PROJECT NO.: TCS/00553/11

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

MONTHLY ENVIRONMENTAL MONITORING AND AUDIT REPORT FOR OPERATION PHASE– MARCH 2016

PREPARED FOR
KWAN LEE-KULY JOINT VENTURE

Quality Index

Date	Reference No.	Prepared By	Certified by
21 April 2016	TCS00553/11/600/R0483v2	 Ben Tam (Environmental Consultant)	 T.W. Tam (Environmental Team Leader)

Ver.	Date	Description
1	14 April 2016	First submission
2	21 April 2016	Amended according to the IEC's comment on 20 April 2016

RAMBOLL ENVIRON

Ref.: DSDSHUWNEM00_0_0726A.16.docx

21 April 2016

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 2016

Reference is made to Environment Team's submission of the Monthly Environmental Monitoring and Audit Report for March 2016 by Email on 21 April 2016 (entitled "DC/2009/22 & DC/2010/02 – Monthly EM&A Report for Operation Phase – March 2016").

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 faithfully,

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

Q:\Projects\DSDSHUWNEM00\Corr\Out\DSDSHUWNEM00_0_0726A.16.docx

Ramboll Environ Hong Kong Limited 英環香港有限公司
Room 2403, 24/F., Jubilee Centre, 18 Fenwick Street, Wanchai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
www.Ramboll-Environ.com

EXECUTIVE SUMMARY

ES.01. This is the Monthly Environmental Monitoring and Audit (EM&A) Report for DSD Contract No. DC/2010/02 (hereafter "Contract 2") for Drainage Improvement in Shuen Wan under Environmental Permit No.EP-303/2008, covering the Operation Phase period from **1 to 31 March 2016** (hereinafter 'the Reporting Period').

ES.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 construction works of Contract 1 was commenced in ***August 2010*** and the Operation Phase was commenced on ***4 December 2014*** and terminated on ***4 December 2015.*** For Contract 2, the construction works was commenced in ***May 2011*** and the Operation Phase was commenced on ***1 April 2015.***

ES.03. The duration of operation phase of Contract 2 shall be one year after the construction completed and the operation phase for Contract 2 was commenced on 1 April 2015 and terminated on 31 March 2016. During the operation phase, monitoring for hydrological characteristics, ecology and landscape and visual were carried out to fulfill the updated EM&A Manual (AEIAR-110/2007) and EP requirement. Therefore, this is the last Monthly EM&A Report for the Project.

ENVIRONMENTAL MONITORING AND AUDIT ACTIVITIES

ES.04. In the Reporting Period, environmental monitoring activities for the Operation Phase of the Project under the of EM&A programme are summarized in the following table.

Environmental Aspect	Monitoring Parameters / Inspection	Contract 2 Operation Phase
Water Quality	Hydrological characteristics measurement – H1, H2, H3 and H4	5 events
Ecological	Ecological Monitoring	0 event
Landscape & Visual	Inspection by a registered Landscape Architect	1 event

ES.05. Operation phase ecological monitoring for Contracts 2 should be undertaken on a quarterly basis. The 4th quarterly ecological monitoring under Contract 2 was carried out 29 January 2016 and no ecological monitoring was carried out in the Reporting Period.

ES.06. Operation phase Landscape and visual inspection of the Contract 2 should be undertaken on a quarterly basis and it was carried out on 26 March 2016.

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.

ENVIRONMENTAL COMPLAINT

ES.08. No written or verbal complaint was recorded in this Reporting Period.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

ES.09. No environmental summons or successful prosecutions were recorded in this Reporting Period.

REPORTING CHANGE

ES.10. In the Reporting Period, no reporting change was made.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

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 construction works of Contract 1 was commenced in ***August 2010*** and the Operation Phase was commenced in ***December 2014 and*** terminated on ***4 December 2015.*** For Contract 2, the construction works was commenced in ***May 2011*** and the Operation Phase was commenced in ***April 2015.*** The Project site boundary is shown in ***Appendix A***.

1.03 Action-United Environmental Services and Consulting (AUES) was appointed as the Environmental Team (ET) of Contracts 1 and 2 to implement the relevant EM&A programme of the Project.

1.04 This is the Monthly EM&A Report presenting the monitoring results for Operation Phase during the Reporting Period from **1** to **31 March 2016.**

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 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***.

SUMMARY OF ENVIRONMENTAL SUBMISSIONS

2.02 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 The EM&A requirements for the Operation Phases are according to the PP, EIAR, Environmental Permit EP-303/2008 (hereinafter 'the EP'), and the associated updated EM&A Manual and they are presented in below sub-section.

MONITORING PARAMETERS

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

Table 3-1 Summary of Monitoring Parameters for the Project

Environmental Aspect	Requirement / Parameter
Hydrological Characteristics Monitoring	• In-situ measurement including water flow and depth
(*) Ecological Monitoring and Audit	• 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

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. The monitoring location is summarized in ***Table 3-2*** and shown in ***Appendix C.***

Table 3-2 Monitoring Locations of Operation Phase

Aspect	Location ID	Address
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 OPERATION PHASE

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

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

3.05 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

3.06 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

Hydrological Characteristics

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

3.08 **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.

3.09 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 for Operation Phase

Equipment	Model
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

Hydrological Characteristics

3.10 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.

3.11 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

3.12 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

3.13 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

3.14 No performance criteria i.e. Action and Limit levels of hydrological is used for the Operation Phase. 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.

4.0 MONITORING RESULTS OF CONTRACT 2 FOR OPERATION PHASE

4.01 The operation phase monitoring schedule is presented in ***Appendix D***. The monitoring results are presented in the following sub-sections.

RESULTS OF HYDROLOGICAL CHARACTERISTICS MONITORING

4.02 In this Reporting Period, hydrological characteristics measurements were carried out on **2, 8, 16, 21 and 29 March 2016**. The detailed measurement results in this Reporting Period are presented in ***Tables 4-1*** and the graphical plot area shown in ***Appendix E.***

Table 4-1 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: 2 March 2016							
H1	12:00	Flood	5.5	0.43	2.3650	0.3	0.710
	17:11	Ebb	5.5	0.42	2.3100	0.2	0.462
H2	12:06	Flood	4.7	0.3	1.4100	0.2	0.282
	17:15	Ebb	4.7	0.29	1.3630	0.3	0.409
H3	12:13	Flood	7.45	0.26	1.9370	0.2	0.387
	17:21	Ebb	7.45	0.27	2.0115	0.2	0.402
H4	12:24	Flood	2.74	0.36	0.9864	0.3	0.296
	17:27	Ebb	2.74	0.36	0.9864	0.2	0.197
Date: 8 March 2016							
H1	16:45	Flood	5.5	0.46	2.5300	0.3	0.759
	1:10	Ebb	5.5	0.44	2.4200	0.3	0.726
H2	16:58	Flood	4.7	0.32	1.5040	0.2	0.301
	1:16	Ebb	4.7	0.31	1.4570	0.2	0.291
H3	17:06	Flood	7.45	0.27	2.0115	0.2	0.402
	1:27	Ebb	7.45	0.26	1.9370	0.2	0.387
H4	17:20	Flood	2.74	0.39	1.0686	0.2	0.214
	1:38	Ebb	2.74	0.38	1.0412	0.2	0.208
Date: 16 March 2016							
H1	12:17	Flood	5.5	0.44	2.4200	0.3	0.726
	16:58	Ebb	5.5	0.43	2.3650	0.2	0.473
H2	12:21	Flood	4.7	0.31	1.4570	0.2	0.291
	17:03	Ebb	4.7	0.3	1.4100	0.2	0.282
H3	12:25	Flood	7.45	0.26	1.9370	0.3	0.581
	17:26	Ebb	7.45	0.25	1.8625	0.3	0.559
H4	12:29	Flood	2.74	0.39	1.0686	0.2	0.214
	17:39	Ebb	2.74	0.37	1.0138	0.2	0.203
Date: 21 March 2016							
H1	16:12	Flood	5.5	0.44	2.4200	0.3	0.726
	11:37	Ebb	5.5	0.42	2.3100	0.2	0.462
H2	16:17	Flood	4.7	0.34	1.5980	0.3	0.479
	11:41	Ebb	4.7	0.3	1.4100	0.3	0.423
H3	16:21	Flood	7.45	0.25	1.8625	0.2	0.373
	11:47	Ebb	7.45	0.23	1.7135	0.2	0.343
H4	16:25	Flood	2.74	0.4	1.0960	0.2	0.219
	11:52	Ebb	2.74	0.38	1.0412	0.3	0.312
Date: 29 March 2016							
H1	10:32	Flood	5.5	0.46	2.5300	0.3	0.759
	16:15	Ebb	5.5	0.47	2.5850	0.3	0.776
H2	10:45	Flood	4.7	0.36	1.6920	0.2	0.338

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						
	16:22	Ebb	4.7	0.35	1.6450	0.3	0.494
H3	10:52	Flood	7.45	0.42	3.1290	0.2	0.626
	16:30	Ebb	7.45	0.43	3.2035	0.2	0.641
H4	11:02	Flood	2.74	0.31	0.8494	0.3	0.255
	16:42	Ebb	2.74	0.31	0.8494	0.3	0.255

4.03 Hydrological characteristics results of the all measurement points are summarized in ***Tables 4-2*** and ***4-3***.

Table 4-2 Summarized Hydrological Characteristics of Water Depth, m

Date	Mid-Flood				Mid-Ebb			
	H1	H2	H3	H4	H1	H2	H3	H4
2-Mar-16	0.43	0.30	0.26	0.36	0.42	0.29	0.27	0.36
8-Mar-16	0.46	0.32	0.27	0.39	0.44	0.31	0.26	0.38
16-Mar-16	0.44	0.31	0.26	0.39	0.43	0.30	0.25	0.37
21-Mar-16	0.44	0.34	0.25	0.40	0.42	0.30	0.23	0.38
29-Mar-16	0.46	0.36	0.42	0.31	0.47	0.35	0.43	0.31

Table 4-3 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
2-Mar-16	0.710	0.282	0.387	0.296	0.462	0.409	0.402	0.197
8-Mar-16	0.759	0.301	0.402	0.214	0.726	0.291	0.387	0.208
16-Mar-16	0.726	0.291	0.581	0.214	0.473	0.282	0.559	0.203
21-Mar-16	0.726	0.479	0.373	0.219	0.462	0.423	0.343	0.312
29-Mar-16	0.759	0.338	0.626	0.255	0.776	0.494	0.641	0.255

4.04 To compare the monitoring data between the Reporting Period and baseline monitoring period, the currently water depth and volumetric flow rate has insignificant change.

RESULTS OF ECOLOGICAL MONITORING

4.05 According to updated EM&A Manual, quarterly ecological monitoring shall be conducted and it is undertaken by the IEC – Ramboll 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.

4.06 The 4th quarterly ecological monitoring under Contract 2 was carried out 29 January 2016 and no ecological monitoring was carried out in the Reporting Period.

METEOROLOGICAL INFORMATION

4.07 The meteorological information during the measurement day of Operation Phase would be extracted from Tai Po and Shatin Stations of the Hong Kong Observatory (HKO). The meteorological data during the measurement days are presented in ***Table 4-4.***

Table 4-4 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
2-Mar-16	Wed	Mainly fine. Moderate easterly winds.	0	16.4	61	8.5	E/NE
8-Mar-16	Tue	Fresh northerly winds, occasionally strong offshore and on high ground at first.	0	19.3	92.2	5.2	E/NE
16-Mar-16	Wed	Moderate to fresh easterly winds	1.1	14.8	90	6.0	W/SE
21-Mar-16	Mon	Moderate to fresh easterly winds	59.6	17.4	92	9.4	E/NE
29-Mar-16	Tue	Light to moderate southeasterly winds.	Trace	16.6	59.5	6.4	E/NE

5.0 SITE INSPECTION

REGULAR SITE INSPECTION AND MONTHLY AUDIT

5.01 According to the Updated Environmental Monitoring and Audit Manual, regular site inspection to evaluate the project environmental performance is not required during operation phase.

LANDSCAPE AND VISUAL INSPECTION

5.02 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.

Operation Phase of Contract 2

5.03 The 4th quarterly Landscape & Visual inspection for Contract 2 which signed by the Registered Landscape Architect was undertaken on 26 March 2016.

5.04 The detail Quarterly Landscape and Visual Monitoring Report are presented in ***Appendix G***.

6.0 ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

ENVIRONMENTAL COMPLAINT, SUMMONS AND PROSECUTION

6.01 For the Project, no environmental complaint, summons and prosecution was received in this Reporting Period. The statistical summary table of environmental complaint for the **Contracts 1 and 2** is presented in ***Tables 6-1, 6-2*** and ***6-3***.

Table 6-1 Statistical Summary of Environmental Complaints

Reporting Period	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	1	1	Air Quality (1)
March 2016	0	1	Air Quality (1)

Table 6-2 Statistical Summary of Environmental Summons

Reporting Period	Environmental Summons Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	0	0	NA
March 2016	0	0	NA

Table 6-3 Statistical Summary of Environmental Prosecution

Reporting Period	Environmental Prosecution Statistics		
	Frequency	Cumulative	Complaint Nature
July 2011 –February 2015	0	0	NA
March 2016	0	0	NA

7.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

7.01 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 the dry season; and
- 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

8.0 CONCLUSIONS AND RECOMMENTATIONS

CONCLUSIONS

8.01 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 construction works of Contract 1 was commenced in ***August 2010*** and the Operation Phase was commenced on ***4 December 2014*** and terminated on ***4 December 2015.*** For Contract 2, the construction works was commenced in ***May 2011*** and the Operation Phase was commenced on ***1 April 2015.***

8.02 This is the Monthly Environmental Monitoring and Audit (EM&A) Report for DSD Contract No. DC/2010/02 (hereafter "Contract 2") for Drainage Improvement in Shuen Wan under Environmental Permit No.EP-303/2008, covering the Operation Phase period from **1 to 31 March 2016** (hereinafter 'the Reporting Period').

8.03 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.

8.04 Operation phase ecological monitoring for Contracts 2 should be undertaken on a quarterly basis. The 4th quarterly ecological monitoring under Contract 2 was carried out 29 January 2016 and no ecological monitoring was carried out in the Reporting Period.

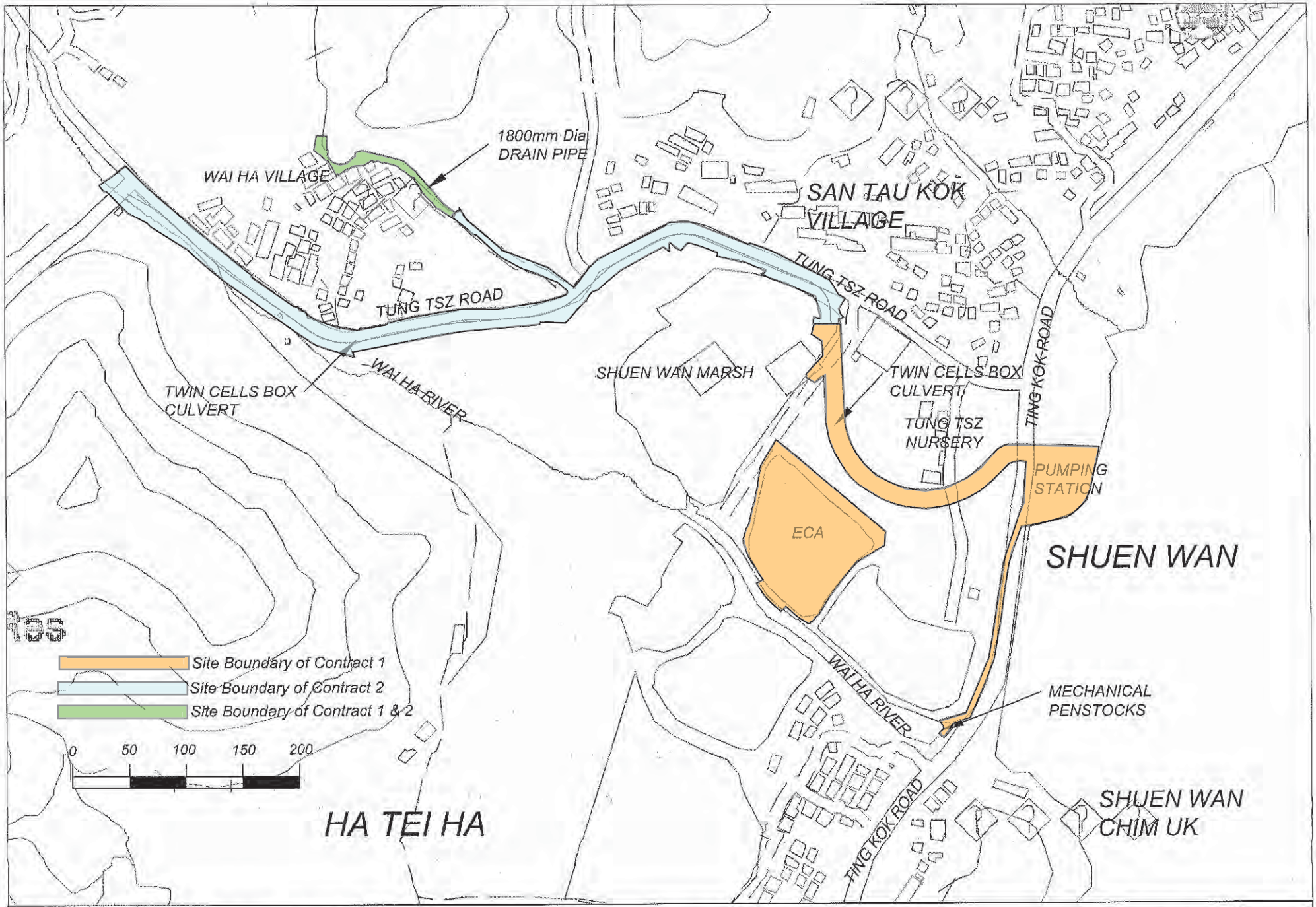
8.05 Operation phase Landscape and visual inspection of the Contract 2 should be undertaken on a quarterly basis and it was carried out on 26 March 2016.

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

8.07 The duration of operation phase of Contract 2 shall be one year after the construction completed and the operation phase for Contract 2 was commenced on 1 April 2015 and terminated on 31 March 2016. During the operation phase, monitoring for hydrological characteristics, ecology and landscape and visual were carried out to fulfill the updated EM&A Manual (AEIAR-110/2007) and EP requirement. Therefore, this is the last Monthly EM&A Report for the Project.

Appendix A

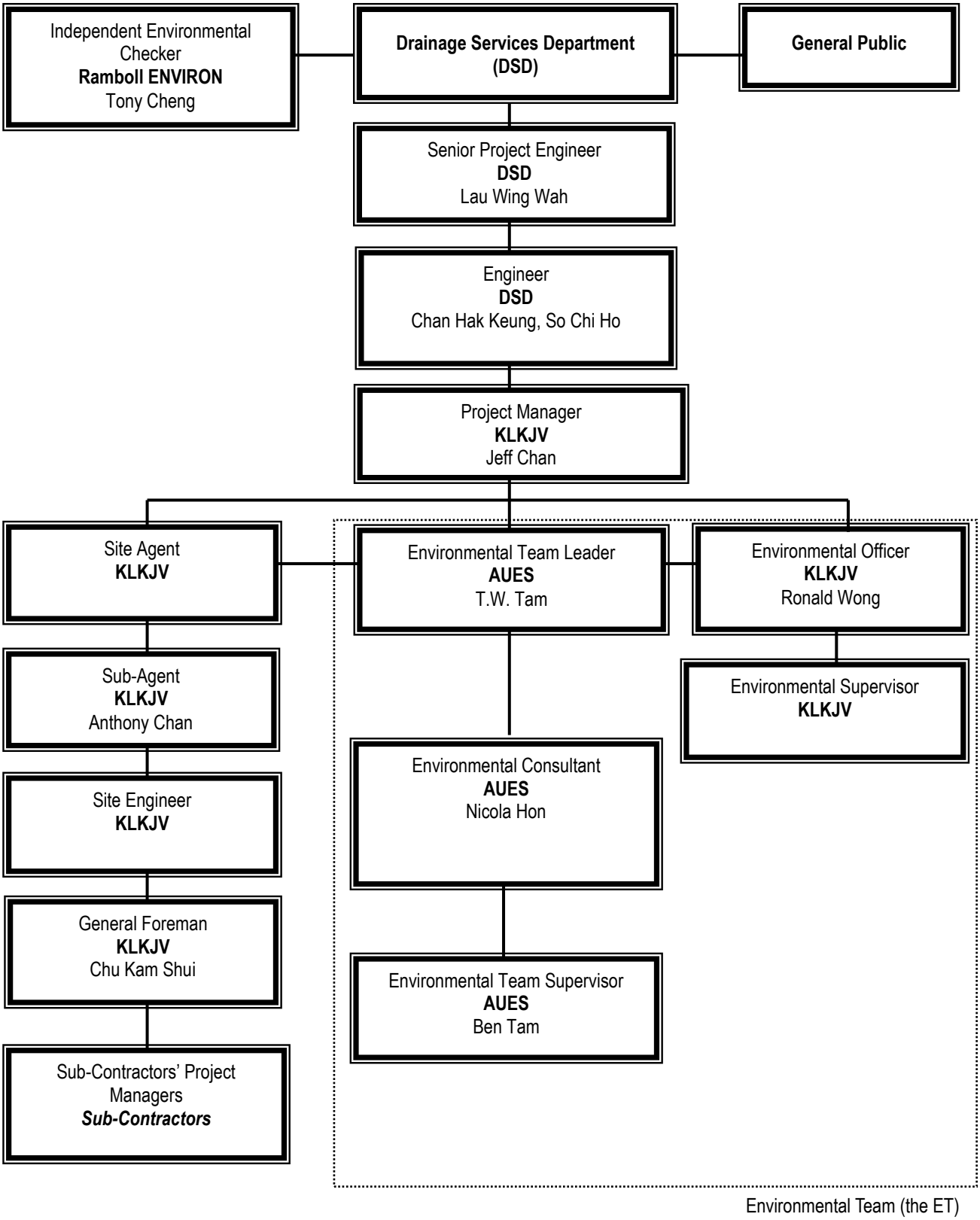
Project Location at Shuen Wan



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
Ramboll 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

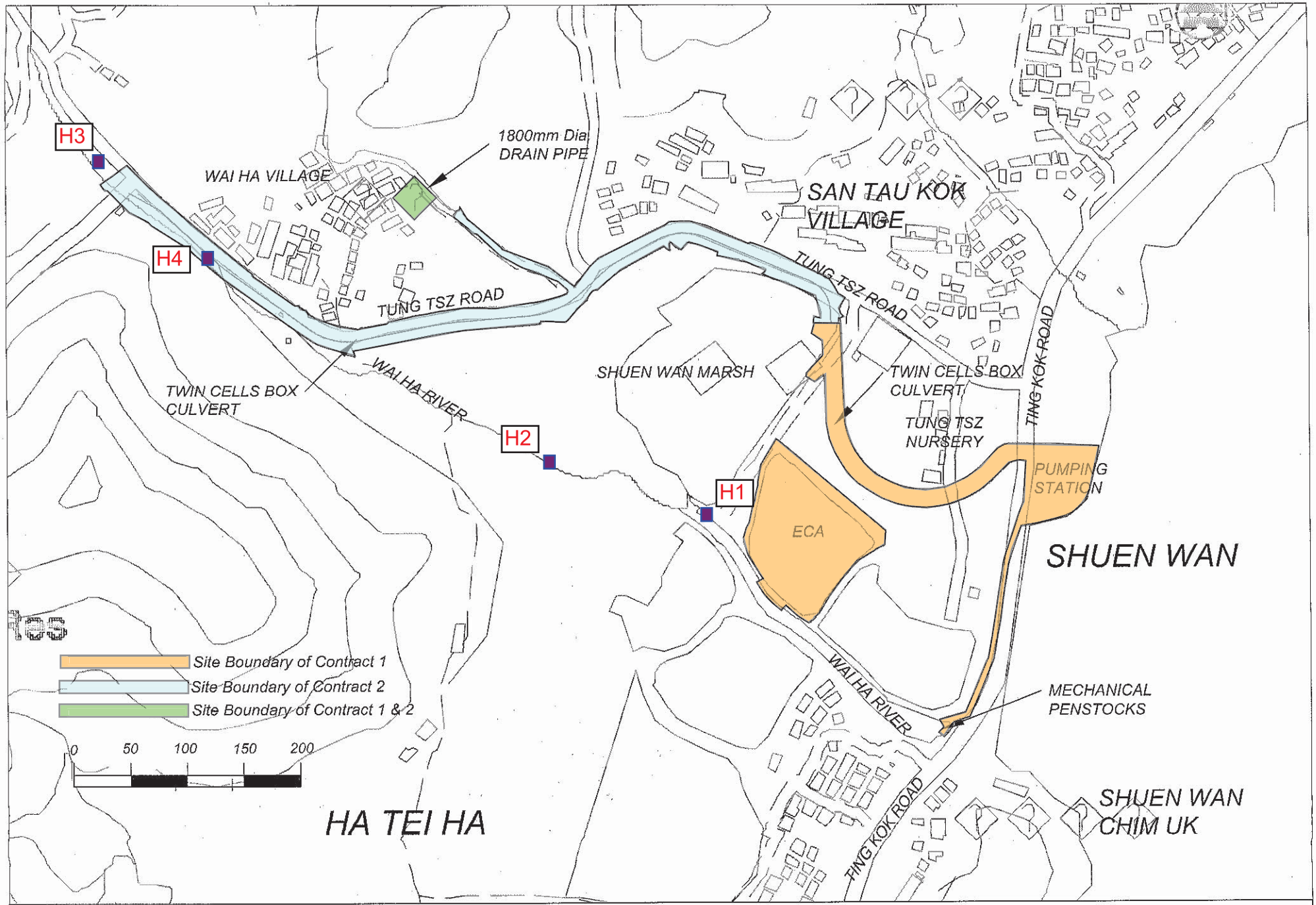
KLKJV (Main Contractor) – Kwan Lee-Kuly Joint Venture

RAMBOLL ENVIRON (IEC) – Ramboll Environ Hong Kong Limited

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

Appendix C

Operation Phase Environmental Monitoring Locations



All Environmental Monitoring Locations

Appendix D

Operation Phase Monitoring Schedule

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

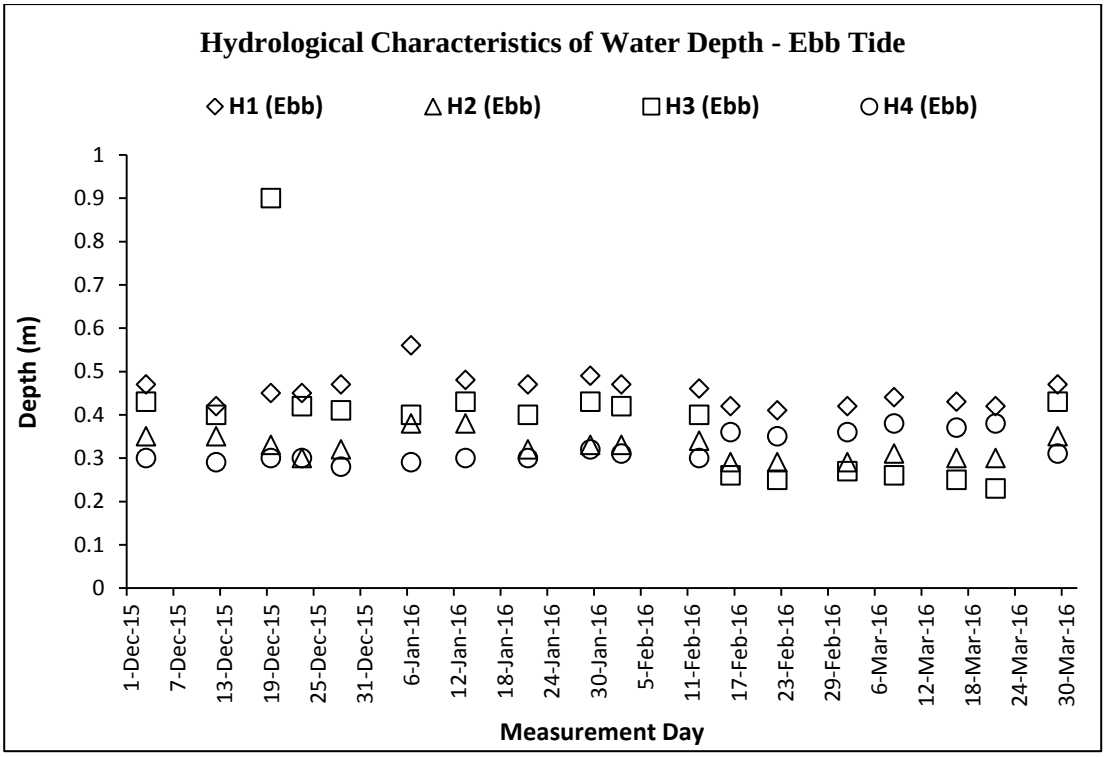
Operational Phase Commencement Date		Hydrological Monitoring											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 2	1-Apr-15	Once per week at mid-flood and mid-ebb tides											

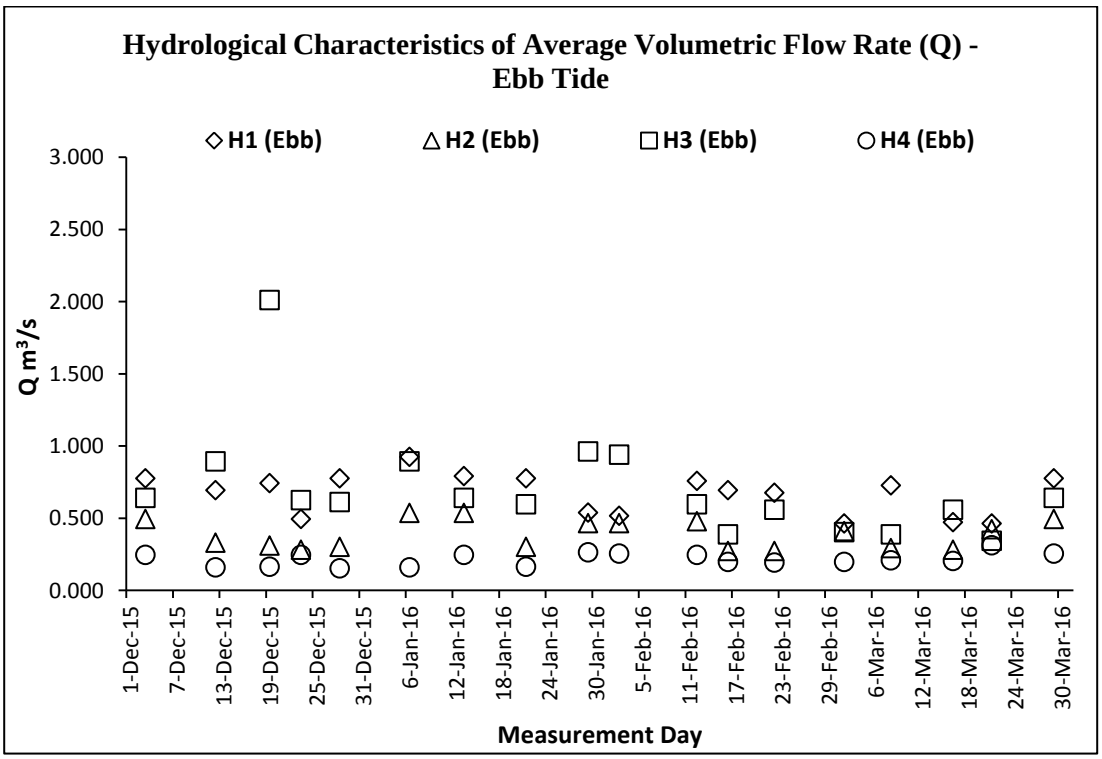
Operational Phase Commencement Date		Landscape & Visual Inspection											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 2	1-Apr-15		×				×			×			×

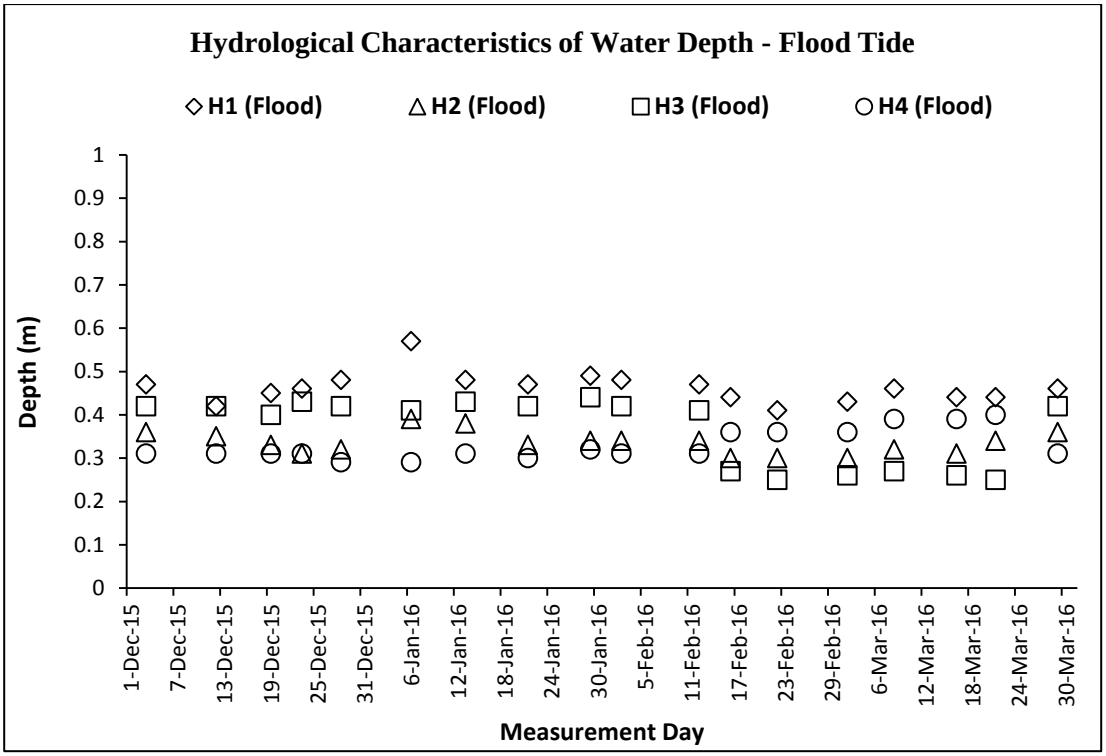
Operational Phase Commencement Date		Ecology Monitoring											
		Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Contract 2	1-Apr-15	×			×			×			×		

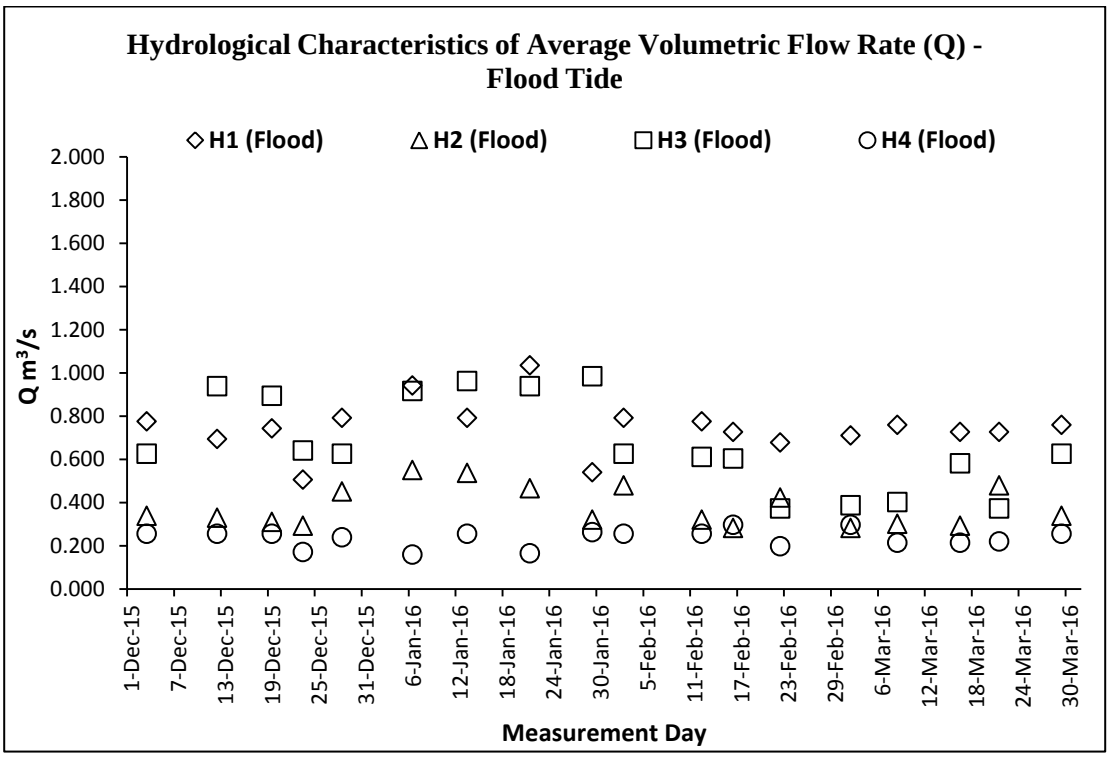
Appendix E

Graphical Plots of Hydrological Characteristics


Hydrological Characteristics of Water Depth - Ebb Tide
H1 (Ebb)
H2 (Ebb)
H3 (Ebb)
H4 (Ebb)
Depth (m)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1-Dec-15
7-Dec-15
13-Dec-15
19-Dec-15
25-Dec-15
31-Dec-15
6-Jan-16
12-Jan-16
18-Jan-16
24-Jan-16
30-Jan-16
5-Feb-16
11-Feb-16
17-Feb-16
23-Feb-16
29-Feb-16
6-Mar-16
12-Mar-16
18-Mar-16
24-Mar-16
30-Mar-16
Measurement Day


Hydrological Characteristics of Average Volumetric Flow Rate (Q) - Ebb Tide
H1 (Ebb)
H2 (Ebb)
H3 (Ebb)
H4 (Ebb)
Q m³/s
3.000
2.500
2.000
1.500
1.000
0.500
0.000
1-Dec-15
7-Dec-15
13-Dec-15
19-Dec-15
25-Dec-15
31-Dec-15
6-Jan-16
12-Jan-16
18-Jan-16
24-Jan-16
30-Jan-16
5-Feb-16
11-Feb-16
17-Feb-16
23-Feb-16
29-Feb-16
6-Mar-16
12-Mar-16
18-Mar-16
24-Mar-16
30-Mar-16
Measurement Day


Hydrological Characteristics of Water Depth - Flood Tide
H1 (Flood)
H2 (Flood)
H3 (Flood)
H4 (Flood)
Depth (m)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1-Dec-15
7-Dec-15
13-Dec-15
19-Dec-15
25-Dec-15
31-Dec-15
6-Jan-16
12-Jan-16
18-Jan-16
24-Jan-16
30-Jan-16
5-Feb-16
11-Feb-16
17-Feb-16
23-Feb-16
29-Feb-16
6-Mar-16
12-Mar-16
18-Mar-16
24-Mar-16
30-Mar-16
Measurement Day


Hydrological Characteristics of Average Volumetric Flow Rate (Q) - Flood Tide
H1 (Flood)
H2 (Flood)
H3 (Flood)
H4 (Flood)
Q m³/s
2.000
1.800
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
1-Dec-15
7-Dec-15
13-Dec-15
19-Dec-15
25-Dec-15
31-Dec-15
6-Jan-16
12-Jan-16
18-Jan-16
24-Jan-16
30-Jan-16
5-Feb-16
11-Feb-16
17-Feb-16
23-Feb-16
29-Feb-16
6-Mar-16
12-Mar-16
18-Mar-16
24-Mar-16
30-Mar-16
Measurement Day

Appendix F

Ecological Monitoring Report for Operation Phase

(Not Used)

Appendix G

Quarterly EM&A (Landscape & Visual) Report

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

Quarterly EM&A (Landscape & Visual) Report (March 2016)
(Issue 1)

Job Ref.: 09/317/161G KLKJV-SW
Date: April 2016

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

15 April 2016

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_20160415

Dear Shan,

Contract No. DC/2009/22 & DC/2010/02 -
Drainage Improvement in Shuen Wan, Tai Po
Quarterly EM&A (Landscape & Visual) Report - March 2016

Reference is made to the Quarterly EM&A (Landscape & Visual) Report for Contract 2 (4th) for the month of March 2016 (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

Quarterly EM&A (Landscape & Visual) Report (March 2016)

(Issue 1)

April 2016

	Name	Signature
Prepared by:	**Henry To**	
Reviewed by:	**Ida YU**	
Date:	**5th April 2016**	

Job Ref.: 09/317/161G 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 The construction work within Contracts 1 (Areas A, B and C) and 2 works areas were completed and formally agreed by EPD. The official commencement dates of the Operation Phase of Contracts 1 and 2 were 4th December 2014 and 1st April 2015 respectively. 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 Operation Phase in the works areas under Contract 2 of the Project. As the final quarterly monitoring for Contract 1 (DC/2009/22) works area was completed in December 2015 and the according Quarterly Monitoring Report was submitted in January 2016. No further quarterly monitoring for Contract 1 (DC/2010/02) works area was conducted in March 2016.

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 to check the effectiveness of the mitigations during the first year of the 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 This report documents the landscape and visual monitoring findings for the 4th and final quarterly monitoring for Contract 2 (DC/2010/02) works area during the first year of operation phase. The quarterly monitoring for Contract 2 was conducted on 26th March 2016. The final quarterly monitoring for Contract 1 (DC/2009/22) works areas was completed in December 2015 and the report was submitted in January 2016.

3.1.2 All photos stated for the quarterly monitoring for Contract 2 are recorded in **Appendices A**.

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

4.1.1 The final quarterly monitoring for Contract 1 (DC/2009/22) works area was completed in December 2015 and the according report was submitted in January 2016. No further quarterly monitoring for Contract 1 (DC/2010/02) works area was conducted in March 2016.

5 QUARTERLY LANDSCAPE & VISUAL MONITORING (OPERATION PHASE) FOR CONTRACT 2 (DC/2010/02)

5.1 Viewing Area Formation

5.1.1 This mitigation measure applies on the viewing area and the associated landscape planting lined along Ting Kok Road for having an open view to Plover Cove. The concerned viewing area and landscape planting area fall within the works area under Contract 1. This is not applicable to Contract 2 of the Project. The according monitoring for Contract 1 was completed in December 2015.

5.2 Architectural Design for Pump House

5.2.1 The pump house of the Project is located in Area A under Contract 1. This is not applicable to Contract 2 of the Project, and the according monitoring for Contract 1 was completed in December 2015.

5.3 Landscape Design for Pump House

5.3.1 The pump house of the Project is located in Area A under Contract 1. This is not applicable to Contract 2 of the Project, and the according monitoring for Contract 1 was completed in December 2015.

5.4 Enhancement Planting along Tung Tsz Road

Observation

5.4.1 A total of 207 tagged compensatory trees were planted under Contract 2, and the planting work and replacement of trees with poor condition were completed in the end of the construction phase. The health conditions of majority of these compensatory trees were in fair to marginally fair condition **(Photos 1-4)**, but with certain number of trees showing poor structural condition (such as decayed wood and peeled tree bark found along the trunks, and broken tree trunks, e.g. **Photo 5-8**) and trees with leaning or fallen tree trunks (**Photos 9-10**).

5.4.2 As reported in the previous quarterly report for the observation made in September 2015, four compensatory trees, including three *Hibiscus tiliaceus* (tree tag no. T111, T127 and T148) and one *Cleistocalyx operculatus* (tree tag no. T021) were missing, probably due to the previous tree failure under adverse weather. Moreover, five compensatory trees (T193-T196 and T201) located in areas opposite to San Tau Kok were found missing and they were located within the CLP's excavation works areas as observed in September 2015 **(Photo 11)**. No tree replacement for such tree loss was conducted by CLP as observed in March 2016.

5.4.3 As observed on 26th March 2016, almost all of the remaining compensatory trees had resprouted and regenerated new leaves after the heavy rains in late dry season **(Photos 12-14)**. However, a total of 58 trees were found missing/ removed, including the 8 missing trees reported in Section 5.4.2. Two additional compensatory trees, including one *Hibiscus tiliaceus* (tree tag no. T047) and one *Cinnamomum burmannii* (tree tag no. T147) were not found on-site, possibly removed by an unknown party due to their previous tree failure. In addition, one *Litsea glutionosa* (tree tag no. T058) was found with a broken trunk, possibly damaged by the nearby construction work or vehicle **(Photo 15)**. All the bamboo stakes used to support the compensatory trees were already removed. Information from the Main Contractor revealed that the areas planted with compensatory trees were formally handed over to the according Lands Department (LandsD) for long-term management, and the removal of dead trees/ trees

of poor condition and bamboo stakes were requested by LandsD. As confirmed by the Main Contractor, no tree replacement was required by the according LandsD. General site condition with the remaining compensatory trees along Tung Tsz Road is shown in **Photos 1-4**.

5.4.4 No shrub planting was proposed in the approved Landscape Plan, while hydroseeding was applied on the reinstated soil ground above the alignment of the box-culvert along Tung Tsz Road **(Photo 16)**, as well as the reinstated area above the drain pipe along the access path leading towards Treasure Spot Garden II **(Photo 17)**. Grass germination in these hydroseeded areas was in fair condition, and other native grass species have also naturally established in these areas. However, localised hydroseeded ground within the village areas was damaged by vehicles and the recent construction work by WSD in area opposite to Wai Ha **(Photo 18)**.

Recommendation

5.4.5 According to the information from DSD and the Contractor, the areas planted with compensatory trees along Tung Tsz Road were formally handed over to LandsD in the previous months. In principle, LandsD will be responsible for maintaining these vegetated areas and provide *ad hoc* tree maintenance if necessary. Since the areas were officially handed over, implementation of any tree maintenance and management practices within these areas should inform and discuss with the corresponding government department. As confirmed by the Main Contractor, no replacement of dead or compensatory trees of poor condition was required by LandsD after the handover. The removal of dead trees and trees of poor condition, bamboo stakes and weedy climbers observed in March 2016 was treated as the final vegetation maintenance work completed by the landscape contractor.

5.5 Soil Depth for Enhancement Planting

Observation

5.5.1 A box-culvert of approximately 1.0km long was constructed along Tung Tsz Road and passed through the underground of Tung Tsz Nursery and finally reach the newly built Shuen Wan Storewater Pumping Station **(Photo 19)**. According to the approved Landscape Plan of the Project, the ground above the box-culvert was backfilled with soil and hydroseeded **(Photos 16-17)**. No compensatory trees were designed to be planted on top of the box-culvert due to the potential maintenance concern by DSD. Compensatory trees were planted mainly to the south and northeast (for trees planted at San Tau Kok) of the box-culvert during the construction phase of Contract 2. Since only hydroseeding was applied on top of the box-culvert, the backfilled soil depth should be adequate for the germination and growth of the grass.

Recommendations

5.5.2 No specific recommendation is required for this mitigation measure.

5.6 Transplanting of Trees to Adjacent Locations

5.6.1 According to the approved Tree Felling Application Report and Landscape Plan of this Project, no existing tree was proposed to be transplanted under Contract 2. This monitoring item was not applicable to Contract 2 of the Project.

5.7 Preparation for Transplanting

5.7.1 As abovementioned, no transplantation of existing tree under Contract 2 was proposed in accordance with the approved Tree Felling Application Report and Landscape Plan of the Project. This monitoring item was not applicable to Contract 2 of the Project.

5.8 Reinstatement of affected area

Observation

5.8.1 The original access roads (Tung Tsz Road), access paths to the villages, low-lying wetland areas to the south of San Tau Kok, planting areas for compensatory trees and stream banks of Wai Ha River were reinstated **(Photos 17, 20-22)**. All these reinstatement works were completed by end of the construction phase and these reinstated areas have been used daily by the villagers and government department. These reinstated works have been handed over to the corresponding government departments in the previous months. The refuse collection chamber previously built in area opposite to Wai Ha was demolished as mentioned in the last quarterly report for December 2015 monitoring **(Photo 4)**. Information from the Main Contractor revealed that the local villagers and Food and Environmental Hygiene Department (FEHD) had requested to remove such chamber.

Recommendation

5.8.2 No specific recommendation is required for the reinstated areas.

6 AUDIT SCHEDULE

6.1.1 The current quarterly monitoring (March 2016) for Contract 2 is the final inspection. No further quarterly monitoring for Contract 1 and 2 will be required.

Appendix A
Photographs for Quarterly Monitoring (Operation Phase) for Contract 2 (DC/2010/02)

	
Photo 1 – Overall view of the compensatory trees planted opposite to San Tau Kok.	**Photo 2** – Overall view of the compensatory trees planted opposite to Wai Ha.
	
Photo 3 – Overall view of the compensatory trees planted opposite to Wai Ha.	**Photo 4** – Overall view of the compensatory trees planted opposite to Wai Ha area. Location of the previous newly built refuse collection chamber is indicated.
	
Photo 5 – Example of a compensatory tree with trunk full of wounds and decayed wood.	**Photo 6** – Example of a compensatory tree with trunk full of wounds and decayed wood.

	
Photo 7 – Compensatory tree with a broken tree trunk.	**Photo 8** – Compensatory tree with a broken tree trunk.
	
Photo 9 – An uprooted and fallen compensatory tree was noted.	**Photo 10** – A compensatory tree with leaning tree.
	
Photo 11 – Previous excavation work related to CLP Project was carried out at the locations where the five missing compensatory trees were planted. No tree replacement was noted.	**Photo 12** – New leaves have been developed on a compensatory tree of *Celtis sinensis*.

Photo 13 – New leaves have been developed on a compensatory tree of *Ficus virens*.

Photo 14 – Example of compensatory tree with improved health condition.

Photo 15 – The trunk of a compensatory tree of *Litsea glutinosa* (T058) was broken, possibly damaged by the parked vehicle or the nearby construction work.

Photo 16 –Hydroseeded ground and reinstated area above the box-culvert along Tung Tsz Road.

Photo 17 –Hydroseeded ground and reinstated area above the drain pipe along the access path leading towards Treasure Spot Garden II.

Photo 18 – A construction works area has been formed next to the planted compensatory trees in Wai Ha area.

	
Photo 19 – The box culvert and the associated drainage work were completed at the upper part of Wai Ha River.	**Photo 20** – The original access road, Tung Tsz Road, was reinstated.
	
Photo 21 –The low-lying wetland areas to the south of San Tau Kok was reinstated and naturally colonised by vegetation.	**Photo 22** – Both stream banks of the upper Wai Ha River have been vegetated naturally in the Operation Phase.