15	9.0	4.0	6.5	6.0	2.0
23-Mar-15	4.0	6.0	5.5	6.0	6.0
25-Mar-15	9.0	4.0	5.0	<2.0	<2.0
27-Mar-15	6.0	7.0	6.0	3.0	5.0
30-Mar-15	7.0	5.0	6.0	<2.0	3.0

4.07 During the Reporting Period, field measurements showed that stream water temperatures were within 18.4℃ to 25.6℃ and pH values within 7.4 to 8.9.

4.08 A statistics of exceedances for the three parameters: dissolved oxygen (DO), turbidity and suspended solids are shown in ***Table 4-5***.

Table 4-5 Statistics Water Quality Exceedance

Station	DO		Turbidity		SS		Total Exceedance	
	Action	Limit	Action	Limit	Action	Limit	Action	Limit
W1	**19**	0	**1**	**23**	0	0	**20**	**23**
W2	**10**	0	0	**13**	0	0	**10**	**13**
W4	**13**	0	**3**	**5**	0	0	**16**	**5**
No. of Exceedance	**42**	0	**4**	**41**	0	0	**46**	**41**

4.09 As shown in *Table 4-4*, no exceedance of Suspended Solids was recorded in W1, W2 and W4. However there were, 42 and 45 exceedances of dissolved oxygen and turbidity were respectively recorded in this Reporting Period. NOEs were issued to notify EPD, IEC, the Contractor and RE upon confirmation of the results.

4.10 According to the Contractor's information and onsite observation, construction activities undertaken in this reporting period is included refuse collection point finishing work and landscape establishment. The active construction activities would not disturb the water body. The investigation results for the exceedances are summarized as follows:

- For the DO exceedances, the construction activities comprised none of DO depleting characteristics. Hence, all exceedances of DO should be natural variation of the river and not related to the Project works.
- At impact monitoring point W2, there were a total thirteen (13) Limit Level exceedances of Turbidity recorded. Since Contract 1 has completed and no construction activities close to W2 was carried out by Contract 2, it is concluded that the exceedances were not project related.
- At impact monitoring point W4, a total of eight (8) exceedances of Turbidity were recorded which including 3 Action Level and 5 Limit Level exceedances. As reviewed ***Table 4-4***, turbidity levels recorded in the control station (W3) at the same days are similar or higher than W4. Therefore it is concluded that the exceedances at W4 were likely due to natural variation and not related to the project.
- For monitoring point W1, a total of **24** exceedances of Turbidity (one Action and twenty-three Limit Levels exceedances) was recorded. Since Contract 1 has completed and W1 is located to nearly a sea-shore, marine water of Tolo Harbour during flood tidal should be to affect it. Therefore, it is considered that the exceedances in W1 were not related to the works under the Project

RESULTS OF HYDROLOGICAL CHARACTERISTICS MONITORING

4.11 In this Reporting Period, hydrological characteristics measurements were carried out on **3, 10, 16** and **27 March 2015**. The detailed measurement results in this Reporting Period are presented in ***Tables 4-6***.

Table 4-6 Detailed monitoring results of hydrological characteristics at Designated Measurement Points

Measurement		Tide Condition	River Width (m)	Water Depth (m)	Cut Section (m^2)	Velocity Flow Rate (m/s)	Average Volumetric Flow Rate (Q), m^3/s
Point	Time						
Date: 3 March 2015							
H1	16:03	Flood	5.5	0.39	2.1450	0.3	0.644
	10:00	Ebb	5.5	0.36	1.9800	0.2	0.396
H2	15:42	Flood	4.7	0.31	1.4570	0.1	0.146
	09:51	Ebb	4.7	0.3	1.4100	<0.1	<0.141
H3	15:26	Flood	7.45	0.36	2.6820	0.2	0.536
	09:32	Ebb	7.45	0.35	2.6075	0.1	0.261
H4	15:34	Flood	2.74	0.26	0.7124	0.2	0.142
	09:43	Ebb	2.74	0.25	0.6850	0.1	0.069
Date: 10 March 2015							
H1	10:10	Flood	5.5	0.45	2.4750	0.3	0.743
	17:18	Ebb	5.5	0.42	2.3100	0.3	0.693
H2	09:51	Flood	4.7	0.31	1.4570	0.1	0.146
	18:07	Ebb	4.7	0.3	1.4100	<0.1	<0.141
H3	09:29	Flood	7.45	0.39	2.9055	0.2	0.581
	17:51	Ebb	7.45	0.38	2.8310	0.1	0.283
H4	09:48	Flood	2.74	0.27	0.7398	0.2	0.148
	17:59	Ebb	2.74	0.25	0.6850	0.2	0.137
Date: 16 March 2015							
H1	17:05	Flood	5.5	0.44	2.4200	0.4	0.968
	09:19	Ebb	5.5	0.39	2.1450	0.3	0.644

Measurement		Tide Condition	River Width (m)	Water Depth (m)	Cut Section (m^2)	Velocity Flow Rate (m/s)	Average Volumetric Flow Rate (Q), m^3/s
Point	Time						
H2	16:48	Flood	4.7	0.29	1.3630	0.1	0.136
	10:30	Ebb	4.7	0.28	1.3160	0.1	0.132
H3	16:28	Flood	7.45	0.37	2.7565	0.2	0.551
	10:03	Ebb	7.45	0.35	2.6075	0.2	0.522
H4	16:43	Flood	2.74	0.26	0.7124	0.2	0.142
	10:12	Ebb	2.74	0.25	0.6850	0.2	0.137
Date: 27 March 2015							
H1	12:20	Flood	5.5	0.39	2.1450	0.4	0.858
	17:47	Ebb	5.5	0.43	2.3650	0.3	0.710
H2	12:07	Flood	4.7	0.27	1.2690	0.1	0.127
	17:34	Ebb	4.7	0.31	1.4570	0.1	0.146
H3	11:40	Flood	7.45	0.35	2.6075	0.2	0.522
	17:21	Ebb	7.45	0.37	2.7565	0.2	0.551
H4	11:58	Flood	2.74	0.25	0.6850	0.3	0.206
	17:29	Ebb	2.74	0.28	0.7672	0.2	0.153

4.12 Hydrological characteristics results of the all measurement points are summarized in ***Tables 4-7*** and ***4-8***.

Table 4-7 Summarized Hydrological Characteristics of Water Depth, m

Date	Mid-Flood				Mid-Ebb			
	H1	H2	H3	H4	H1	H2	H3	H4
3-Mar-15	0.39	0.31	0.36	0.26	0.36	0.30	0.35	0.25
10-Mar-15	0.45	0.31	0.39	0.27	0.42	0.30	0.38	0.25
16-Mar-15	0.44	0.29	0.37	0.26	0.39	0.28	0.35	0.25
27-Mar-15	0.39	0.27	0.35	0.25	0.43	0.31	0.37	0.28

Table 4-8 Summarized Hydrological Characteristics of Average Volumetric flow rate (Q), m^3/s

Date	Mid-Flood				Mid-Ebb			
	H1	H2	H3	H4	H1	H2	H3	H4
3-Mar-15	0.644	0.146	0.536	0.142	0.396	<0.141	0.261	0.069
10-Mar-15	0.743	0.146	0.581	0.148	0.693	<0.141	0.283	0.137
16-Mar-15	0.968	0.136	0.551	0.142	0.644	0.132	0.522	0.137
27-Mar-15	0.858	0.127	0.522	0.206	0.710	0.146	0.551	0.153

4.13 To compare the monitoring data between the Reporting Period (dry season) and baseline monitoring period, the currently water depth and volumetric flow rate has insignificant change. Furthermore, no exceedance in water depth and water flow rate was found in this Reporting Period.

RESULTS OF ECOLOGICAL MONITORING

4.14 According to updated EM&A Manual Section 6.17, bi-monthly ecological monitoring is conducted by the IEC – ENVIRON Hong Kong Limited. 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.

4.15 In the Reporting Period, the ecological monitoring carried out by the IEC is on 26 March 2015. The detailed monitoring report is presented in ***Appendix M***.

5.0 MONITORING RESULTS OF CONTRACT 1 OF OPERATION PHASE

5.01 The Operation Phase monitoring schedule has issued to relevant parties before the Reporting Period and attached in ***Appendix G***. The monitoring results are presented in the following sub-sections.

RESULTS OF HYDROLOGICAL CHARACTERISTICS MONITORING

5.02 For Contract 1 Operation Phase, hydrological characteristics measurement at H1 and H2 was conducted on **3**, **10**, **16** and **27 March 2015**. The detailed measurement results were presented in ***Tables 4-6, 4-7 and 4-8*** of ***Section 4*** of this report. Graphical Plots of Hydrological Characteristics shows in ***Appendix D.***

RESULTS OF ECOLOGICAL MONITORING

5.03 According to updated EM&A Manual Section 6.20, quarterly ecological monitoring is conducted by the IEC – ENVIRON Hong Kong Limited. 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 of the Contract 1.

5.04 In the Reporting Period, no ecological monitoring under the ***Contract 1*** was carried out by the IEC. For the tentative schedule, ecological monitoring of operation phase will be carried out in ***April 2015***.

6.0 WASTE MANAGEMENT

6.01 Waste management was carried out by an on-site Environmental Officer or an Environmental Supervisor from time to time.

RECORDS OF WASTE QUANTITIES

6.02 All types of waste arising from the construction work are classified into the following:

- Construction & Demolition (C&D) Material;
- Chemical Waste;
- General Refuse; and
- Excavated Soil.

6.03 The quantities of waste for disposal in this Reporting Period are summarized in ***Table 5-1*** and ***5-2*** and the Monthly Summary Waste Flow Table is shown in ***Appendix K***.

Table 5-1 Summary of Quantities of Inert C&D Materials

Type of Waste	Quantity	Disposal Location
C&D Materials (Inert) (m^3)	0	-
Reused in this Contract (Inert) (m^3)	0	-
Reused in other Projects (Inert) (m^3)	0	-
Disposal as Public Fill (Inert) (m^3)	0	-

Table 5-2 Summary of Quantities of C&D Wastes

Type of Waste	Quantity	Disposal Location
Recycled Metal (kg)	0	-
Recycled Paper / Cardboard Packing (kg)	0	-
Recycled Plastic (kg)	0	-
Chemical Wastes (kg)	0	-
General Refuses (m^3)	0	-

6.04 To control over the site performance on waste management, the Contractor shall ensure that all solid and liquid waste management works are in full compliance with the relevant license/permit requirements, such as the effluent discharge license and the chemical waste producer registration. The Contractor is also reminded to implement the recommended environmental mitigation measures according to the EM&A Manual based on actual site conditions. Whenever possible, materials should be reused on-site as far as practicable.

7.0 SITE INSPECTION

REGULAR SITE INSPECTION AND MONTHLY AUDIT

7.01 According to the Updated Environmental Monitoring and Audit Manual stipulation, regular site inspection to evaluate the project environmental performance should be carried out during Construction Phase but it is not required for the Operation Phase.

7.02 In 4 December 2014, EPD agreed that EM&A programmes of DC/2009/22 (Contract 1) changed to operation phase, but Contract 2 should be continued in construction phase.

7.03 In the Reporting Period, regular weekly environmental site was performed for Contract 2 by the Contractor and RE on **5**, **12**, **19** and **31 March 2015**. Moreover, ET was independently to undertake site inspection on **3, 10** and **18 March 2015**. No non-compliance was observed during site inspection by ET. Maintain the work area cleanness and tidiness of the general requirement was reminded the Main Contractor of Contract 2.

7.04 Furthermore, joint site inspection by EPD, the RE, IEC, Main Contractor of Contract 2 and ET was carried out on **24 March 2015**. For the joint site inspection, EPD has accepted that EM&A Programme of Contract 2 of operation phase can commenced in April 2015.

LANDSCAPE AND VISUAL INSPECTION

Operation Phase of Contract 1

7.05 According to Section 7.5 of the Updated EM&A Manual, quarterly landscape and visual inspection shall be carried out during the first year of the Operation Phase for **Contract 1**.

7.06 Since construction phase of Contract 1 was completed on **26 November 2014** which accepted by EPD on **4 December 2014**. The first quarterly Landscape & Visual inspection has been undertaken on **2 March 2015**. The inspection report signed by the Registered Landscape Architect is enclosed in ***Appendix L***.

7.07 The second quarterly Landscape & Visual inspection of Contract 1 is scheduled in **June 2015**.

Construction Phase of Contract 2

7.08 In this Reporting Period, landscape and visual inspection for the **Contract 2** was carried on **2nd** and **16th March 2015**. The Landscape & Visual Report (**March 2015**) signed by the registered Landscape Architect is enclosed in ***Appendix L***.

7.09 Due to EPD accepted the Contract 2 operation phase commencement in April 2015, Landscape & Visual inspection thus will change as quarterly conduct. The first quarter inspection of landscape and visual for Contract 2 is scheduled to be conducted in **June 2015**.

8.0 ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

ENVIRONMENTAL COMPLAINT, SUMMONS AND PROSECUTION

8.01 For the Project, no environmental complaint, summons and prosecution was received in this Reporting Period. The statistical summary table of environmental complaint for the **Contract 2** is presented in ***Tables 8-1, 8-2*** and ***8-3***.

Table 8-1 Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	1	1	Air Quality (1)
March 2015	0	1	Air Quality (1)

Table 8-2 Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	0	0	NA
March 2015	0	0	NA

Table 8-3 Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	0	0	NA
March 2015	0	0	NA

9.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

9.01 According to the Updated Environmental Monitoring and Audit Manual, mitigation measures recommended for the Construction and Operation Phases summarized as follows.

CONSTRUCTION PHASE

Noise Mitigation Measure

(a) Only well-maintained plant should be operated on-site and plant shall be serviced regularly during the construction program;

(b) Silencers or mufflers on construction equipment should be utilized and shall be properly maintained during the construction program;

(c) Mobile plant, if any, should be sited as far from NSRs as possible;

(d) Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;

(e) Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs;

(f) Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities;

(g) Use of quieter plants to carry out the construction tasks proposed for the Project;

(h) Use about 3.5m high of temporary noise barriers as screened the noisy PMEs to carry out construction of box culvert and site clearance.

(i) Low Impact Method, such as using PMEs smaller in size and to be enclosed by noise enclosure, should be adopted for the construction of box culvert and pipe laying in Wai Ha; and

(j) Use of noise enclosure during the works area for pipe laying in Wai Ha.

Dust Mitigation Measure

(a) Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather;

(b) Use of frequent watering for particularly dusty static construction areas and areas close to ASRs;

(c) Tarpaulin covering of all dusty vehicle loads transported to, from and between site location;

(d) Establishment and use of vehicle wheel and body washing facilities at the exit points of the site;

(e) Routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs;

(f) Stockpiled excavated materials should be covered with tarpaulin and should be removed offsite within 24 hours to avoid any odour nuisance arising.

Local Stream Water Quality Mitigation Measure

(a) Before commencing any site formation work, all sewer and drainage connections shall be sealed to prevent debris, soil, sand etc. from entering public sewers/drains;

(b) 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;

(c) 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 facilities and erosion and sediment control structures shall be inspected monthly and maintained to ensure proper and efficient operation al all times and particularly during rainstorms

(d) Water pumped out from excavated pits shall be discharged into sill removal facilities;

(e) During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed

(f) Exposed soil areas shall be minimized to reduce potential for increased siltation and contamination of runoff

(g) 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;

(h) Open stockpiles of construction materials or construction wastes on-site shall be covered with tarpaulin or similar fabric during rainstorms;

(i) 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 01 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;

(j) 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 0.1 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;

(k) 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;

(l) Tarpaulin sheets would be used to cover the excavation areas during heavy rainstorms. This would prevent the ingress of rainwater into the trench minimizing the risk of muddy water getting into Wai Ha River and the adjacent Conservation Area;

(m) Any concrete washing water would be contained inside the works site surrounded by the extended sheet piles. A pump sump at the bottom 0f the trench would be provided to pump any excess water during concrete washing;

(n) 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;

(o) Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering the Wai Ha River and fish ponds at Shuen Wan. Stockpiles of cement and other construction materials should be kept covered when not being used.

(p) 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 01 the largest tank The bund should be drained of rainwater after a rain event

(q) Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site. A licensed contractor would be responsible for appropriate disposal and maintenance of these facilities;

(r) 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 should 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 April.

Waste Mitigation Measures

(a) The Contractor shall observe and comply with the Waste Disposal Ordinance (WDO) and its subsidiary regulations.

(b) The Contractor shall submit to the Engineer for approval a Waste Management Plan with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site operations comply with the approved waste management plan.

(c) The Contractor shall minimize the generation of waste from his work. Avoidance and minimization of waste generation can be achieved through changing or improving design and practices, careful planning and good site management.

(d) The reuse and recycling of waste shall be practised as far as possible. The recycling materials shall include paper/cardboard, timber and metal etc.

(e) The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The public fill which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt shall be reused in earth filling, reclamation or site formation works. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled where possible and, as the last resort, disposal of at landfills.

(f) The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites). The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill.

(g) In order to avoid dust or odour impacts, any vehicles leaving a works area carrying construction waste or public fill shall have their load covered.

(h) To avoid the excessive use of wood, reusable steel shutters shall be used as a preferred alternative to formwork and falsework where possible.

(i) The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation. The Contractor shall apply for registration as chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation when chemical waste is produced. All chemical waste shall be properly stored, labeled, packaged and collected in accordance with the Regulation.

Ecology

- To minimize sedimentation, de-silting should be limited to the dry season
- Waste material produced during de-silting should be disposed of in a timely and appropriate manner

Landscape and visual

- 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
- Reinstatement of affected area should be carried out to check that the works areas are properly reinstated

OPERATION PHASE

9.02 According to the Updated Environmental Monitoring and Audit Manual, mitigation measures of Operation Phase of the Project is included the Ecological and Landscape & Visual as listed below.

Ecological

- To minimize sedimentation, de-silting should be limited to conduct the dry season; and
- Waste material produced during de-silting should be disposed of in a timely and appropriate manner

Landscape and visual

- Architectural design and landscape design to reinstate of affected areas including pump house and along Tung Tsz Road are practiced to mitigate the impacts during operation phase;
- Enhancement planting along Tung Tsz Road with shrubs / trees of suitable species to protect the stream and marshes;
- Trees pruning shall be regular to conduct; and
- Check whether the affected area had been reinstated

9.03 As coming a year, Contracts 1 and 2 under the Project are the Operation Phase.

10.0 CONCLUSIONS AND RECOMMENTATIONS

CONCLUSIONS

10.01 This is the **45th** monthly EM&A report for the Contract 1 and Contract 2 presenting the Project Construction and Operation Phases monitoring results with inspection findings for the Reporting Period of **1** to **31 March 2015**.

10.02 No noise complaint (which is an Action Level exceedance) was received in this Reporting Period.

10.03 In Reporting Period, no exceedance of Suspended Solids was recorded in W1, W2 and W4. However, there were 42 and 45 exceedances of dissolved oxygen and turbidity were respectively recorded. Investigation result concluded that the exceedances were not project related.

10.04 The hydrological characteristics of water depth and water flow rate as compared baseline monitoring period, the currently water depth and volumetric flow rate has insignificant change.

10.05 In the Reporting Period, no ecological monitoring in area under the Project of Contract 1 was performed. However, bi-monthly ecological monitoring in area of Contract 2 was performed by IEC on ***26 March 2015***.

10.06 In the Reporting Period, Landscape & Visual of bi-weekly inspection for **Contract 2** was undertaken on **2** and **16 March 2015**, and quarterly inspection of **Contract 1** was on **2 March 2015**. The relevant Landscape & Visual Reports has been signed by the registered Landscape Architect.

10.07 In the Reporting Period, regular weekly environmental site was performed for Contract 2 by the Contractor and RE on **5**, **12**, **19** and **31 March 2015**. Moreover, ET was independently to undertake site inspection on **3, 10** and **18 March 2015**. No non-compliance was observed during site inspection by ET. Furthermore, joint site inspection by EPD, the RE, IEC, Main Contractor of Contract 2 and ET was carried out on **24 March 2015**. For the joint site inspection, EPD has accepted that EM&A Programme of Contract 2 of operation phase can commenced in April 2015.

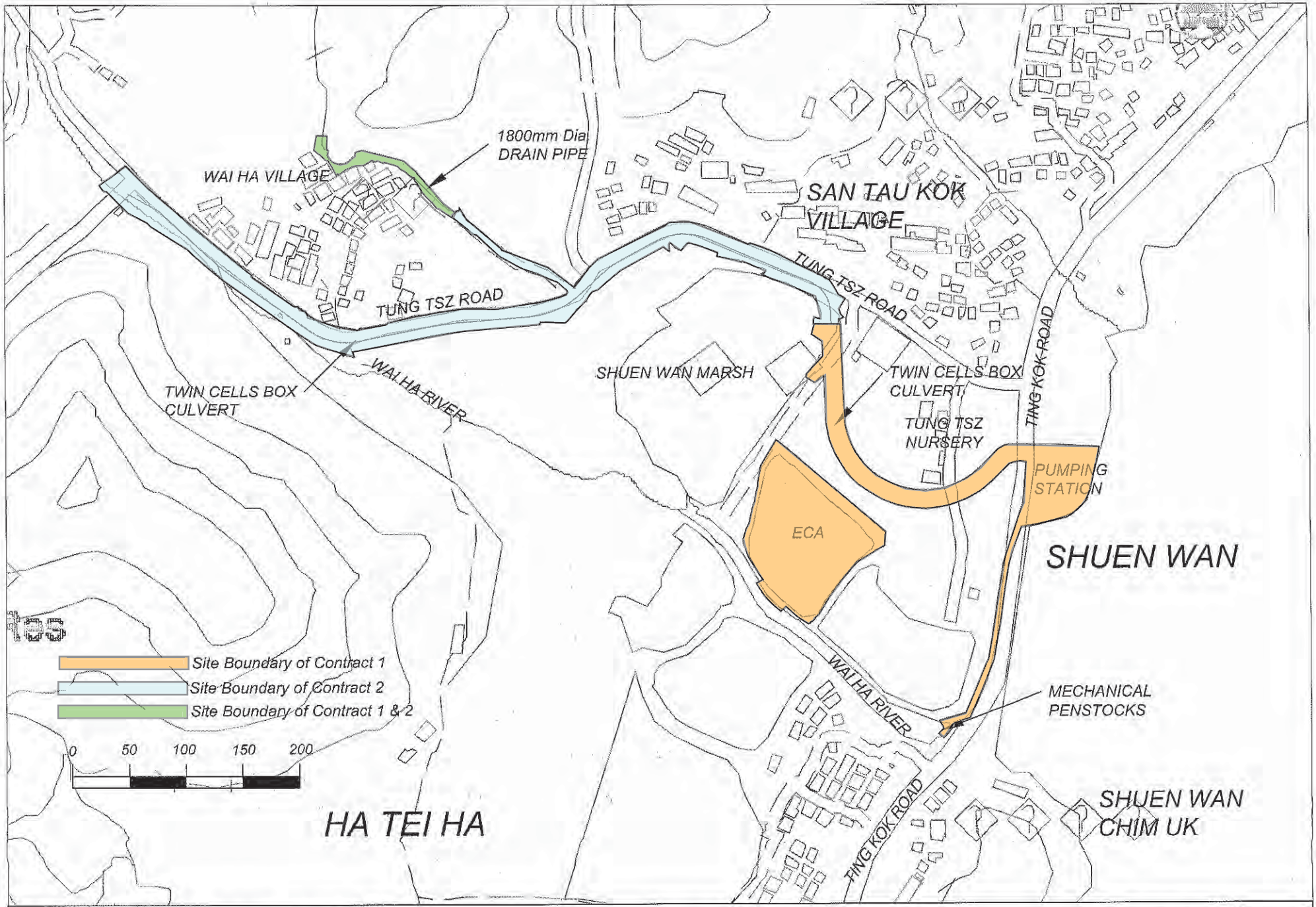
10.08 No documented complaint, notification of summons or successful prosecution was received in the Reporting Period.

RECOMMENDATIONS

10.09 As agreed with the EPD, a whole Project will be changed to Operation Phase in April 2015. Mitigation Measures of Operation Phase shall fulfill the updated EM&A Manual requirements.

Appendix A

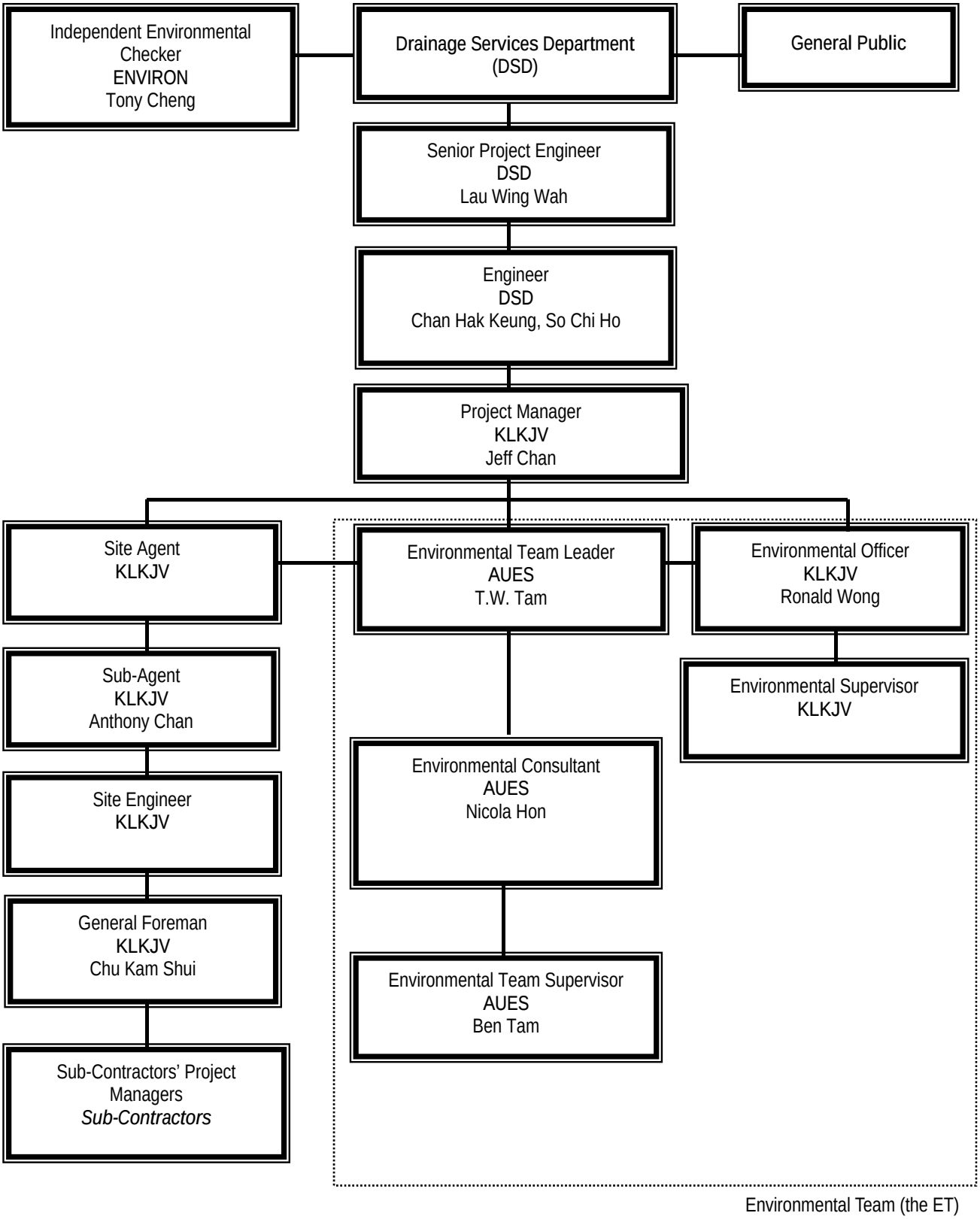
Project Location at Shuen Wan



Site Location Plan of DSD Contract 1 and Contract at Shuen Wan

Appendix B

Organization Chart and the Key Contact Person



Environmental Management Organization

Contact Details of Key Personnel

Organization	Project Role	Name of Key Staff	Tel No.	Fax No.
DSD	Employer	Mr. Luk Wai Hung	2594 7400	2827 8700
DSD	Senior Engineer	Mr. Lau Wing Wah	2594 7402	2827 8700
DSD	Engineer	Mr. Chan Hak Keung	2594 7596	2827 8700
DSD	Engineer	Mr. So Chi Ho	2594 7356	2827 8700
DSD	Senior Inspector	Mr. Tso Si On	6778 2708	2827 8700
ENVIRON	Independent Environmental Checker	Mr. Tong Cheng	3465-2888	3465-2899
KLKJV	Project Director	Mr. Poon Chi Yeung Francis	2674 3888	2674 9988
KLKJV	Project Manager	Mr. Jeff Chan	2674 3888	2674 9988
KLKJV	Sub- Agent	Mr. Anthony Chan	2674 3888	2674 9988
KLKJV	Site Forman	Mr. Chu Kam Shui	2674 3888	2674 9988
KLKJV	Environmental Officer	Mr. Ronald Wong	2674 3888	2674 9988
AUES	Environmental Team Leader	Mr. T.W. Tam	2959-6059	2959-6079
AUES	Environmental Consultant	Miss. Nicola Hon	2959-6059	2959-6079
AUES	Environmental Supervisor	Mr. Ben Tam	2959-6059	2959-6079

Legends:

DSD (Employer) – Drainage Services Department

DSD (Engineer) – Drainage Services Department

KLKJV (Main Contractor) – Kwan Lee-Kuly Joint Venture

ENVIRON (IEC) – ENVIRON Hong Kong Limited

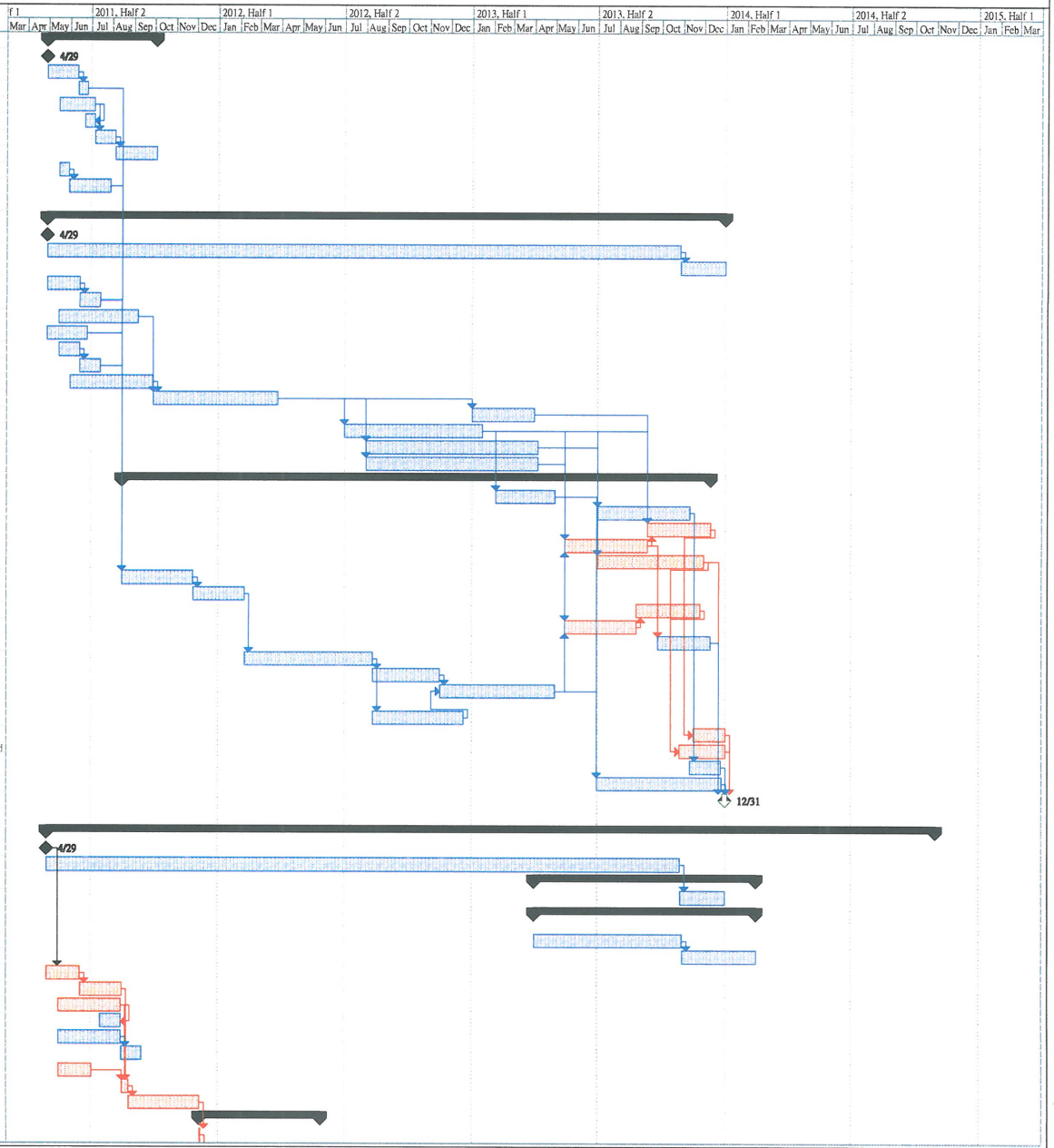
AUES (ET) – Action-United Environmental Services & Consulting

Appendix C

Master Construction Programs

Contract No.: DC/2010/02
Contract Title: Drainage Improvement Works in Shuen Wan and Shek Wu Wai
Updated Programme (No. 6)

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Preliminary Works**	**158 days**	**Fri 11 Apr 29**	**Mon 11 Oct 3**	
2	Commencement of Works	0 days	Fri 11 Apr 29	Fri 11 Apr 29	
3	Site Clearance	44 days	Fri 11 Apr 29	Sat 11 Jun 11	
4	Record Survey	14 days	Sun 11 Jun 12	Sat 11 Jun 25	3
5	Design & Construction of Hoarding	51 days	Mon 11 May 16	Tue 11 Jul 5	
6	Signboard (Type B)	14 days	Wed 11 Jun 22	Tue 11 Jul 5	5FF
7	Design & Approval of Engineer's Site Office	30 days	Wed 11 Jul 6	Thu 11 Aug 4	5
8	Construction of Engineer's Site Office	60 days	Fri 11 Aug 5	Mon 11 Oct 3	7
9	Pre-construction Condition Survey	14 days	Mon 11 May 16	Sun 11 May 29	
10	Relocation of Existing Shrines (2 Nos.)	60 days	Mon 11 May 30	Thu 11 Jul 28	9
11					
12	**Section I (Construction Works in Shuen Wan)**	**978 days**	**Fri 11 Apr 29**	**Tue 13 Dec 31**	
13	**Commencement of Works**	0 days	Fri 11 Apr 29	Fri 11 Apr 29	
14	**Original Contract Period**	913 days	Fri 11 Apr 29	Sun 13 Oct 27	
15	**Extension of Time - due to Inclement Weather**	65 days	Mon 13 Oct 28	Tue 13 Dec 31	14
16	Design of TTA	47 days	Fri 11 Apr 29	Tue 11 Jun 14	
17	Submission of TTA to TMLG for Approval	30 days	Wed 11 Jun 15	Thu 11 Jul 14	16
18	Excavation Permit	115 days	Mon 11 May 16	Wed 11 Sep 7	
19	Submission & approval of caluclation & MS for BC (including trench ELS/slope)	58 days	Fri 11 Apr 29	Sat 11 Jun 25	
20	Notify EPD on commencement (one month advance notice)	30 days	Mon 11 May 16	Tue 11 Jun 14	
21	Tree Felling	30 days	Wed 11 Jun 15	Thu 11 Jul 14	20
22	Utility detection and diversion programme	120 days	Wed 11 Jun 1	Wed 11 Sep 28	
23	Utilities corordination	180 days	Thu 11 Sep 29	Mon 12 Mar 26	18,22
24	Tempory disconnection of fire hydrant (Bay 7)	90 days	Tue 13 Jan 1	Sun 13 Mar 31	23
25	CLP's overhead pole diversion (bay 1 to Bay 15)	199 days	Sun 12 Jul 1	Tue 13 Jan 15	23
26	Relocation/ diversion of light post (near Bay 13)	248 days	Wed 12 Aug 1	Fri 13 Apr 5	23
27	Relocation/ diversion of light post (near Bay 32)	248 days	Wed 12 Aug 1	Fri 13 Apr 5	23
28	**Construction of Single Cell (approx. 724m)**	**849 days**	**Mon 11 Aug 15**	**Tue 13 Dec 10**	
29	**Intake of Box Culvert - in progress**	86 days	Mon 13 Feb 4	Tue 13 Apr 30	25
30	from CH67 to CH127 (Bay 1,2,3,4,5)	133 days	Mon 13 Jul 1	Sun 13 Nov 10	25
31	from CH127 to CH152 (Bay 6,7)	91 days	Wed 13 Sep 11	Tue 13 Dec 10	32,24,25
32	from CH152 to CH200 (Bay 8,9,10,11)	119 days	Wed 13 May 15	Tue 13 Sep 10	41,25
33	from CH200 to CH297 (Bay 12,13,14,15,16,17,18,19)	153 days	Mon 13 Jul 1	Sat 13 Nov 30	26,25
34	**from CH297 to CH334 (Bay 20,21,22) completed**	**103 days**	**Mon 11 Aug 15**	**Fri 11 Nov 25**	**17,19,21,10,4**
35	**from CH334 TO CH395 (Bay 23,24,25,26,27) completed**	**74 days**	**Sat 11 Nov 26**	**Tue 12 Feb 7**	**34**
36	from CH395 to CH419 (Bay 28,29)	92 days	Mon 13 Aug 26	Mon 13 Nov 25	37
37	From CH419 to CH455 (Bay 30,31,32)	103 days	Wed 13 May 15	Sun 13 Aug 25	41,27
38	from CH455 to CH480 (Bay 33,34)	76 days	Thu 13 Sep 26	Tue 13 Dec 10	32FS+15 days
39	**from CH480 to CH541 (Bay 35,36,37,38,39) completed**	**185 days**	**Wed 12 Feb 8**	**Fri 12 Aug 10**	**35**
40	**from CH541 to CH577 (Bay 40,41,42) completed**	97 days	Sat 12 Aug 11	Thu 12 Nov 15	39
41	**from CH577 to CH674 (Bay 43,44,45,46,47,48,49,50) in progress**	166 days	Fri 12 Nov 16	Tue 13 Apr 30	40,42FS-44 days
42	**from CH674 to CH732 (Bay 51,52,53,54,55) completed**	131 days	Sat 12 Aug 11	Wed 12 Dec 19	39
43	RCP (above Bay 6)	46 days	Sat 13 Nov 16	Tue 13 Dec 31	31FS-25 days
44	CCTV Inspection	66 days	Sun 13 Oct 27	Tue 13 Dec 31	36FS-30 days,33FS-35 d
45	Installation of Type 2 Railing at Upstream (CH67 to CH240)	45 days	Mon 13 Nov 11	Wed 13 Dec 25	30
46	Landscape Softwork	180 days	Sun 13 Jan 30	Thu 13 Dec 26	29,41FS+60 days
47	**Completion of Section I**	0 days	Tue 13 Dec 31	Tue 13 Dec 31	46,45,43,44,33,38
48					
49	**Section II (Construction Works in Shek Wu Wai)**	**1281 days**	**Fri 11 Apr 29**	**Thu 14 Oct 30**	
50	Commence of Works	0 days	Fri 11 Apr 29	Fri 11 Apr 29	
51	Original Contract Period	913 days	Fri 11 Apr 29	Sun 13 Oct 27	
52	**Extension of Time**	**320 days**	**Mon 13 Apr 1**	**Fri 14 Feb 14**	
53	EOT due to inclement weather	65 days	Mon 13 Oct 28	Tue 13 Dec 31	51
54	**Utilities in conflict with Construction of Box Culvert at downstream**	**320 days**	**Mon 13 Apr 1**	**Fri 14 Feb 14**	
55	utilities diversions	213 days	Mon 13 Apr 1	Wed 13 Oct 30	
56	construction of remaining works	107 days	Thu 13 Oct 31	Fri 14 Feb 14	55
57	Design of TTA	48 days	Fri 11 Apr 29	Wed 11 Jun 15	50
58	Submission of TTA to TMLG for Approval	60 days	Thu 11 Jun 16	Sun 11 Aug 14	57
59	Excavation Permit	90 days	Mon 11 May 16	Sat 11 Aug 13	
60	Temp. Work Design	30 days	Fri 11 Jul 15	Sat 11 Aug 13	59FF
61	Site Investigation for Utilities	90 days	Mon 11 May 16	Sat 11 Aug 13	
62	Submit Program for Utilities Diversion	30 days	Sun 11 Aug 14	Mon 11 Sep 12	61
63	Site Clearance and Tree Felling	48 days	Mon 11 May 16	Sat 11 Jul 2	
64	Implement Stage 1 of TTA	10 days	Mon 11 Aug 15	Wed 11 Aug 24	58,59,63
65	Temp. Steel Decking and temporary carriageway	102 days	Thu 11 Aug 25	Sun 11 Dec 4	64
66	**Box Culvert Construction**	**175 days**	**Mon 11 Dec 5**	**Sun 12 May 27**	
67	Implement Stage 2 of TTA	1 day	Mon 11 Dec 5	Mon 11 Dec 5	65



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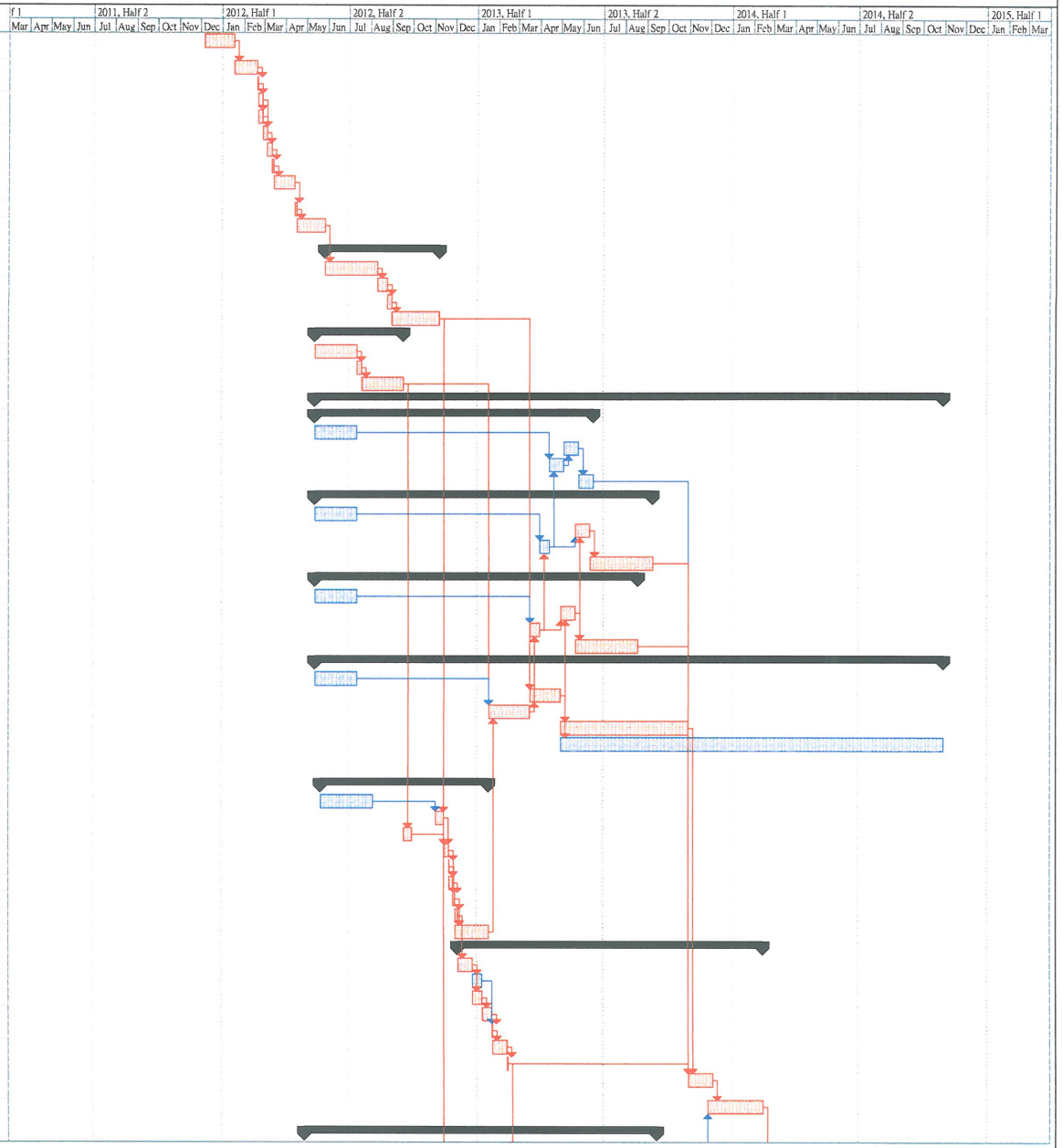
Task | Milestone | Rolled Up Task | Rolled Up Milestone | Split | Project Summary | Inactive Task | Deadline
Critical Task | Summary | Rolled Up Critical Task | Rolled Up Progress | External Tasks | Group By Summary | Progress

Contract No.: DC/2010/02
Contract Title: Drainage Improvement Works in Shuen Wan and Shek Wu Wai
Updated Programme (No. 6)

ID	Task Name	Duration	Start	Finish	Predecessors
68	Construction of Box Culvert along Castle Peak Road (West Bound) including demolition of ex. BC	43 days	Tue 11 Dec 6	Tue 12 Jan 17	67
69	Temporary carriageway for stage 3 TTA	33 days	Wed 12 Jan 18	Sun 12 Feb 19	68
70	Implement Stage 3 of TTA	1 day	Mon 12 Feb 20	Mon 12 Feb 20	69
71	Trial pit for utilities	7 days	Tue 12 Feb 21	Mon 12 Feb 27	70
72	Construction of steel footbridge	7 days	Tue 12 Feb 21	Mon 12 Feb 27	70
73	Installation of steel sheet piles	6 days	Tue 12 Feb 28	Sun 12 Mar 4	72,71
74	Temporary support for utilities	7 days	Mon 12 Mar 5	Sun 12 Mar 11	73
75	Demolish Exisiting Box Culvert (East Bound)	3 days	Mon 12 Mar 12	Wed 12 Mar 14	74
76	Construction of Base Slab & Wall of Box Culvert along Castle Peak Road (East Bound)	30 days	Thu 12 Mar 15	Fri 12 Apr 13	75
77	Remove Temporary flow diversion	3 days	Sat 12 Apr 14	Mon 12 Apr 16	76
78	Construction of 3.5m wide top slab of box culvert along Castle Peak Road (East Bound)	41 days	Tue 12 Apr 17	Sun 12 May 27	77
79	**Construction of RW1 wing wall portion**	**164 days**	**Mon 12 May 28**	**Wed 12 Nov 7**	
80	CLP (overhead pole) - cable laying	75 days	Mon 12 May 28	Fri 12 Aug 10	78
81	CLP (overhead pole) - changing over	14 days	Sat 12 Aug 11	Fri 12 Aug 24	80
82	*CLP (overhead pole) - removal of overhead pole*	*7 days*	*Sat 12 Aug 25*	*Fri 12 Aug 31*	*81*
83	Retaining wall RW1 - wing wall portion	68 days	Sat 12 Sep 1	Wed 12 Nov 7	82
84	**Construction of RW2 (wing wall)**	**127 days**	**Mon 12 May 14**	**Mon 12 Sep 17**	
85	PCCW - XP application	60 days	Mon 12 May 14	Thu 12 Jul 12	
86	PCCW - demolition of existing joint box/ cable drawpit	7 days	Fri 12 Jul 13	Thu 12 Jul 19	85
87	Retaining wall RW2 (wing wall)	60 days	Fri 12 Jul 20	Mon 12 Sep 17	86
88	**Utilities Diversion by UU**	**900 days**	**Mon 12 May 14**	**Thu 14 Oct 30**	
89	**CLP (2no. 11kV cables)**	**399 days**	**Mon 12 May 14**	**Sun 13 Jun 16**	
90	CLP (2 no. 11kV cables) - XP application	60 days	Mon 12 May 14	Thu 12 Jul 12	
91	CLP (2 no. 11kV cables) - ducting & cable works (near RW1)	21 days	Mon 13 May 6	Sun 13 May 26	92
92	CLP (2 no. 11kV cables) - ducting & cable works (near RW2)	21 days	Mon 13 Apr 15	Sun 13 May 5	90,97
93	CLP (2 no. 11kV cables) - changing over	21 days	Mon 13 May 27	Sun 13 Jun 16	91
94	**NWT**	**484 days**	**Mon 12 May 14**	**Mon 13 Sep 9**	
95	NWT - XP application	60 days	Mon 12 May 14	Thu 12 Jul 12	
96	NWT - manholes & ducting construction works (near RW1)	21 days	Wed 13 May 22	Tue 13 Jun 11	97,101
97	NWT - manholes & ducting construction works (near RW2)	14 days	Mon 13 Apr 1	Sun 13 Apr 14	95,102
98	NWT - diversion & changing over	90 days	Wed 13 Jun 12	Mon 13 Sep 9	96
99	**HGC**	**463 days**	**Mon 12 May 14**	**Mon 13 Aug 19**	
100	HGC - XP application	60 days	Mon 12 May 14	Thu 12 Jul 12	
101	HGC - manholes & ducting construction works (near RW1)	21 days	Wed 13 May 1	Tue 13 May 21	102,106
102	HGC - manholes & ducting construction works (near RW2)	14 days	Mon 13 Mar 18	Sun 13 Mar 31	100,107
103	HGC - diversion & changing over	90 days	Wed 13 May 22	Mon 13 Aug 19	101
104	**PCCW**	**900 days**	**Mon 12 May 14**	**Thu 14 Oct 30**	
105	PCCW - XP application	60 days	Mon 12 May 14	Thu 12 Jul 12	
106	PCCW - manholes & ducting construction works (near RW1)	44 days	Mon 13 Mar 18	Tue 13 Apr 30	83,107
107	PCCW - manholes & ducting construction works (near RW2)	59 days	Fri 13 Jan 18	Sun 13 Mar 17	87,105,119
108	PCCW - diversion & changing over (local cables)	183 days	Wed 13 May 1	Wed 13 Oct 30	106
109	PCCW - diversion & changing over (overseas cables - about 4 nos.) - to be hanged up for construction of remaining Box Culvert	548 days	Wed 13 May 1	Thu 14 Oct 30	106
110	**WSD**	**241 days**	**Tue 12 May 22**	**Thu 13 Jan 17**	
111	WSD - material delivery	75 days	Tue 12 May 22	Sat 12 Aug 4	
112	WSD - pipes frabrication, installation & laying (near RW1)	12 days	Sat 12 Nov 3	Wed 12 Nov 14	83FS-5 days,111
113	WSD - pipes frabrication, installation & laying (near RW2)	12 days	Tue 12 Sep 18	Sat 12 Sep 29	87
114	WSD - excavation of connection points	7 days	Thu 12 Nov 15	Wed 12 Nov 21	112,113
115	WSD - inspection of connection points with WSD	1 day	Thu 12 Nov 22	Thu 12 Nov 22	114
116	WSD - swabling/ flushing/ sterilization	6 days	Thu 12 Nov 22	Tue 12 Nov 27	114
117	WSD - shutdown & commissioning by WSD	3 days	Wed 12 Nov 28	Fri 12 Nov 30	116,115
118	WSD - removal of disused pipes/ reinstatement	4 days	Sat 12 Dec 1	Tue 12 Dec 4	117
119	WSD - diversion of 3 nos. dia.25 pipes	48 days	Sat 12 Dec 1	Thu 13 Jan 17	117
120	**Remaining box culvert**	**437 days**	**Wed 12 Dec 5**	**Fri 14 Feb 14**	
121	Construction of top slab of box culvert for East Bound	21 days	Wed 12 Dec 5	Tue 12 Dec 25	118
122	Construction of temp. footway at downstream	14 days	Wed 12 Dec 26	Tue 13 Jan 8	121
123	Backfilling and removal of temporary works	14 days	Wed 12 Dec 26	Tue 13 Jan 8	121
124	Temporary road surface for East Bound	14 days	Wed 13 Jan 9	Tue 13 Jan 22	123
125	Resume the east bound traffic	1 day	Wed 13 Jan 23	Wed 13 Jan 23	122,124
126	Temporary road surface for West Bound	21 days	Thu 13 Jan 24	Wed 13 Feb 13	125
127	Resume Castle Peak Road traffic for both direction	1 day	Thu 13 Feb 14	Thu 13 Feb 14	126
128	Construction of remaining top slab of box culvert and footpath at downstream	35 days	Thu 13 Oct 31	Wed 13 Dec 4	127,108,93,98,103
129	Implementation of TTA, Permanent road surface & Paving block for footpath and associated works	79 days	Thu 13 Nov 28	Fri 14 Feb 14	128FS-7 days,136
130	**Retaining Wall RW1 & Access Ramp**	**505 days**	**Sun 12 Apr 29**	**Sun 13 Sep 15**	



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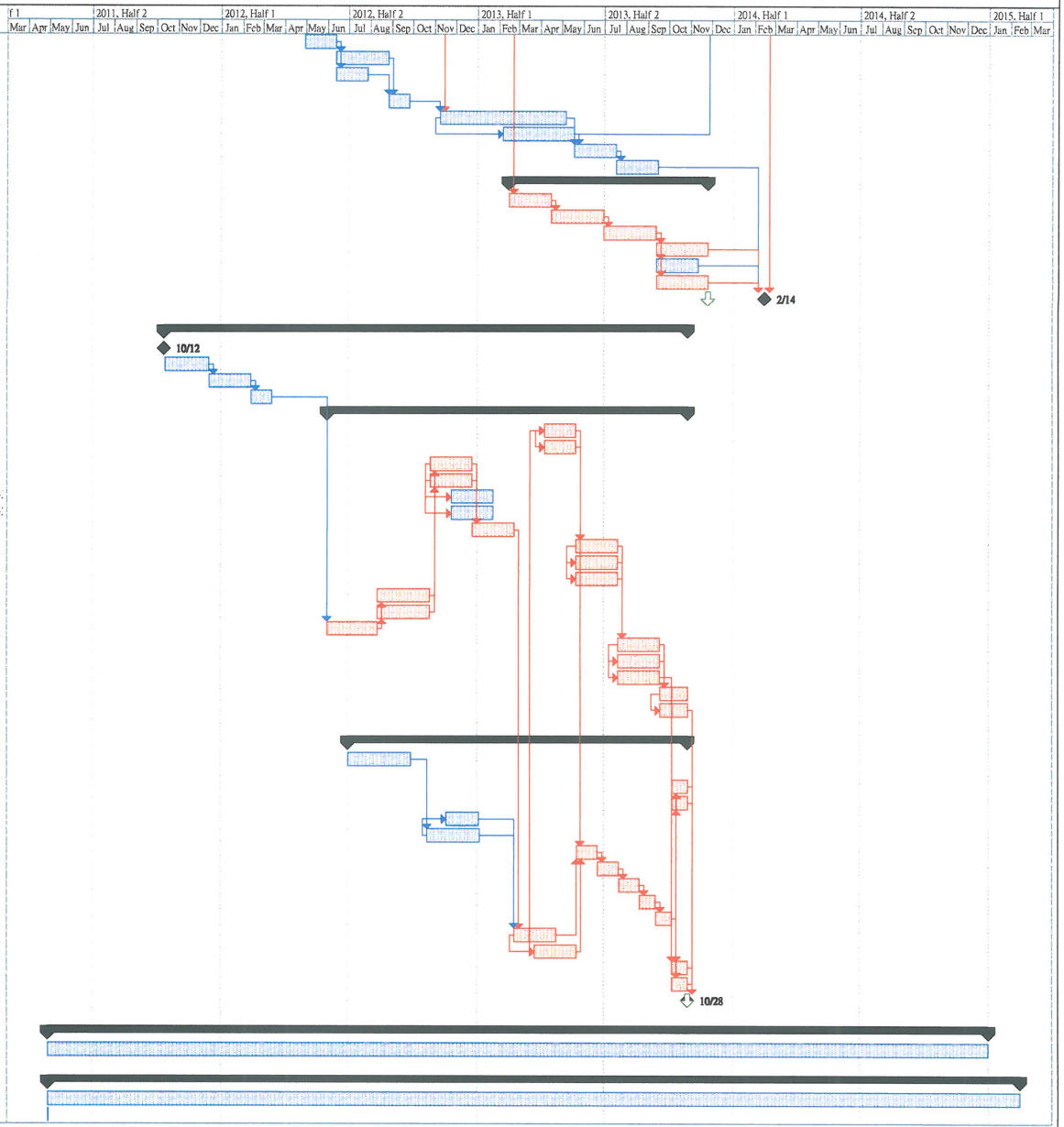
Contract No.: DC/2010/02
Contract Title: Drainage Improvement Works in Shuen Wan and Shek Wu Wai
Updated Programme (No. 6)

ID	Task Name	Duration	Start	Finish	Predecessors
131	Design & submission of TTA (San Tin Tsuen Road) for construction RW1	45 days	Sun 12 Apr 29	Tue 12 Jun 12	
132	Relocation of fire hydrant	75 days	Wed 12 Jun 13	Sun 12 Aug 26	131
133	Coordination with RMO & TD to finalize the implementation date of TTA at San Tin Tsuen Road	45 days	Wed 12 Jun 13	Fri 12 Jul 27	131
134	Implementation of TTA at San Tin Tsuen Road	30 days	Mon 12 Aug 27	Tue 12 Sep 25	132,133
135	Construction of RW1	180 days	Thu 12 Nov 8	Mon 13 May 6	83,134
136	Construction of access ramp	102 days	Wed 13 Feb 6	Sat 13 May 18	135SS+90 days
137	Construction of concrete parapet	60 days	Sun 13 May 19	Wed 13 Jul 17	136,135
138	Installation of railing and vehicular gate	60 days	Thu 13 Jul 18	Sun 13 Sep 15	137
139	**Retaining Wall RW3 & RW4**	**284 days**	**Fri 13 Feb 15**	**Mon 13 Nov 25**	
140	Removal of steel road bridge at upstream	60 days	Fri 13 Feb 15	Mon 13 Apr 15	127
141	Construction of RW4	75 days	Tue 13 Apr 16	Sat 13 Jun 29	140
142	Construction of RW3	75 days	Sun 13 Jun 30	Thu 13 Sep 12	141
143	UU diversion/ permanent works	74 days	Fri 13 Sep 13	Mon 13 Nov 25	142
144	Installation of Type 2 railing and construction of flood wall	60 days	Fri 13 Sep 13	Mon 13 Nov 11	142
145	Reinstatement of footpath and planter areas	74 days	Fri 13 Sep 13	Mon 13 Nov 25	142
146	**Completion of Section II**	0 days	Fri 14 Feb 14	Fri 14 Feb 14	145,138,143,144,129
147					
148	**Section III (Construction Works in Wai Ha Village)**	**748 days**	**Wed 11 Oct 12**	**Mon 13 Oct 28**	
149	Commence of Works	0 days	Wed 11 Oct 12	Wed 11 Oct 12	
150	Design of 2.4m x 0.9m Box Culvert	63 days	Thu 11 Oct 13	Wed 11 Dec 14	
151	Submission of design & works proposal for Approval	60 days	Thu 11 Dec 15	Sun 12 Feb 12	150
152	Site Clearance & trial pits	30 days	Mon 12 Feb 13	Tue 12 Mar 13	151
153	**Construction of Box Culvert (approx. 200m) Bay 1 to Bay 16**	**515 days**	**Fri 12 Jun 1**	**Mon 13 Oct 28**	
154	Bay 1	45 days	Sun 13 Apr 7	Tue 13 May 21	185SS+14 days
155	Bay 2	45 days	Sun 13 Apr 7	Tue 13 May 21	154SS
156	Bay 3	60 days	Fri 12 Oct 26	Mon 12 Dec 24	164,165
157	Bay 4	60 days	Fri 12 Oct 26	Mon 12 Dec 24	164,165
158	Bay 5	60 days	Sun 12 Nov 25	Wed 13 Jan 23	156SS+30 days,157SS+.
159	Bay 6	60 days	Sun 12 Nov 25	Wed 13 Jan 23	156SS+30 days,157SS+.
160	Bay 7	60 days	Tue 12 Dec 25	Fri 13 Feb 22	156,157
161	Bay 8	60 days	Wed 13 May 22	Sat 13 Jul 20	154,155
162	Bay 9	60 days	Wed 13 May 22	Sat 13 Jul 20	161SS
163	Bay 10	60 days	Wed 13 May 22	Sat 13 Jul 20	161SS
164	Bay 11	75 days	Sun 12 Aug 12	Thu 12 Oct 25	166
165	Bay 12	75 days	Sun 12 Aug 12	Thu 12 Oct 25	166
166	Bay 13	72 days	Fri 12 Jun 1	Sat 12 Aug 11	152
167	Bay 14	60 days	Sun 13 Jul 21	Wed 13 Sep 18	161,162,163
168	Bay 15	60 days	Sun 13 Jul 21	Wed 13 Sep 18	167SS
169	Bay 16	60 days	Sun 13 Jul 21	Wed 13 Sep 18	167SS
170	Bay 17	40 days	Thu 13 Sep 19	Mon 13 Oct 28	167,168,169
171	Bay 18 and Outfall	40 days	Thu 13 Sep 19	Mon 13 Oct 28	170SS
172					
173	**Construction of box culvert (1m x 1m) Bay 1 to Bay 8 (approx. 95m)**	**485 days**	**Sun 12 Jul 1**	**Mon 13 Oct 28**	
174	Notification to villagers regarding traffic arrangement for construction of 1m x 1m box culvert	90 days	Sun 12 Jul 1	Fri 12 Sep 28	
175	Intake headwall	23 days	Sun 13 Oct 6	Mon 13 Oct 28	183
176	Bay 1	23 days	Sun 13 Oct 6	Mon 13 Oct 28	183
177	Bay 2	47 days	Sun 12 Nov 18	Thu 13 Jan 3	178SS+27 days
178	Bay 3	75 days	Mon 12 Oct 22	Fri 13 Jan 4	174
179	Bay 4	30 days	Thu 13 May 23	Fri 13 Jun 21	154,155,184,185
180	Bay 5	30 days	Sat 13 Jun 22	Sun 13 Jul 21	179
181	Bay 6	30 days	Mon 13 Jul 22	Tue 13 Aug 20	180
182	Bay 7	23 days	Wed 13 Aug 21	Thu 13 Sep 12	181
183	Bay 8	23 days	Fri 13 Sep 13	Sat 13 Oct 5	182
184	Bay 9	60 days	Sat 13 Feb 23	Tue 13 Apr 23	177,178,160
185	Bay 10	60 days	Sun 13 Mar 24	Wed 13 May 22	184SS+29 days
186	CCTV inspection of box culvert	23 days	Sun 13 Oct 6	Mon 13 Oct 28	183,169
187	Grouting of existing 900mm storm drain	23 days	Sun 13 Oct 6	Mon 13 Oct 28	183
188	**Completion of Section III**	0 days	Mon 13 Oct 28	Mon 13 Oct 28	171,175,176,186,187
189					
190	**Section IV (Portion A1 and A2, Shuen Wan)**	**1343 days**	**Fri 11 Apr 29**	**Wed 14 Dec 31**	
191	Landscape Establishment Works and preservation & protection of trees	1343 days	Fri 11 Apr 29	Wed 14 Dec 31	
192					
193	**Section V (Portion B, Sheck Wu Wai)**	**1388 days?**	**Fri 11 Apr 29**	**Sat 15 Feb 14**	
194	Landscape Establishment Works and preservation & protection of trees	1388 days	Fri 11 Apr 29	Sat 15 Feb 14	
195		1 day?	Fri 11 Apr 29	Fri 11 Apr 29	



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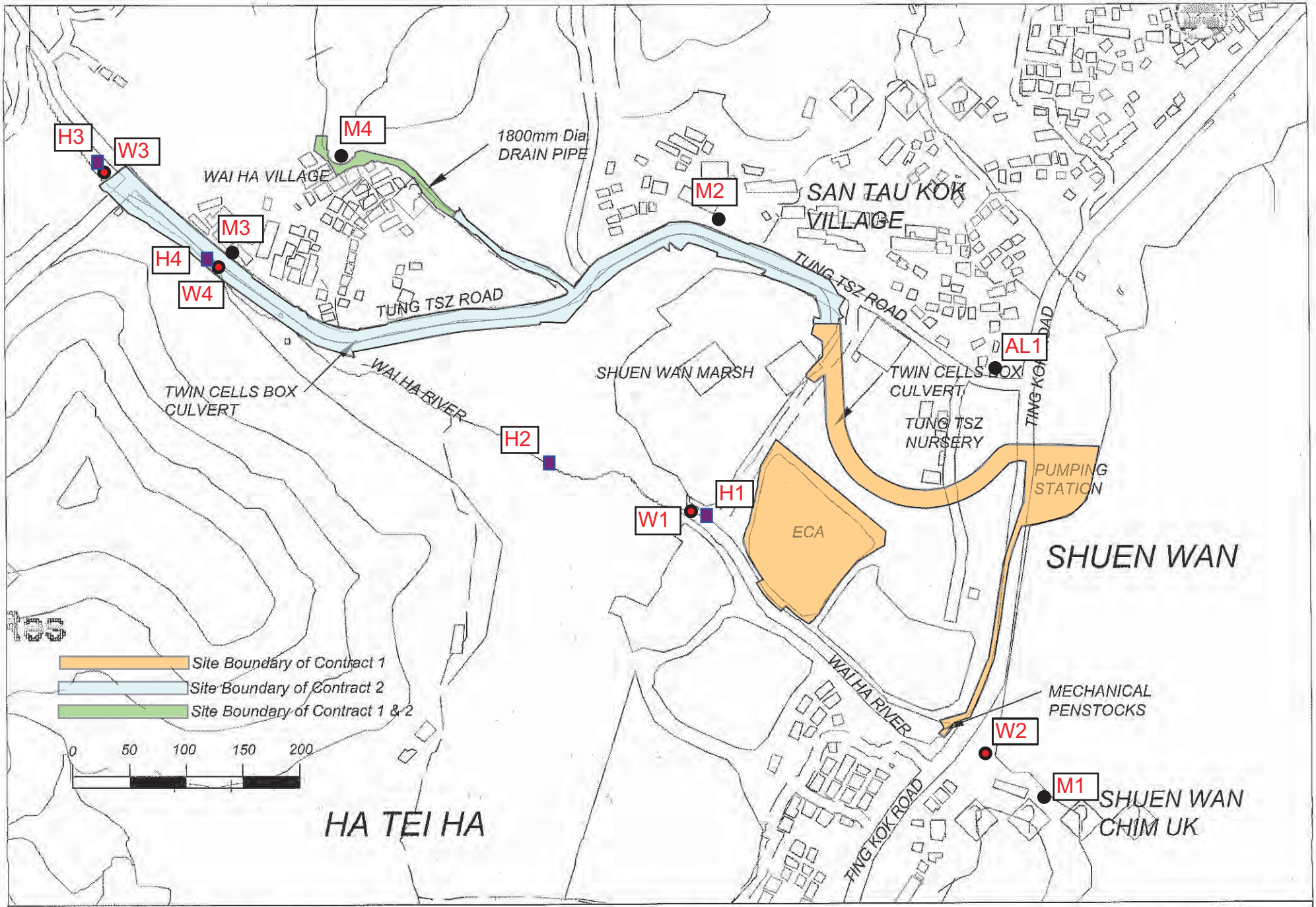
Appendix D

Environmental Monitoring Locations



All Environmental Monitoring Locations

Appendix E

Calibration certificates of the monitoring equipment and Certificate of ALS Technichem (HK) Pty Ltd

Equipment Calibration List

Items	Aspect	Description of Equipment	Date of Calibration	Date of Next Calibration
1	Noise	Rion Sound Level Meter (Serial No. 00410247)	29 Apr 14	29 Apr 15
*2		B&K Sound Calibrator 4231 (Serial No.2326408)	26 April 14	26 April 15
3	Water	YSI Pro 20 (Serial No. 12C100570)	6 Jan 15	6 Apr 15
4		Turbidmeter HACH 2100Q (Serial No. 12060C018266)	13 Jan 15	13 Apr 15
5		pH meter 8685 (Serial No. 212632)	15 Jan 15	15 Apr 15

Note:

** This Appendix G presents only calibration certificates of new monitoring equipment or those expired and re-calibrated during the Reporting Period (**Renewed Item No. and Calibration dates will be highlighted for ease of checking**). No valid calibration certificates presented in the previous report will be dittoed under environmental consideration.*

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C142545
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-0853) Date of Receipt / 收件日期 : 14 April 2014

Description / 儀器名稱 : Acoustical Calibrator (EQ081)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 2326408
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 26 April 2014

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By 測試 : K C Lee
Project Engineer

Certified By 核證 : K M Wu
Engineer

Date of Issue 簽發日期 : 29 April 2014

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C142545
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C133632
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C141558

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.0		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this 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 environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Appendix F

Event and Action Plan

Event Action Plan for Construction Noise

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

Event and action Plan for Water Quality

Event	ET Leader	IEC	ER	Contractor
ACTION LEVEL				
Action level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Repeat measurement on next day of exceedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
Action level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exeedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures
LIMIT LEVEL				
Limit level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform EPD, IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit Level.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Request Contractor to critically review the working methods; 3. Make agreement on mitigation measures to be implemented; 4. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
Limit level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform EPD, IEC, Contractor and Engineer; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Request Contractor to critically review the working methods; 3. Make agreement on mitigation measures to be implemented; 4. Assess effectiveness of implemented mitigation measures; 5. Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes in working methods; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures; 7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.

Event and action Plan for Hydrological Characteristics

Event	ET Leader	IEC	ER	Contractor
ACTION LEVEL				
Action level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Repeat measurement on next day of exceedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
Action level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and Engineer; 4. Check monitoring data, Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exeedance.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Make agreement on mitigation measures to be implemented; 3. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures
LIMIT LEVEL				
Limit level being exceeded by one sampling day	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform AFCD, IEC, Contractor and Engineer; 4. Check monitoring data, and Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Request Contractor to critically review the working methods; 3. Make agreement on mitigation measures to be implemented; 4. Assess effectiveness of implemented mitigation measures.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures.
Limit level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurements to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform AFCD, IEC, Contractor and Engineer; 4. Check monitoring data and Contractor's working methods and any excavation works or dewatering processes; 5. Discuss mitigation measures with IEC, Engineer and Contractor; 6. Ensure mitigation measures are implemented. 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.	1. Discuss mitigation measures with ET, Engineer and Contractor; 2. Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; 3. Assess effectiveness of implemented mitigation measures.	1. Discuss proposed mitigation measures with IEC, ET and Contractor; 2. Request Contractor to critically review the working methods; 3. Make agreement on mitigation measures to be implemented; 4. Assess effectiveness of implemented mitigation measures; 5. Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.	1. Inform Engineer and confirm in writing notification of the non-compliance; 2. Rectify unacceptable practice; 3. Check working methods and any excavation works or dewatering processes; 4. Consider changes in working methods and plans; 5. Discuss with ET, IEC and Engineer and propose mitigation measures to IEC and Engineer within three working days; 6. Implement agreed mitigation measures; 7. As directed by the Engineer, slow down or stop all or part of the construction activities until no exceedance of Limit level.

Appendix G

Monitoring Schedule in Reporting Period and the Coming Month

Monitoring Schedule in this Reporting Period – March 2015

Date		Stream Monitoring		Noise Monitoring	Weekly Site Inspection of ET
		Sampling and In-situ Measurement	Hydrological Characteristics		
Sun	1-Mar-15				
Mon	2-Mar-15				
Tue	3-Mar-15	W1, W2, W3, W4,	H1, H2, H3, H4	M1, AL1,M2, M3, M4	Contract 2
Wed	4-Mar-15				
Thu	5-Mar-15	W1, W2, W3, W4			
Fri	6-Mar-15				
Sat	7-Mar-15	W1, W2, W3, W4			
Sun	8-Mar-15				
Mon	9-Mar-15				
Tue	10-Mar-15	W1, W2, W3, W4	H1, H2, H3, H4	M1, AL1,M2, M3, M4	Contract 2
Wed	11-Mar-15				
Thu	12-Mar-15	W1, W2, W3, W4			
Fri	13-Mar-15				
Sat	14-Mar-15	W1, W2, W3, W4			
Sun	15-Mar-15				
Mon	16-Mar-15	W1, W2, W3, W4	H1, H2, H3, H4	M1, AL1,M2, M3, M4	
Tue	17-Mar-15				
Wed	18-Mar-15	W1, W2, W3, W4			Contract 2
Thu	19-Mar-15				
Fri	20-Mar-15	W1, W2, W3, W4			
Sat	21-Mar-15				
Sun	22-Mar-15				
Mon	23-Mar-15	W1, W2, W3, W4		M1, AL1,M2, M3, M4	
Tue	24-Mar-15				Contract 2
Wed	25-Mar-15	W1, W2, W3, W4			
Thu	26-Mar-15				
Fri	27-Mar-15	W1, W2, W3, W4	H1, H2, H3, H4		
Sat	28-Mar-15				
Sun	29-Mar-15				
Mon	30-Mar-15	W1, W2, W3, W4		M1, AL1,M2, M3, M4	
Tue	31-Mar-15				

	Monitoring Day
	Sunday or Public Holiday

Monitoring/Inspection Schedule for the coming year (April 2015 to March 2016)

Operational Phase Commencement Date		Hydrological Monitoring											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 1	4-Dec-15	Once per week at mid-flood and mid-ebb tides								N/A	N/A	N/A	N/A
Contract 2	1-Apr-15	Once per week at mid-flood and mid-ebb tides											

Operational Phase Commencement Date		Landscape & Visual Inspection											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 1	4-Dec-15			×			×			×			
Contract 2	1-Apr-15			×			×			×			×

Operational Phase Commencement Date		Ecology Monitoring											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 1	4-Dec-15	×			×			×					
Contract 2	1-Apr-15	×			×			×			×		

Appendix H

Meteorological Data of Reporting Period

Meteorological Data in Reporting Period

Date		Weather	Total Rainfall (mm)	Tai Po Station		Shatin Station	
				Mean Air Temp. (°C)	Mean Relative Humidity (%)	Wind Speed (km/h)	Wind Direction
1-Mar-15	Sun	Cloudy to overcast with a few rain and mist patches. Cool in the morning. Fresh to strong easterly winds.	Trace	18.4	72.5	6.1	N/NE
2-Mar-15	Mon	Becoming cloudy. Visibility relatively low at first. Light winds, strengthening from the east.	Trace	16.9	73.5	6.5	E
3-Mar-15	Tue	Becoming cloudy. Visibility relatively low at first. Light winds, strengthening from the east.	0.2	18.4	88.7	7.6	N/NE
4-Mar-15	Wed	Cloudy to overcast with a few rain and mist patches. Cool in the morning. Fresh to strong easterly winds.	0.2	17	92	9.8	E
5-Mar-15	Thu	Dry with sunny periods in the afternoon. Cloudy tonight. Fresh easterly winds, strong offshore and on high ground.	4.8	16.3	92.2	11.5	E/NE
6-Mar-15	Fri	Cloudy to overcast with a few rain and mist patches. Cool in the morning. Fresh to strong easterly winds.	0.1	16.5	93.5	9.3	E
7-Mar-15	Sat	Dry with sunny periods in the afternoon. Cloudy tonight. Fresh easterly winds, strong offshore and on high ground.	0.2	16.6	92.2	8	E/SE
8-Mar-15	Sun	Cloudy to overcast with a few rain and mist patches. Cool in the morning. Fresh to strong easterly winds.	Trace	18.1	86.5	9.5	E/SE
9-Mar-15	Mon	Becoming cloudy. Visibility relatively low at first. Light winds, strengthening from the east.	Trace	20	79.7	5	E/SE
10-Mar-15	Tue	Dry with sunny periods in the afternoon. Cloudy tonight. Fresh easterly winds, strong offshore and on high ground.	Trace	18	67	9.9	E/SE
11-Mar-15	Wed	Cloudy to overcast. It will be cool with a few rain patches. Moderate northeasterly winds.	0.3	15.7	73.2	7	E/SE
12-Mar-15	Thu	Cloudy to overcast. It will be cool with a few rain patches. Moderate northeasterly winds.	3.7	14.6	91.2	10	N/NE
13-Mar-15	Fri	Cloudy to overcast. It will be cool with a few rain patches. Moderate northeasterly winds.	0	16.9	79.5	8.2	E
14-Mar-15	Sat	Humid with coastal fog. Warm with sunny intervals. Light to moderate east to southeasterly winds.	Trace	18.9	81.7	8.2	N/NE
15-Mar-15	Sun	Humid with coastal fog. Warm with sunny intervals. Light to moderate east to southeasterly winds.	0	20.3	92.2	6.5	N/NE
16-Mar-15	Mon	Humid with coastal fog. Warm with sunny intervals. Light to moderate east to southeasterly winds.	Trace	21.1	94	5.1	E/NE
17-Mar-15	Tue	Sunny intervals during the day. Light to moderate southeasterly winds.	0	22.3	89.2	6.9	W/SW
18-Mar-15	Wed	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	0	22.3	91.5	6.5	N/NE
19-Mar-15	Thu	Sunny intervals during the day. Light to moderate southeasterly winds.	0	22.7	86.2	6	E/NE
20-Mar-15	Fri	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	0	23.5	84.7	8.2	E/NE
21-Mar-15	Sat	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	0	21.9	87.2	7	N
22-Mar-15	Sun	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	0.1	20.3	81.5	7.2	E/SE
23-Mar-15	Mon	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	Trace	21.4	60	9.1	N/NE
24-Mar-15	Tue	Mainly cloudy. Sunny intervals in the afternoon. Fresh easterly winds.	0	20	73.2	9.2	E/SE
25-Mar-15	Wed	Mainly cloudy with one or two rain patches. Fresh easterly winds, strong offshore.	Trace	17.9	77	7	E/NE
26-Mar-15	Thu	Mainly cloudy with relatively low visibility. Light to moderate easterly winds.	4.2	18.6	76.5	6.5	N/NE
27-Mar-15	Fri	Sunny intervals during the day. Light to moderate southeasterly winds.	14.6	19.7	89	4.2	N/NE
28-Mar-15	Sat	Mainly cloudy with relatively low visibility. Light to moderate easterly winds.	0	20.4	78.7	8.2	E/NE
29-Mar-15	Sun	Mainly cloudy with one or two rain patches. Fresh easterly winds, strong offshore.	0	21.6	81.5	7	N/NE
30-Mar-15	Mon	Sunny intervals during the day. Light to moderate southeasterly winds.	0	23.2	83.5	6	S
31-Mar-15	Tue	Sunny intervals during the day. Light to moderate southeasterly winds.	Trace	23.4	86.5	7	N/NE

** The record was downloaded from The Hong Kong Observatory Weather Stations*

Appendix I

Data Base of Monitoring Results

Construction Noise Measurement Data

Designated Monitoring Station – M1 (14, Shuen Wan Chim Uk)

Date	Start Time	1st Leq_{5min}	2nd Leq_{5min}	3rd Leq_{5min}	4th Leq_{5min}	5th Leq_{5min}	6th Leq_{5min}	Leq_{30min}	Corrected* Leq_{30min}
3-Mar-15	10:16	58.8	56.9	57.6	56.0	56.3	57.0	57.2	60
10-May-15	15:58	55.8	56.6	57.1	56.6	57.9	56.9	56.9	60
16-Mar-15	14:10	54.4	56.9	58.2	58.2	56.5	55.3	56.8	60
23-Mar-15	15:29	58.1	60.2	58.8	58.9	58.5	57.4	58.7	62
30-Mar-15	16:51	56.6	55.1	58.2	58.8	57.9	57.6	57.5	61
Limit Level		-						**> 75 dB(A)**	

Designated Monitoring Station – AL1 (Joint Village Office for Villages in Shuen Wan, Tai Po)

Date	Start Time	1st Leq_{5min}	2nd Leq_{5min}	3rd Leq_{5min}	4th Leq_{5min}	5th Leq_{5min}	6th Leq_{5min}	Leq_{30min}	Corrected* Leq_{30min}
3-Mar-15	10:49	58.5	57.1	59.8	59.1	59.1	59.9	59.0	62
10-Mar-15	13:11	63.1	64.2	63.6	66.5	65.0	65.9	64.9	68
16-Mar-15	13:33	58.2	58.0	58.6	58.1	58.3	57.8	58.2	61
23-Mar-15	10:08	57.8	57.6	58.5	61.7	61.8	58.3	59.7	63
30-Mar-15	14:07	60.5	59.1	57.8	58.5	57.6	59.0	58.9	62
Limit Level		-						**> 75 dB(A)**	

Designated Monitoring Station - M2 (150, San Tau Kok)

Date	Start Time	1st Leq_{5min}	2nd Leq_{5min}	3rd Leq_{5min}	4th Leq_{5min}	5th Leq_{5min}	6th Leq_{5min}	Leq_{30min}	Corrected* Leq_{30min}
3-Mar-15	11:23	53.6	52.0	52.5	50.5	51.6	53.4	52.4	55
10-Mar-15	15:13	58.2	57.9	58.8	60.4	56.7	59.1	58.7	62
16-Mar-15	11:32	55.2	53.9	54.8	54.6	53.7	54.1	54.4	57
23-Mar-15	14:11	55.0	55.6	56.6	58.3	55.4	57.1	56.5	59
30-Mar-15	16:10	62.4	56.1	57.6	58.0	57.2	56.8	58.6	62
Limit Level		-						**> 75 dB(A)**	

Designated Monitoring Station – M3 (31,Wai Ha)

Date	Start Time	1st Leq_{5min}	2nd Leq_{5min}	3rd Leq_{5min}	4th Leq_{5min}	5th Leq_{5min}	6th Leq_{5min}	Leq_{30min}	Corrected* Leq_{30min}
3-Mar-15	13:14	52.7	51.1	49.6	50.0	50.4	50.3	50.8	54
10-Mar-15	14:03	54.9	56.6	55.5	55.2	56.8	57.5	56.2	59
16-Mar-15	10:21	51.9	52.5	53.1	52.2	51.6	52.3	52.3	55
23-Mar-15	13:00	52.3	51.1	50.8	55.9	53.2	55.6	53.6	57
30-Mar-15	14:59	55.8	55.1	54.5	56.2	57.5	56.6	56.1	59
Limit Level		-						**> 75 dB(A)**	

Designated Monitoring Station – M4 (Block 15, Treasure Spot Garden)

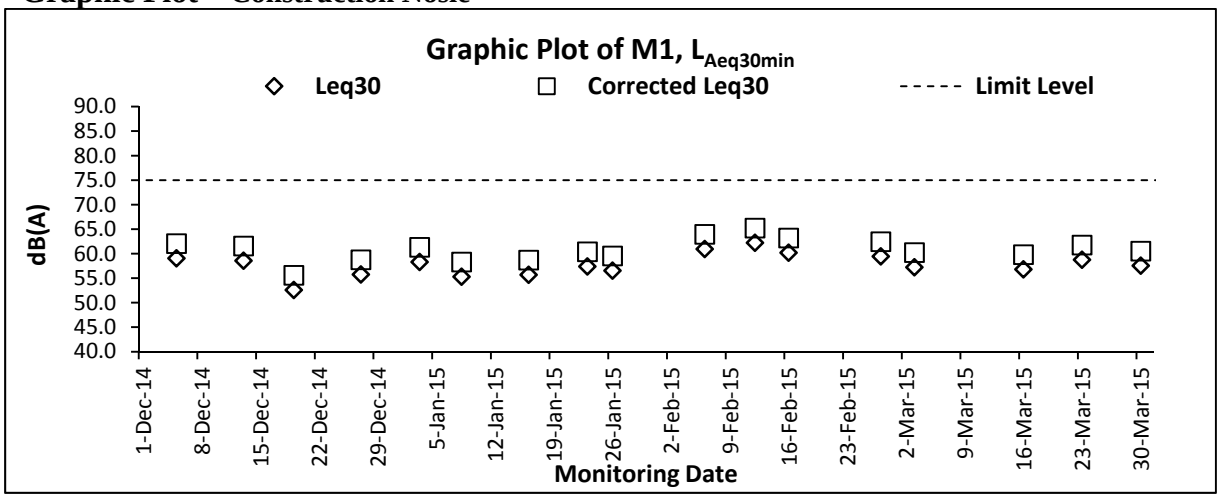
Date	Start Time	1st Leq_{5min}	2nd Leq_{5min}	3rd Leq_{5min}	4th Leq_{5min}	5th Leq_{5min}	6th Leq_{5min}	Leq_{30min}	Corrected* Leq_{30min}
3-Mar-15	13:48	49.0	49.3	49.9	48.3	50.1	50.9	49.7	53
10-Mar-15	14:39	44.8	43.6	44.7	46.9	46.0	45.8	45.4	48
16-Mar-15	10:56	47.8	46.3	46.4	50.4	46.0	46.9	47.6	51
23-Mar-15	13:36	48.9	47.7	48.3	44.9	43.3	45.7	46.9	50
30-Mar-15	15:36	51.5	47.6	46.5	44.6	48.1	45.2	47.9	51
Limit Level		-						**> 75 dB(A)**	

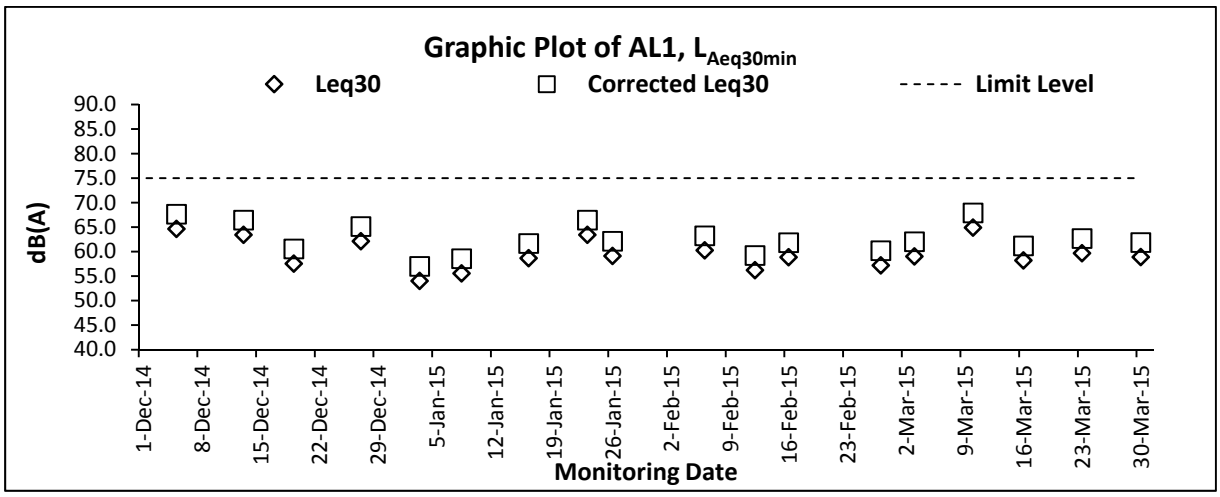
Remarks
(*) A façade correction of +3 dB(A) has been added according to acoustical principles and EPD guidelines.

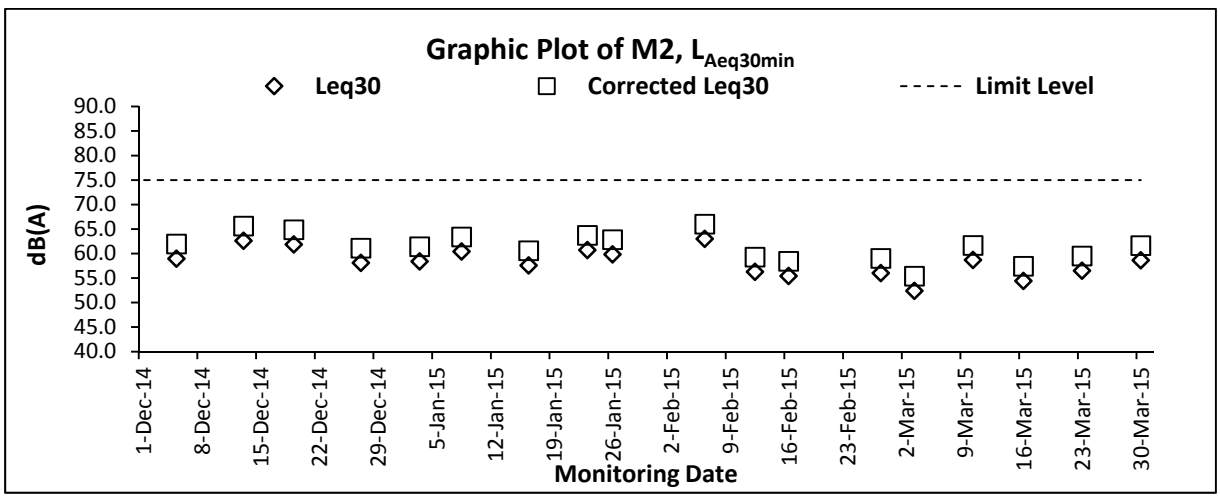
Appendix J

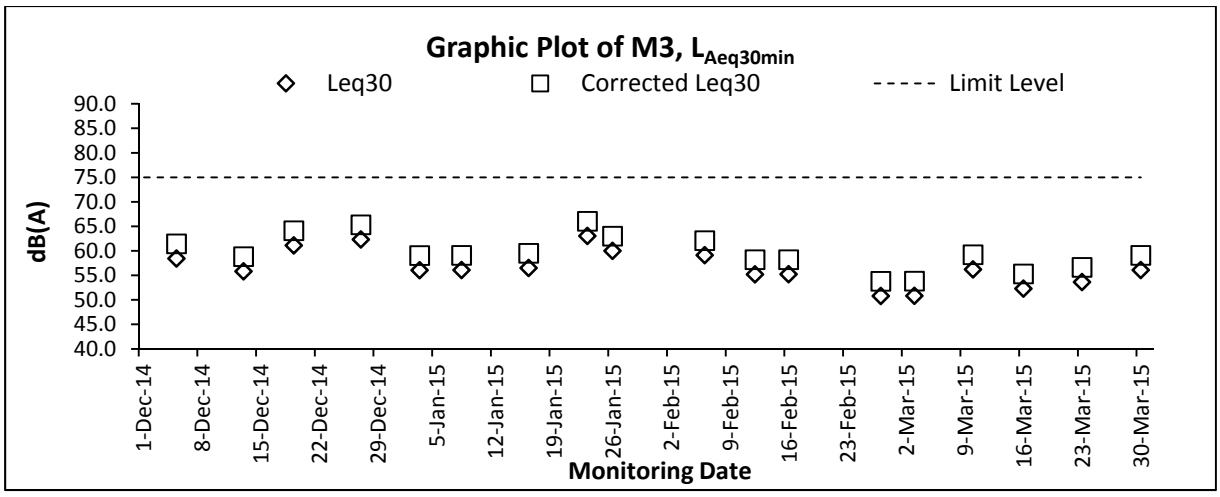
Graphical Plots of Impact Monitoring – Noise, Water Quality and Hydrological Characteristics

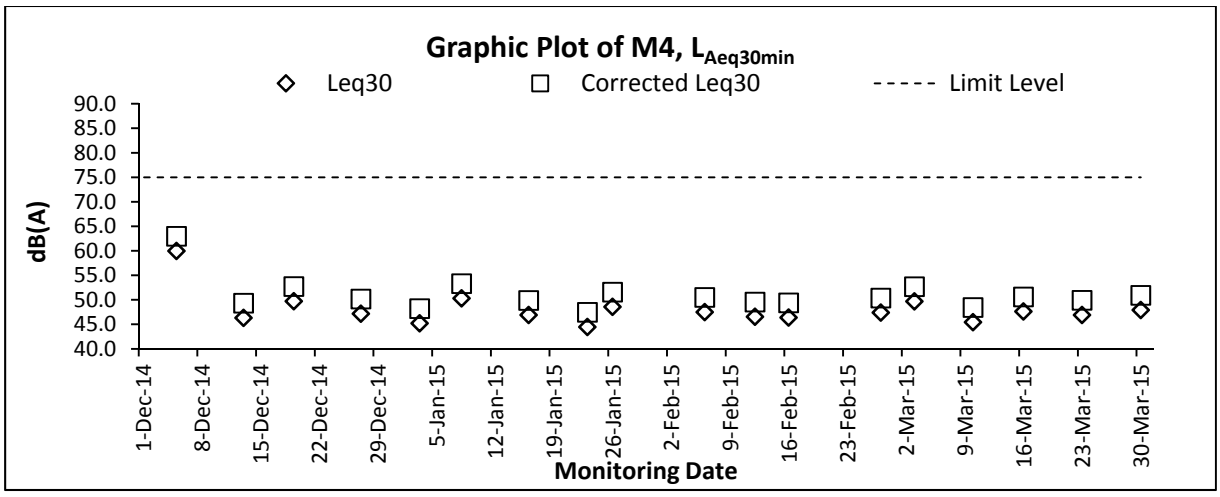
Graphic Plot – Construction Nosie



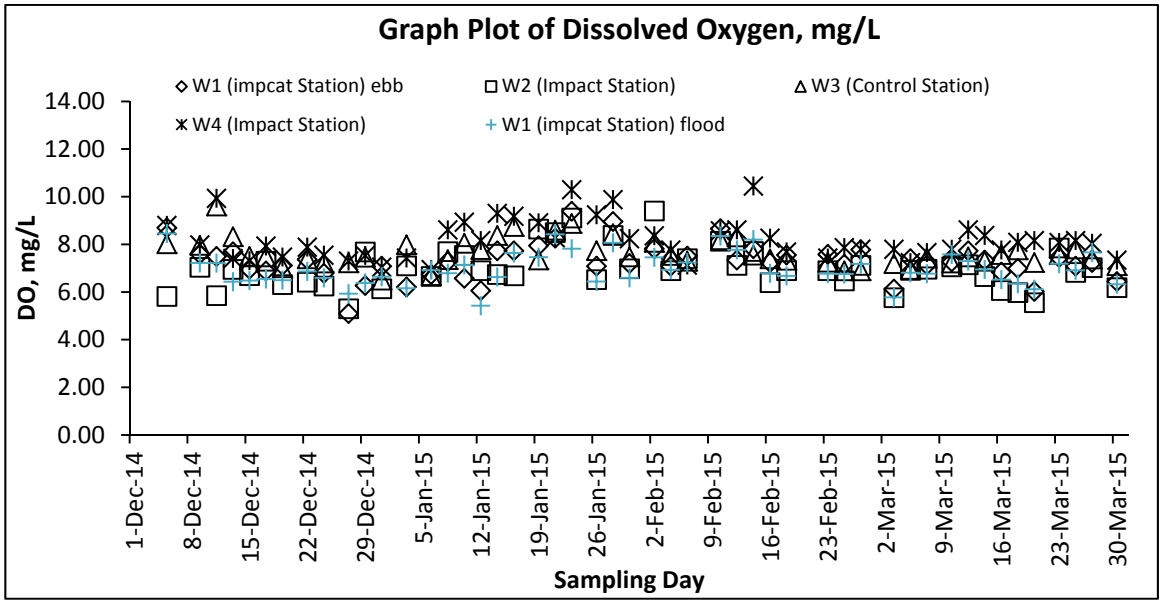


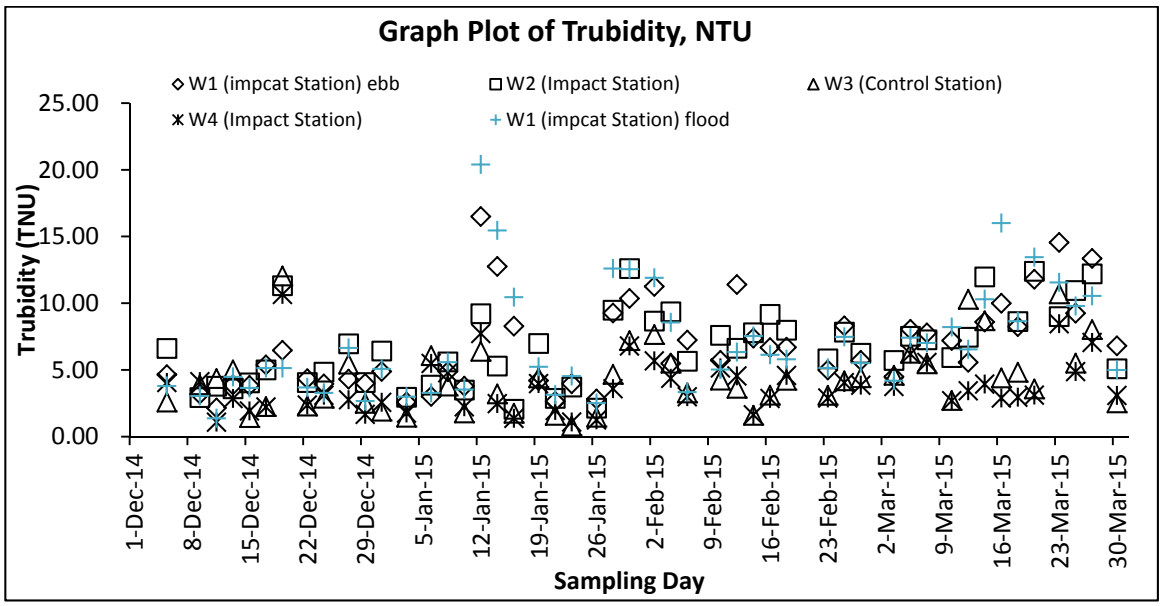


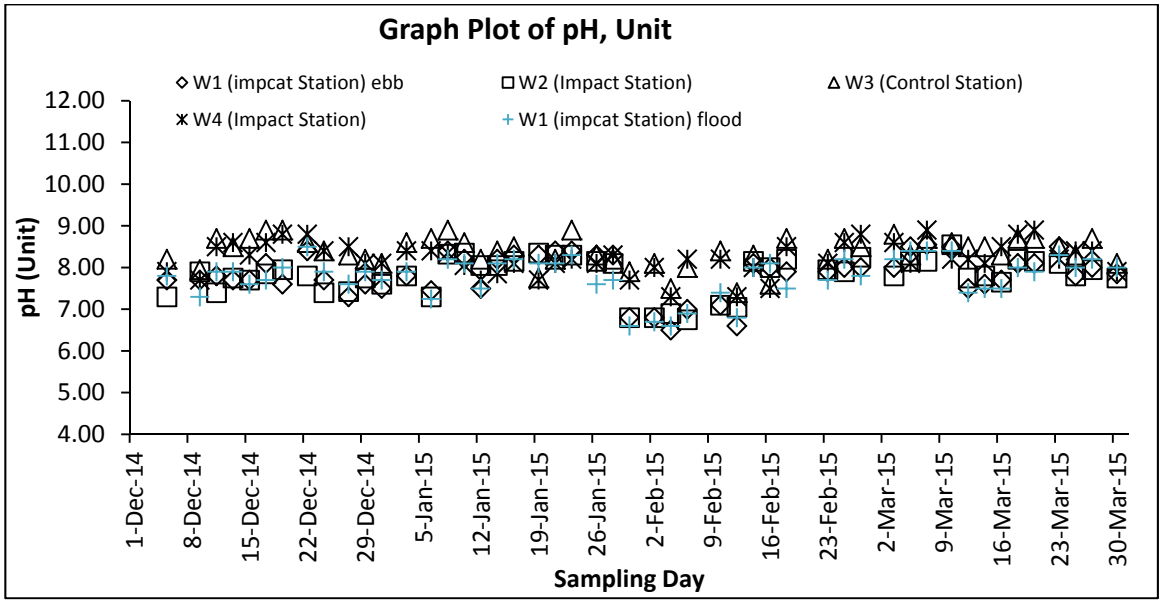

Graphic Plot of M3, $L_{Aeq30min}$
Leq30
Corrected Leq30
Limit Level
dB(A)
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
1-Dec-14
8-Dec-14
15-Dec-14
22-Dec-14
29-Dec-14
5-Jan-15
12-Jan-15
19-Jan-15
26-Jan-15
2-Feb-15
9-Feb-15
16-Feb-15
23-Feb-15
2-Mar-15
9-Mar-15
16-Mar-15
23-Mar-15
30-Mar-15
Monitoring Date

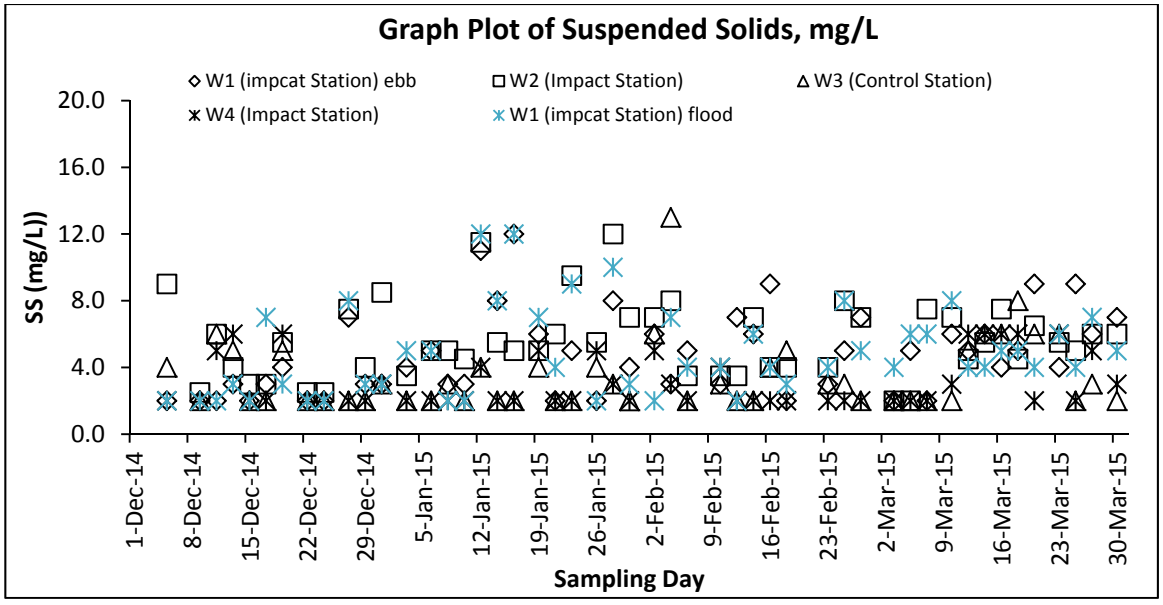

Graphic Plot of M4, $L_{Aeq30min}$
Leq30
Corrected Leq30
Limit Level
dB(A)
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
1-Dec-14
8-Dec-14
15-Dec-14
22-Dec-14
29-Dec-14
5-Jan-15
12-Jan-15
19-Jan-15
26-Jan-15
2-Feb-15
9-Feb-15
16-Feb-15
23-Feb-15
2-Mar-15
9-Mar-15
16-Mar-15
23-Mar-15
30-Mar-15
Monitoring Date

Graphic Plot – Water Quality

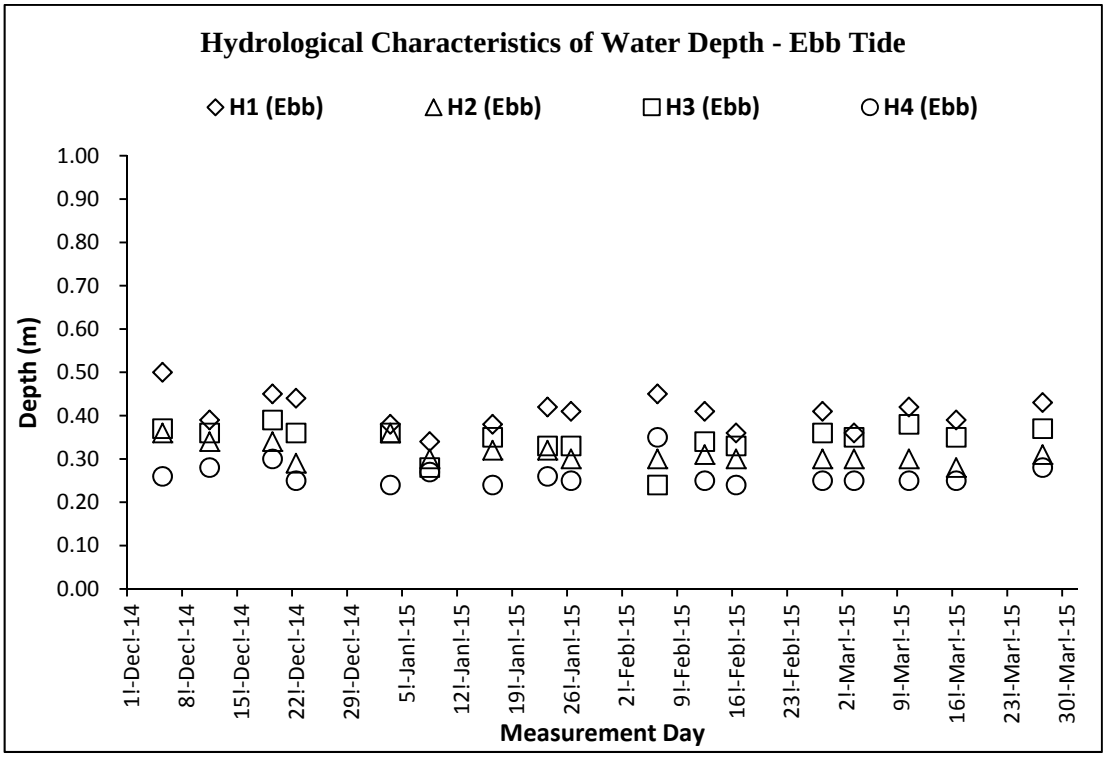


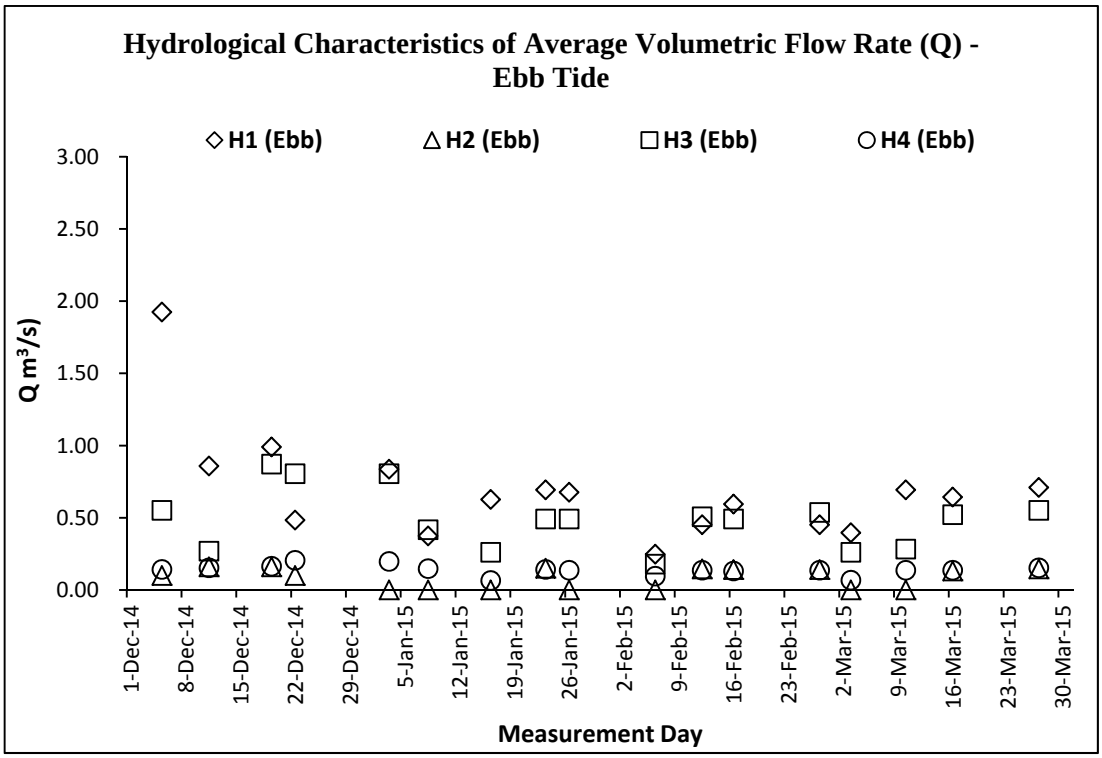




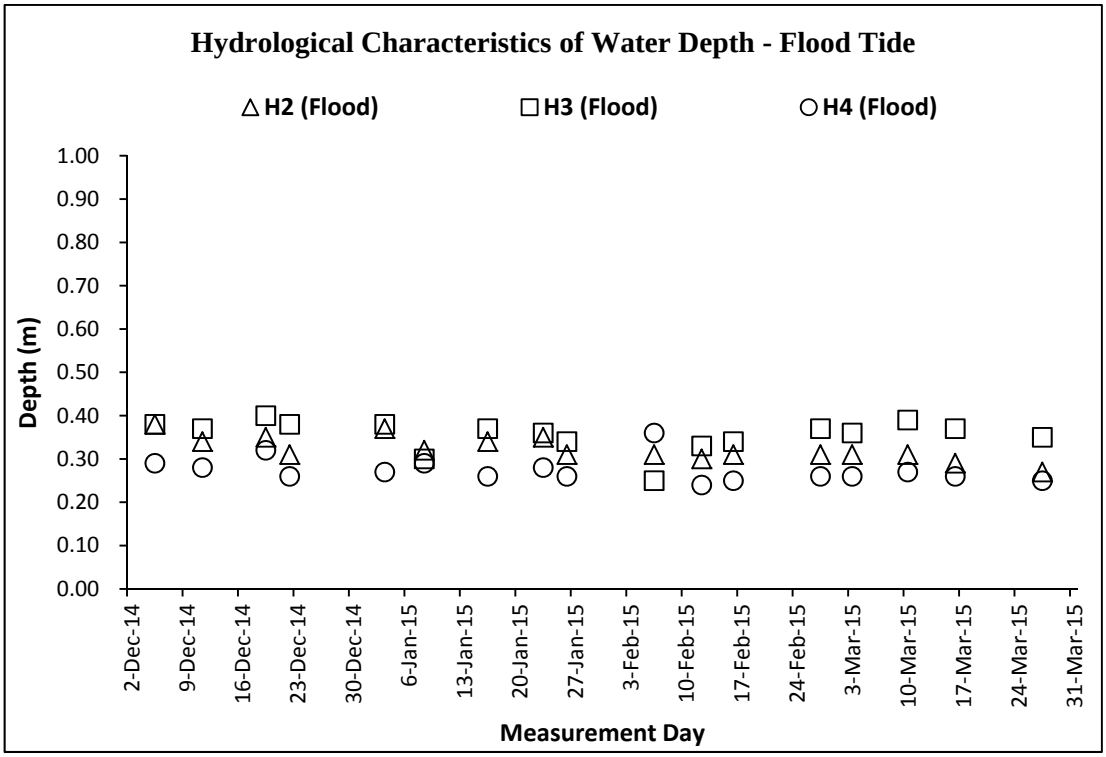

Graph Plot of Suspended Solids, mg/L
W1 (impcat Station) ebb
W2 (Impact Station)
W3 (Control Station)
W4 (Impact Station)
W1 (impcat Station) flood
SS (mg/L))
20.0
16.0
12.0
8.0
4.0
0.0
1-Dec-14
8-Dec-14
15-Dec-14
22-Dec-14
29-Dec-14
5-Jan-15
12-Jan-15
19-Jan-15
26-Jan-15
2-Feb-15
9-Feb-15
16-Feb-15
23-Feb-15
2-Mar-15
9-Mar-15
16-Mar-15
23-Mar-15
30-Mar-15
Sampling Day

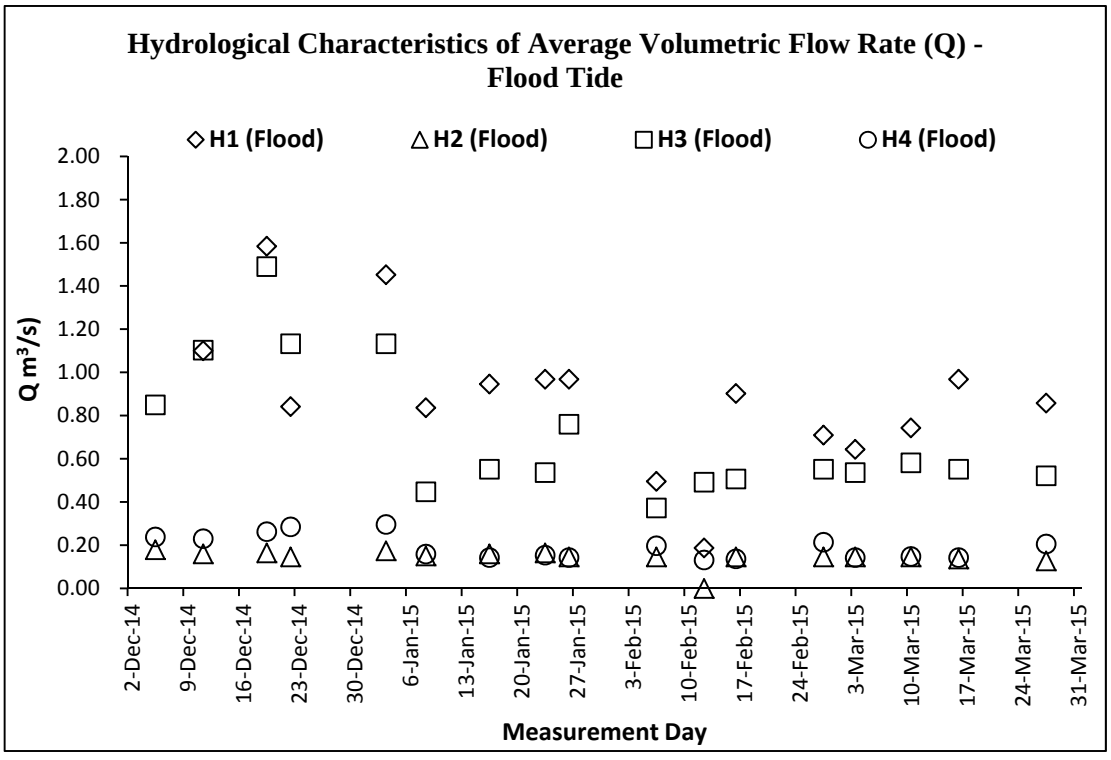
Graphic Plot – Hydrological Characteristics (Water Depth)





Graphic Plot – Hydrological Characteristics (Water Depth)





Appendix K

Monthly Summary Waste Flow Table

Kwan Lee - Kuly Joint Venture
Enviornmental Management Plan for Contract No. DC/2012/02
Drainage Improvement Works in Shuen Wan and Shek Wu Wai

Name of Department DSD

Monthly Summary Waste Flow Table

Month	Actual Quantities of Inert C & D Materials Generated Monthly						Actual Quantities of Inert C & D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposal as Public Fill	Imported Fill	Metals	Paper/cardbpard packaging	Plastics (see note 3)	Chemical Waste	Others, e.g. general refise
	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000m^3)
Jan-14	0.435	-	-	-	-	0.435	-	-	-	-	0.015
Feb-14	0.215	-	-	-	-	0.215	-	-	-	-	0.000
Mar-14	0.036	-	-	-	-	0.036	-	-	-	-	0.000
Apr-14	0.333	-	-	-	-	0.333	-	-	-	-	0.000
May-14	0.333	-	-	-	-	0.333	-	-	-	-	0.000
Jun-14	1.776	-	-	-	-	1.776	-	-	-	-	0.000
Jul-14	0.461	-	-	-	-	0.461	-	-	-	-	0.000
Aug-14	2.187	-	-	-	-	2.187	-	-	-	-	0.000
Sep-14	0.000	-	-	-	-	0.000	-	-	-	-	0.000
Oct-14	0.680	-	-	-	-	0.680	-	-	-	-	0.000
Nov-14	0.000	-	-	-	-	0.000	-	-	-	-	0.090
Dec-14	0.000	-	-	-	-	0.000	-	-	-	-	0.015
Jan-15	0.000	-	-	-	-	0.000	-	-	-	-	0.120
Feb-15	0.000	-	-	-	-	0.000	-	-	-	-	0.000
Mar-15	0.000	-	-	-	-	0.000	-	-	-	-	0.000
Total	6.456	-	-	-	-	6.456	-	-	-	-	0.240

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	Disposal as Public Fill	Imported Fill	Metals	Paper/cardbpard packaging	Plastics (see note 3)	Chemical Waste	Others, e.g. general refise
	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000m^3)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000kg)	(in'000m^3)
	23	1	10	0	10	2	5	2	1	1	3

Note: (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 specificed in the Contract to be imported for used at the Site

(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)

Appendix L

Landscape & Visual Inspection Report

Contract No. DC/2009/22 & DC/2010/02
Drainage Improvement Works in Shuen Wan and Shek Wu Wai
Landscape & Visual Monitoring

EM&A (Landscape & Visual) Report (March 2015)
(Issue 1)

Job Ref.: 09/317/161A & 09/317/161D KLKJV-SW
Date: April 2015

Environmental Resources Management

16/F
Berkshire House
25 Westlands Road
Quarry Bay
Hong Kong

Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

04 May 2015

Kwan Lee – Kuly Joint Venture
Unit 6, 16/F, Yuen Long Trading Centre
33 Wang Yip Street West
Yuen Long, Hong Kong

Attn.: Nicola Hon

Our ref: 0125606_Cert02_20150504

Dear Shan,

Contract No. DC/2009/22 & DC/2010/02 –
Drainage Improvement in Shuen Wan, Tai Po
Monthly EM&A (Landscape & Visual) Report

Reference is made to the Monthly EM&A (Landscape & Visual) Report – Contract 2 for the month of March 2015 (Construction phase) with quarterly monitoring findings for Contract 1 (operational phase), please kindly note that we have no adverse comment on the combined reports.

Should you have any queries, please feel free to contact Mr. Jon Binalay at 2271 3212.

Yours sincerely,
For ERM-Hong Kong, Limited

Kenneth Ng
Landscape Architect

Registered Office
ERM-Hong Kong, Ltd
16/F Berkshire House
25 Westlands Road
Quarry Bay
Hong Kong

Offices worldwide

Contract No. DC/2009/22 & DC/2010/02
Drainage Improvement Works in Shuen Wan and Shek Wu Wai
Landscape & Visual Monitoring

EM&A (Landscape & Visual) Report (March 2015)

(Issue 1)

April 2015

	Name	Signature
Prepared by:	**Henry To** **Tracy Ho**	
Reviewed by:	**Ida YU**	
Date:	**2nd April 2015**	

Job Ref.: 09/317/161A & 09/317/161D KLKJV-SW

127 Commercial Centre, Palm Springs, Yuen Long, New Territories, Hong Kong
Tel: +852 2486 2885 Email: aec@aechk.hk

CONTENTS

LIST OF APPENDICES

1 INTRODUCTION

1.1.1 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 31st May 2012) 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.

1.1.2 This monthly monitoring report will detail the scope of landscape and visual monitoring work, monitoring findings and observations, and any recommendation and advice on proper implementation of the landscape mitigation measures (during construction phase) in the works areas under Contract 2 of the Project. Besides, since the bi-weekly landscape & visual monitoring for Contract 1 works areas was ended in early December 2014 after the joint site inspection with EPD, which confirmed the completion of construction work within the Contract 1 works area (i.e. Areas A, B and C) on 4th December 2014, no construction phase monitoring within Contract 1 works area was conducted. However, findings from quarterly landscape and visual monitoring (during operational phase) for Contract 1 will be detailed under Section 4.

2 SCOPE OF MONITORING

2.1 Monitoring objectives

2.1.1 Landscape and Visual Monitoring of the Project should be conducted on 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.

2.2 Monitoring during Construction Phase

2.2.1 The following landscape and visual mitigation measures 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* (Not relevant to Contract 2 of the Project) – 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.

2.3 Monitoring during Operational Phase

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

- *Viewing Area Formation* - Planting of shrubs, grasses and building benches along Ting Kok Road along the shore;
- *Architectural Design for Pump House* – Architectural design to help the pump house fit into the existing suburban, natural to semi-natural surroundings (Not relevant to Contract 2 of the Project);
- *Landscape Design for Pump House* – Provide sufficient planting around its boundary fence (Not relevant to Contract 2 of the Project);
- *Enhancement Planting along Tung Tsz Road* – Planting of shrubs/ trees of suitable species to help protect the stream and marshes;
- *Soil Depth for Enhancement Planting* – Construction of box culvert should be with at least 1.0m soil depth for enhancement planting;
- *Transplanting of Trees to Adjacent Locations* – Transplanting of existing affected trees to adjacent locations should be carried out;
- *Preparation for Transplanting* – Preparation for transplanting is needed to allow sufficient time for root pruning and rootball preparation prior to transplanting; and
- *Reinstatement of Affected Area* – The works area should be properly reinstated to the satisfaction of relevant government departments.

3 LANDSCAPE & VISUAL MONITORING PROGRAMME

3.1 Monitoring Date(s)

3.1.1 For the Operational Phase monitoring, the quarterly Landscape and Visual Monitoring for Contract 1 (DC/2009/22) was conducted to cover Areas A, B and C of Contract 1 of the Project. The quarterly monitoring was conducted on 2nd March 2015. Area C (i.e. Ecological Compensatory Area (ECA)) was formally handed over to AFCD on 16th October 2012 for management and maintenance. No access into the ECA is allowed after the handover and hence, no quarterly monitoring was carried out in this area.

3.1.2 For the Construction Phase monitoring, the bi-weekly Landscape and Visual Monitoring (March 2015) for Contract 2 (DC/2010/02) was conducted to cover only areas of Contract 2 of the Project (i.e. the construction of a twin-cell box culvert close to Shuen Wan Conservation Area and Wai Ha River along Tung Tsz Road, and a drainage pipe near Wai Ha Village). The bi-weekly monitoring was conducted on 2nd, 18th and 30th March 2015.

3.1.3 All photos stated for the quarterly monitoring for Contract 1 are recorded in **Appendix A**, while photos stated for the bi-weekly monitoring for Contract 2 are recorded in **Appendix B**.

4 QUARTERLY LANDSCAPE & VISUAL MONITORING (OPERATIONAL PHASE) FOR CONTRACT 1 (DC/2009/22)

4.1 Viewing Area Formation

Observations

4.1.1 The roadside planters in Ting Kok Road were hydroseeded and planted with shrubs *Duranta erecta* which were in fair condition as observed in March 2015 **(Photo A1)**.

4.1.2 According to EIA Report of the Project, planters with shrubs and grasses, and putting a few benches were suggested as Landscape & Visual Mitigation Measure (i.e. OM-01) along Ting Kok Road. However, with reference to the approved Landscape Plan of this Project, provision of benches along Ting Kok Road was not included in accordance with the engineering design. Thus only the record of reinstated planters and the monitoring of shrubs and grass along Ting Kok Road were adpoted under this mitigation measure.

Recommendation

4.1.3 The roadside planters in Ting Kok Road were handed over to Highway Department and under maintenance by the corresponding party. No further recommendation on the growth performance of these planters is given from the current observation.

4.2 Architectural Design for Pump House

4.2.1 The Quarterly Monitoring on 2nd March 2015 did not include Area A (i.e. the pump house) as the pump house was inaccessible on the monitoring day. Monitoring of the architectural design for the pump house will be resumed in the next quarterly monitoring once the accessibility issue is solved.

4.2.2 Only the general appearance of the pump house was observed from Ting Kok Road in this quarterly monitoring on 2nd March 2015 **(Photo A2)**. According to the routine monitoring conducted during the construction phase of Contract 1, the architectural design of the pump house generally follows the proposed materials and color (e.g. a wall of clay cladding to facilitate the development of climbers for vertical greening) as stated in the approved Landscape Plan.

4.3 Landscape Design for Pump House

4.3.1 As stated in Section 4.2, the quarterly monitoring on 2nd March 2015 did not include Area A due to inaccessibility issue on that day. Monitoring of the landscape design for the pump house will be resumed in the next quarterly monitoring.

4.3.2 As observed from Ting Kok Road, a sloping area with green roof on the pump house was provided **(Photo A3)**. With reference to the observation conducted during the bi-weekly landscape and visual monitoring during the construction phase, the landscape design (including the planting of ground cover, climbers, shrubs, trees and construction of green roof) generally followed the proposed design in the approved Landscape Plan.

4.4 Soil Depth for Enhancement Planting

Observations

4.4.1 Planting of trees and shrubs were already finished at construction phase. Soil depth on the box culvert was unable to be checked during Operational Phase. Moreover, Area B was handed over back to Tung Tsz Nursery after the construction phase for routine maintenance practice by the nursery. The roadside planters in Ting Kok Road were also handed over to Highway Department and under maintenance by the corresponding party.

Recommendations

4.4.2 No specific recommendation is required for this mitigation measure.

4.5 Transplanting of Trees to Adjacent Locations

Observation

4.5.1 Transplantation of trees was finished during the early construction phase of Contract 1 **(Photo A4)**. The health performance of these transplanted trees had been regularly monitored and reported during the construction phase. Any trees of poor performance were reported to the Contractor and replaced accordingly. Area B was handed over to Tung Tze Nursery after the construction phase, and the transplanted trees were under the maintenance of the Nursery Operator.

4.5.2 Some of the locations of the transplanted trees were different from those proposed in the approved Landscape Plan. Moreover, as reported during the construction phase, gap was observed between the root balls of some transplanted trees and the inner surface of their newly built planters. However, these trees were accepted by the Nursery Operator.

4.5.3 The nylon cables or hessian wrapping tied on tree trunks were removed as observed in March 2015 **(Photo A5)**.

4.5.4 The remaining retained and transplanted trees within the nursery were maintained generally in fair condition, with no significant damage on tree crowns, trunks and roots observed during the monitoring in March 2015.

4.5.5 Trees proposed for transplantation from Area A to Area C were already carried out in 2011 and Area C was handed over to AFCD in October 2012.

Recommendation

4.5.6 Area B was handed over to Tung Tze Nursery which will provide routine maintenance of these transplanted trees. No further recommendation is given under this mitigation measures.

4.6 Preparation for Transplanting

Observation

4.6.1 Transplantation of trees was finished during the construction phase. No preparation of root balls for transplantation could be monitored during the operation phase.

Recomendation

4.6.2 No specific recommendation is required for this mitigation measures.

4.7 Reinstatement of affected area

Observation

4.7.1 The reinstatement works for the original access paths, ground of the nursery beds, basic nursery utility (such as irrigation pipes and lamp posts), shelters for potted plants, planters for transplanting trees, and wire mesh fences within the nursery were finished in Area B as observed in March 2015 **(Photo A6)**. The planters along Ting Kok Road were also reinstated **(Photo A1).**

Recommendation

4.7.2 No specific recommendation is required for this mitigation measures.

5 BI-WEEKLY LANDSCAPE & VISUAL MONITORING (CONSTRUCTION PHASE) FOR CONTRACT 2 (DC/2010/02)

5.1 Visual Screen

5.1.1 No follow-up action by the Contractor is required as from the *Monthly EM&A Report for February 2015*. The recommendations listed in Report for February 2015 are reminders for good site practices to be implemented by the Contractor throughout the construction phase.

Observation

5.1.2 Temporary hoardings, in the form of construction barriers, have been erected from west to east parts along Tung Tsz Road from the opposite side of Wai Ha to the opposite side of San Tau Kok. The temporary hoardings lined along the construction site along the access road from Tung Tsz Road towards Treasure Spot Garden II were removed in March 2015 **(Photo B1)**. **Photos B2-B3** show the views of the erected hoardings along other works area under Contract 2.

5.1.3 All construction works for building the box culverts in the works areas along Tung Tsz Road opposite to Wai Ha and San Tau Kok, and next to Wai Ha River were completed in March 2015 **(Photos B4-B6)**. The civil works noted along the path leading from Tung Tsz Road to Treasure Spot Garden II, as well as those opposite to Wai Ha area were completed as observed on 30th March 2015 **(Photos B7-B8)**. Compensatory trees were planted in October 2014 and have been maintained by the landscape contractor **(Photos B9-B10)**.

5.1.4 The temporary parking area which had been maintained at the end of the access path to Treasure Spot Garden Phase II was abandoned by the villagers since part of the parking area was demarcated with wire mesh fences by the villagers **(Photo B11)**. The untagged leaning tree, which was located just outside the Project Site, was found being removed by an unknown party within the fenced area **(Photo B12)**.

5.1.5 The construction work at the end of the Treasure Spot Garden II near the retained tree T103 was already completed. The temporary construction barriers and chain-link fence next to T103 were already removed in December 2014, and villagers' vehicles were parked in this area **(Photo B13)**.

5.1.6 As reported in the previously submitted Monthly EM&A Reports, a fenced area has been seen on the field next to the construction site along the access to Treasure Spot Garden since March 2014 **(Photo B14)**. This area was still surrounded by chain-link fence and the adjacent areas were also fenced by the villagers. These areas were not fenced by the construction works related to the current project as reported by the Contractor.

5.1.7 No hoardings have been erected along the rest of the proposed works area since neither construction works nor any associated preparation works have been commenced.

Recommendations

5.1.8 No specific recommendation is required in regard to the observations made in March 2015.

5.1.9 For good site practices, the Contractor should also make sure there are no piled rocks or construction materials influencing the existing trees within the Project Area or the wetland rehabilitation area throughout the construction phase. Otherwise, the Contractor should request the on-site workers to remove those piled rocks or construction materials. The Contractor is also recommended to check the condition of the temporary construction barriers surrounding the works areas, and replace the broken barriers with new barriers. The Contractor should remove these temporary construction barriers after the commencement of the operational phase.

5.2 Contaminant/ Sediment Control

5.2.1 No follow-up action by the Contractor is required as from the *Monthly EM&A Report for February 2015*. The recommendations listed in Report for February 2015 are reminders for good site practices to be implemented by the Contractor throughout the construction phase.

Observation

5.2.2 As observed on 30th March 2015, all construction works in Contract 2 works area were completed. No used water was released from the works area next to Wai Ha River was observed in March 2015. The river water was clear **(Photos B15-B16)**.

Recommendations

5.2.3 For good site practice, the Contractor is suggested to conduct regular checking to ensure no direct discharge or leakage of contaminants or any polluted fluid into the adjacent Wai Ha River and the nearby Shuen Wan marsh. The Contractor should maintain regular check (e.g. daily) on the sedimentation and filtration facilities and appropriate sedimentation beds and/or tanks (e.g. check the function of the sedimentation beds and remove surplus sand and gravels deposited along the beds or within the tanks) to make sure all discharged water was filtered appropriately prior to any discharge.

5.3 Pollution Control

5.3.1 No follow-up action by the Contractor is required as from the *Monthly EM&A Report for February 2015*. The recommendations listed in Report for February 2015 are reminders for good site practices to be implemented by the Contractor throughout the construction phase.

Observation

5.3.2 As observed on 30th March 2015, all construction works in Contract 2 works area were completed. No used water has been released from the works area nearby Wai Ha River. The river water was clear **(Photos B15-B16)**. No direct water discharge into the upper stream of Wai Ha River was observed as all construction works in Contract 2 works area have been completed **(Photo B17)**.

Recommendations

5.3.3 For good site practice, the Contractor should prevent any contaminant and sediment from entering the sensitive water-based habitats (i.e. Shuen Wan marsh and Wai Ha River) and implement pollution control measures to minimize any adverse environmental impacts to the water body. If needed, the Contractor should maintain appropriate sedimentation beds and/or tanks throughout the construction phase.

5.4 Liaison with Nursery

5.4.1 The construction undertaken within Tung Tsz Nursery is restricted under Contract 1 of the Project. This monitoring item is not applicable to Contract 2 of the Project.

5.5 Existing Trees within Works Areas

5.5.1 Individual trees retained within the active works area have been protected within TPZs. The protection measures (such as the establishment of TPZs) follow the recommendations stated in the *Monthly EM&A Report for February 2015*. Particular observations are highlighted in the following paragraphs.

Observation

5.5.2 Most trees which are proposed to be retained within the Project Area were recorded generally in fair health condition and some of the retained trees and their canopies have been naturally covered by invasive climbers spreading from the adjacent natural habitats outside the project boundary. Trees with canopies influenced by invasive climbers are located either nearby hillside woodland edge or next to private lots of the villagers. The climbers have covered the tree canopies prior to the commencement of the construction work of Contract 2.

5.5.3 As observed on 18th March 2015, an untagged leaning tree, which was located outside the Project site, was found being removed by an unknown party within the fenced area (previously as a temporary parking area) at Treasure Spot Garden Phase II **(Photo B12)**.

5.5.4 As reported in the submitted Reports, the retained trees T167 (*Litsea monopetala*) and T168 (*Celtis sinensis*) were topped after the vegetation clearance in the surrounding works area in November 2013. These trees have been monitored since the topping incident, and both were in fairly poor health condition with vigorous development of epicormics along trunks or branches **(Photo B18)** to form the tree canopies. The upper section of the trunk of T168 was dead and decayed.

5.5.5 The civil works next to the two trees T093 and T094, which are located next to the access path in Treasure Spot Garden II, were completed. The nearby roadside berm was also reinstated **(Photo B19)**. T093 with poor tree health and structural condition was removed in February 2015. The felled tree parts were piled on the slope nearby its original tree location **(Photo B20)**.

5.5.6 Construction work at the end of Treasure Spot Garden II was completed. No excavated soil or rocks were piled around the trunk flare of T103. Rocks were lined around the remaining root ball of T103 **(Photos B21-B22)**. As reported since December 2014, the climbers overhanging on the tree canopy and a branch of T103 and the nearby hillside vegetation were removed and pruned by an unknown party with confirmation from the Contractor. Similar removal of vegetation on the nearby woodland edge by an unknown party has been noted since February 2015. Another two retained trees T097 (*Schefflera heptaphylla*) and T098 (*Aquilaria sinensis*) located in this woodland edge and next to the access path in Treasure Spot Garden II were

substantially removed by such vegetation clearance work conducted by an unknown party **(Photo B23)**.

5.5.7 Sheet piling works were conducted within the tree root zone of a retained tree T025 (*Celtis sinensis*) in June 2013. Due to the close proximity of the erected sheet piles to the tree, root damage by previous sheet piling works was anticipated. The tree was also over-pruned in June 2013. It had been temporarily guyed by strings so as to provide additional support to the tree until September 2014. The tree's structural condition has been quite stable at its location since its potential root damage in June 2013. It was in fair health condition and new leaves regenerated as observed in March 2015 **(Photo B24)**.

5.5.8 Concrete pavement, which was applied for additional parking area for the villagers, has been observed close to the root flare of the tree group T089-091, and the trees were in fair condition **(Photo B25)**.

5.5.9 Excavation work was noted close to the tree group T181-T183 in May 2014 and its raised soil ground has been planted with ornamental plants by a third party so as to extend and decorate the access path adjacent to these trees **(Photo B26)**. These trees have been surrounded by some stones to demarcate the tree group area since May 2014.

5.5.10 Outside the Project boundary, two untagged trees (*Cleistocalyx nervosum* and *Macaranga tanarius* var. *tomentosa*) near the tree group T181-T183 were also affected by the excavation work previously conducted by a party other than the Contractor of this Project. Such observation was reported in the submitted reports.

5.5.11 As observed and reported since December 2014, the tree trunk from the tree group of T085-T087 at the junction of Tung Tsz Road and Tung Tsz Shan Road was partly uprooted and significantly leaned towards Wai Ha River **(Photo B27)**. Removal of these trees was required. The Contractor reported that its tree roots are in close contact with the underground high-voltage cables and there is a safety concern when removing the leaning tree part. As the leaning tree part is pointing towards Wai Ha River where no target is noted within the tree fall zone, removal of the leaning tree trunk will not be performed soon. Routine monitoring of its stability have to be continued throughout the operational phase prior to the tree removal.

5.5.12 All compensatory trees were planted in October 2014, and individual trees with poor growth performance were replaced on 18th March 2015 **(Photo B28)**. The landscape contractor also applied fertilizer to all planted compensatory trees in March 2015. The growth performance of individual of *Litsea glutinosa* and *Sapium sebiferum* was improved after the application of fertilizers and the increase of humidity in March 2015. New leaves and buds regenerated on these two tree species, as well as other compensatory trees such as *Ficus virens*, *Celtis sinensis* and *Cleistocalyx operculatus* **(Photo B29)**. As observed on 30th March 2015, the on-site worker added a mixture of planting soil and mulch around the planting area of each compensatory tree. Climbers were noted on a few bamboo stakes used to support the compensatory trees.

5.5.13 As reported in the submitted *Monthly EM&A Reports*, at least 15 compensatory trees (including *Sapium sebiferum, Hibiscus tiliaceus*, *Cleistocalyx operculatus* and *Cinnamomum burmannii*) were inundated with tidal water. The dead trees and trees with poor performance under the influence of the tide were removed **(Photo B30)**. Other planted compensatory trees were in fair condition **(Photos B9-B10)**. A few domestic rubbish was discarded by the villagers in the planting area opposite to San Tau Kok.

5.5.14 The planted mangrove seedlings of *Kandelia obovata* and *Aegiceras corniculatum* along the sloping area facing Shuen Wan Marsh were in fair condition **(Photo B31)**.

5.5.15 No significant signs of damage on other existing tree crowns, trunks and roots resulting from the construction works were observed in this monthly monitoring.

5.5.16 As Area C under Contract 1 of the Project has been formally handed over to AFCD for management and maintenance since October 2012, no access into the ECA is allowed. Two transplanted shrubs of *Pavetta hongkongensis* (PH-01 and PH-03) were inspected through the fence of Tung Tsz Nursery. PH01 has remained in satisfactory condition **(Photo B32)**. The previously cut PH03 (cut during grass cutting by a third party who maintain the ECA) was cut again in November 2014 and no resprout was noted in March 2015 **(Photo B33)**. PH-03 may probably die after several grass cutting activities conducted by the contractor responsible for the landscape maintenance of Area C.

Recommendations

5.5.17 Within the Project Site, maintenance of TPZs for the retained trees and recently planted compensatory trees should be maintained. Trunk bases of all retained trees and planted compensatory trees should be kept clear, with no stockpiled soil, construction equipments and rubbish allowed around the trunk bases and within the TPZs. If necessary, these retained trees shall be watered regularly to maintain their health, while all planted compensatory trees should be watered regularly by the appointed landscape contractor (e.g. at least three times per week during dry season). All fallen trees or tree parts of the existing trees maintained within the works area of Contract No. DC/2010/02 should be removed if they pose imminent hazards to the people/property or cause obstruction to the traffic. Any broken tree parts still attached to the trees could be pruned appropriately to prevent their potential hazard to the public and property.

5.5.18 Apart from the routine irrigation of the planted compensatory trees, the Contractor should request the appointed landscape contractor to regularly check the stability and condition of the bamboo stakes during each irrigation activity. Trees of poor quality (such as loose tree bark) should be replaced in the coming operational phase. The replaced trees should be heavy standard trees with qualification following the standard quality as stipulated in Annex 4 of the approved Landscape Plan. The appointed landscape contractor is recommended to remove the climbers on the bamboo stakes.

5.5.19 Disturbance is prohibited in all TPZs. In any practical circumstances, the contractor should follow Section 8 of Annex 4 of the approved Landscape Plan for protecting the existing trees from any potential damages resulting from the construction works. In addition, the Contractor and the Project Proponent should have routine inspection on any tree remedial works conducted by other party on the trees within the Project Area.

5.5.20 With regard to the vigorous development of epicormics along trunks and branches of the retained trees T167 and T168, the Contractor is recommended to have corrective pruning on selected watersprouts along the lower tree trunks so as to make these trees become less hazardous. The recommended pruning work can be carried out by the appointed landscape contractor during the coming operational phase.

5.5.21 With regard to the previous tree topping incident on the retained trees (such as T088, T089, T167 and T168), as well as T118 and T093 in which the construction work was undertaken close to the tree trunks or other tree parts as reported previously, and potentially damage the tree roots, the Contractor is reminded to monitor all trees protected within the project boundary regularly. The Contractor should instruct the operator of heavy machinery or on-site workers not to damage any tree parts of the retained trees and planted compensatory trees when they remove the temporary construction barriers from the Project Site. The Contractor

should also be aware of any potential damage on the trees within the Project Boundary by other contractor(s) undertaking construction work concurrently or tree damage by the villagers. These routine tree inspection and site maintenance should be carried out throughout the construction phase.

5.5.22 Tree topping (like the case for T025, T167 and T168 reported previously) should be prohibited and the Contractor should appoint qualified landscape contractor to perform appropriate pruning practice. The pruning works should follow any local, national or international standards for pruning works and relevant tree remedial works. Given that the tree roots of T025 could be damaged by previous sheet piling works and the topped tree exists with unbalanced tree form, the long-term tree stability and health condition should be checked after the previous removal of the guying in October 2014. The Contractor should have close monitoring of tree stability with regard to its unbalanced tree form and health condition in the coming operational phase.

5.6 Construction Light

5.6.1 No follow-up action on maintenance of construction light is required as from the *Monthly EM&A Report for February 2015*.

Observation

5.6.2 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

5.6.3 No specific recommendation is required.

6 AUDIT SCHEDULE

6.1.1 As acknowledged during the joint site inspection with EPD, DSD (the Project Proponent) and the Contractor on 24th March 2015, the construction phase of Contract 2 was ended on 31st March 2015 and the corresponding commencement of the Operation Phase was from 1st April 2015. Accordingly, no bi-weekly Landscape & Visual Monitoring will be scheduled from April 2015 onwards. The first quarterly Landscape & Visual Monitoring (during operational phase) for Contract 2 will be scheduled in June 2015.

Appendix A

Photographs for Quarterly Monitoring (Operational Phase) for Contract 1 (DC/2009/22)

	
Photo A1 – Planters at Ting Kok Road were hydroseeded and planted with shrubs.	**Photo A2** – General appearance of the pump house in Area A.
	
Photo A3 – View of sloping area with ground cover in the pump house.	**Photo A4** – Example of transplanted trees in Area B.
	
Photo A5 – The nylon cables or hessian wrapping previously tied on tree trunks were removed.	**Photo A6** – Example of the completed reinstatement works within the nursery (such as lamp posts, shelters for potted plants and new planters for the transplanted tree).

Appendix B
Photographs for Bi-weekly Monitoring (Construction Phase) for Contract 2 (DC/2010/02)

	
Photo B1 – Temporary hoardings along the access path towards Treasure Spot Garden II were removed.	**Photo B2** – Temporary hoardings erected along Tung Tsz Road and opposite to Wai Ha.
	
Photo B3 – Temporary hoardings erected opposite to Wai Ha.	**Photo B4** – Construction works opposite to San Tau Kok was already completed and fully vegetated.
	
Photo B5 –The box culvert and the associated drainage work were completed at the upper part of Wai Ha River.	**Photo B6** – Construction work opposite to Wai Ha area was already completed.

	
Photo B7 – The work along the access road in Treasure Spot Garden II was completed and the area was hydroseeded.	**Photo B8** – The minor civil work opposite to Wai Ha area was completed by end of March 2015.
	
Photo B9 – Compensatory trees were planted in area opposite to San Tau Kok.	**Photo B10** – Compensatory trees were planted opposite to Wai Ha area.
	
Photo B11 – The parking area in Treasure Spot Garden II was abandoned by the villagers and demarcated with wire mesh fence by the villagers.	**Photo B12** – The untagged tree isolated within the fenced area was found being removed by an unknown party on 18th March 2015.

Photo B13 – Construction work at the end of the access path in Treasure Spot Garden II was finished. The works area was parked with villagers' cars.

Photo B14 - A fenced area, which was erected by the villagers, has been recorded next to the works area of this Project.

Photo B15 – No used water was released from the works area to Wai Ha River and the lower section of Wai Ha River was clear.

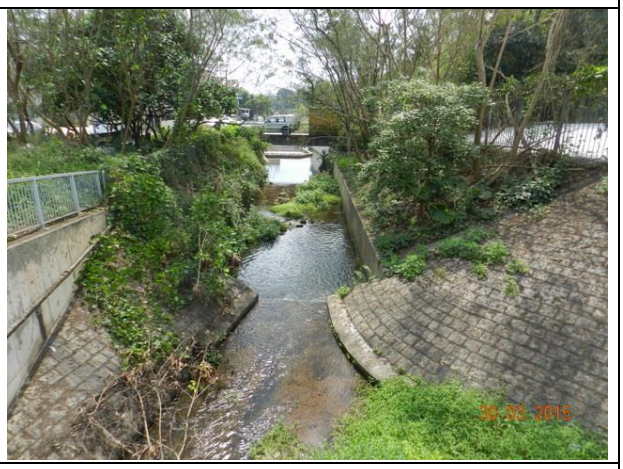


Photo B16 – No direct water discharge into the upper stream of Wai Ha River was observed.

Photo B17 – The river water was clear at the upper section of Wai Ha River.

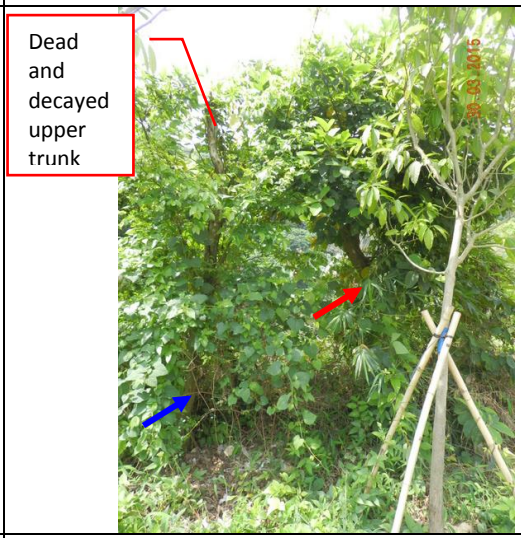


Photo B18 – Topped trees T167 (indicated by Red arrow) and T168 (indicated by Blue arrow) were in poor health condition with vigorous development of epicormics to form canopies.

Photo B19 – The civil work next to the tree T094 was already completed. The road berm was reinstated.

Photo B20 – The cut tree parts of the tree T093 were piled on the slope nearby its original tree location.

Photo B21 – The retained tree T103 was in fair condition, with some pruned branches observed in the past three months.

Photo B22 – Rocks were lined around the remaining root ball of T103.

Photo B23 – The hillside vegetation and the retained trees T097 and T098 were cleared by an unknown party.

Photo B24 – The retained tree T025 was in fair condition. It generated new leaves in March 2015.

	
Photo B25 – Concrete pavement maintained for parking area for the villagers was still observed around the tree group T089-T091.	**Photo B26** – Retained trees T181-T183 have been surrounded by some stones to demarcate the tree group area by the villagers.
	
Photo B27 – The tree trunk from the tree group of T085-T087 at the junction of Tung Tsz Road and Tung Tsz Shan Road was partly uprooted and significantly leaned towards Wai Ha River.	**Photo B28** – Replacement planting of compensatory trees was observed on 18th March 2015.
	
Photo B29 – Development of new buds and leaves of a compensatory tree of *Ficus virens*.	**Photo B30** – The dead trees and trees of poor performance in the planting area that was influenced of tidal water were removed in March 2015.

Photo B31 – Mangrove seedlings were planted along the sloping area facing Shuen Wan Marsh.

Photo B32 – The transplanted shrub of *Pavetta hongkongensis* (PH01) in Area C under Contract 1 has remained in satisfactory condition.

Photo B33 – The transplanted shrub of *Pavetta hongkongensis* (PH03) was cut by the third party during the grass cutting work within Area C. No resprout on the cut specimen was noted.

Appendix M

Ecological Monitoring Report

Agreement No. DP/01/2010
Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 2 (Report 25b for March 2015)

Prepared for:

Drainage Services Department

Prepared by:
ENVIRON Hong Kong Limited

Date:
April 2015

Reference Number:
R4379_V1.0

Agreement No. DP/01/2010
Drainage Improvement Works in Shatin and Tai Po:
Ecological Monitoring in area under Contract 2
(Report 25b for March 2015)

Prepared by:

Shirley Lui
Environmental Consultant

Approved by:

Tony Cheng
Project Manager

ENVIRON Hong Kong Limited
Room 2403, Jubilee Centre
18 Fenwick Street, Wan Chai, Hong Kong
Tel: (852) 3465 2888
Fax: (852) 34652899
Email: hkinfo@environcorp.com

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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.

1.2 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 100m of the works boundary.

1.3 China-Hong Kong Ecology Consultants Co. was commissioned by ENVIRON Hong Kong Limited to perform the ecological impact monitoring survey for the projects under Contract 2 since July 2011.

1.4 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

1.5 This is the report No. 25b ecological monitoring conducted on 26th March 2015 within the works boundary under Contract 2 and area within 100m from the works boundary.

2. Highlights of this report

- Field survey was conducted on 26th March 2015
- Construction activities of Contract 2 was observed to be substantially completed during reporting month
- Lower number of species was observed within the works area under Contract 2, but habitats in the 100m buffer area retain its natural condition.

3. Summary of construction activities for the month

Major construction activities carried out in Contract 2 at Wai Ha Village and Tung Tsz Road by the contractor during the present monitoring period (March 2015) includes:

1. Rectification of minor defects along Box Culvert and landscape planting.

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 100m buffer area of Contract 2 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 2 (i.e. SEMP 3 & 4; 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

Herpetofauna groups are considered to be inactive during dry season (November to March), thus detailed herpetofauna monitoring was not conducted. However, any sign/calling of reptiles or amphibians encountered during the in situ survey was recorded.

4.4 Butterflies and Odonata

Odonates and butterfly are considered to be inactive during dry season (November to March), thus detailed monitoring was not conducted.

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 2 (i.e. SEMP 3 & 4). 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 2 are river course, wooded area, mangrove, marsh and developed area (including village). Vegetation were found in wooded area, mangrove, marsh, develop area and river bank. The riparian vegetation which were dominated by *Leucaena leucocephala* and *Bidens alba* with average coverage ranged from 20% to 30% (Table 1). A list of plant species recorded from different habitats within the assessment area under Contract 2 is presented on Table 2. A total of 207 species were recorded within the assessment boundary in which 207 species were recorded within the buffer area, while 91 species recorded within the work areas under Contract 2. Among them, species protected under Hong Kong ordinance were found in buffer area under Contract 2, namely *Aquilaria sinensis* (Cap. 586), *Cibotium barometz* (Cap. 586). Three individuals of protected species *Pavetta hongkongensis* located within works area of Contract 2 were transplanted to ECA on 20th Dec 2011. Currently, construction work was substantially completed. Some trees were planted along the construction site for landscaped purpose. Moreover, some drainage section has been restored as marsh habitat by planting wetland species such as *Juncus effuses*.

5.2 Avifauna

A total of 17 bird species were recorded in the current survey (Table 3). In the work area under Contract 2, 10 bird species were recorded in which two wetland dependent species *Ardeola bacchus* and *Egretta garzetta* are recognized as being regional conservation concern. A total of 12 bird species were recorded in the 100m buffer area in which no bird species was considered to be of conservation concern.

5.3 Herpetofauna

No amphibian or reptile was recorded within the assessment area during dry season.

5.4 Butterflies

No butterfly was recorded within the assessment area during dry season.

5.5 Odonata

No Odonata was recorded within the assessment area during dry season.

5.6 Mammal

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

5.7 Aquatic fauna

Under Contract 2 (i.e. SEMP 3 & 4), a total of 10 fish species, 1 crustacean, 1 gastropod and 1 arthropod were recorded and most of them were freshwater species (Table 4). *Carassius auratus* was commonly observed at SEMP 3 because of the traditional Buddhist practice from the nearby temple in which captured organisms were released back to nature. In addition, river section at SEMP 3 is relatively natural and the presence of *Parazacco spilurus* may imply that good water quality at this section is maintained. 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 2, while 100m buffer area remains natural. Much of the construction activities are carried out along Tung Tsz Road under Contact 2. In general, lower numbers of species were recorded within the works area under Contract 2 than that of 100m buffer area because of the associated constructions and urbanized in nature. Water quality in river section of Contract 2 (i.e. SEMP 3) was maintained at acceptable condition as indicated by the presence of *Parazacco spilurus*. In addition, most of the construction activities are restricted in the developed area with low ecological significance. Currently, construction work was substantially completed. Thus, the impact on downstream of SEMP 4 is anticipated to be minor. 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 commencement of operation phase EM&A of Contract 2 from 1 April 2015 has been approved by EPD. The monitoring programme described in EM&A will be strictly followed 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 2 was conducted in March 2015 and relevant flora and fauna data were collected according to project specification and EM&A Manual. As indicated by the low abundance and diversity of species within the work areas, habitats within the work boundary under Contracts 2 offer few ecological opportunities for colonization 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 100m buffer area are retained at acceptable condition, and hence the 100m buffer area has not been significantly affected by the construction works. Currently, most construction work was substantially completed. Thus, the impact on downstream of SEMP 4 is anticipated to be minor.

11. References

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

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

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

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

AFCD, Hong Kong Biodiversity Website:
http://www.afcd.gov.hk/english/conservation/hkbiodiversity/database/search.asp

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

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

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

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

Figures

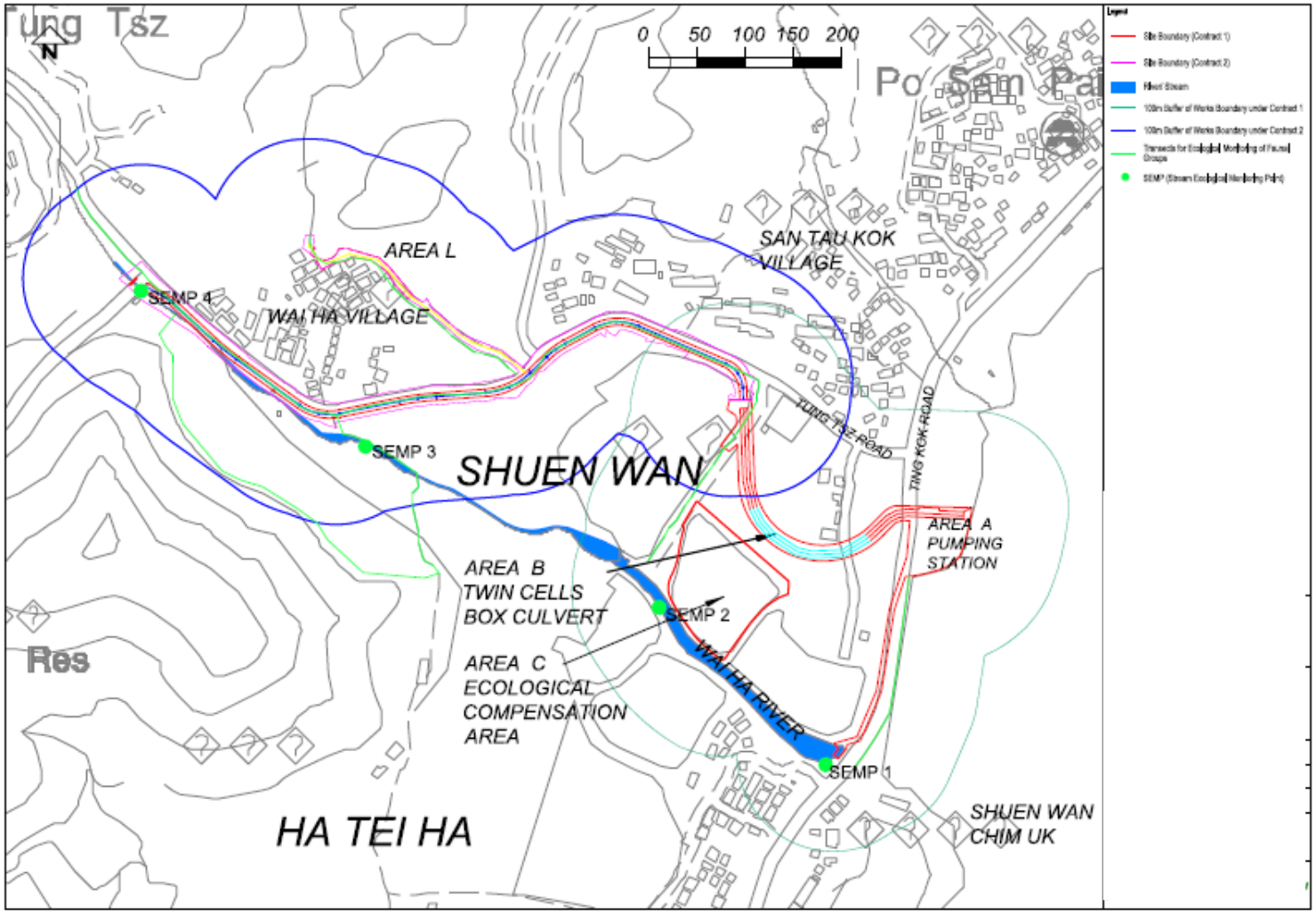

Figure: 1

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

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Checked by:	SL
Rev.:	1.0
Date:	March 2015

Project: Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 2 (March 2015, Report 25b)

Figure: 2	ENVIRON
Title: SEMP 3, the third sampling point of Wai Ha River under Contract 2.	Drawn by: IT
	Checked SL
Project: Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 2 (March 2015, Report 25b)	Rev.: 1.0
	Date: April 2015

Figure: 3	ENVIRON
Title: SEMP 4, the forth sampling point along Wai Ha River under Contract 2.	Drawn by: IT
	Checked SL
Project: Agreement No. DP/01/2010 Drainage Improvement Works in Shatin and Tai Po: Ecological Monitoring in area under Contract 2 (March 2015, Report 25b)	Rev.: 1.0
	Date: April 2015

Tables

Table 1. List of riparian vegetation and coverage (%) recorded from two stream sampling points under Contract 2 (i.e. SEMP 3 & 4).

			Sampling point	**SEMP 3**		**SEMP 4**	
Species	**Family**	**Growth form**	**Status in Hong Kong**	**Height (cm)**	**%**	**Height (cm)**	**%**
Bidens alba	ASTERACEAE	Herb	E			0.9	30
Alocasia odora	ARACEAE	Shrub	N	1	2		
Commelina diffusa	COMMELINACEAE	Herb	N	0.2	2	0.3	5
Leucaena leucocephala	MIMOSACEAE	Small Tree	E			4	20
Microstegium ciliatum	POACEAE	Perennial Procumbent Herb	N	0.5	2		
Pistia stratiotes	ARACEAE	Floating Aquatic Herb	N				
Polygonum chinensis	POLYGONACEAE	Herb	N				
Polygonum lapathifolium	POLYGONACEAE	Herb	N				
Rhaphiolepis salicifolia	ROSACEAE	Shrub or Small Tree	N				
Spirodela polyrrhiza	LEMNACEAE	Floating Small Herb	N				
Pueraria lobata	FABACEAE	Climber	N			0.5	10
Cyclosorus parasiticus	THELYPTERIDACEAE	Herb	N	0.2	2		
Wedelia chinensis	ASTERACEAE	Perennial Herb	N				
Bare	n/a	n/a	n/a	n/a	92	n/a	40

***Key:**

E = Exotic

N = Native

n/a = not available

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

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
ACANTHACEAE	*Acanthus ilicifolius*	老鼠簕	N		V	V	V					V
ACANTHACEAE	*Rhinacanthus nasutus*	靈枝草	E		V							V
ACROSTICHACEAE	*Acrostichum aureum*	鹵蕨	N		V	V						V
AGAVACEAE	*Cordyline fruticosa*	朱蕉	E		V							V
AGAVACEAE	*Dracaena draco*	龍血樹	E		V							V
AGAVACEAE	*Sansevieria trifasciata*	虎尾蘭	E		V							V
AMARANTHACEAE	*Amaranthus viridis*	野莧	N		V	V			V	V	V	V
ANACARDIACEAE	*Mangifera indica*	杧果	E					V				V
ANACARDIACEAE	*Rhus hypoleuca*	白背漆	N					V				V
ANACARDIACEAE	*Rhus succedanea*	野漆樹	N					V				V
ANNONACEAE	*Desmos chinensis*	假鷹爪	N					V				V
ANNONACEAE	*Uvaria macrophylla*	紫玉盤	N					V				V
APIACEAE	*Coriandrum sativum*	芫荽	E						V			V
APOCYNACEAE	*Catharanthus roseus*	長春花	N		V						V	V
ARACEAE	*Alocasia odora*	海芋	N		V	V					V	V
ARACEAE	*Colocasia esculenta*	芋	N						V			V
ARACEAE	*Pistia stratiotes*	大漂	N	V							V	V
ARALIACEAE	*Acanthopanax gracilistylus*	五加皮	E	V							V	V
ARALIACEAE	*Schefflera actinophylla*	傘樹	E		V							V
ARALIACEAE	*Schefflera heptaphylla*	鴨腳木	N		V	V					V	V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
ARECACEAE	*Archontophoenix alexandrae*	假檳榔	E		V							V
ARECACEAE	*Caryota ochlandra*	魚尾葵	E		V							V
ARECACEAE	*Chrysalidocarpus lutescens*	散尾葵	E	V	V							V
ARECACEAE	*Phoenix roebelenii*	日本葵	E		V							V
ARECACEAE	*Rhapis excelsa*	棕竹	N		V							V
ASTERACEAE	*Bidens alba*	白花鬼針	E	V							V	V
ASTERACEAE	*Chrysanthemum coronarium*	茼蒿	E						V			V
ASTERACEAE	*Conyza canadensis*	小蓬草	E		V			V	V	V	V	V
ASTERACEAE	*Emilia sonchifolia*	一點紅	N		V						V	V
ASTERACEAE	*Ageratum conyzoides*	藿香薊	E	V	V				V		V	V
ASTERACEAE	*Lactuca sativa*	萵苣	E						V			V
ASTERACEAE	*Mikania micrantha*	薇甘菊	E	V	V	V		V	V	V	V	V
ASTERACEAE	*Pterocypsela indica*	山萵苣	N		V						V	V
ASTERACEAE	*Wedelia chinensis*	蟛蜞菊	N		V					V	V	V
ASTERACEAE	*Youngia japonica*	黃鵪菜	N		V						V	V
ASTERACEAE	*Spilanthes paniculata*	金鈕扣	N		V						V	V
ASTERACEAE	*Artemisia indica*	五月艾	N		V				V		V	V
ASTERACEAE	*Eclipta prostrata*	鱧腸	N	V	V				V		V	V
BIGNONIACEAE	*Pyrostegia venusta*	炮仗花	E		V							V
BRASSICACEAE	*Brassica rapa*	大頭菜	E						V			V
CAESALPINIACEAE	*Bauhinia blakeana*	洋紫荊	N		V							V
CAESALPINIACEAE	*Bauhinia variegata*	宮粉羊蹄	E		V							V
CAESALPINIACEAE	*Cassia spectabilis*	美麗決明	E		V							V
CARICACEAE	*Carica papaya*	番木瓜	E							V		V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
CARYOPHYLLACEAE	*Drymaria diandra*	荷莲豆	N						V		V	V
CARYOPHYLLACEAE	*Myosoton aquaticum*	鵝腸菜	N						V		V	V
CASUARINACEAE	*Casuarina equisetifolia*	木麻黃	E		V							V
CASUARINACEAE	*Citrus grandis*	柚	E		V							V
CHENOPODIACEAE	*Chenopodium ficifolium*	小藜	N			V			V		V	V
CLUSIACEAE	*Cratoxylum cochinchinense*	黃牛木	N					V				V
COMBRETACEAE	*Lumnitzera racemosa*	欖李	N			V	V				V	V
COMBRETACEAE	*Terminalia catappa*	欖仁樹	E		V							V
COMMELINACEAE	*Commelina diffusa*	節節草	N	V							V	V
COMMELINACEAE	*Tradescantia spathacea*	蚌花	E		V							V
CONNARACEAE	*Rourea microphylla*	紅葉藤	N					V				V
CONVOLVULACEAE	*Ipomoea cairica*	五爪金龍	E		V	V	V	V			V	V
CONVOLVULACEAE	*Merremia hederacea*	魚黃草	N		V				V	V	V	V
CONVOLVULACEAE	*Ipomoea aquatica*	蕹菜	E			V					V	V
CUPRESSACEAE	*Thuja orientalis*	側柏	E		V							V
CUPRESSACEAE	*Juniperus chinensis L.* `	龍柏			V							V
CUSCUTACEAE	*Cuscuta chinensis*	菟絲子	N						V		V	V
CYPERACEAE	*Cyperus flabelliformis*	風車草	E	V							V	V
CYPERACEAE	*Pycreus polystachyos*	多枝扁莎	N			V			V		V	V
DICKSONIACEAE	*Cibotium barometz*	金毛狗	N (Cap. 586)					V				V
ELAEOCARPACEAE	*Elaeocapus haminanensis*	水石榕	E		V							V
EQUISETACEAE	*Equisetum debile*	筆管草	N	V								V
EUPHORBIACEAE	*Antidesma bunius*	五月茶	N					V		V	V	V
EUPHORBIACEAE	*Aporusa dioica*	銀柴	N					V		V		V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
EUPHORBIACEAE	*Bischofia javanica*	秋風	N							V		V
EUPHORBIACEAE	*Bridelia insulana*	禾串树	N					V				V
EUPHORBIACEAE	*Bridelia tomentosa*	土蜜樹	N		V						V	V
EUPHORBIACEAE	*Excoecaria agallocha*	海漆	N				V					V
EUPHORBIACEAE	*Glochidion eriocarpum*	毛果算盘	N					V			V	V
EUPHORBIACEAE	*Glochidion puberum*	算盘子	N		V							V
EUPHORBIACEAE	*Glochidion zeylanicum*	香港算盤	N	V							V	V
EUPHORBIACEAE	*Macaranga tanarius*	血桐	N		V	V	V					V
EUPHORBIACEAE	*Mallotus apelta*	白桐	N							V		V
EUPHORBIACEAE	*Mallotus paniculatus*	白楸	N					V				V
EUPHORBIACEAE	*Sapium discolor*	山烏桕	N	V				V				V
EUPHORBIACEAE	*Euphorbia thymifolia*	千根草			V				V		V	V
FABACEAE	*Mucuna championii Benth.*	港油麻藤	N					V		V	V	V
FABACEAE	*Pueraria lobata*	葛	N		V	V			V			V
FABACEAE	*Sesbania cannabina*	田菁	E		V						V	V
FABACEAE	*Crotalaria pallida var.obovata*	豬屎豆	E		V						V	V
FABACEAE	*Desmodium heterocarpon*	假地豆	N		V						V	V
FABACEAE	*Millettia reticulata*	雞血藤	N					V				V
FABACEAE	*Mucuna birdwoodiana*	白花油麻	N	V				V			V	V
FABACEAE	*Uraria crinita*	貓尾草	E					V				V
FABACEAE	*Pueraria lobata*	葛	N	V	V			V	V	V	V	V
FLACOURTIACEAE	*Scolopia chinensis*	刺柊	N							V		V
GLEICHENIACEAE	*Dicranopteris pedata*	芒萁	N					V				V
HALORAGACEAE	*Gonocarpus chinensis*	黃花小二	N		V				V		V	V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
JUNCACEAE	*Juncus effusus*	燈心草	N			V					V	V
LAMIACEAE	*Salvia japonica*	鼠尾草	N		V							V
LAURACEAE	*Cinnamomum burmannii*	陰香	N		V			V			V	V
LAURACEAE	*Cinnamomum camphora*	樟	N					V				V
LAURACEAE	*Litsea cubeba*	山蒼樹	N					V				V
LAURACEAE	*Litsea glutinosa*	潺槁樹	N		V			V			V	V
LAURACEAE	*Litsea monopetala*	假柿樹	N							V	V	V
LEMNACEAE	*Spirodela polyrrhiza*	青萍	N	V							V	V
LILIACEAE	*Allium fistulosum*	蔥	E						V			V
LILIACEAE	*Disporum cantoniense*	萬壽竹	E					V				V
LYGODIACEAE	*Lygodium japonicum*	海金沙	N		V							V
MALVACEAE	*Hibiscus rosa-sinensis*	大紅花	E		V							V
MALVACEAE	*Hibiscus tiliaceus*	黃槿	N	V		V					V	V
MALVACEAE	*Thespesia populnea*	恒春黃槿	N				V					V
MALVACEAE	*Abelmoschus moschatus*	黃葵	N			V					V	V
MELASTOMATACEAE	*Melastoma candidum*	野牡丹	N					V				V
MELASTOMATACEAE	*Melastoma sanguineum*	毛蒽	N					V				V
MELIACEAE	*Melia azedarach*	楝	E	V							V	V
MENISPERMACEAE	*Coculus orbiculatus*	木防己	N	V	V	V		V	V	V	V	V
MENISPERMACEAE	*Pericampylus glaucus*	細圓藤	N		V						V	V
MENISPERMACEAE	*Stephania longa*	蕺箕篤	N		V			V				V
MIMOSACEAE	*Acacia confusa*	台灣相思	E		V							V
MIMOSACEAE	*Albizia lebbeck*	大葉合歡	E	V								V
MIMOSACEAE	*Calliandra haematocephala*	朱纓花	E		V							V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
MIMOSACEAE	*Leucaena leucocephala*	銀合歡	E	V	V						V	V
MIMOSACEAE	*Mimosa pudica*	含羞草	E		V				V		V	V
MORACEAE	*Artocarpus macrocarpon*	菠蘿蜜	E		V						V	V
MORACEAE	*Ficus benjamina*	垂葉榕	E		V						V	V
MORACEAE	*Ficus elastica*	印度榕樹	E		V							V
MORACEAE	*Ficus hispida*	對葉榕	N	V	V	V					V	V
MORACEAE	*Ficus microcarpa*	榕樹	N		V			V				V
MORACEAE	*Ficus simplicissima*	五指毛桃	N		V			V				V
MORACEAE	*Ficus triangularis*	三角榕	E	V							V	V
MORACEAE	*Ficus variegata*	青果榕	N		V			V				V
MORACEAE	*Ficus virens*	大葉榕	N	V	V						V	V
MORACEAE	*Morus alba*	桑	N		V							V
MUSACEAE	*Musa x paradisiaca L.*	大蕉	E		V				V			V
MYRSINACEAE	*Aegiceras corniculatum*	蠟燭果	N		V	V	V					V
MYRSINACEAE	*Ardisia quinquegona*	羅傘樹	N					V				V
MYRSINACEAE	*Embelia ribes*	白花酸藤	N					V			V	V
MYRSINACEAE	*Maesa perlarius*	鯽魚胆	N		V					V		V
MYRTACEAE	*Cleistocalyx operculatus*	水翁	N	V						V	V	V
MYRTACEAE	*Melaleuca quinquenervia*	白千層	E		V							V
MYRTACEAE	*Psidium guajava*	番石榴	E		V							V
MYRTACEAE	*Syzygium jambos (L.) Alston*	蒲桃	E		V			V				V
OLEACEAE	*Ligustrum sinensis*	山指甲	N		V							V
ONAGRACEAE	*Ludwigia perennis*	細花丁香	M			V					V	V
OXALIDACEAE	*Averrhoa carambola*	楊桃	E		V							V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
OXALIDACEAE	*Oxalis corniculata*	酢漿草	N		V						V	V
PANDANACEAE	*Pandanus tectorius*	露兜樹	N				V					V
PINACEAE	*Pinus massoniana*	馬尾松	N							V		V
PIPERACEAE	*Piper hancei*	山蒟	N							V		V
PLANTAGINACEAE	*Plantago major*	車前草	N		V	V					V	V
POACEAE	*Apluda mutica*	水蔗草	N		V	V					V	V
POACEAE	*Arundinella nepalensis*	石珍芒	N	V	V			V				V
POACEAE	*Bambusa sp.*	竹	/					V				V
POACEAE	*Coix lacryma-jobi*	薏苡	N	V								V
POACEAE	*Cynodon dactylon*	狗牙根	N		V						V	V
POACEAE	*Digitaria ciliaris*	升馬唐	N		V	V						V
POACEAE	*Eleusine indica*	牛筋草	N		V						V	V
POACEAE	*Microstegium ciliatum*	剛莠竹	N	V							V	V
POACEAE	*Panicum maximum*	大黍	E								V	V
POACEAE	*Panicum repens L.*	鋪地黍	N		V	V						V
POACEAE	*Brachiaria mutica*	巴拉草	E			V			V		V	V
POACEAE	*Pennisetum alopecuroides*	狼尾草	N		V	V		V				V
POACEAE	*Phragmites anstralis*	蘆葦	N		V	V						V
POACEAE	*Phragmites karka*	卡開蘆	N									V
POACEAE	*Zoysia sp.*	結縷草	N			V	V				V	V
POACEAE	*Eragrostis tenella*	鯽魚草	N		V				V	V	V	V
POACEAE	*Chloris virgata*	虎尾草	N		V	V			V	V	V	V
POACEAE	*Echinochloa crusgalli*	稗	N		V	V			V		V	V
POACEAE	*Echinochloa colona*	光頭稗	N		V				V	V	V	V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
POLYGONACEAE	*Polygonum chinensis*	火炭母	N						V			V
POLYGONACEAE	*Polygonum hydropiper*	水蓼	N		V							V
POLYGONACEAE	*Polygonum lapathifolium*	大馬蓼	N			V			V		V	V
PTERIDACEAE	*Pteris semipinnata*	半邊旗	N					V				V
PTERIDIACEAE	*Pteridium aquilinum*	蕨	N						V			V
PTERIDACEAE	*Pteris vittata L*	蜈蚣草	N		V				V		V	V
RHIZOPHORACEAE	*Kandelia obovata*	秋茄樹	N			V	V					V
ROSACEAE	*Eriobotrya japonica*	枇杷	E		V							V
ROSACEAE	*Rubus reflexus*	蛇泡簕	N							V	V	V
RUBIACEAE	*Canthium dicoccum*	鐵矢	N					V				V
RUBIACEAE	*Hedyotis hedyotidea*	牛白藤	N									V
RUBIACEAE	*Lasianthus chinensis*	粗葉木	N					V				V
RUBIACEAE	*Paederia scandens*	雞屎藤	N		V					V	V	V
RUBIACEAE	*Pavetta hongkongensis*	香港大沙	N (Cap. 96)					V				V
RUBIACEAE	*Psychotria asiatica*	九節	N					V				V
RUBIACEAE	*Psychotria serpens*	蔓九節	N		V							V
RUBIACEAE	*Spermacoce stricta*	豐花草	N	V	V			V	V	V	V	V
RUBIACEAE	*Hedyotis corymbosa*	傘房花耳	N	V	V			V	V	V	V	V
RUTACEAE	*Acronychia pedunculata*	降真香	N					V			V	V
RUTACEAE	*Citrus reticulata*	柑橘	E		V							V
RUTACEAE	*Clausena lansium*	黃皮	E		V							V
RUTACEAE	*Murraya paniculata*	九里香	E	V	V						V	V
SAPINDACEAE	*Dimocarpus longan*	龍眼	E		V					V		V
SAPINDACEAE	*Litchi chinensis*	荔枝	E		V							V

Family	Species name	Chinese name	*Status in Hong Kong	S	DA	M	Man	SW	CL	P	Work Area of Contract 2	100m buffer area under Contract 2
SAPINDACEAE	*Sapindus saponaria*	無患子	N							V		V
SAPOTACEAE	*Manilkara zapota*	人心果	E	V								V
SCROPHULARIACEAE	*Scoparia dulcis*	野甘草	N		V				V		V	V
SCROPHULARIACEAE	*Lindernia crustacea*	母草		V	V	V			V		V	V
SELAGINELLACEAE	*Selaginella uncinata*	翠雲草	N					V				V
SOLANACEAE	*Lycopersicon esculentum*	番茄	E						V			V
SOLANACEAE	*Solanum nigrum*	龍葵	N		V	V					V	V
SOLANACEAE	*Solanum torvum*	水茄	E			V		V			V	V
STERCULIACEAE	*Byttneria aspera*	刺果藤	N					V				V
STERCULIACEAE	*Sterculia lanceolata*	假蘋婆	N	V	V						V	V
THYMELAEACEAE	*Aquilaria sinensis*	土沉香	N (Cap. 586)					V				V
TILIACEAE	*Microcos paniculata*	布渣葉	N		V					V		V
THELYPTERIDACEAE	*Cyclosorus parasiticus*	華南毛蕨	N	V	V	V		V	V	V	V	V
ULMACEAE	*Celtis sinensis*	朴樹	N		V		V				V	V
URTICACEAE	*Boehmeria nivea*	苧麻	E							V	V	V
URTICACEAE	*Pouzolzia zeylanica*	霧水葛	N	V	V				V	V	V	V
VERBENACEAE	*Avicennia marina*	白骨壤	N			V	V					V
VERBENACEAE	*Clerodendrum inerme*	苦郎樹	N	V								V
VERBENACEAE	*Lantana camara*	馬櫻丹	E	V	V						V	V

Note: “S” = Stream; “SW” = Secondary Woodland; “M” = Marsh; “Man” = Mangrove; “DA” =Developed area; “CL” = Cultivated area; “P” = Plantation

Table 3. List of avifauna species and maximum counts recorded from the impact monitoring survey at work area under Contracts 2 and 100m buffer area.

Common name	Species	Habitat	Conservation status in Hong Kong	Work area: Contract 2	100m buffer area
Chinese Bulbul	*Pycnonotus sinensis*		--		2
Barn Swallow	*Hirundo rustica*			2	1
Black-collared Starling	*Sturnus nigricollis*				2
Chinese Pond Heron	*Ardeola bacchus*	W	RC	1	
Common Tailorbird	*Orthotomus sutorius*		--	1	1
Crested Myna	*Acridotheres*		--		2
Common Koel	*Eudynamys*				1
Eurasian Tree Sparrow	*Passer montanus*				4
Masked Laughing thrush	*Garrulax*		--		2
Oriental Magpie Robin	*Copsychus saularis*		--	1	1
Little Egret	*Egretta garzetta*	W	RC	2	
Japanese White-eye	*Zosterops japonicus*				2
Spotted Dove	*Streptopelia*		--	2	3
White-breasted Water hen	*Amaurornis*		--	1	
Grey Wagtail	*Motacilla cinerea*			1	
Yellow-bellied Prinia	*Prinia flaviventris*			2	
White Wagtail	*Motacilla alba*			1	1
Total number of species:				**10**	**12**

***Key:**

W = Wetland dependent species; RC = Regional Concern; LC = Local Concern

Table 4. Relative abundance of aquatic species recorded in Wai Ha River within the 100m buffer of works boundary under Contracts 2 in the impact monitoring survey.

Species	**Common name**	**[1]Life-cycle characteristics**	**[2]Origin**	**SEMP 3**	**SEMP 4**
Carassius auratus	Goldfish	F	I	++	
Cirrhinus molitorella	Mud carp	F	I	++	
Cyprinus carpio	Common Carp	F	I	+	
Gambusia affinis	Mosquito Fish	F	I	++	+
Oreochromis niloticus	Nile Tilapa	F	I	+	
Parazacco spilurus	Predaceaous Chub	F	N	+	
Poecilia reticulata	Guppy	F	I	+	+
Puntius semifasciolatus	Chinese Barb	F	N	+	
Rhinogobius duospilus	Goby	F	N	+	+
Xiphophorus hellerii	Swordtail	F	I	+	+
Uca arcuata	Fiddler Crab	M	N	+	
Pomacea lineata	Apple snail	F	I	+	
Gerris sp.	Water Strider	F	/	+	
Total number of species:	**13**			**13**	**4**

***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