DRAINAGE SERVICES DEPARTMENT
CONTRACT NO. DC/2011/06

REPROVISIONING OF BOUNDARY PATROL ROAD AND ASSOCIATED SECURITY FACILITIES BETWEEN PING YUEN RIVER AND PAK FU SHAN AND DRAINAGE WORKS IN NORTH DISTRICT

EM&A REPORT FOR DRAINAGE WORKS UNDER EP-277/2007/A (FEBRUARY 2014)

PREPARED FOR
SANG HING CIVIL CONSTRUCTORS CO., LTD.

Quality Index

Date	Reference No.	Prepared By	Approval By
13 March 2014	TCS00599/12/600/R0210v2	 Ben Tam Environmental Consultant	 T. W. Tam Environmental Team Leader

Version	Date	Description
1	12 March 2014	First Submission
2	13 March 2014	Amended against the IEC's comment on 13 March 2014

ENVIRON

Ref.: DSDBPRNDEM00_0_0247L.14

14 March 2014

By Post and Fax (2959 6079)

Action-United Environmental Services & Consulting
Unit A, 20/F,
Gold King Industrial Building,
New Territories, Hong Kong

Attention: Mr. T.W. Tam

Dear Sir,

Re: Contract No. DC/2011/06
Reprovisioning of Boundary Patrol Road and Associated Security Facilities between Ping Yuen River and Pak Fu Shan and Drainage Works in North District
EM&A report for Drainage Works under EP-277/2007/A (February 2014)

Reference is made to the Environmental Team's submission of the captioned report (Version 2) dated 13 March 2014 received through E-mail on 13 March 2014 and sequence of revised pages on 13 March 2014 for our review and comment.

Please be informed that we have no adverse comment on the captioned submission. We write to verify the captioned submission in accordance with Condition 3.4 in the captioned Environmental Permit.

Thank you for your kind attention and please do not hesitate to contact the undersigned should you have any queries.

Yours sincerely,

Roger Leung
Independent Environmental Checker

c.c.	DSD	Mr. Eric Y.M. Cheng	by fax: 2827 8700
	SHCCCL	Mr. Raymond W.M. Yau	by fax: 2403 1162

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EXECUTIVE SUMMARY

BREACHES OF ENVIRONMENTAL QUALITY CRITERIA (ACTION/LIMIT LEVELS)

ES01 Monitoring results indicated no exceedance of Action/Limit Levels for air quality and construction noise during the Reporting Period. However, eleven water quality exceedances occurred at the downstream impact station Wx2. Consider the results exceedance is insignificant different and not due to the project works. However, two (2) NOEs were issued for two Limit Level exceedances on 10 February 2014.

COMPLAINTS LOG

ES02 No environmental complaint was registered in the Reporting Period. The complaint log is presented as follows:

Reporting Month	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
May 2012 to January 2014	0	0	NA
February 2014	0	0	NA

NOTIFICATIONS OF SUMMONS AND SUCCESSFUL PROSECUTIONS

ES03 No notifications of summons and successful prosecutions were registered during the Reporting Period.

REPORTING CHANGES

ES04 No reporting changes were made during the Reporting Period.

FUTURE KEY ISSUES

ES05 Construction dust, noise and water quality continue to be the key environmental issues for construction of the Works during the coming Reporting Period.

ES06 As predicted in the EIA Report (Register No. in the EP: AEIAR-108/2007), with full implementation of the recommended environmental protection measures, adverse environmental impacts generated from future construction activities under the Works can be eliminated to acceptable levels.

ES07 Since dry and wind season has been come, so air quality mitigation measures should be special attention to implementation, in particular construction dust suppression measures during dusty construction activities under dry and windy conditions.

ES08 In addition, water quality mitigation measures is reminded during rainy days to eliminate adverse water quality impacts generated from surfaces runoff of haul roads, stock pile of excavated materials, etc.

ES09 Construction noise mitigation measures should also be implemented during noisy construction activities.

RECOMMENDATION

ES10 Temporary noise barrier should be modified in compliance with the Environment Permit and contract specific requirement.

ES11 If the stream channel section is commenced construction work, general ecology audit should be conducting in accordance with the EM&A Manual Sections 6.3.9 and 6.3.10.

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LIST OF ANNEXES

1 ENVIRONMENTAL IMPLEMENTATION STATUS

1.01 This is the eighteenth monthly EM&A report (hereinafter "this Report") for Drainage Works under EP-277/2007/A for the period from ***1*** to ***28 February 2014*** (hereinafter "the Reporting Period").

1.02 Location plan for the works under the Contract is shown in ***Annex A***, whereas environmental management organization and communication lines, including contacts of key personnel under the Contract are shown in ***Annex B***.

1.03 Status of environmental licenses and permit is summarized in the following ***Table 1-1***.

Table 1-1 Status of Environmental Licenses and Permit

Permit Type	Licenses / Permit No.	Date of Issuance by EPD	Expiry Date	Concerned Location	Status
Environmental Permit	EP-277/2007	09 July 2007	N.A	Man Uk Pin	EP-277/2007/A to supersede EP-277/2007
	EP-277/2007/A	01 December 2009			
Notification pursuant to Section 3(1) of the Air Pollution Control Ordinance (APCO) (Construction Dust) Regulation	N.A.	N.A.	N.A.	Contract Area (Lin Ma Hang, Man Uk Pin, Ma Wat Wai and Ping Yuen River)	Valid
Account for Disposal of Construction Waste	7015003	07 May 2012	N.A.	Contract Area (Lin Ma Hang, Man Uk Pin, Ma Wat Wai and Ping Yuen River)	Valid
Application for Wastewater Discharge License under Water Pollution Control Ordinance (WPCO)	W5/11363/1	29 August 2012	31 Aug 2017	Man Uk Pin	Valid
Register as a Chemical Waste Producer under Waste Disposal Ordinance	5123-642-S3565-03	3 October 2012	N.A	Contract Area (Lin Ma Hang, Man Uk Pin, Ma Wat Wai and Ping Yuen River)	Valid

1.04 Construction program of the Works with fine tuning of construction activities showing the interrelationship with environmental protection/mitigation measures is presented in Implementation Schedule for the recommended mitigation measures attached in ***Annex C*** of this Report whereas updated 3-Month Construction Program of the Works is shown in ***Annex D***.

1.05 Implementation Status for the recommended mitigation measures are presented in the monthly site inspection checklists which are endorsed by related parties including representatives of the ER, IEC, Contractor, EO and ET.

2 CONSTRUCTION AND EM&A ACTIVITIES

CONSTRUCTION ACTIVITIES

2.01 The *Three-Month Rolling Program* was enclosed in ***Annex D***. Major construction activities of Mau Uk Pin undertaken in this reporting period are included:

- Establishment of Transplanted Tree T1107
- Plugging the abandoned watermain by WSD
- Liaise with lot owner for the access
- Construction of Gabion Block at the upstream
- Construction of Box Culvert
- Installation of temporary noise barrier

ENVIRONMENTAL MITIGATION MEASURES

2.02 Environmental mitigation measures to minimize potential environmental impacts arising from the construction of the Contract have been recommended and summarized in ***Annex C***. Those related to the construction activities for the up-coming construction period are summarized in ***Table 7-2*** *Environmental Mitigation Measures for the Coming Month* in ***Section 7*** of this Report.

EM&A ACTIVITIES

Baseline Monitoring and Environmental Quality Criteria

2.03 The baseline monitoring for air quality, construction noise and water quality has been carried out since 17 September 2008, whereas that for ecology has been performed since 16 September 2008 in close accordance with the requirements of the EM&A Manual.

2.04 It is agreed amongst the Engineer, IEC, Contractor and ET that the established environmental quality criteria i.e. Action/Limit Levels (hereinafter "the A/L Levels") for air quality, construction noise and water quality as shown in ***Tables 2-7*** and ***Tables 2-8*** respectively are to be used in the EM&A for air quality, construction noise and water quality under Drainage Works under EP-277/2007/A.

Environmental Monitoring

2.05 The environmental monitoring during the Reporting Period was conducted in accordance with the environmental monitoring schedule submitted to relevant parties upon agreement with the IEC and ER prior to implementation. They are presented in ***Annex E***.

3 SUMMARY OF REQUIREMENTS FOR CONSTRUCTION IMPACT MONITORING

3.01 The requirements for EM&A for Drainage Works under EP-277/2007/A are detailed in *Methodology for Environmental Monitoring and Audit under the Contract* (hereinafter "the Methodology", which has been verified by the IEC on 27 July 2012 and submitted to EPD for approval subsequently. They are summarized as follows.

MONITORING PARAMETERS

3.02 The monitoring parameters required for the Works during construction phase are summarized in ***Table 3-1***.

Table 3-1 Summary of Monitoring Parameters

Environmental Aspect	Parameters
Air Quality	• Hour Total Suspended Particulate (hereinafter '1-Hr TSP'); and • 24-Hour Total Suspended Particulate (hereinafter '24-Hr TSP').
Construction Noise	• A-weighted equivalent continuous sound pressure level (30min) (hereinafter 'Leq(30min)' during the normal working hours; and • A-weighted equivalent continuous sound pressure level (5min) (hereinafter 'Leq(5min)' for construction work during the restricted hours.
Water Quality	• In Situ Measurement – temperature, Dissolved Oxygen, Dissolved Oxygen Saturation, pH value, Water Depth, Temperature & Turbidity • Laboratory Analysis – Suspended Solids (hereinafter 'SS'),
Ecology (MUP05)	• The stream conditions monitoring (in-situ measurements of DO, pH and turbidity; laboratory testing of SS); and • General site audit on ecological mitigation measures implement.

MONITORING LOCATIONS

Designated Locations in the EM&A Manual

3.03 Monitoring locations for EM&A under EP-277/2007/A have been identified in the EM&A Manual. They are shown in ***Annex F***. According to the EM&A Manual and agreement among the Engineer, IEC, Contractor and ET, the environmental monitoring stations closest to the construction site are to be adopted for the EM&A under the Contract. As sensitive receiver MUP05-2 is the closest location to the Works site, it will most likely be impacted by the construction under the Works. The sensitive receiver MUP05-1 is therefore adopted as environmental monitoring locations for air quality namely MUP-A1 and construction noise namely MUP-N1.

3.04 During the construction period of Works, no ecology monitoring is required in accordance with EM&A Manual. However, general site audit should be undertaken for ecological mitigation measures implement.

3.05 ***Table 3-2*** summarizes all the monitoring locations under the Works.

Table 3-2 Monitoring Locations

Issue	Channel	Sensitive Receiver	Location ID	Detailed Address
Air	MUP05	MUP05-2	MUP-A1	Village house at Man Uk Pin
Noise	MUP05	MUP05-2	MUP-N1	Same village house at Man Uk Pin as MUP-A1 above

Additional Monitoring Locations

3.06 In order to monitor the potential construction impacts more effectively, additional environmental monitoring for construction noise and water quality has been recommended by the Engineer and IEC. They are summarized in ***Table 3-3*** and shown in ***Annex F***.

Table 3-3 Summary of Additional Environmental Monitoring Locations

Issue	Channel	Sensitive Receiver	Location ID	Monitoring Time
Construction Noise	MUP05	MUP05-2	MUP-Nx (Village house)	The whole construction period
Water Quality	MUP05	-	MUP-Wx1 (Up-Stream Control Station)	The whole construction period
		-	MUP-Wx2 (Impact Monitoring Station)	Before connection of stream diversion
		-	MUP-Wx3 (Impact Monitoring Station)	After connection of stream diversion

3.07 The additional monitoring has been commenced since August 2012 upon the IEC's verification of the Methodology.

MONITORING FREQUENCY

3.08 The impact monitoring should be conducted during the construction period to ensure the environmental conditions comply with the environmental quality criteria i.e. A/L Levels. The impact monitoring frequency as stipulated in the EM&A Manual is summarized below.

Air Quality

Parameters: 24-Hour TSP and 1-Hour TSP.
Frequency: Once every 6 days for 24-Hour TSP & three times every 6 days for 1-Hour TSP.
Duration: During the course of construction works

Construction Noise

Parameters: Leq(30 min) in six consecutive Leq(5 min) measurements
Frequency: Once a week during 0700-1900 on normal weekdays
Duration: During the course of construction works

Water Quality

Parameters: Duplicate in-situ measurements of water depth, temperature, DO, pH & turbidity; and laboratory testing of SS. Relevant data will also be measured time of sampling, DO Saturation, weather conditions and special phenomena.
Depths: All measurements will be carried out at three water depths, namely, 1 m below water surface, mid-water depth, and 1 m above river bed. If the water depth is less than 6 m, the mid-depth measurement will be omitted. If the depth is less than 3 m, only the mid-depth measurement will be taken.
Frequency: 3 times a week with an interval of at least 36 hours between two consecutive sampling days
Duration: During the construction period of the channel works

MONITORING EQUIPMENT

3.09 The monitoring equipment for air quality, construction noise, stream water quality and ecology are summarized below.

Air Quality

3.10 Air quality monitoring equipment is listed in the following ***Table 3-4***.

Table 3-4 Air Quality Monitoring Equipment

Equipment	Model
24-Hour TSP	
High Volume Air Sampler (herein after 'HVS')	Grasby Anderson GMWS 2310 HVS
Calibration Kit	TISCH Model TE-5025A
1-Hour TSP	
Portable Dust Meter	AM510; Dust Trak Model 8520

Construction Noise

3.11 Construction noise monitoring equipment is listed in ***Table 3-5***.

Table 3-5 Construction Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	B&K Type 2238
Calibrator	B&K Type 4231
Portable Wind Speed Indicator	Testo Anemometer

Water Quality

3.12 Monitoring equipment for water quality is listed in ***Table 3-6***.

Table 3-6 Water Quality Monitoring Equipment

Equipment	Model / Description
In-situ Measurement	
Water Depth Detector	Eagle Sonar or steel ruler
Water Sampler	Teflon bailer / bucket
Thermometer & DO meter	YSI Multimeter
pH meter	Extech pH EC 500
Turbidimeter	Hach 2100p
Sample Container and Storage	High density polythene bottles (provided by laboratory) and 'Willow' 33-liter plastic cool box
Laboratory Analysis	
Suspended Solids	HOKLAS accredited Laboratory

EQUIPMENT CALIBRATION

3.13 The calibrations certificate of all monitoring equipment are used during the impact monitoring program are attached in ***Annex G*** and the calibration requirement are described in below:

Air Quality

3.14 The calibration of the HVS is performed at a bimonthly interval in accordance with the manufacturer's instruction using the NIST-certified standard calibrator (Tisch Calibration Kit Model No.TE-5025A). The calibration data are properly documented and the associated records are maintained by the ET for future reference.

3.15 The 1-Hour TSP meter is calibrated at a year intervals in accordance with the in-house method. Zero response of the equipment is checked before and after each monitoring event.

Noise

3.16 The sound level meters are calibrated using an acoustic calibrator prior to and after spot checking measurements. The meters are calibrated annually by HOKLAS accredited laboratory. Prior to and following each noise measurement, the accuracy of the sound level meter is checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements are considered valid only if the calibration levels before and after the noise measurement agree to within 1.0 dB.

Water Quality

3.17 Once every three months, the in-situ monitoring instruments are calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme.

MONITORING PROCEDURE

3.18 The monitoring methodology and procedure during the impact monitoring are presented as below:

Air Quality

1-Hour TSP

3.19 Operation of the 1-Hour TSP meter is follow manufacturer's Operation and Service Manual. The 1-Hour TSP monitor, a TSI Dust Track Aerosol Monitor Model 8520, or Sibata LD-3 Laser Dust Meter is a portable, battery-operated laser photometer. The 1-Hour TSP meter provides a real time 1-Hour TSP measurement based on 90^0 light scattering. The 1-Hour TSP monitor consists of the following:

1) A pump to draw sample aerosol through the optic chamber where TSP is measured;
2) A sheath air system to isolate the aerosol in the chamber to keep the optics clean for maximum reliability; and
3) A built-in data logger compatible with Windows based program to facilitate data collection, analysis and reporting.

3.20 The 1-Hour TSP meter using was within the valid period, calibrated by the manufacturer prior to purchasing. Zero response of the instrument was checked before and after each monitoring event.

24 –hour TSP

3.21 The equipment used for 24-Hour TSP measurement is the HVS brand named Thermo Andersen, Model GS2310 TSP high volume air sampling system, which complied with EPA Code of Federal Regulation, Annex B to Part 50. The HVS consists of the following:

1) An anodized aluminum shelter;
2) A 8"x10" stainless steel filter holder;
3) A blower motor assembly;
4) A continuous flow/pressure recorder;
5) A motor speed-voltage control/elapsed time indicator;
6) A 6-day mechanical timer, and
7) A power supply of 220v/50 Hz

3.22 The HVS is calibrated prior the impact monitoring to following the manufacturer's instruction using the NIST-certified standard calibrator brand named Tisch Calibration Kit Model TE-5028A. Regular HVS operation and maintenance as well as filter paper installation and collection was performed by the ET's competent technicians, whereas laboratory analyses were conducted in a local HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd (hereinafter 'ALS'). The analyzed 24-Hour TSP filters were kept in ALS for six months prior to disposal.

Meteorological Information

3.23 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper is recorded in detail.

3.24 Meteorological information is sourced from the Hong Kong Observatory (Ta Kwu Ling Station). The data included wind direction, wind speed, humidity, rainfall, air pressure and temperature etc that in general is required for evaluating the air quality for air quality monitoring.

Construction Noise

3.25 Sound level meters listed above comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications, as recommended in Technical Memorandum

BE issued under the Noise Control Ordinance (NCO).

3.26 All noise measurements are performed with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (Leq). Leq(30min) measurements are used as the monitoring parameter for the time period throughout the construction phase.

3.27 The sound level meter is set higher than 1.2m above the existing ground. The microphone is pointed to the site with the microphone facing perpendicular to the line of sight. The windshield is fitted for all measurements. As the measurement point at impact locations is set close to the exterior of the building, i.e. no free field noise measurement is performed; free field correction will not be made for monitoring results.

3.28 Immediately prior to and following each noise measurement the accuracy of the sound level meter is checked using an acoustic calibrator generating a known sound pressure level at a known frequency (94 dB). Measurements are accepted as valid due to the calibration levels from before and after the noise measurement agree to within 1.0 dB.

Water Quality

3.29 Water quality monitoring is conducted at the middle of the water columns (Mid-Depth) due to water columns at all sampling locations are less than 3.0 meters during monitoring.

Water Depth

3.30 Water depths are determined prior to measurement and sampling. A steel ruler with a suitable weight was dropped to the bottom of the water column to measure the water depth which is actually well below 1 meter.

Dissolved Oxygen (DO)

3.31 A portable Extech Instrument, ExStikR DO600 DO Meter 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.

3.32 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 is recorded.

pH

3.33 A portable Extech Instrument, ExStikTM Models pH EC 500 or a Hanna HI98107 pH Meter 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.

Turbidity

3.34 A portable Hach 2100p turbidity Meter is used for in-situ turbidity measurement. The turbidity meter is capable of measuring turbidity in the range of 0 – 1000 NTU.

Suspended Solids (SS)

3.35 SS is determined by ALS using HOKLAS accredited analytical methods namely ALS Method EA-025. The Limit of Reporting (hereinafter "LOR") is 2 mg/L.

Water Sampler

3.36 Water samples are collected by the ET using a plastic sampler to avoid metal contamination. Due to water depth for both sampling locations are lesser than 0.5 m, a cleaned plastic beaker is used for sample collection.

3.37 The sampler is rinsed with the sample before collection with the sample to be taken. 1,000mL water sample is collected from depth for laboratory analyses.

Sample Container

3.38 Water samples are contained in screw-cap PE (Poly-Ethylene) bottles as provided by ALS. The PE bottles are pretreated by laboratory in accordance with the corresponding analytical requirements of HOKLAS. Where appropriate, the sampling bottles are rinsed with the water to be contained. Water sample is transferred from the sampler to the sample bottles to 95% bottle capacity to allow possible volume expansion during delivery and storage.

Sample Storage and delivery

3.39 A 'Willow' 33-liter plastic cool box packed with ice is used to preserve the collected water samples prior to arrival at the laboratory. The temperature of the cool box is maintained as close to 4^0C as possible without being frozen. Samples are delivered to the laboratory end of sampling day or following day within the maximum storage time requirement.

Chemical Analysis

3.40 ALS Technichem (HK) Pty Ltd (HOKLAS No. 66) is appointed by ET to provide analytical services for this project. The analysis of suspended solids is carried out to follow the APHA Standard Methods for the Examination of Water and Wastewater 19ed 2540D. The sample preparation and analysis under the QA/QC control is follow the HOKLAS QA/QC requirements and undertaken by the laboratory.

ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

3.41 Baseline monitoring for air quality and construction noise was carried out during 17 September to 13 October 2008 in close accordance with the requirements stipulated in the EM&A Manual. The A/L Levels of MUP-A1 and MUP-N1 will be adopted for EM&A for air quality and construction noise respectively. They are summarized in ***Table 3-7*** and ***Table 3-8*** respectively.

Table 3-7 Action and Limit Levels for Air Quality

Monitoring Station	Action Level (μg /m^3)		Limit Level (μg/m^3)	
	1-Hour TSP	24-Hour TSP	1-Hour TSP	24-Hour TSP
MUP-A1	307	156	500	260

Table 3-8 Action and Limit Levels for Construction Noise (dB(A))

Time Period	Action Level	Limit Level
0700-1900 hours on normal weekdays	When one documented complaint is received	75* dB(A)

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

3.42 Environmental quality criteria for additional water quality monitoring are proposed in ***Table 3-9*** as follows:

Table 3-9 Action and Limit Levels for Additional Water Quality Monitoring

Action Level	Limit Level
120% of the corresponding Levels of Up-Stream Control Station	130% of the corresponding Levels of Up-Stream Control Station

EVENT AND ACTION PLAN

3.43 Event Action Plan for air quality, construction noise and water quality as stipulated in ***Annex H*** will be triggered in cases of exceedances of A/L Levels.

DATA MANAGEMENT AND QUALITY CONTROL

3.44 The impact monitoring data is handled by the ET's systematic data recording and management, which complies with an in-house certified (ISO 9001:2000) Quality Management System. Standard Field Data Sheets (FDS) are used in the EM&A program.

3.45 The monitoring data recorded in the equipment e.g. 1-Hour TSP meters and noise meters are downloaded directly 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.

3.46 For monitoring activities which require laboratory analysis, the responsible laboratory, ALS, follows the QA/QC requirements as set out under their HOKLAS scheme for all laboratory testing.

4 ENVIRONMENTAL MONITORING RESULTS

AIR QUALITY

4.01 As agreed among the Engineer, IEC, Contractor and ET, the construction noise monitoring is performed at MUP-A1 of Channel MUP05.

Monitoring Results

4.02 The air quality monitoring results of 24-Hour and 1-Hour TSP during the Reporting Period are summarized in ***Table 4-1***. Detailed 24-Hour TSP monitoring data and the graphic plots of both 24-Hour and 1-Hour TSP are shown in ***Annex I***.

Table 4-1 Air Quality (1-Hour & 24-Hr TSP) Monitoring Results at MUP-A1 (MUP05)

Date	24-Hour TSP Monitoring Results, μg/m³	Date	Start Time	1-Hour TSP Monitoring Results, μg/m³		
				1st	2nd	3rd
4-Feb-14	#	4-Feb-14	13:15	131	111	102
8-Feb-14	#	10-Feb-14	10:09	129	155	141
14-Feb-14	97	15-Feb-14	13:00	174	197	141
20-Feb-14	71	21-Feb-14	13:30	76	82	86
26-Feb-14	61	27-Feb-14	12:00	102	115	92
Average (Range)	**77 (61-97)**	**Average (Range)**		**122 (76 – 197)**		
A/L Levels	**156 / 260**	**A/L Levels**		**307 / 500**		

Remark: (#) – Power failure of HVS

Discussions

4.03 As shown in ***Table 4-1***, no exceedances of A/L Levels were recorded for 1-Hour TSP and 24-Hour TSP during the Reporting Period.

4.04 In this Reporting Period, 2 events of power failure of high volume sampler were occurred during 24-hour TSP monitoring on 4 February and 8 February2014. The incident has been reported to relevant parties and the provision of power supply was rectified by the Contractor on 14 February 2014. Since the monitoring was resumed as scheduling on 14 February and 20 February 2014, there were no making up of lost samples. To avoid re-occurrence of power failure, the Contractor has been reminded to pay more attention on the power issue and ensure stable power source for the HVS.

4.05 Neither Notice of Exceedance (hereinafter "NOE") nor the associated remedial actions were required for air quality during the Reporting Period.

Recommendation

4.06 Since dry and wind season has been come, so air quality mitigation measures should be special attention to implementation, in particular construction dust suppression measures during dusty construction activities under dry and windy conditions.

CONSTRUCTION NOISE

4.07 As agreed among the Engineer, IEC, Contractor and ET, the construction noise monitoring is performed at MUP-N1 of Channel MUP05 as recommended in the EM&A Manual.

4.08 Additional construction noise monitoring has also been commenced since August 2012 at MUP-Nx upon verification of the Methodology by the IEC prior to implementation.

4.09 As the measurement point is set close to the exterior of the building at MUP-N1, no free field correction of +3 dB(A) will be made for monitoring results of MUP-N1.

4.10 On the other hand, the measurement point is NOT set close to the exterior of the building at MUP-Nx, free field correction of +3 dB(A) is made for monitoring results of MUP-Nx.

Monitoring Results

4.11 Construction noise monitoring results are summarized in ***Table 4-2*** and ***Table 4-3*** below and graphic plots of the monitoring results are shown in ***Annex I***.

Table 4-2 Construction Noise Monitoring Results at MUP-N1 (MUP05)

Date	Start Time	1st Leq5	2nd Leq5	3rd Leq5	4th Leq5	5th Leq5	6th Leq5	Leq30 (dB(A))
4-Feb-14	13:20	64.3	61.7	59.1	59.0	57.6	56.2	61
10-Feb-14	11:14	68.8	66.3	64.0	64.2	62.0	62.8	65
15-Feb-14	17:20	49.2	49.8	60.3	50.0	49.4	51.5	54
21-Feb-14	16:00	59.6	61.3	63.0	62.2	59.1	61.4	61
27-Feb-14	16:55	57.5	56.4	57.7	56.2	55.7	52.9	56
Average (Range)		**60 (54 – 65)**						

Table 4-3 Construction Noise Monitoring Results at MUP-Nx (MUP05)

Date	Start Time	1st Leq5	2nd Leq5	3rd Leq5	4th Leq5	5th Leq5	6th Leq5	Leq30 (dB(A))	Corrected Leq30 (dB(A))
4-Feb-14	13:00	57.9	56.0	54.9	61.7	62.5	59.2	60	63
10-Feb-14	10:22	61.1	67.4	72.0	61.6	61.1	62.3	67	70
15-Feb-14	17:30	61.5	59.9	58.2	59.7	57.2	59.2	59	62
21-Feb-14	15:47	56.0	52.3	57.4	57.2	59.3	57.3	57	60
27-Feb-14	17:00	58.9	60.1	57.3	56.7	54.2	60.9	59	62
Average (Range)		**63 (60 – 70)**							

Discussions

4.12 During the Reporting Period, no environmental complaint against construction noise was registered, indicating no Action Level exceedance was documented. In addition, no exceedance of construction noise Limit Level of 75 dB(A) were recorded. Neither NOE nor the associated remedial actions were required for construction noise during the Reporting Period.

Recommendation

4.13 Attention is drawn to construction noise mitigation measures during noisy construction activities.

WATER QUALITY

4.14 No environmental monitoring is recommended in the EM&A Manual during construction of the Works.

4.15 However, additional water quality monitoring at MUP-Wx1 (Up-Stream Control Station) and MUP-Wx2 (Impact Monitoring Station) is recommended by the Engineer and IEC to commence from August 2012 upon verification of the Methodology prior to implementation.

Monitoring Results

4.16 Water quality monitoring results are summarized in ***Table 4-4*** below and graphically presented in ***Annex I***.

Table 4-4 Water Quality Monitoring Results at Wx1 and Wx2 (MUP05)*

Date	Monitoring Parameter							
	DO, mg/L		Turbidity, NTU		pH, pH Value		SS, mg/L	
	Wx1	Wx2	Wx1	Wx2	Wx1	Wx2	Wx1	Wx2
4-Feb-14	7.0	4.0	2.9	3.6 (*)	7.6	7.3	10.5	3.0
6-Feb-14	7.1	4.5	7.7	6.5	8.1	8.0	10.0	3.0
8-Feb-14	6.3	4.0	7.4	8.7	7.4	7.5	9.0	5.5
10-Feb-14	6.3	5.4	6.9	24.8 (#)	6.8	6.6	13.0	79.0 (#)
12-Feb-14	7.8	4.4	21.0	9.6	7.9	7.8	5.0	5.5 (*)
15-Feb-14	6.6	4.1	14.0	10.1	8.0	7.6	14.5	9.0
17-Feb-14	7.9	4.6	4.7	5.6 (*)	7.4	7.2	5.5	5.5
19-Feb-14	8.6	7.9	5.0	6.0 (*)	7.9	7.6	2.0	3.0 (#)
21-Feb-14	8.4	4.7	3.7	4.2	7.6	7.4	5.0	6.0 (*)
25-Feb-14	7.2	4.3	6.0	6.6 (*)	7.4	7.4	5.0	6.0 (*)
27-Feb-14	6.5	4.7	5.0	5.5 (*)	7.5	7.2	3.5	3.5
**Note:*	*Wx1- up-stream control station ; Wx2 – Impact monitoring station*							

Remarks:
(*) *Action Level Exceedance*
(#) *Limit Level Exceedance*

Discussion

4.17 As shown in Table 4-4, water result of Turbidity and Suspended Solids higher than 120% (Action Level exceedance) and 130% (Limit Level exceedance) of the corresponding Up-Stream Control Station were respectively found on 4 February 2014, 10 February 2014, 12 February 2014, 17 February 2014, 19 February 2014, 21 February 2014, 25 February 2014 and 27 February 2014. Consider both exceedance days of the results (***2.9mg/L (Wx1):3.6mg/L (Wx2), 5.0mg/L (Wx1):5.5mg/L (Wx2), 4.7mg/L (Wx1):5.6mg/L (Wx2), 5.0mg/L (Wx1):6.0mg/L (Wx2)***, ***2.0mg/L (Wx1):3.0mg/L (Wx2), 5.0mg/L (Wx1):6.0mg/L (Wx2), 6.0mg/L (Wx1):6.6mg/L (Wx2), 5.0mg/L (Wx1):6.0mg/L (Wx2) and 5.0mg/L (Wx1):5.5mg/L (Wx2)***), with insignificant difference about 1.5mg/L different. Therefore, no NOE was issued and the associated remedial action was required for water quality monitoring. Furthermore, in total of eight (8) water quality exceedances on Action Level and three (3) water quality exceedances on Limit Level occurred at the downstream impact station Wx2 during the reporting period.

4.18 However, two (2) Limit Level exceedances including parameters turbidity and SS were recorded at MUP05 on 10 February 2014. The Notification on Exceedances (NOEs) was issued to all relevant parties upon the results confirmed. The investigation for the cause of exceedance was completed and the result is presented as follow:

- According to the exceedance site investigation and information as provided by Contractor, there was no construction activity conducted on 10 February 2014.
- For water mitigation measures, the Contractor has provided rock bund to prevent surface runoff to the river.
- Furthermore, for the turbidity and SS exceedances recorded at Wx2 on 10 February 2014, it is noted that exceedance was recorded after a rainy day on 9 February 2014. The natural soil runoff thought the surrounding at Wx2 cause turbidity and SS exceeded.

4.19 Based on above investigation and consider that the exceedance should not be due to the Project works.

Recommendation

4.20 Due to rainy season is approaching, muddy water and other water quality pollutants via site surface water runoff get into public areas should be avoided. Mitigation measures for water quality should be properly implemented to avoid adverse water quality impacts on the receiving water bodies.

METEOROLOGICAL DATA

4.21 Meteorological information downloaded from the Hong Kong Observatory Ta Kwu Ling Weather Station was summarized in ***Annex J*** and used in the EM&A of the Works as appropriate. In addition, no noise impacts monitoring were conducted during raining period.

CONCLUSIONS

4.22 Although five monitoring days of SS and six monitoring day of Turbidity were found to exceed Action or Limit Levels. As considered the exceedance are insignificant, so it can be said that no exceedance. Furthermore, the results of air quality and construction noise monitoring indicated no exceedance of environmental quality criteria during the Reporting Period. The associated remedial actions therefore were not required for air quality, construction noise and water quality.

4.23 Nevertheless, fully implementation of the required environmental protection measures are reminded, in particular construction dust suppression measures during dusty construction activities under dry and windy conditions and water quality protection measures during wet season.

5 WASTE MANAGEMENT

5.01 Waste management is routinely carried out by the on-site Environmental Officer or Environmental Supervisor.

5.02 The quantity of waste for disposal or reuse is summarized in *Monthly Summary of Waste Flow Table* in ***Annex K***.

5.03 To ensure satisfactory performance of the waste management, the Contractor is reminded to comply with all relevant regulatory requirements, including those stipulated in the effluent discharge licenses and chemical waste producer registration, as well as the EM&A Manual, etc.

5.04 Where possible, construction materials should be reused on-site as far as practicable to reduce the construction waste, which should then be sorted or classified on site for proper recycling and disposal as recommended in the Environmental Management Plan and the associated Waste Management Plan.

6 SITE INSPECTION AND AUDIT

GENERAL ENVIRONMENTAL SITE INSPECTION

6.01 According to the EM&A Manual, the environmental site inspection should be formulated by the ET Leader and regularly conducted jointly by the representatives of the ET, Contractor, ER and IEC. During the Reporting Period, a total of ***Four*** (**4**) occasions of the site inspection were conducted on 6, 11, 20 and 27 February 2014.

6.02 No non-compliance with the relevant regulatory requirements was identified. Observations of the regular site inspection and environmental audit during the Reporting Period are summarized in ***Table 6-1***.

Table 6-1 Observations of Site Inspection during the Reporting Period

Date	Findings / Deficiencies	Follow-Up Status
6 February 2014	No adverse environmental impacts were observed during the site inspection. However, full implementation of the required environmental mitigation measures is reminded, in particular dust suppression measure during dusty construction activities under dry and windy conditions. Furthermore, temporary noise barrier should be modified in compliance with the Environment Permit and contract specific requirement. Addition, mosquito control should be performed to prevent mosquito breeding on site.	Not required for general reminders.
11 February 2014		
20 February 2014		
27 February 2014		

6.03 Site inspection checklists completed and endorsed by all related parties on the date of site inspection have been kept by the ET and are available for inspection upon request.

ECOLOGY AUDIT

6.04 According to the related EM&A Manual ***Section 6.3.9***, ecology audit should be required to carry out during work at natural stream at MUP05. Although, construction activities work has been nearly the designated stream channel, ecology audit is not yet to commence. The Contractor is being to consider and arrange the work requirements.

7 ENVIRONMENTAL COMPLAINT, SUMMONS AND PROSECUTION

7.01 No environmental complaint was received during the Reporting Period. Summary of environmental complaint is presented in ***Table 7-1*** below.

Table 7-1 Summary of Environmental Complaints

Reporting Month	Environmental Complaint Statistics		
	Frequency	Cumulative	Complaint Nature
May 2012 to February 2014	0	0	NA
February 2014	0	0	NA

7.02 No summons and prosecution was received during the Reporting Period. Summary of summon and prosecution is presented in ***Table 7-2*** and ***Table 7-3*** below.

Table 7-2 Summary of Environmental Summons

Reporting Month	Environmental Summons Statistics		
	Frequency	Cumulative	Nature
May 2012 to February 2014	0	0	NA
February 2014	0	0	NA

Table 7-3 Summary of Environmental Prosecutions

Reporting Month	Environmental Prosecution Statistics		
	Frequency	Cumulative	Nature
May 2012 to February 2014	0	0	NA
February 2014	0	0	NA

8 IMPACT FORECAST

TENTATIVE CONSTRUCTION ACTIVITIES IN FEBRUARY 2014

8.01 The construction activities would be undertaken at Man Uk Pin in the coming month is listed below:

- Pruning and establishment of Transplanted Tree T1107
- Construction of box culvert and transition
- Construction of gabion channel
- Installation of temporary noise barrier

KEY ENVIRONMENTAL ISSUES

8.02 Key environmental issues to be considered in the up-coming month are summarized in ***Table 8-1*** below:

Table 8-1 Key Environmental Issues for the Up-Coming Month

Item	Environmental Issue	Description
(a)	Air Quality	Construction activities under the Contract may have the potential of generating adverse construction dust impacts during dusty construction activities under dry and windy conditions.
(b)	Water Quality	Ssurface runoff during heavy storm/rain may pollute the surrounding water bodies with suspended solids or turbidity, and concrete washing may change the alkalinity or acidity or pH value of the water bodies;
(c)	Chemical Waste	Potential adverse water quality impacts and soil contamination may be generated from chemicals used or chemical waste generated during construction of the Contract, e.g., organic solvents, cleaning solutions, waste batteries, oil & grease spillage or leakage from construction equipment and the associated oil containers within site areas;
(d)	Construction Noise	Construction noise impacts may be caused by noisy construction activities;

ENVIRONMENTAL MITIGATION MEASURES FOR THE COMING MONTH

8.03 Environmental mitigation measures for construction of the Contract have been compiled in ***Annex C***. Attention is drawn to implementation of the environmental mitigation measures for construction activities in the up-coming month as summarized in ***Table 8-2*** below:

Table 8-2 Environmental Mitigation Measures for the Up-Coming Month

Item	Environmental Issue	Description
(a)	Air Quality	Dust suppression measures, in particular proper watering during dusty construction activities under dry and dusty conditions, should be fully implemented;
(b)	Water Quality	Sedimentation or silt removal facilities of adequate capacity should be used, for proper treatment of any site effluent generated from stockpiles of construction materials/waste or dusty haul roads or excavated surfaces within the site during storm rain, prior to discharge to nearby water bodies in order to remove suspended solids or turbidity;
(c)	Chemical Waste	Proper handling and storage of chemical wastes should be maintained;
(d)	Construction Noise	Implementation of the construction noise mitigation measures during noisy construction works
(e)	Other	Follow-up actions for any defects identified during regular site inspection should be promptly taken to rectify the situation.

9 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

9.01 Monitoring results indicated that no exceedances of A/L Levels for air quality and construction noise during the Reporting Period. However, eleven water quality exceedances occurred at the downstream impact station Wx2. Consider the results exceedance is insignificant different and not due to the project works. Therefore, no associated remedial action was required for water quality monitoring.

9.02 However, two (2) Limit Level exceedances including parameters turbidity and SS were recorded at MUP05 on 10 February 2014. Based on above investigation and consider that the exceedance should not be due to the Project works.

9.03 No environmental complaints, notification of summons or successful prosecution were registered during the Reporting Period.

9.04 No non-compliance with regulatory requirements was found during the site inspection and environmental audit of the Reporting Period, including the regular joint site inspection by the ER, IEC, ET and Contractor. Defects of minor environmental significance were sometimes observed during the site inspection, they were normally rectified in-situ or within the specified time prior to the next site inspection.

RECOMMENDATIONS

9.05 The Contractor is reminded to fully comply with all relevant regulatory environmental requirements, including environmental mitigation measures stipulated in the EM&A Manual.

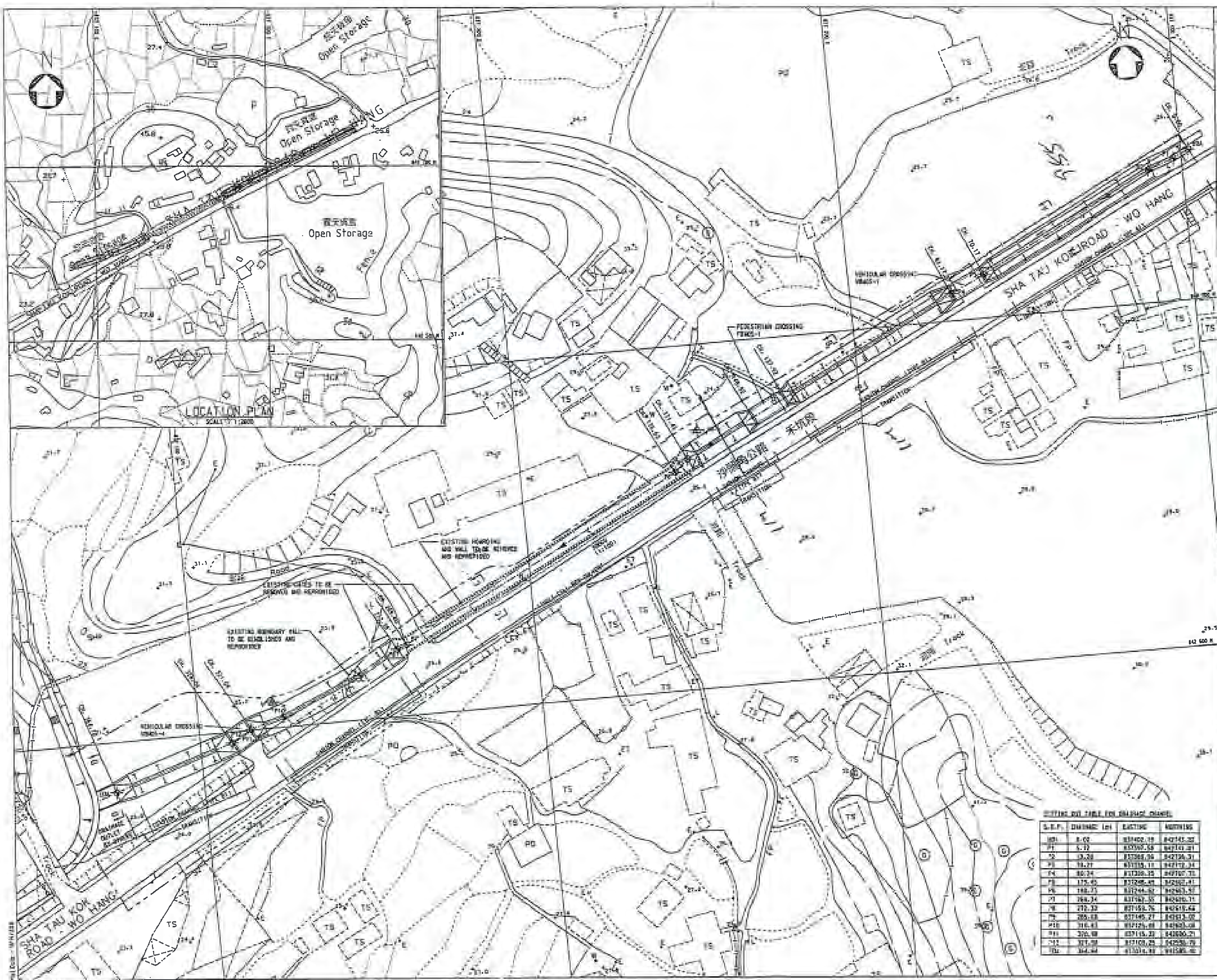
9.06 Since dry and wind season has been come, so air quality mitigation measures should be special attention to implementation, in particular construction dust suppression measures during dusty construction activities under dry and windy conditions.

9.07 In addition, water quality mitigation measures is reminded during rainy days to eliminate adverse water quality impacts generated from surfaces runoff of haul roads, stock pile of excavated materials, etc.

9.08 Moreover, attention is drawn to implementation of the construction noise mitigation measures during noisy construction works. The temporary noise barrier should be modified in compliance with the Environment Permit and contract specific requirement.

Annex A

Location Plan for the Works under EP-277/2007/A



NOTES:

1. ALL LEVELS ARE IN METERS ABOVE PRINCIPAL DATUM OF HONG KONG.
2. GRIDLINES ARE HONG KONG METRIC GRID(1980).
3. DIMENSIONS AND CHAINAGES ARE IN METERS, UNLESS OTHERWISE STATED.
4. THE CHAINAGE FOR THE CHANNELS ARE INDICATIVE ONLY. THE EXACT CHAINAGE MAY BE CHANGED ACCORDING TO THE SITE CONDITION.
5. THE EXACT LOCATION FOR THE REPROVISION OF WALLS, HOARDING AND GATES TO BE AGREED WITH THE ENGINEER ON SITE.
6. FLOOD WARNING SIGN REFER TO DSD STANDARD DRAWING NO. DS1012.
7. EXACT LOCATIONS OF FLOOD WARNING SIGN SHALL BE AGREED WITH THE ENGINEER ON SITE.

LEGEND:

	WORKS LIMIT
	SETTING OUT POINT (S.D.P.) FOR CHANNEL
BOA	BEGINNING OF ALIGNMENT
EOA	END OF ALIGNMENT
300CU (1:100)	U-CHANNEL WITH CONCRETE COVER (W THE DIRECTION OF FLOW AND SIZE SPECIFIED GRADIENT OF FALL SPECIFIED)
	PROPOSED MANHOLE
	PROPOSED FLOOD WARNING SIGN

SETTING OUT TABLE FOR DRAINAGE CHANNEL

S.O.P.	CHAINAGE (m)	EASTING	NORTHING
BOA	0.00	837402.19	842143.32
P1	5.12	837397.58	842141.01
P2	13.28	837388.36	842136.31
P3	18.21	837385.11	842132.34
P4	80.34	837330.35	842107.71
P5	175.45	837246.45	842062.41
P6	188.73	837244.62	842063.47
P7	266.34	837167.55	842026.71
P8	272.32	837159.76	842019.64
P9	285.60	837149.27	842013.02
P10	316.63	837125.40	842003.08
P11	326.58	837115.33	842000.21
P12	337.58	837105.25	841996.79
EOA	364.94	[illegible]	[illegible]

FOR TENDER PURPOSES ONLY

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
initial	WLC	CDM	SS	CDM	
date	10/11	10/11	10/11	10/11	

Approved

Contract No.
DC/2011/06

Contract Title
REPROVISIONING OF BOUNDARY PATROL ROAD AND ASSOCIATED SECURITY FACILITIES BETWEEN PING YUEN RIVER AND PAK FU SHAN AND DRAINAGE WORKS IN NORTH DISTRICT

Drawing Title
GENERAL LAYOUT PLAN FOR DRAINAGE CHANNEL MUP05

Drawing No.
DDP/DC1106/41011

Scale
1:500 A1
1:1000 A3

香港特別行政區政府渠務署
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

ANNEX B

ENVIRONMENTAL MANAGEMENT ORGANIZATION AND COMMUNICATION LINES

Contact Details of Key Personnel

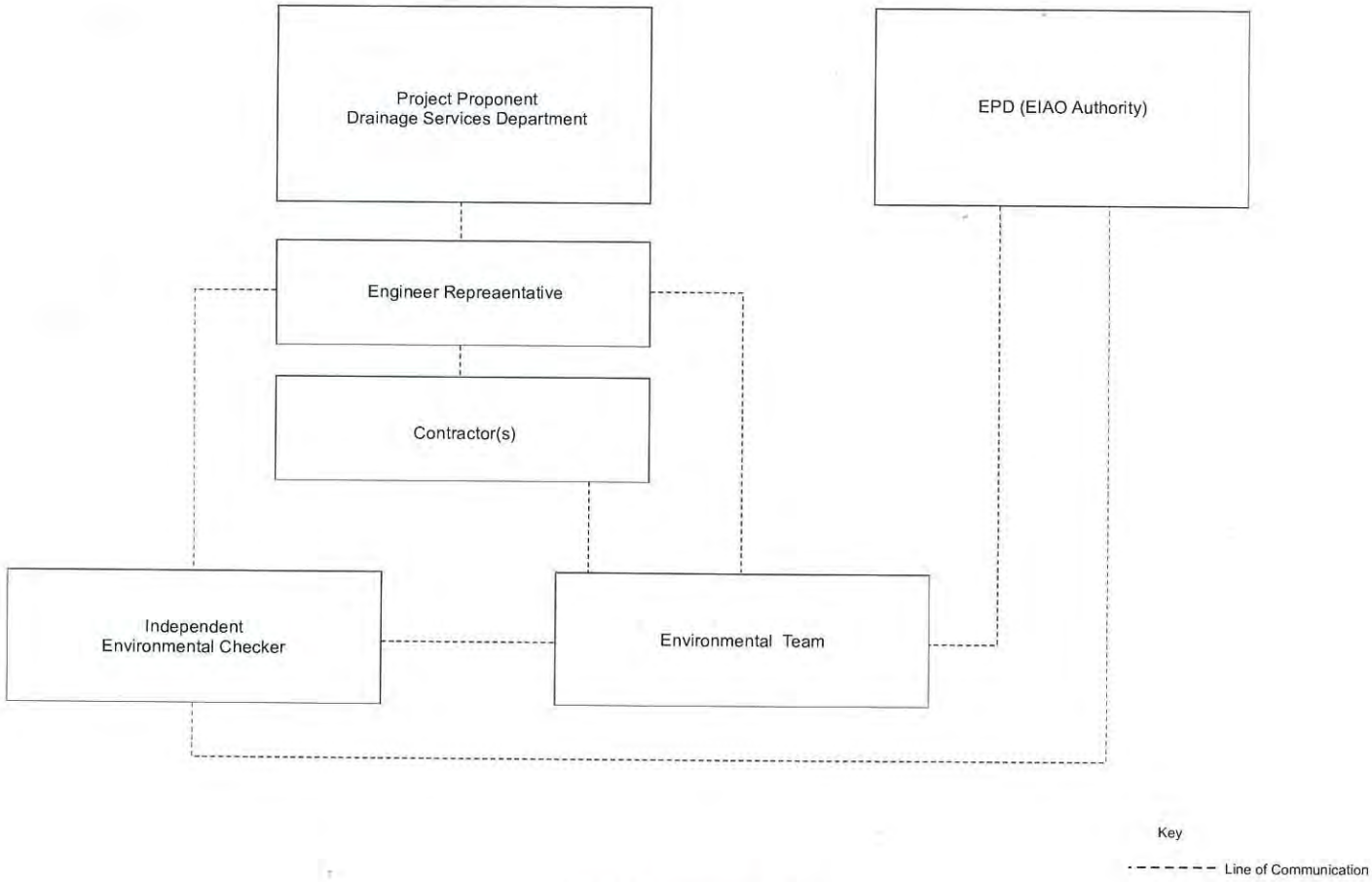
Organization	Project Role	Name of Key Staff	Tel No.	Fax No.
DSD	Project Proponent / Employer	Mr. Eric Y. M. Cheng	2594 7341	2827 8700
Environ	Independent Environmental Checker	Mr. Roger W. K. Leung	3465 2888	3465 2899
CHCC	Project Manager	Mr. Raymond Yau	2403 1165	2403 1165
SHCC	Site Agent	Mr. Elvin Lam	2640 9286	2640 9286
AUES	Environmental Team Leader	Mr. T. W. Tam	2959 6059	2959 6079
AUES	Environmental Consultant	Miss Nicola Hon	2959 6059	2959 6079
AUES	Environmental Team Supervisor	Mr. Ben Tam	2959 6059	2959 6079

24-Hour Hotline Telephone Number for the Public to Make Enquiries

24-Hour Hotline: 6770 3827
Contact Person: Mr. Mocha Mok

Legends:

DSD (Project Proponent / Engineer) – Drainage Services Department
SHCC (Main Contractor) –Sang Hing Civil Constructors Co., Ltd
Environ (IEC) – Environ Hong Kong Limited
AUES (ET) – Action-United Environmental Services & Consulting



EM&A Organisation Chart

ANNEX C

IMPLEMENTATION SCHEDULE FOR ENVIRONMENTAL MITIGATION MEASURES

APPENDIX A
IMPLEMENTATION SCHEDULE OF THE PROPOSED MITIGATION MEASURES

Table A1 Implementation Schedule of Air Quality Mitigation Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Air Quality - Construction Phase									
3.6.1	2.9.2	*Construction Dust* In order to comply with Air Pollution Control Ordinance (APCO), the Contractor should undertake at all times measures to prevent dust nuisance as a results of his activities. The Contractors are required to follow all the requirements for dust control stipulated in the Air Pollution Control (Construction Dust) Regulation. Dust suppression measures should be installed as part of good construction practice, and they should be incorporated in the Contract Specification and implemented to minimize dust nuisance to within acceptable levels arising from the works. The followings are examples of the dust suppression measures. (i) The area in which excavation takes place shall be sprayed with water immediately prior to, during and immediately after the excavation to minimise dust generation. (ii) The Contractor shall frequently clean and water the site to minimize fugitive dust emissions.	To prevent dust nuisance on ASRs during construction	All works site / during construction	Construction Contractor		√		Air Pollution Control Ordinance Air Pollution Control (Construction Dust) Regulation

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		(iii) Effective water sprays shall be used during the delivery and handling of aggregate, and other similar materials, when dust is likely to be created and to dampen all stored materials during dry and windy weather. (iv) Watering of exposed surfaces shall be conducted at least 2 times per day especially during dry and windy weather. (v) Areas within the site where there is a regular movement of vehicles must be regularly watered as often as necessary for effective suppression of dust or as often as directed by the Engineer. (vi) Where dusty material are being discharged to vehicle from a conveying system at a fixed transfer point, a three-sided roofed enclosure with a flexible curtain across the entry shall be provided. Exhaust fans shall be provided for this enclosure and vented to a suitable fabric filter system. (vii) The Contractor shall restrict all motorised vehicles within the site, excluding those on public roads, to a maximum speed of 15 km per hour and confine haulage and delivery vehicles to designated roadways inside the site. (viii) Wheel washing facilities shall be installed and used by all vehicles leaving the site. No earth, mud, debris, dust and the like shall be deposited on public roads. Water in the wheel cleaning							

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		facility shall be changed at frequent intervals and sediments shall be removed regularly. The Contractor shall submit details of proposals for the wheel cleaning facility. Such wheel washing facilities shall be usable prior to any earthworks excavating activity on the site. The Contractor shall also provide a hard-surfaced road between any washing facility and the public road. (ix) All vehicle exhausts should be directly vertically upwards or directed away from the ground. (x) Any materials dropped on paved roads will need to be cleaned up immediately to prevent dust nuisance.							
3.6.2	2.9.3	*Odour* In the event that excavated materials are found to be odourous, the following measures should be implemented by the Contractor. (i) Place odorous excavated material as far away (say, at least 20m) from air sensitive receivers as possible. (ii) Temporary stockpiles of odorous excavated material should be properly covered with tarpaulin and should be removed off-site as soon as practically possible within 24 hours to	To prevent odour nuisance on ASRs during construction	All works site / during construction	Construction Contractor		√		Air Pollution Control Ordinance Environmental Impact Assessment Ordinance

Table A2 Implementation Schedule of Noise Mitigation Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Noise - Construction Phase									
4.6.2 – 4.6.5	Table 3.4	*Level 1 Mitigation – Use of Quiet Plant* The use of quiet plant is considered to be the most effective ways of alleviating construction noise impact. The Contractor should use quiet plant with sound power level lower than that stipulated in the TM-GW as the Level 1 mitigation for construction noise. The quiet plant used in the construction noise calculation is shown in Appendix B. The Contractor can propose other suitable alternative equipment with similar or lower sound power level. The use of mini or lower power rating equipment (e.g. mini excavator) should also be considered where practical. This technique would be feasible and practical at some locations given the limited space available for using large size construction equipment and the small scale works involved (e.g. localised bank improvement at LMH01, U-channel and drainage pipes at MUP03 & 04B). The contractor should take note of ETWB TCW No. 19/2005 on the use of QPME.	To protect NSRs from noise during construction	All works site / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
4.6.7 – 4.6.8	Table 3.4	*Level 2 Mitigation - Use of Temporary Noise Barriers* Since most of the NSRs within the Project area are typically low-rise village houses of not more than 3 storeys tall, it would be effective to have noise screening structures or temporary noise barriers purposely-built along the site boundary to provide additional protection to NSRs close to the construction site boundary. This could be in the form of purposely-built site hoarding constructed from appropriate materials with a minimum superficial density of 7 kg/m^2. Noise barrier should be provided for noisy construction activities that would be undertaken close (about 25m or less) to NSRs. With the exception of NSRs MUP04A-2 and MUP05-6, the noise barrier should have a vertical height of at least 2.5 m or (depending on the height of the NSRs to be protected) a height ensuring that the operating equipment can be shielded from the view of the NSRs. For NSR MUP04A-2, the temporary noise barrier should have a minimum height of 3.5m with a small cantilevered upper portion. For MUP05-6, the temporary noise barrier should have a minimum height of 3m with a small cantilevered upper portion. The temporary noise barrier should have no gaps or opening at joints. The Contractor should regularly inspect and maintain the noise	To protect NSRs from noise during construction	All works site located at 25m or less from NSRs as shown in Figures 4.4 – 4.6 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		barrier to ensure its effectiveness. For the construction works which have the potential to exceed the noise standards on nearby NSR and whose line of sight cannot be effectively blocked by the temporary noise barrier, movable (mobile) barriers should be provided. Movable barriers of at least 2.5 m height with a small cantilevered upper portion and skid footing can be located within a few meters of stationary plant (e.g. generator, compressor) and within about 5 m or more of a mobile equipment (e.g. excavator, mobile crane), such that the line of sight to the NSR is blocked by the barriers.							
4.6.11	Table 3.4	*Good Site Practices* In general, potential construction noise impact can be minimised or avoided by imposing a combination of the following good site practices as mitigation measures: (a) Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction period. (b) Construction plant should be sited away from NSRs.	To protect NSRs from noise during construction	All works site / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		(c) Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum. (d) Equipment known to emit sound strongly in one direction should be orientated such that the noise is directed away from nearby NSRs. (e) Material stockpiles and other structures (such as site offices) should be effectively utilised to shield on-site construction activities. (f) Stationary equipment should be located within the channel when weather conditions permit (e.g. dry season). (g) The Contractor shall devise, arrange methods of working and carrying out the works in such manner as to minimise noise impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these measures are implemented properly. (h) In the event that new schools are built near the works area, the Contractor should minimize construction noise exposure to the schools (especially during examination periods). The Contractor should liaise with the school and the Examination Authority to							

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		ascertain the exact dates and times of all examination periods during the course of the contract and to avoid noisy activities during these periods.							
4.6.13 – 4.6.14	Table 3.4	To adopt good public relation with the local communities and maintain effective communication channel with the public such as setting up a 24-hour hotline system for enquiry and complaint.	To promote good public relation and maintain effective communication during construction	All works site / during construction	Project Office (Engineer) & Construction Contractor		√		Environmental Impact Assessment Ordinance
4.6.17 & 4.6.18	Table 3.4	Further mitigation by restricting concurrent usage of several equipment at the same time.	To further mitigate construction noise at NSRs MUP04A-2 & MUP04B-2	For works within 20m of NSRs MUP04A-2 & MUP04B-2 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
4.6.19	Table 3.4	The use of purpose built temporary noise barriers would not be practicable for works at LMH01 as the works are small scale, short duration and within village environs with very limited working space. It may also hamper access causing inconvenience to the villagers. The process of installing and dismantling the noise barriers itself would create additional noise nuisance. The use of light-weight mobile barrier is considered more preferable.	To protect NSRs at LMH01 from noise during construction	All works site located at 25m or less from NSRs as shown in Figure 4.6 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
4.6.20 – 4.6.21	Table 3.4	Employ quiet working method (e.g. mini-concrete crusher, saw & lift) during demolition works of crossings, restrict concurrent usage of several equipment at the same time such as parking dump truck, concrete lorry mixer outside main village area. The use of dump truck or concrete lorry mixer will be limited to only about 1 trip every few days.	To further mitigate construction noise at NSRs for LMH01	Construction works at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
4.8.4	Table 3.4	It is recommended that works programme should be scheduled such that only one crossing is constructed at any one time. Bank improvement work can be conducted concurrently.	To mitigate cumulative noise impact at LMH01	Crossing construction at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
4.9.1	3.8.1	The Contractor should design, construct, operate and maintain the mitigation measures throughout the construction stage and as required by the Engineer. Before commencement of the works, the Contractor should submit to the Engineer for approval (as part of their method statement) details of the mitigation measures to be employed under the works. The Contractor's proposed mitigation measures should also be certified by the ET Leader and verified by the IEC to ensure the intended noise reduction effectiveness can be achieved.	To protect NSRs from noise during construction and to ensure the Contractor will properly implement the mitigation measures	All works site / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Noise - Operational Phase									
		N/A							

* D=Design, C=Construction, O=Operation
N/A Not applicable

Table A3 Implementation Schedule of Water Quality Mitigation Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Water Quality - Construction Phase									
5.6.2	4.9.2	*General* The contractor shall observe and comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulations. The contractor shall carry out the works in such a manner as to minimise adverse impacts on the water quality during execution of the works. In particular the contractor shall arrange his method of working to minimise the effects on the water quality within and outside the site and on the transport routes.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.3	4.9.3	The contractor shall follow the practices, and be responsible for the design, construction, operation and maintenance of all the mitigation measures below and as specified in ProPECC PN 1/94 - Construction Site Drainage. In particular, the contractor shall submit and implement an Erosion Control Plan (as part of the Environmental Management Plan) which shall incorporate details of the mitigation measures recommended below to reduce water quality impacts arising from construction works. The design of the mitigation measures and the Plan shall be submitted by the contractor to the Engineer for approval.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94 ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		avoid any odour nuisance arising.							
Air Quality - Operational Phase									
		N/A							

* D=Design, C=Construction, O=Operation
N/A Not applicable

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		Site Surface Runoff							
5.6.4	4.9.4	Proper construction site drainage management measures shall be implemented to control site runoff and drainage, and thereby prevent high sediment loadings from reaching downstream sections of the river and adjacent agricultural land.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94
5.6.5	4.9.5	Turbid water from construction sites must be treated to minimise the solids content before being discharged. Advice on the handling and disposal of site discharge is given in the ProPECC Note PN 1/94 - Construction Site Drainage.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94
5.6.6	4.9.6	In general, surface run-off from construction sites should be discharged into waterbodies via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels or earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Perimeter channels at site boundaries should be provided to intercept storm run-off from outside the site so that it will not wash across the site (or into the proposed channel works area). Catchpits and perimeter channels should be constructed in advance of earthworks.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
5.6.7	4.9.7	Silt removal facilities, channels should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to ensure proper functioning of these facilities at all times.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94
5.6.8	4.9.8	Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into the nearby waterbodies. Open stockpiles susceptible to erosion should be covered with tarpaulin or similar fabric and provided with containment such as bunds, sand bag barriers or equivalent measures, especially during the wet season (April – September) or when heavy rainstorm is predicted. Runoff to watercourses should be reduced by minimising flat exposed areas of permeable soil, and by forming pits or diversion channels into which runoff can flow to suitable treatment facilities before discharge.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94
5.6.9	4.9.9	*De-watering / Excavation of Streams and Removal of Sediment* The use of containment structures such as earth bund or sand bag barriers wrapped with geotextile fabric or similar material or diversion channels is recommended to facilitate a dry or at least confined excavation within watercourses.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
5.6.10	4.9.10	Excavation works at the existing stream section of MUP05 should be programmed to be carried out during periods of low flow (dry season from 1st October to 31st March) to minimise impacts on downstream water quality and sensitive receivers. For the ecologically sensitive stream of LMH01, the restriction period should be further extended for an additional month (i.e. excavation works allowed from 1st November to 31st March) to protect the aquatic fauna from silty runoff due to possible heavy rain during the transitional period of the wet / dry seasons.	To minimize adverse water quality impact from excavation works during wet season	MUP05 & LMH01 / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.11	4.9.11	In addition, the excavation works should be carried out in sections to reduce the area of exposed surfaces as described below. For MUP05, the first 300m upstream section will have no restriction. For the remaining sections of MUP05 (within existing stream course), the length would be restricted to 300m at any one time. For MUP04A, a 100m restriction should be imposed for the entire stream works area to cater for potential cumulative impact on MUP05.	Restrict length of excavation work to minimise impacts on downstream water quality and sensitive receivers	MUP05 & MUP04A / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.12	4.9.12	As for LMH01, given its relatively small scale works but sensitive nature of the stream, it is recommended that only either one portion of bank	To minimize adverse water quality impact on LMH01 during	LMH01 / during construction	Construction Contractor		√		Water Pollution Control Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		improvement works or one vehicular crossing reconstruction should be carried out at any one time.	construction						
5.6.14	4.9.14	After dewatering of the streams, the sediments should be allowed to dry before excavation (yet still maintain a moist state to avoid dust nuisance). This will facilitate excavation of the sediments and also minimise the risk of drained water flowing back into watercourses as the sediment is handled. Where time or weather constraints require handling of wet sediment, care should be taken in the removal of sediment and the storage area should be bunded to prevent silty runoff entering watercourses. Given its small quantity, all excavated sediment should be reused on-site as backfilling material.	To minimize adverse water quality impact during construction (in particular when excavating and handling sediments)	All works site where sediment removal is required / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.15	4.9.15	Excavated sediment will likely be temporarily stored on-site for reuse as backfilling material. This should be stored in a bunded area and covered during wet season or when rainstorm is forecasted to avoid inadvertent release of silts and suspended solids to nearby water bodies.	To minimize adverse water quality impact during construction (in particular when excavating and handling sediments)	All works site where sediment removal is required / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.16	4.9.16	Regular monitoring of suspended solids and turbidity should be conducted during excavation works. Any exceedance of water quality in the	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		nearby water bodies caused by inadvertent release of site runoff should be rectified in accordance with EM&A programme for this Project.							
5.6.17	4.9.17	*Concreting Work* Runoff should be carefully channelled to prevent concrete-contaminated water from entering watercourses. Adjustment of pH can be achieved by adding a suitable neutralising reagent to wastewater prior to discharge. Re-use of the supernatant from the sediment pits for washing out of concrete lorries should be practised.	To minimize adverse water quality impact during construction (in particular concreting works)	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.18	4.9.18	Any exceedance of acceptable range of pH levels in the nearby water bodies caused by inadvertent release of site runoff containing concrete should be monitored and rectified under the EM&A programme for this Project.	To minimize adverse water quality impact during construction (in particular concreting works)	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.19	4.9.19	To protect the sensitive stream of Lin Ma Hang, no concrete should be used during bank improvement works at LMH01.	To minimize adverse water quality impact on LMH01 during construction	LMH01 bank improvement works / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
5.6.20	4.9.20	*Site Workshop or Depot* Any contractor generating waste oil or other	To minimize adverse	All works site /	Construction		√		Water Pollution

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		chemicals as a result of his activities should register as a chemical waste producer and provide a safe storage area for chemicals on site. The storage site should be located away from existing water courses.	water quality impact during construction	during construction	Contractor				Control Ordinance
5.6.21	4.9.21	All compounds in works areas should be located on areas of hard standing with provision of drainage channels and settlement ponds where necessary to allow interception and controlled release of settled/treated water; and provision of bunding for all potentially hazardous materials on site including fuels. Hard standing compounds should drain via an oil interceptor. To prevent spillage of fuels or other chemicals to water courses, all fuel tanks and storage areas should be sited on sealed areas, within a bund of a capacity equal to 110% of the storage capacity of the largest tank. Disposal of the waste oil should be done by a licensed collector. Oil interceptors should be regularly inspected and cleaned to avoid wash-out of oil during storm conditions. A bypass should be provided to avoid overload of the interceptor's capacity. Good housekeeping practices should be implemented to minimise careless spillage and to keep the storage and the work space in a tidy and clean condition. Appropriate training including safety codes and relevant manuals should be given to the personnel who regularly handle the chemicals on site.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
5.6.22	4.9.22	The contractor should prepare an emergency contingency plan (spill action plan) for the Project to contain and remove all accidental spillage of chemicals and hazardous materials on-site including fuels at short notice and to prevent or minimize the quantities of contaminants entering the stream water and affecting the habitats. The contractor should submit the emergency contingency plan to the ET for review & comment and the engineer for approval.	To prevent or minimize the quantities of contaminants entering the stream water and affecting the habitats in case of accidental spillage of chemicals and hazardous materials	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance
5.6.24	4.9.24	*Presence of Additional Population (Workers)* Sewage arising from the additional population of workers on site should be collected in a suitable storage facility, such as portable chemical toilets. An adequate number of portable toilets should be provided for the construction workforce. The portable toilets should be maintained in a state that will not deter the workers from using them. The collected wastewater from sewage facilities and also from eating areas or washing facilities must be disposed of properly, in accordance with the WPCO requirements. Wastewater collected should be discharged into foul sewers and collected by licensed collectors.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94 Water Pollution Control Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
5.6.25	4.9.25	Either chemical toilets or other types of sewage treatment facilities without local discharge of wastewater shall be used to handle the foul water effluent arising from the project sites.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 1/94 Water Pollution Control Ordinance
Water Quality - Operational Phase									
5.8.1	4.9.27	The most important feature of the proposed channels is the prospect of suitable re-vegetation of the gabion side slopes replicating existing riparian vegetation. The vegetation is not expected to be detrimental in any way to the structure. However, seasonal cutting and clearance of vegetation, particularly in advance of the wet season will be required. This mitigation measure has additional benefits of aesthetic and ecological value.	To minimize adverse water quality impact during operation (desilting or maintenance works)	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004
5.8.2	4.9.28	In addition, the use of gabion or rock fill base for the bed of the channel has the benefit of providing uneven surfaces and cavities for sediment to accumulate. Ultimately a sediment layer will build up on the gabion floor, forming a natural layer for development of the benthic community. Removal of the upper layer of this sediment will only be necessary once the layer thickness has built up to around 300 mm thick, and sediment is likely to be washed downstream in heavy storms. A minimum of 75mm thick sediment would be allowed to	To minimize adverse water quality impact during operation (desilting or maintenance works)	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		accumulate at the channel bed to permit recolonizing of benthic communities. Growth of vegetation within the gabion sections will inhibit washout of sediment and sediment removal can be carried out at the same time as vegetation harvesting during the dry season when flows are minimal.							
5.8.5	4.9.31	Maintenance of grass species in the channel bottoms is relatively simple and they can be cut prior to the rainy season to prevent washing into River Indus. The recommended vegetation will take up both nutrients and pollutants and should be disposed to landfill. At the same time as grass cutting, excessive sediment may be removed to prevent this being washed into River Indus. As the volume of excess sediment is expected to be minimal, this can be disposed to landfill along with the excess vegetation. The excess sediment should be allowed to drained and dried before disposal.	To minimize adverse water quality impact during operation (desilting or maintenance works)	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004
5.8.8	4.9.33	Before proceeding with any desilting or maintenance works, except for emergency works, the maintenance engineer should check to ascertain if any of the proposed works will be located in or near an environmentally sensitive and/or ecologically important watercourses. In case of doubt, advice from EPD and AFCD or	To minimize adverse water quality impact during operation (desilting or maintenance works)	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		other relevant departments should be sought.							
5.8.9	4.9.34	If the proposed works will be located inside or near one of the environmentally sensitive and/or ecologically important watercourses, careful consideration should be given to the proposed method of implementation so as to minimize any adverse environmental impact. Depending on the extent of the maintenance works, EPD and AFCD should be notified and/or consulted as appropriate on the proposed method and mitigation measures for executing the works. Their comments on necessary mitigation measures should be seriously considered and incorporated. Any difference in opinion on the right balance between flood protection and ecological conservation should be brought to the attention of the relevant Chief Engineer.	To minimize adverse water quality impact during operation (maintenance works)	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004
5.8.10	4.9.35	The following considerations should be included in planning for the maintenance works for the proposed gabion channels: (a) Maintenance of the channels should be restricted to annual silt removal when the accumulated silt will adversely affect the hydraulic capacity of the channel (except during emergency situations where flooding	To minimize adverse water quality impact during operation (maintenance works) of the gabion channels	All proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	DSD TC No.2/2004

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		risk is imminent). Desilting should be carried out by hand or light machinery during the dry season (October to March) when water flow is low. (b) The management of woody / emergent vegetation should be limited to manual cutting, to be carried out during dry season and only when unchecked growth of such vegetation is very likely to impede channel flow. (c) A minimum of 75mm thick sediment should be allowed to accumulate on the channel bed to permit recolonization of benthic communities. (d) Phasing of the works should be considered to better control and minimize any impacts caused, and to provide refuges for aquatic organisms. Where possible, works should be carried out along half width of the watercourse in short sections. A free passage along the watercourse is necessary to avoid forming stagnant water in any phase of the works and to maintain the integrity of aquatic communities. (e) Containment structures (such as sand bags barrier) should be provided for the active desilting works area to facilitate a dry or at least confined working area within the watercourses.							

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		(f) Where no maintenance access is available for the channel, temporary access to the works site should be carefully planned and located to minimize disturbance caused to the watercourse, adjacent vegetation and nearby sensitive receivers by construction plants. (g) The use of lesser or smaller construction plants should be considered to reduce disturbance to the channel bed where fish habitats are located and to the nearby sensitive receivers. Quiet construction plants should be used. (h) The use of concrete or the like should be avoided or minimized. (i) The locations for the disposal of the removed materials should be identified and agreement sought with the relevant departments before commencement of the maintenance works. Temporary stockpile of waste materials should be located away from the channel and properly covered. These waste materials should be disposed of in a timely and appropriate manner.							

* D=Design, C=Construction, O=Operation
N/A Not applicable

Table A4 Implementation Schedule of Waste Management Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Waste - Construction Phase									
6.5.2 – 6.5.3	5.1.2 – 5.1.3	*General* Upon appointment, the main contractor of each construction contract should prepare and implement an Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/2005 – Environmental Management on Construction Sites which should describe the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should be submitted to the Engineer for approval. The contractor shall implement the waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated (preferably monthly) by the contractor. The EMP should take into account the recommended mitigation measures in the EIA Report. The contractor also should refer to the Construction and Demolition Material Management Plan (C&DMMP) in Appendix D1 (of the EIA) to facilitate him in the preparation of the EMP of the Contract.	Waste reduction, reuse, recycling and proper disposal of waste	All works site / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
6.5.4	5.1.4	Training of construction staff should be undertaken by the contractor about the concept of site cleanliness and appropriate waste management procedures. The contractor should develop and provide toolbox talk for on-site sorting of C&D materials to enhance worker's awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training should be included in the EMP.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.5	5.1.5	Good planning and site management practice should be employed to eliminate over ordering or mixing of construction materials to reduce wastage. Proper storage and site practices will minimise the damage or contamination of construction materials.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.6	5.1.6	Where waste generation is unavoidable, the potential for recycling or reuse should be rigorously explored. If wastes cannot be recycled, disposal routes described in the EMP should be followed. A recoding system for the amount of waste generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005 31/2004
6.5.7	5.1.7	Regular cleaning and maintenance of the waste storage area should be provided.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
									ETWB TCW No. 19/2005
6.5.8	5.1.8	*On-site Sorting, Reuse and Recycling* All waste materials should be segregated into categories covering: • excavated materials suitable for reuse on-site; • excavated materials suitable for public filling facilities; • remaining C&D waste for landfill; • chemical waste; and • general refuse for landfill.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.9	5.1.9	Proper segregation and disposal of construction waste should be implemented. Separate containers should be provided for inert and non-inert wastes.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.10	5.1.10	Sorting is important to recover materials for reuse and recycling. Specific area should be allocated for on-site sorting of C&D materials and to provide a temporary storage area for those sorted materials	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 31/2004

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		such as metals, concrete, timber, plastics, glass, excavated spoils, bricks / tiles and waste papers. If area is limited, all C&D materials should at least be sorted on-site into inert and non-inert component. Non-inert materials (C&D waste) such as bamboo, timber, vegetation, packaging waste and other organic materials should be reused and recycled wherever possible and disposed of to designated landfill only as a last resort. Inert materials (public fill) such as concrete, stone, clay, brick, soil, asphalt and the like should be separated and reuse in this or other projects (subject to approval by the relevant parties in accordance with the ETWB TCW No. 31/2004) before disposed of at a public filling facility operated by Civil Engineering and Development Department (CEDD). Steel and other metals should be recovered from demolition waste stream and recycled.							
6.5.11	5.1.11	The reuse of inert materials such as soil, rock and broken concrete should be maximised. Waste should be separated into fine, soft and hard materials. With the use of a crusher coarse material can be crushed to make it suitable for use as fill material where fill is required in the works. This minimises the use of imported material and maximises use of the C&D material produced.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.12	5.1.12	Prior to export of material from the site, the	Waste reduction, reuse,	All work sites /	Construction		√		Waste Disposal

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		potential for it to be reused should be assessed. With the exception of excavated clay most C&D material can easily be reused. Waste separation methods should be followed to ensure that C&D waste is separated at source. Suitable soft materials should be used for landscaping and grading of embankments. Fine material should be separated out and used as topsoil.	recycling and proper disposal of waste	during construction	Contractor				Ordinance ETWB TCW No. 19/2005
6.5.13	5.1.13	The feasibility of using recycled aggregates in lieu of virgin materials should be rigorously considered during the detailed design and construction stages as stipulated in WBTC No. 12/2002 and ETWB TCW No. 24/2004. In general, recycled aggregates are suitable for use as fill materials in earthworks, road sub-base formation, and drainage works. Recycled aggregates can also be used in concrete (up to Grade 35) for mass concrete walls and other minor structures such as planter boxes, toe wall planters and pavement, etc.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 24/2004 WBTC No. 12/2002
6.5.14	5.1.14	Recycled inert C&D material should be used in the works as sub-bases for access roads and footpaths of the proposed channels. Recycled aggregates should be considered for use in concrete as outlined in the above mentioned technical circulars. Some recycled rock material can be reused in the gabions, as rock fill or as stream bed material. This is dependent on size of rock fragments but can be	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		achieved by appropriate use of a crusher.							
6.5.15	5.1.15	*Site Clearance / Demolition Materials* *Excavated Materials* All C&D materials should be sorted on-site into inert and non-inert components by the contractor. Non inert materials (C&D waste) such as wood, glass and plastic should be reuse and recycle before disposal to a designated landfill as a last resort (currently assume to be the nearby NENT Landfill). Inert materials (public fill) such as soil, rubble, sand, rock, brick and concrete should be separated and where appropriate broken down to size suitable for subsequent filling. Suitable C&D material should be use as pipe bedding or for backfilling of retaining walls, box culvert and formation of channel embankments. Excavated rocks from existing streams should be reuse for rip-rap lining and gabion lining. Inert materials should be reused on-site or in other projects approved by relevant parties in accordance with the ETWB TCW No. 31/2004 before disposed of at public filling facilities. Steel and other metals should be recovered from C&D materials and recycled.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 31/2004
6.5.16	5.1.16	Excavated sediment from existing stream should be reuse on-site as backfilling material.	Reuse of excavated sediment to minimize offsite disposal	MUP04A / during construction	Construction Contractor		√		Waste Disposal Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
6.5.17	5.1.17	Good quality reusable topsoil should be stockpiled for later landscaping works. Stockpiles should be less than 2 m in height, formed to a safe angle of repose and hydroseeded or covered with tarpaulin to prevent erosion during the rainy season and to minimise dust generation.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.18	5.1.18	Control measures for temporary stockpiles on-site should be taken in order to minimize the noise, generation of dust, pollution of water and visual impact. These measures include: • surface of stockpiled soil should be regularly wetted with water especially during dry season; • disturbance of stockpiled soil should be minimized; • stockpiled soil should be properly covered with tarpaulin especially when heavy rain storms are predicted; • stockpiling areas should be enclosed where space is available; • stockpiling location should be away from the water bodies; and • an independent surface water drainage system	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		equipped with silt traps should be installed at the stockpiling area.							
6.5.19	5.1.19	The identification of final disposal sites for C&D materials generated by the construction works will be considered during the detailed design stage of the Project when the volume and types of C&D materials can be more accurately estimated. The Public Fill Committee of CEDD should be consulted on designated outlets (e.g. public filling area) for public fill, whilst EPD should be consulted on landfills for C&D waste. Disposal of C&D waste to landfill must not have more than 50% (by weight) inert material. The C&D waste delivered for landfill disposal should contain no free water and the liquid content should not exceed 70% by weight.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.20	5.1.20	In order to avoid dust or odour impacts, any vehicle leaving a works area carrying C&D waste or public fill should have their load covered before leaving the construction site.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005 WBTC No. 19/2001
6.5.21	5.1.21	C&D materials should be disposed of at designated public filling facilities or landfills. Disposal of	Waste reduction, reuse, recycling and proper	All work sites / during	Construction Contractor		√		Waste Disposal Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		these materials for use at other construction projects is subject to the approval of the EPD, Engineer and/or relevant authorities, such as LandsD, PlanD, etc. Furthermore, unauthorized disposal of C&D materials in particular on private agricultural land is prohibited and may be subject to relevant enforcement and regulating actions. The contractor shall refer and strictly follow the trip-ticket system for the disposal of C&D material as stipulated in the ETWB TCW No. 31/2004.	disposal of waste	construction					ETWB TCW No. 19/2005, 31/2004
		Chemical Waste							
6.5.22	5.1.22	Where the construction processes produce chemical waste, the contractor must register with EPD as a chemical waste producer. Wastes classified as chemical wastes are listed in the Waste Disposal (Chemical Waste) (General) Regulation. These wastes are subject to stringent disposal routes. EPD requires information on the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates. A nominated contact person must be registered with EPD. An updated list of licensed chemical waste collector can be obtained from EPD.	Waste reduction, reuse, recycling and proper disposal of chemical waste	All work sites / during construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.23	5.1.23	Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the	Waste reduction, reuse, recycling and proper	All work sites / during	Construction Contractor		√		Waste Disposal (Chemical Waste) (General)

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published by EPD, and should be collected by a licensed chemical waste collector.	disposal of chemical waste	construction					Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.24	5.1.24	Suitable containers should be used for specific types of chemical wastes, containers should be properly labelled (English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations), resistance to corrosion, stored safely and closely secure. Stored volume should not be kept more than 450 liters unless the specification has been approved by the EPD. Storage area should be enclosed by three sides by a wall, partition of fence that is at least 2 m height or height of tallest container with adequate ventilation and space.	Waste reduction, reuse, recycling and proper disposal of chemical waste	All work sites / during construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.25	5.1.25	Hard standing, impermeable surfaces draining via oil interceptors should be provided in works area compounds. Interceptors should be regularly emptied to prevent release of oils and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded and/or enclosed on three sides to prevent discharge due to accidental spillages or breaches of tanks. Bunding	Waste reduction, reuse, recycling and proper disposal of chemical waste	Work sites / During construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		should be of sufficient capacity to accommodate 110% of the volume of the largest container or 20% of the total volume of waste, whichever is largest. Waste collected from any grease traps should be collected and disposed of by a licensed contractor.							
6.5.26	5.1.26	Lubricants, waste oils and other chemical wastes are likely to be generated during the maintenance of vehicles and mechanical equipment. Used lubricants should be collected and stored in individual containers which are fully labelled in English and Chinese and stored in a designated secure place. If possible, such waste should be sent to oil recycling companies, and the empty oil drums collected by appropriate companies for reuse or refill.	Waste reduction, reuse, recycling and proper disposal of chemical waste	All work sites / during construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.27	5.1.27	The registered chemical waste producer (i.e. the contractor) has to arrange for the chemical waste to be collected by licensed collectors. The licensed collector should regularly take chemical waste to a licensed chemical waste treatment facility (such as the Chemical Waste Treatment Centre in Tsing Yi). A trip ticket system operates to control the movement of chemical wastes.	Waste reduction, reuse, recycling and proper disposal of chemical waste	All work sites / during construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.28	5.1.28	No lubricants, oils, solvents or paint products should be allowed to discharge into water courses,	Waste reduction, reuse, recycling and proper	All work sites / during	Construction Contractor		√		Waste Disposal (Chemical Waste)

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		either by direct discharge, or as contaminants carried in surface water runoff from the construction site.	disposal of chemical waste	construction					(General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
6.5.29	5.1.29	*Concrete Waste* Dry concrete waste (considered as public fill) should be sorted out from the other wastes and recycled for reuse or sorted out for disposal at designated public filling facilities.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002
6.5.30	5.1.30	*Wooden Materials* All wooden materials used on-site should be kept separate from other wastes to avoid damage and to facilitate reuse. Timber which cannot be reused should be sorted out from other waste and stored separately from all inert waste before being disposed of to landfill.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002
6.5.31	5.1.31	Reusable steel or concrete panel shutters, fencing and hoarding and signboard should be used as a preferred alternative to items made of wood, to minimise wastage of wood. Attention should be paid to WBTC No. 19/2001 - Metallic Site Hoardings and Signboards to reduce the amount of	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		timber used on construction sites. Metallic alternatives to timber are readily available and should be used rather than new timber. Recast concrete units should be adopted wherever feasible to minimize the use of timber formwork.							
6.5.32	5.1.32	Only waste material need be taken to a landfill. It should be separated from recyclable wood and steel materials. As for all waste types these materials should be reused on-site or other approved sites before disposal is considered as an option. Disposal to landfill should only be considered as a final option. Contractors are responsible for storage of re-useable materials on-site.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002
6.5.33	5.1.33	*Municipal Waste* General refuse generated on-site should be stored in enclosed bins or skips and collected separately from other construction and chemical wastes and disposed of at designated landfill. A temporary refuse collection point should be set up by the contractor to facilitate the collection of refuse by licensed contractors. The removal of waste from the site should be arranged on a daily or at least on every second day by the contractor to minimise any potential odour impacts, minimise the presence of pests, vermin and other scavengers and prevent unsightly accumulation of waste.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
6.5.34	5.1.34	The recyclable component of the municipal waste generated by the workforce, such as aluminium cans, paper and cleansed plastic containers should be separated from other waste. Provision and collection of recycling bins for different types of recyclable waste should be set up by the contractor. The contractor should also be responsible for arranging recycling companies to collect these materials.	Waste reduction, reuse, recycling and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
6.5.35	5.1.35	The burning of refuse on-site is prohibited under the Air Pollution Control Ordinance (APCO) (Cap.311).	Waste reduction, reuse, recycling and proper disposal of waste as well as air pollution control	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005 Air Pollution Control Ordinance
Waste – Operation Phase									
6.7.2	-	Desilting or maintenance works should be carried out during dry season where flow in the watercourse is low. Non-inert materials such as excess vegetation and garbage should be disposed of to landfill. Inert material such as excess silt should be dried and disposed of public filling facilities, or to landfill if the amount is negligible. The locations for the disposal of the above materials should be identified and agreement	Proper disposal of wastes during annual routine maintenance	The proposed channels / during operation	DSD (or DSD's maintenance contractor)			√	Waste Disposal Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		sought with the relevant departments before commencement of the maintenance works.							

* D=Design, C=Construction, O=Operation
N/A Not applicable

Table A5 Implementation Schedule of Ecological Impact Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Ecology - Construction Phase									
		LMH01							
7.9.3	6.5.2	Given the ecological importance of Lin Ma Hang stream, it is proposed that construction works at LMH01 should be restricted to the dry season period from 1st November – 31st March. The small scale of works should allow all construction to be completed within dry season to ensure that the risk of erosion and sedimentation due to heavy rain on the works areas, as well as disturbance impacts to surrounding areas, will be minimised.	Minimize ecological impacts during construction at LMH01	All works sites at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.4	6.5.3	In addition, the breaking of existing shotcrete banks at LMH01 should be restricted to hand-held equipment. Concrete should not be used for construction of the gabion banks.	Minimize ecological impacts during construction at LMH01	All works sites at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.5	6.5.4	Potential disturbance impacts to surrounding habitats and pollution risks (water quality impacts) to the stream should be minimised by adoption of appropriate site management procedures, as detailed in ETWB TCW No. 5/2005; including among others the location of access to the site and storage of materials, and treatment of construction site waste to prevent	Minimize ecological impacts during construction at LMH01	All works sites at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		pollution of the stream. These site management measures are listed in the subsequent section.							
7.9.9	6.5.8	*MUP05 (natural stream section)* <u>Streambed</u> One of the main benefits of the proposed stream widening measures is that the existing natural stream bed is left undisturbed. Accordingly, works should be carried out in such a way that as much as possible of the natural stream bed should be left undisturbed and that where disturbance is essential this should be minimised in terms of area, magnitude and duration to minimise potential impacts to stream fauna and to ensure refuges for these species during the period of the works. Avoidance of the stream bed can be achieved by conducting the earthworks to widen the stream from the landward side, by not lowering the widened channel to the same level as, or below, the existing channel, and by leaving the existing stream untouched except during the final stage, when the newly formed widened stream bed is joined to the existing stream.	Minimize ecological impacts during construction at MUP05	All works sites at MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.10	6.5.9	In addition, the widened stream bottom should be floored with natural materials (natural rock and fines of varying sizes) to approximate as closely as possible to the rocky components of a natural stream bottom. Natural materials of a smaller particle size (sand and silt grains) will soon be	Minimize ecological impacts during construction at MUP05	All works sites at MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		deposited naturally.							
7.9.11	6.5.10	In order to minimise potential impacts to stream fauna during excavation of the widened "two-stage" channel, this work should be limited to the dry season as far as possible, between 1st October and 31st March. As rainfall is low at this time, erosion is less likely and deposition of sediment downstream of the works should be minimised. This also avoids the time when stream fauna are at the most vulnerable stage in their life cycle (eggs and young larvae). Any essential works outside the dry season should be temporarily isolated from the stream to prevent the risk of pollution or sedimentation affecting the ecological integrity of the stream.	Minimize ecological impacts during construction at MUP05	All works sites at MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.12	6.5.11	As required to minmize potential water quality impacts (Section 5.6), excavation works at the stream section of MUP05 should be restricted to 300m length at any one time. No restriction is considered necessary for the first 300m upstream concrete drains section. Excavation works at MUP04A should be restricted to 100m to cater for potential cumulative impact on MUP05.	Minimize ecological impacts during construction at MUP05	All works sites at MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.13	6.5.12	Appropriate site management procedures during the construction phase should be adopted, as	Minimize ecological impacts during	All works sites at MUP05 / during	Construction Contractor		√		Environmental Impact Assessment

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		recommended in ETWB TCW No. 5/2005, to minimise potential disturbance impacts and pollution risks (water quality impacts) to the stream. This should include the location of access to the site and storage of materials, and treatment of construction site waste to prevent pollution of the stream. These site management measures are listed in the subsequent section.	construction at MUP05	construction					Ordinance
7.9.20, Table 7.29	6.5.19 & Table 6.6	The loss of bankside trees, and associated riparian habitats, should be mitigated through transplanting existing trees to suitable locations wherever possible, and through supplemental planting of native trees and bamboos in locations where the project area includes sufficient space adjacent to the stream but outside the channel itself (in addition to retaining in-situ as much trees as possible). The appropriate species of trees and bamboos include. ▪ *Celtis tetranda (sinensis)* ▪ *Ficus hispida* ▪ *Ficus microcarpa* ▪ *Litsea glutinosa* ▪ *Sapium discolor* ▪ *Schleffera arboricolar (octophylla)* ▪ *Trema tomentosa*	Mitigate the loss of bankside trees and associated riparian habitats at MUP05	MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		▪ *Bambusa eutuldoides*							
7.9.21	6.5.20	The proposed landscape compensatory planting of about 740 trees (approximately 1,100 m^2) along the MUP channels will serve dual purpose of landscape impact mitigation as well as mitigating the loss of riparian trees.	Dual purpose of landscape impact mitigation and mitigate the loss of riparian trees at the MUP channels	MUP channels / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
7.9.22 Table 7.29 (8.11.27)	6.5.21 Table 6.6 (7.5.11)	The Landscape Plan to be submitted prior to commencement of planting or landscaping works should take into account the recommended plant species.	To ensure the recommended plant species are taken into account in the Landscape Plan	All works site / during detailed design and construction	DSD (or its appointed Detailed Design Engineer) Construction Contractor to implement the approved planting plan	√	√		Environmental Impact Assessment Ordinance
7.9.23	6.5.22	The recommended site management measures are generally good site practices and proper water quality control / waste management measures to be implemented by the contractor for all works near stream courses. These measures include: ▪ Construction activities should be restricted to works area that should be clearly demarcated.	Recommended site management measures to minimize ecological impacts during construction at LMH01 and MUP05	All works sites at LMH01 and MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		▪ Excavation works should be carried out during the dry season where stream flow is low. Where adequate space is available, works should be carefully phased such that only one side of the channel is constructed. Temporary diversion should be provided to ensure continuous water flow to the downstream section. ▪ The proposed works site inside or in the proximity of natural streams should be temporarily isolated, such as using bunds or sandbag barriers (wrapped with geotextile fabric) or other similar techniques, to prevent adverse impacts on the stream water quality. ▪ For the stream section where the existing natural stream bed and bank will be left untouched, no disturbance to the stream bed and bank should be allowed from construction works, equipment or workers. If temporary access track on streambed is unavoidable, this should be kept to the minimum width and length. Temporary stream crossings should be supported on stilts above the stream bed. ▪ Adequate temporary drainage measures including sediment and oil/grease traps should be provided to prevent contaminated site run-off entering the water bodies. ▪ Stockpiling of construction materials, spoils and waste should be properly covered and located away from water bodies to prevent silty runoff and other pollutants from entering							

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		the water bodies during rain storms. ▪ Construction effluent, site run-off and sewage should be properly collected, treated and disposed. ▪ Supervisory staff of the contractor should be assigned to station on site to closely supervise and monitor the construction works. All workers should be regularly briefed to avoid disturbing the flora and fauna near the works area.							
7.9.24	6.5.23	The contractor should provide details of the mitigation measures to be implemented during construction stage as part of their working method statement to the Engineer for approval. This should be reviewed by the Environmental Team Leader.	Minimize ecological impacts during construction at LMH01 and MUP05 and to ensure the contractor will properly implement the mitigation measures	All works sites at LMH01 and MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
Ecology - Operation Phase									
7.9.6	6.5.5	*LMH01* Very little or no management / maintenance of the completed sections of LMH01 are expected. Removal of obstruction should be undertaken only when flooding or safety issues have been identified.	Minimize ecological impacts during operation of LMH01	LMH01 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
7.9.7 (5.8.7 – 5.8.10)	6.5.6 (4.9.32 – 4.9.35)	Environmental considerations for maintenance of the proposed gabion channels (see Section 5.8) should be adopted.	Minimize ecological impacts during operation of LMH01	LMH01 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance
7.9.8	6.5.7	Vegetation management should be restricted to the removal of the exotic creeper *Mikania micrantha* which has previously been found to readily colonise gabion embankments. The establishment of this species would have a detrimental impact on the establishment of natural riparian vegetation. Control of *Mikania* and other invasive exotic species should be incorporated in the maintenance regime.	Minimize ecological impacts during operation of LMH01	LMH01 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance
7.9.15	6.5.14	*MUP05* Streambed, gabion banks and other areas within the operational limits of the channel Management and maintenance of the streambed and channel sides should be limited to the minimum required to prevent flooding and ensure safety. Accordingly, the stream should be permitted to find (and adjust) its own low flow channel and natural changes in the disposition of silt, sand and rock should be tolerated except where a specific flooding or safety issue is identified (in accordance with the guidance of DSD technical circular.	Minimize ecological impacts during operation of MUP05	Streambed, gabion banks and other areas within the operational limits of MUP05 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
7.9.16 (5.8.7 – 5.8.10)	6.5.15 (4.9.32 – 4.9.35)	Environmental considerations for maintenance of the proposed gabion channels (see Section 5.8) should be adopted.	Minimize ecological impacts during operation of MUP05	MUP05 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance
7.9.17	6.5.16	The provision of natural rock and fines in the widened streambed, and the use of stepped gabion banks, will permit recolonisation of the channel by riparian vegetation following completion of the works, thus mitigating for the loss of natural riparian vegetation. Vegetation management within the channel should therefore be restricted to removing obstructions and preventing tree establishment, while the presence of herbaceous vegetation should be tolerated as much as possible. If clearance of herbaceous vegetation is required to prevent obstruction of water flow, where specific flooding or safety issues have been identified, this should not be undertaken during March – August (the main period during which this vegetation would be used as a breeding/nursery area by fauna). Control of invasive plant species, especially the creeper *Mikania micrantha*, which has previously been found to readily colonise gabion embankments, should be carried out where necessary to permit the establishment of a native floral community.	Minimize ecological impacts during operation of MUP05	MUP05 / during operation stage	DSD (or DSD's maintenance contractor)			√	Environmental Impact Assessment Ordinance

* D=Design, C=Construction, O=Operation
N/A Not applicable

Table A6 Implementation Schedule of Landscape and Visual Impact Measures

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Landscape and Visual Impact Mitigation Measures									
8.11.3 Figures 8.6A-I to V, Figures 8.6B-I to III	7.5.1	*LMM1 (Landscape Mitigation Measure 1):* *Gabions / Gabion Mattress for Riparian Vegetation* Gabion Mattress, a wire mesh cage filled with loose stone - provide flexible structure for bank & bed protection and with the gaps in between the loose stone, suitable plants can be introduced. A sufficient planting medium (compacted clay and topsoil) is needed to cover the gabion / gabion mattress to accommodate roots of the proposed plants. Since the water level for the channel will rise during wet season and drop during dry season, plants that are proposed should be able to adapt the alternate wet and dry condition and must have the ability to regenerate in the next season. These may include but not limited to the following species (which are also species present in the area): *Alocais macrorrhiza*, *Alopecurus aequalis*, *Bacopa monniera*, *Colocasia esculenta*, *Commelina diffusa*, *Cyperus pilosus*, *Ludwigia adscendens*, *Polygonum barbatum*, *Polygonum chinense*, and *Ranunculus scleratus*. Further suggested species are listed in DSD Practice Note No. 1/2005 "Guidelines on Environmental Considerations for River Channel Design, Section 9.2.2 - Proposed plant list in channel bed and toe-zone".	To mitigate the landscape and visual impacts arising from the proposed works	MUPs channels & LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance DSD Practice Note No. 1/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		Areas to receive Gabion / Gabion Mattress and Riparian Vegetation are as follows: - MUP 03, 04A, 04B & 05: approx. 4,170 m^2 - LMH 01: approx. 705 m^2							
8.11.3 Figures 8.6A-I to V	7.5.1	*LMM 2 (Landscape Mitigation Measure 2):* *Existing natural river bed to be retained or widened, using natural substrate (example rip-rap bedding) & Existing natural riverbank to be retained or reinforced using gabions/ gabion mattress for riparian vegetation* This measure has an emphasis on retaining or widening the existing natural riverbed and retaining or reinforcing the existing natural riverbank. Riprap bedding comprises of a layer of different sized, angular rocks or boulders to simulate the condition of natural pebble or stone stream/ riverbed. The space between the rocks provide good habitat for establishment of the eco-system for flora and fauna. Similar to LMM 1, suggested species of plants are those that can adapt to dry and wet conditions are listed in DSD's "Guidelines on Environmental Considerations for River Channel Design, Section 9.2.2 - Proposed plant list for channel bed and toe-zone". Areas for planting are shown as below:	To mitigate the landscape and visual impacts arising from the proposed works	MUPs channels / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance DSD Practice Note No. 1/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		- MUP 03, 04A, 04B & 05: approx. 14,390 m^2 - LMH 01: N/A							
8.11.3 & Table 8.8, Figures 8.6A-I to V, Figures 8.6B-I to III (7.9.20 – 7.9.22, Table 7.29)	7.5.1 (6.5.19 – 6.5.21, Table 6.6)	*LMM 3 (Landscape Mitigation Measure 3):* *Compensatory tree planting along channel side* The 1-meter wide verge at one side or both sides of the channel are proposed for compensatory tree planting. Compensatory tree planting is intended to replace trees that cannot be retained or transplanted and will serve dual purpose of landscape impact mitigation as well as mitigating the loss riparian trees in terms of ecological impacts. The species of trees for planting along the channel sides are selected as being appropriate for the habitat of the river bank and are in accordance with DSD's "Guidelines on Environmental Considerations for River Channel Design, Section 9.2.3 - Proposed plants for use along channel side". Plant species which are known to be of high value to wildlife as recommended in the Ecology chapter should also be considered. The areas to receive LMM3 – compensatory tree planting are as follows:	To mitigate the landscape and visual impacts (and ecological impact) arising from the proposed works	MUPs channels & LMH01/ during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance DSD Practice Note No. 1/2005

<table>
<tr><th>EIA Ref</th><th>EM&A Ref</th><th>Recommended Mitigation Measures</th><th>Objectives of the Recommended Measures and Main Concerns to addressed</th><th>Location / Timing</th><th>Implementation Agent</th><th colspan="3">Implementation Stages*</th><th>Relevant Legislation & Guidelines</th></tr>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th>D</th><th>C</th><th>O</th><th></th></tr>
<tr><td></td><td></td><td>- MUP03, 04A, 04B & 05: 740 no. of trees, approx. 1,100 m^2
- LMH01: 11 no. of trees, approx. 16 m^2
<table>
<tr><th>Proposed Tree</th><th>Recommended Size</th><th>Approximate Percentage</th></tr>
<tr><td>Bischofia javanica</td><td>Heavy standard</td><td>5%</td></tr>
<tr><td>Castanopsis fissa</td><td>Heavy standard</td><td>10%</td></tr>
<tr><td>Celtis sinensis</td><td>Heavy standard</td><td>20%</td></tr>
<tr><td>Cleistocalyx operculatus</td><td>Heavy standard</td><td>35%</td></tr>
<tr><td>Cinnamomum burmannii</td><td>Heavy standard</td><td>5%</td></tr>
<tr><td>Cinnamomum camphora</td><td>Heavy standard</td><td>5%</td></tr>
<tr><td>Liquidambar formosana</td><td>Heavy standard</td><td>10%</td></tr>
<tr><td>Sapium sebiferum</td><td>Heavy standard</td><td>10%</td></tr>
</table></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.11.3
Figures</td><td>7.5.1</td><td>LMM 4 (Landscape Mitigation Measure 4):
Maintenance access ramps with grasscrete finish and planting with channel bed/ toe zone vegetation

Similar to LMM 1 & 2, plants proposed for LMM4 are plants that are able to adapt the alternate wet and dry conditions and have the</td><td>To mitigate the landscape and visual impacts arising from</td><td>MUP05 / during construction</td><td>Construction Contractor</td><td></td><td>√</td><td></td><td>Environmental Impact Assessment Ordinance</td></tr>
</table>

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
8.6A-I to V		ability to regenerate in the next season. Suggested species are listed in DSD's "Guidelines on Environmental Considerations for River Channel Design, Section 9.2.2 - Proposed plant list in channel bed and toe-zone". These measures will only apply in MUP areas where grasscrete ramps are implemented in an area of approximately 2,180 m^2. Mitigation measures could involve the establishing of plant communities from wild grass/flower seed mixes instead of turf.	the proposed works						DSD Practice Note No. 1/2005
8.11.3 Figures 8.6A-I to V	7.5.1	*LMM 5 (Landscape Mitigation Measure 5):* *Mitigation planting along embankments* These measures will only apply in MUP05 areas (approximately 590 m^2) - downstream portion of Ng Tung River, at the existing Wo Keng Shan Road Park. Proposed plants are those that are adapted to the area between the average high water level and top of the embankment as this area is close to water table, the moisture content in soil is relative high during the wet season. These may include but not limited to the following species (some of which are also species present in the area): *Ficus hispida*, *Ficus viriolosa*, *Ilex pubescens*, *Ligustrum sinense*, *Rhododendron simsii*, and *Schefflera heptaphylla*. Further suggested species are listed	To mitigate the landscape and visual impacts arising from the proposed works	MUP05 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance DSD Practice Note No. 1/2005

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		in DSD's "Guidelines on Environmental Considerations for River Channel Design, Section 9.2.2 - Proposed plant list for planting at embankment".							
8.11.14 & Figure 8.7i	7.5.2	The tree vegetation in this (MUP05) area is dominated by the roadside planting (nearly 300 trees) of mainly exotic tree species along Sha Tau Kok Road. Most trees within the site limit are retained but some in some condition it is necessary to fell or transplant the trees. A few large species, such as **Chinese Hackberry Tree** (*Celtis sinensis*) (tree nos. T884, T973, T1001, T1028: 4 trees) including one with a climber, *Derris trifoliate* growing on it at Loi Tong village, **Chinese Banyan** (*Ficus microcarpa*) (tree no. T905: 1 tree) and **Chinese Tallow Tree** (*Sapium sebiferum*) (tree no. T1002: 1 tree) located within the channel, are native, in good to fair health condition and medium in amenity value, will be retained (preserved) with special treatment using gabion mattress. An indicative sketch showing the special treatment to preserve these existing trees within the channel is shown in **Figure 8.7i** of the EIA Report.	To preserve 6 large trees within MUP05	MUP05 / during detailed design and construction	DSD (or its appointed Detailed Design Engineer) Construction Contractor	√	√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006
8.11.18	7.5.3	*Measures for Preservation and Protection of Trees* To ensure the preserved trees are not adversely affected during construction, the Contractor	To ensure all the preserved trees are not	All works sites / during	Construction Contractor		√		Environmental Impact Assessment

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		should submit a Tree Preservation and Protection Plan to the ET for review and Engineer for approval before commencing any works on site.	adversely affected during construction	construction					Ordinance ETWB TCW No. 3/2006
8.11.19	7.5.4	In addition, the Contractor should exercise the greatest care to avoid any damage to the preserved trees and should comply with the following in respect of all the preserved trees: (i) No nails or other fixings shall be driven into the trees. (ii) No fencing, services, or signs other than the identification labels or markings shall be attached to any part of the trees. (iii) No trees shall be used as anchorages for ropes or chains used in guying or pulling or for equipment used for removing stumps, roots or other trees, or for any other purposes. (iv) No soil, materials, equipment or machinery shall be stockpiled or stored within the tree protection zones. (v) No site offices, workshops, canteens, containers or similar structures shall be installed within the tree protection zones. (vi) Excessive water shall be drained away from the tree protection zones to prevent damage to tree roots by asphyxiation.	To ensure the preserved trees are not adversely affected during construction	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		(vii) No passage or parking of vehicles and no operation of equipment or machinery shall take place within the tree protection zones unless otherwise agreed by the Engineer. (viii)No stripping of surface vegetation or top layer of soil shall be carried out within the tree protection zones unless otherwise agreed by the Engineer.							
8.11.20	7.5.5	The Contractor should erect, secure and maintain in good condition temporary protective fencing to protect the preserved trees before commencement of any works within the site. The temporary protective fencing should be erected along or beyond the perimeter of the tree protection zone of each individual tree. If erection of temporary protective fencing is not practicable, temporary hessian armouring (or hessian and plank armouring) should be provided around tree trunks to protect the preserved trees. The Contractor should submit method statements including proposed design details of the temporary protective fencing or armouring to the ET for review and to the Engineer for approval.	To ensure the preserved trees are not adversely affected during construction	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006
8.11.21	7.5.6	Notwithstanding the above measures, the Contractor should also follow all the requirements listed in the General Specification for Civil Engineering Works: Section 26 – Preservation and Protection of Trees.	To ensure the preserved trees are not adversely affected during construction	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
8.11.22	7.5.7	To enhance the health and the appearance of the preserved trees, advance tree surgery or pruning works may be necessary. The Contractor should provide detailed proposals and method statements to the ET for review and to the Engineer for approval before commencement of any tree surgery or pruning works. Pruning should be conducted in accordance with good arboriculture and horticultural practices.	To ensure the preserved trees are not adversely affected during construction	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006
8.11.23	7.5.8	The Contractor should assign a competent member of the site supervisory staff to oversee and supervise tree works related to horticultural operations and preservation of trees within the site, including, but without limitation to, planting, transplanting, tree surgery work, pruning and control of pest and disease affecting trees on the site.	To ensure the preserved trees are not adversely affected during construction	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006
		Tree Transplanting							
8.11.24	7.5.9	Selection criteria for determining tree suitable for transplanting are summarized below: **1. Health** - determine if the tree is healthy, free of disease, infestation, is undamaged in any way. **2. Species** - is the tree of a species worth retaining in some way - if really rare then a more sensible approach would be to revise the	Selection criteria for determining tree suitable for transplanting	All works sites / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		alignment. However, no registered tree or tree of conservation importance or rare/protected species was found in the Project area. A good specimen even if not rare then it could be a good candidate for transplanting. Invasive species, introduced species of no amenity value or very common, quick growing species and species that tend not to respond well to transplanting (e.g. many conifers) would be best avoided as candidates for transplanting also. **3. Size** - Large trees, 500mm girth or larger (measured at 1m above ground level), which require specialized methods to transplant, have a lower survival rate than that of smaller trees and are also likely to be considerably damaged to their form using conventional transplanting techniques. Budget constraints may be a consideration in assessing the possibility of very large trees as only in the case of significant trees (or old or valuable trees) are the costs likely to be an acceptable proposition. The transplanting of large trees is therefore likely to be considered only when all other factors justify the attempt. **4. Form** - Trees of poor shape (even though they may be healthy) and multi-stem trees which are difficult to transplant. **5. Location** - Certain trees may be situated in positions that are difficult to transplant from due							

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		to their location next to surfaces, utilities, structures etc that makes careful excavation and protection of the root difficult or impossible.							
		Compensatory Tree Planting (LMM3)							
8.11.25 Figures 8.6A I-V to 8.6B I-III	7.5.10	Where trees cannot be retained or transplanted and have to be felled, compensatory tree planting (LMM3) is proposed as shown in **Figures 8.6A I-V to 8.6B I-III.** In addition, existing retained and new slopes should be planted with suitable tree planting mixes for screening to mitigate views and other purposes. Based on the current available information, the approximate numbers of trees to be felled and compensated are summarized below. MUPs: 117 nos. felled, 740 nos. compensated, 1:6.3 LMH01: 1 no. felled, 11 nos. compensated, 1:11	To compensate for the trees to be felled.	MUP channels & LMH01 / during construction (with reference to the Landscape Plan – see below)	Construction Contractor		√		Environmental Impact Assessment Ordinance ETWB TCW No. 3/2006
		Landscape Plan							
8.11.27 (7.9.20 – 7.9.22, Table 7.29)	7.5.11 (6.5.19 – 6.5.21, Table 6.6)	As details of the proposed planting cannot be ascertain at the EIA stage, the preliminary design stage of the Project, it is recommended that a detailed Landscape Plan be submitted before commencement of the planting or landscape works of the Project. The Landscape Plan should	To ensure the recommendations in the EIA are taken on board in the landscape works of the Project.	All works site / during detailed design & construction	DSD (or its appointed Detailed Design Engineer)	√	√		Environmental Impact Assessment Ordinance

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
		include the locations, size, number and species of plantings, design details, implementation programme, maintenance and management schedules, and drawings in scale of 1:1000 showing the landscape and visual mitigation measures. The Landscape Plan should also take into account plant species recommended in the Ecology chapter. The Landscape Plan should be certified by the ET Leader and verified by the IEC as conforming to the information, requirements and recommendations set out in the approved EIA Report before submission to the relevant authorities.			Construction Contractor to follow the approved Plan				

* D=Design, C=Construction, O=Operation
N/A Not applicable

Table A7 Implementation Schedule of Cultural Heritage Impact Assessment

EIA Ref	EM&A Ref	Recommended Mitigation Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation & Guidelines
						D	C	O	
Cultural Heritage - Construction Phase									
Table 9.9 & 9.10	-	The design of the replacement structure should be such that it does not require the removal of / or have contact with any section of the existing wall.	To minimize impacts on cultural heritage resources during construction at LMH01	Terrace wall (AAHB- 855) at LMH01 / during detailed design	DSD (or its appointed Detailed Design Engineer)	√			Environmental Impact Assessment Ordinance
Table 9.9 & 9.10	8.2.1	The wall should be provided with protective covering, in the form of heavy duty plastic sheeting, by the contractor.	To minimize impacts on cultural heritage resources during construction at LMH01	Terrace wall (AAHB- 855) at LMH01 / during construction	Construction Contractor		√		Environmental Impact Assessment Ordinance
Cultural Heritage - Construction Phase									
		N/A							

* D=Design, C=Construction, O=Operation
N/A Not applicable

ANNEX D

3-MONTH ROLLING CONSTRUCTION PROGRAM

ID	Task Name	Duration	Start	Finish
198	5.2.1 Base slab	63 days	15/2/2013	4/5/2013
199	5.2.2 Wall	80 days	6/5/2013	9/8/2013
200	5.3.3 Fill behind wall	25 days	10/8/2013	7/9/2013
201	**6. XPM fence and gates**	236 days	10/8/2013	26/5/2014
202	**7. Landscaping**	606 days	13/9/2012	26/9/2014
203	**8. Security system by EMSD**	103 days	27/5/2014	26/9/2014
204				
205	**Construction of Portion D**	**294 days**	**31/3/2012**	**28/3/2013**
206	**Possession of Site**	**1 day**	**31/3/2012**	**31/3/2012**
207	**Setting out and site clearance**	**24 days**	**31/3/2012**	**4/5/2012**
208	**Traffic diversion**	**45 days**	**2/4/2012**	**30/5/2012**
209	**Box culvert**	**155 days**	**31/5/2012**	**3/12/2012**
210	**Reinstate existing road**	**6 days**	**26/7/2012**	**1/8/2012**
211	**Rectangular Channel**	**213 days**	**5/5/2012**	**17/1/2013**
212	**Protect existing structure near CH 54**	**120 days**	**2/4/2012**	**28/8/2012**
213	**Inlet apron**	**32 days**	**18/1/2013**	**27/2/2013**
214	**Reinstate existing structure**	**45 days**	**4/12/2012**	**28/1/2013**
215	**Type 2 railing**	**25 days**	**28/2/2013**	**28/3/2013**
216				
217	**Construction of Portion E**	**323 days**	**31/3/2012**	**7/5/2013**
218	**Possession of Site**	**1 day**	**31/3/2012**	**31/3/2012**
219	**Site clearance**	**30 days**	**31/3/2012**	**11/5/2012**
220	Setting out	15 days	12/5/2012	29/5/2012
221	Utilies detection	7 days	30/5/2012	6/6/2012
222	**Utility Diversion**	**20 days**	**14/9/2012**	**9/10/2012**
223	Liasion with villagers	45 days	30/5/2012	23/7/2012
224	**Reprovisioning of existing boundary fence for private lots**	30 days	24/7/2012	27/8/2012
225	**Landscaping Works**	**271 days**	**30/5/2012**	**27/4/2013**
226	1. Tree Survey	30 days	30/5/2012	5/7/2012
227	2. Tree felling	60 days	6/7/2012	13/9/2012
228	3. Transplant	90 days	6/7/2012	20/10/2012
229	4. Compensatory planting	89 days	7/1/2013	27/4/2013
230	**Transition Section**	226 days	6/7/2012	10/4/2013
231	Gabion Wall Channel	162 days	14/9/2012	5/4/2013
232	**Box Culvert**	172 days	14/9/2012	17/4/2013
233	**Vehicular Crossings**	92 days	14/9/2012	5/1/2013
234	**Pedestrian Crossing FBM05-1 (S7)**	52 days	7/1/2013	11/3/2013
235	**Parapet**	34 days	12/3/2013	24/4/2013
236	**Type 2 railing**	16 days	18/4/2013	7/5/2013

Project No: DC/2011/06
Master Programme: MP03
Date: 15-11-2012

progress | Split | Summary | Project Summary | Duration-only | Manual Summary | Critical | Critical Split | Progress

ANNEX E

IMPACT MONITORING SCHEDULE

IMPACT MONITORING SCHEDULE FOR THE REPORTING PERIOD

Date		Noise	Air Quality		Water Quality
			1-Hour TSP	24-Hour TSP	
Sat	1-Feb-14				
Sun	2-Feb-14				
Mon	3-Feb-14				
Tue	4-Feb-14				
Wed	5-Feb-14				
Thu	6-Feb-14				
Fri	7-Feb-14				
Sat	8-Feb-14				
Sun	9-Feb-14				
Mon	10-Feb-14				
Tue	11-Feb-14				
Wed	12-Feb-14				
Thu	13-Feb-14				
Fri	14-Feb-14				
Sat	15-Feb-14				
Sun	16-Feb-14				
Mon	17-Feb-14				
Tue	18-Feb-14				
Wed	19-Feb-14				
Thu	20-Feb-14				
Fri	21-Feb-14				
Sat	22-Feb-14				
Sun	23-Feb-14				
Mon	24-Feb-14				
Tue	25-Feb-14				
Wed	26-Feb-14				
Thu	27-Feb-14				
Fri	28-Feb-14				

	Monitoring Day
	Sunday or Public Holiday

IMPACT MONITORING SCHEDULE FOR THE NEXT MONITORING PERIOD

Date		Noise	Air Quality		Water Quality
			1-Hour TSP	24-Hour TSP	
Sat	1-Mar-14				
Sun	2-Mar-14				
Mon	3-Mar-14				
Tue	4-Mar-14				
Wed	5-Mar-14				
Thu	6-Mar-14				
Fri	7-Mar-14				
Sat	8-Mar-14				
Sun	9-Mar-14				
Mon	10-Mar-14				
Tue	11-Mar-14				
Wed	12-Mar-14				
Thu	13-Mar-14				
Fri	14-Mar-14				
Sat	15-Mar-14				
Sun	16-Mar-14				
Mon	17-Mar-14				
Tue	18-Mar-14				
Wed	19-Mar-14				
Thu	20-Mar-14				
Fri	21-Mar-14				
Sat	22-Mar-14				
Sun	23-Mar-14				
Mon	24-Mar-14				
Tue	25-Mar-14				
Wed	26-Mar-14				
Thu	27-Mar-14				
Fri	28-Mar-14				
Sat	29-Mar-14				
Sun	30-Mar-14				
Mon	31-Mar-14				

	Monitoring Day
	Sunday or Public Holiday

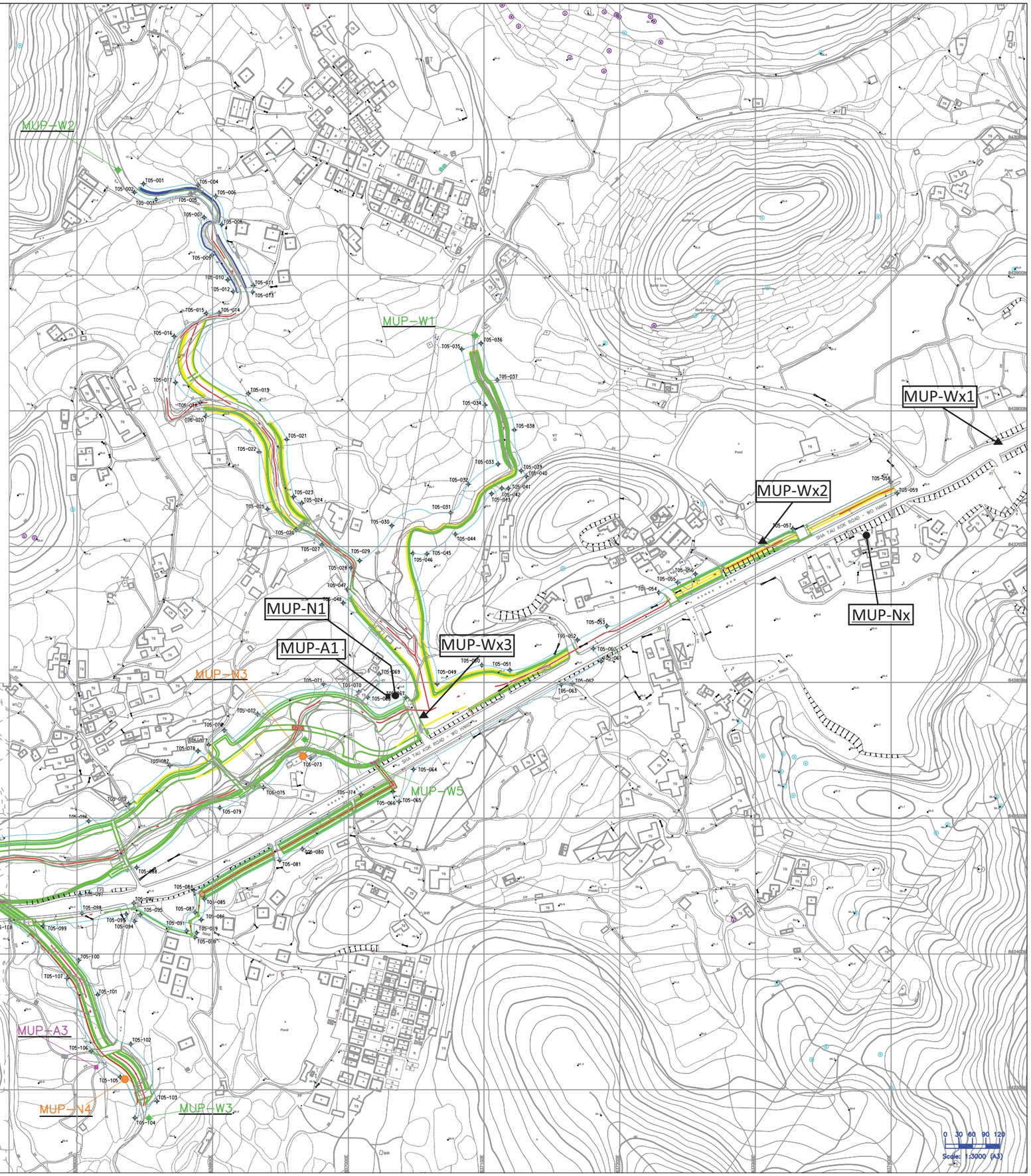
ANNEX F

MONITORING LOCATIONS

Location Plan for Environmental Monitoring Station

Legend:

● MUP-N1	**Air Quality Monitoring Location**
■ MUP-A1	**Construction Noise Monitoring Location**
▲ MUP-Wx1	**Water Quality Monitoring Location**



ANNEX G

MONITORING EQUIPMENT CALIBRATION CERTIFICATES

*MONITORING EQUIPMENT CALIBRATION CERTIFICATES**

Items	Aspect	Description of Equipment	Date of Calibration	Date of Next Calibration
1	Air	TSP Sampler Calibration Spreadsheet for MUP-A1	23 Dec 13	23 Mar 14
2		Calibration Kit (Serial No. 0438320)	09 Apr 13	09 Apr 14
3		Laser Dust Monitor, Model LD-3B (Serial No. 366407)	17 Jun 13	17 Jun 14
4	Noise	Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2337676)	20 May13	20 May 14
5		NL-31 Rion Sound Level Meter (Serial No. 00410221)	8 Mar 13	8 Mar 14
6		Bruel & Kjaer 4231 Acoustical Calibrator EQ081 (Serial number 2326408)	15 Apr 13	15 Apr 14
*7	Water	YSI Professional Plus (Serial No. 10G101946)	03 Jan 14	03 Apr 14
8		Hach 2100Q (Serial No. 12060C018266)	15 Jan 14	15 Apr 14

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.*

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F: +852 2610 2021
www.alsglobal.com

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	**WORK ORDER:**	HK1336477
CLIENT:	ACTION UNITED ENVIRO SERVICES	**LABORATORY:**	HONG KONG
ADDRESS:	RM A 20/F., GOLDEN KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T., HONG KONG	**DATE RECEIVED:**	30/12/2013
		DATE OF ISSUE:	03/01/2014
PROJECT:	--		

COMMENTS

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

Scope of Test:	Dissolved Oxygen, pH, Salinity and Temperature
Equipment Type:	YSI PROFESSIONAL PLUS
Brand Name:	YSI
Model No.:	YSI PROFESSIONAL PLUS
Serial No.:	10G101946
Equipment No.:	--
Date of Calibration:	03 January, 2014

NOTES

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

Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1336477
Date of Issue: 03/01/2014
Client: ACTION UNITED ENVIRO SERVICES

Equipment Type: YSI PROFESSIONAL PLUS
Brand Name: YSI
Model No.: YSI PROFESSIONAL PLUS
Serial No.: 10G101946
Equipment No.: --
Date of Calibration: 03 January, 2014 Date of next Calibration: 03 April, 2014

Parameters:

Dissolved Oxygen

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.96	4.84	-0.12
7.76	7.67	-0.09
9.02	9.04	0.02
	Tolerance Limit (±mg/L)	0.20

pH Value

Method Ref: APHA 21st Ed. 4500H:B

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.02	0.02
7.0	7.08	0.08
10.0	9.91	-0.09
	Tolerance Limit (±pH unit)	0.20

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0	--
10	9.03	-9.7
20	18.38	-8.1
30	27.63	-7.9
	Tolerance Limit (±%)	10.0

Temperature

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

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
6.0	6.4	0.4
20.0	20.2	0.2
42.0	42.3	0.3
	Tolerance Limit (±°C)	2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

ANNEX H

EVENT/ ACTION PLAN

Table 2.4
Event/Action Plan for Air Quality

EVENT	ACTION			
	ET Leader	**IEC**	**ER**	**Contractor**
ACTION LEVEL				
1. Exceedance for one sample	1. Identify source 2. Inform IEC, ER and Contractor 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily	1. Check monitoring data submitted by ET Leader 2. Check Contractor's working method	1. Notify Contractor	1. Rectify any unacceptable practice 2. Amend working methods if appropriate
2. Exceedance for two or more consecutive samples	1. Identify source 2. Inform IEC, ER and Contractor 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Discuss with IEC, Contractor and ER on remedial actions required 6. If exceedance continue, arrange meeting with IEC, ER and Contractor 7. If exceedance stops, cease additional monitoring	1. Checking monitoring data submitted by ET Leader. 2. Check Contractor's working method 3. Discuss with ET Leader and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervise implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial measures properly implemented	1. Submit proposals for remedial actions to IEC and ER within 3 working days of notification 2. Implement the agreed proposals 3. Amend proposal if appropriate
LIMIT LEVEL				
1. Exceedance for one sample	1. Identify source 2. Inform IEC, ER, EPD and Contractor 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Assess effectiveness of Contractor's remedial actions and kept IEC, EPD and ER informed of the results	1. Check monitoring data submitted by ET Leader 2. Check Contractor's working method 3. Discuss with ET Leader and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Audit implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial measures properly implemented	1. Take immediate action to avoid for the exceedance 2. Submit proposals for remedial actions to IEC and ER within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
2. Exceedance for two or more consecutive samples	1. Notify IEC, ER, Contractor and EPD 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Arrange meeting with IEC, Contractor and ER to discuss the remedial actions to be taken 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 leader 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. Audit the implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. In consultation with IEC, agree with the Contractor on the remedial measures to be implemented 4. Ensure remedial measures properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Take immediate action to avoid for the exceedance 2. Submit proposals for remedial actions to IEC and ER 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 abate.

Table 3.3 Event/Action Plan for Construction Noise Monitoring

EVENT	ACTION			
	ET Leader	**IEC**	**ER**	**Contractor**
Action Level	1. Notify IEC, Contractor and ER 2. Carry out investigation and identify source 3. Report the results of investigation to the IEC, Contractor and ER 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency 6. Check compliance to Action/Limit Levels after application of mitigation measures	1. Review the analysed results submitted by the ET Leader 2. Review the proposed remedial measures by the Contractor and advise the ER & ET accordingly 3. Review the implementation of remedial measures	1. Confirm receipt of notification of complaint in writing 2. Notify Contractor 3. Check monitoring data submitted by the ET 4. Require Contractor to propose remedial measures for the analysed noise problem 5. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to ER and IEC within three working 2. Liaise with the ER to ensure the effectiveness of the agreed mitigation 3. Amend proposal if required 4. Implement noise mitigation proposals
Limit Level	1. Notify IEC, ER, EPD and Contractor 2. Identify Source 3. Repeat measurement 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 & 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. Check monitoring data submitted by ET 2. Discuss amongst ER, ET Leader and Contractor on the potential remedial actions 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER & ET accordingly 4. Audit the implementation of remedial measures	1. Confirm receipt of notification of exceedance 2. Notify Contractor 3. Check monitoring data submitted by the ET 4. Require Contractor to propose remedial measures for the analysed noise problem 5. Discuss with ET, IEC and Contractor on proposed remedial actions to be implemented 6. Ensure remedial measures are properly implemented 7. Assess the effectiveness of the remedial actions and keep the Contractor informed 8. 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 ER within 3 working days of notification 3. Liaise with the ER to ensure the effectiveness of the agreed mitigation 4. Amend proposal if required 5. Implement the agreed proposals 6. Resubmit proposals if problem still not under control 7. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Table 4.6 Event and Action Plan for Water Quality

Event	ET Leader	IEC	ER	Contractor
Action Level being exceeded by one sampling day	1. Repeat in-site measurement to confirm findings. 2. Identify source(s) of impact. 3. Inform IEC an Contractor. 4. Check monitoring data, all plant, equipment and Contractor's working methods. 5. Discuss mitigation measures with IEC and Contractor. 6. Repeat measurement on next day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures. 2. Review proposals on mitigation measures. submitted by Contractor and advise the ER accordingly. 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures. 2. Make agreement on the mitigation measures to be implemented. 3. Assess effectiveness of the implemented mitigation measures.	1. Inform the ER and confirm notification of the non-compliance in writing. 2. Rectify unacceptable practice. 3. Check all plant and equipment. 4. Consider changes of working methods. 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER. 6. Implement the agreed mitigation measures.
Action Level being exceeded by more than one consecutive sampling days	1. Repeat in-situ measurement to confirm findings; 2. Identify source(s) of impact. 3. Inform IEC and Contractor. 4. Check monitoring data, all plant, equipment and Contractor's working methods. 5. Discuss mitigation measures with IEC and Contractor. 6. Ensure mitigation measures are implemented. 7. Prepare to increase the monitoring frequency to daily. 8. Repeat measurement on next day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures. 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly. 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures. 2. Make agreement on the mitigation measures to be implemented. 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform the ER and confirm notification of the non-compliance in writing. 2. Rectify unacceptable practice. 3. Check all plant and equipment. 4. Consider changes of working methods. 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER within 3 working days. 6. Implement the agreed mitigation measures.
Limit Level being exceeded by one sampling day	1. Repeat in-situ measurement to confirm findings. 2. Identify source(s) of impact. 3. Inform IEC, contractor and EPD. 4. Check monitoring data, all plant, equipment and Contractor's working methods. 5. Discuss mitigation measures with IEC, ER and Contractor. 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit Level.	1. Discuss with ET and Contractor on the mitigation measures. 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly. 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures. 2. Request Contract to critically review the working methods. 3. Make agreement on the mitigation measures to be implemented. 4. Assess the effectiveness of the implemented mitigation measures.	1. Inform the ER and confirm notification of the non-compliance in writing. 2. Rectify unacceptable practice. 3. Check all plant and equipment. 4. Consider changes of working methods. 5. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 3 working days. 6. Implement the agreed mitigation measures.

ANNEX I

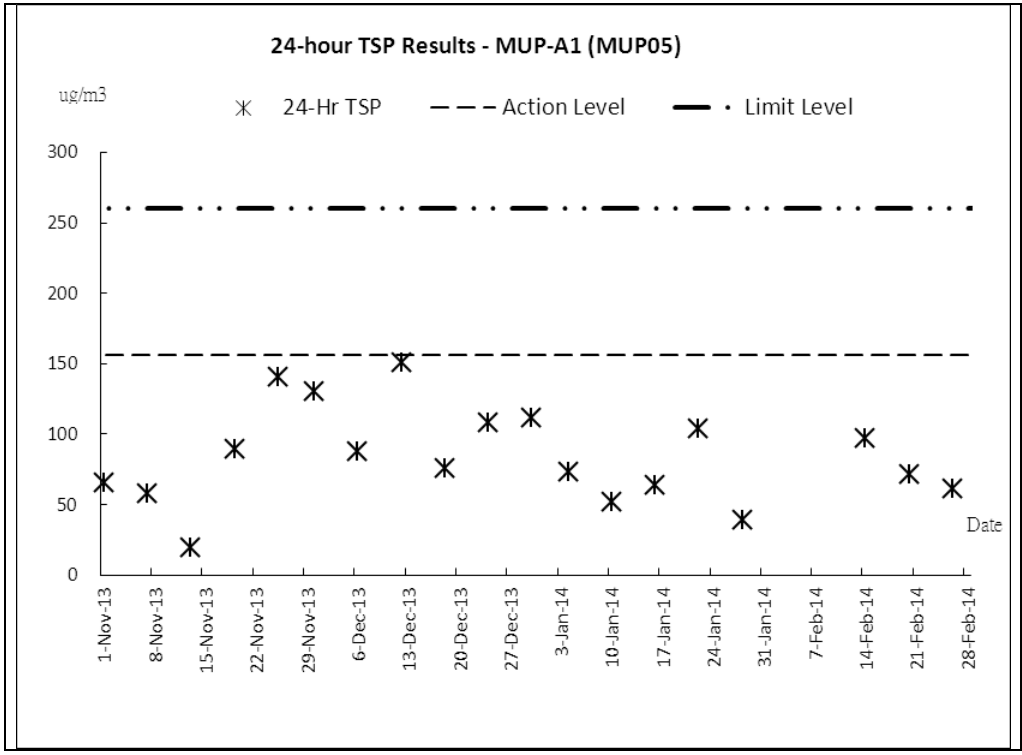
24-HR TSP DATA
AND
GRAPHICAL PLOTS OF ENVIRONMENTAL MONITORING RESULTS

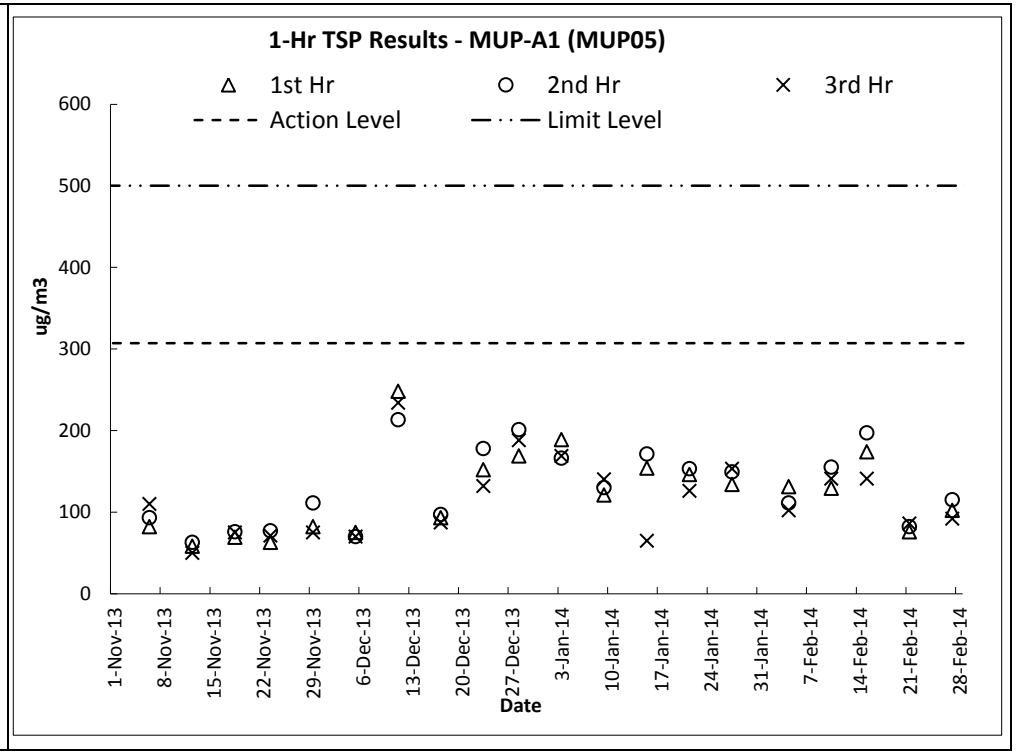
A) AIR QUALITY
B) CONSTRUCTION NOISE
C) WATER QUALITY

24-HR TSP DATA

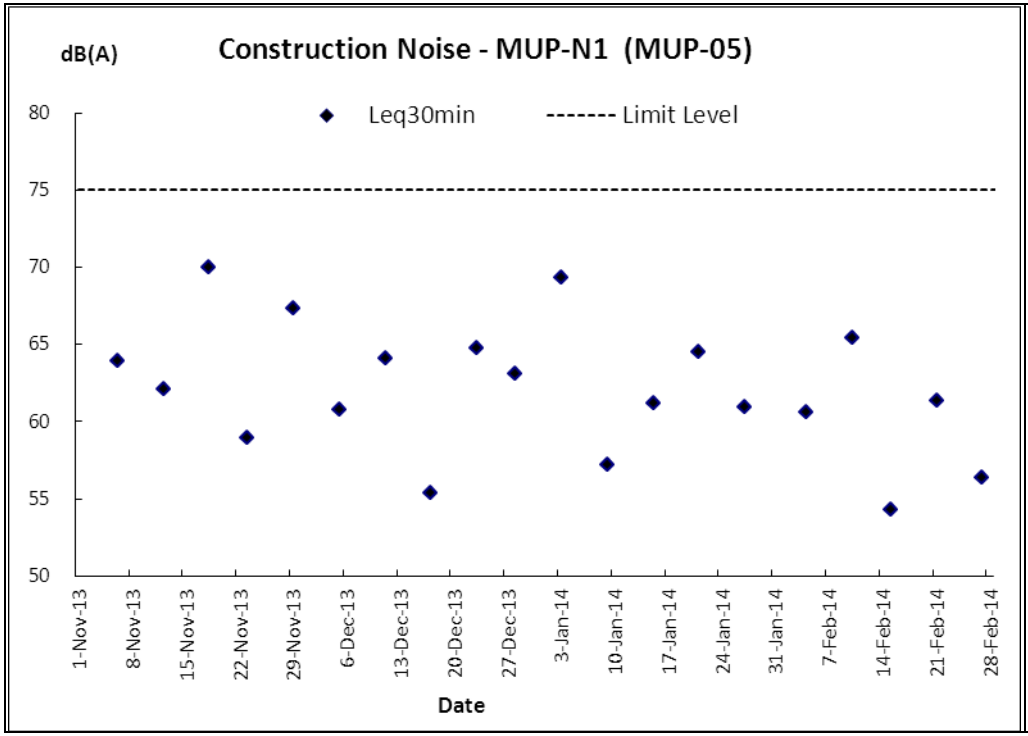
DATE	SAMPLE NUMBER	ELAPSED TIME			CHART READING			AVG TEMP (℃)	STANDARD			FILTER WEIGHT (g)		WEIGHT DUST COLLECTED (g)	24-hr TSP in air (μg/m³)
		INITIAL	FINAL	(min)	MIN	MAX	AVG		AVG PRESS (hPa)	FLOW RATE (m3/min)	AIR VOLUME (std m3)	INITIAL	FINAL		
4-Feb-14	Power	failure													
8-Feb-14	Power	failure													
14-Feb-14	26394	5702.62	5726.74	1447.20	38	39	38.5	17.3	1017.3	1.2409	1795.87	2.7214	2.8954	0.1740	97
20-Feb-14	26447	5748.34	5771.41	1384.20	38	39	38.5	16.7	1018.3	1.2426	1720.01	3.5495	3.6723	0.1228	71
26-Feb-14	26471	5771.41	5794.32	1374.60	36	37	36.5	16.9	1018.2	1.1852	1629.15	2.7052	2.8052	0.1000	61

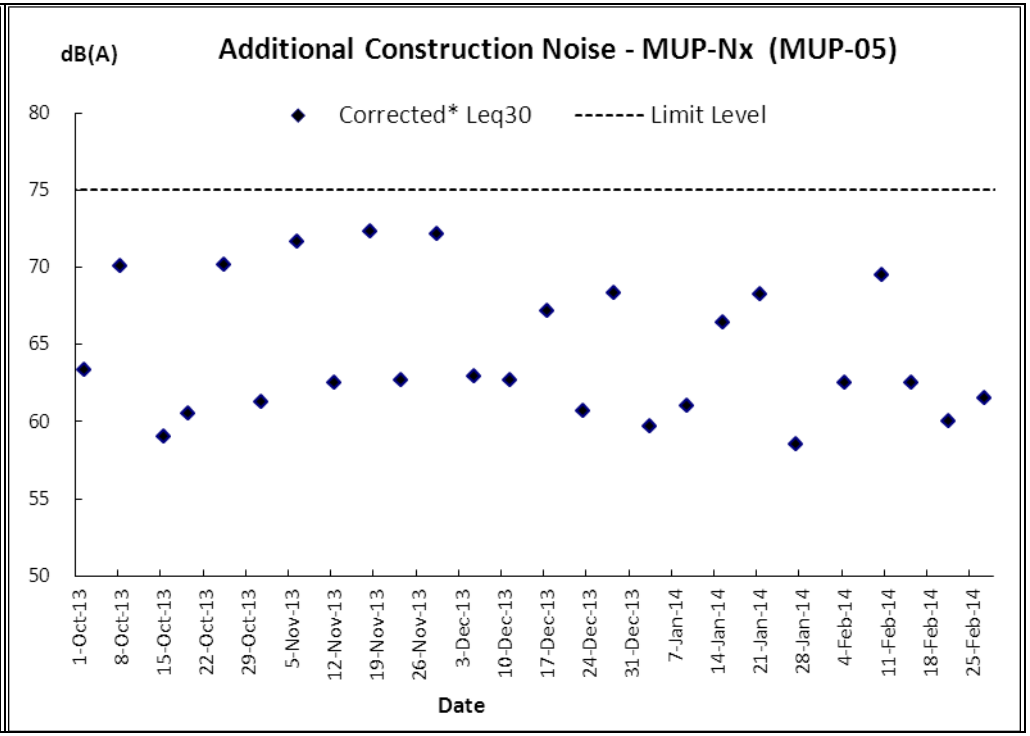
A) AIR QUALITY



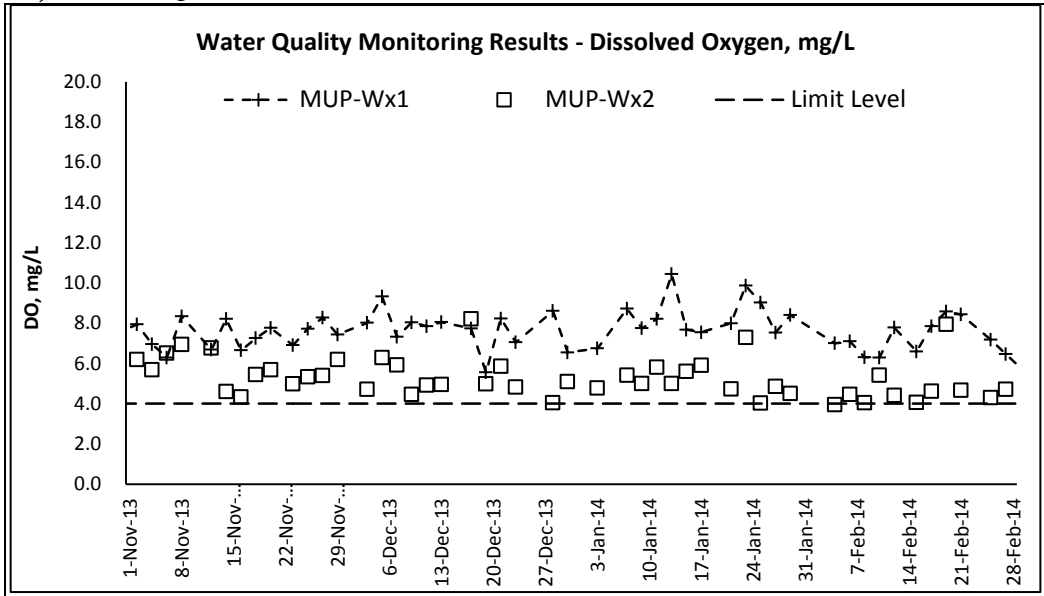


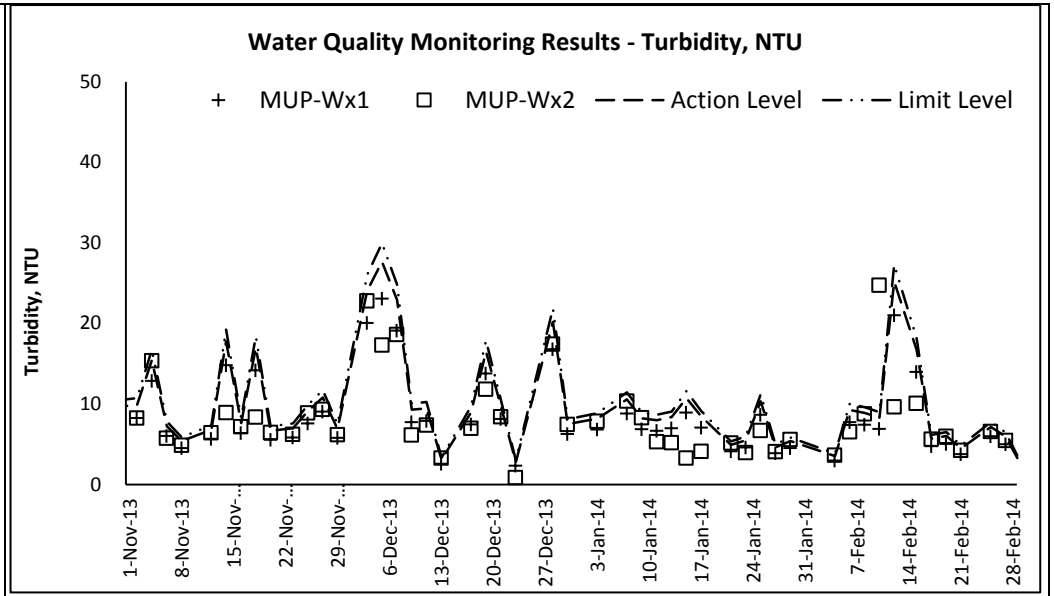
B) ***CONSTRUCTION NOISE***

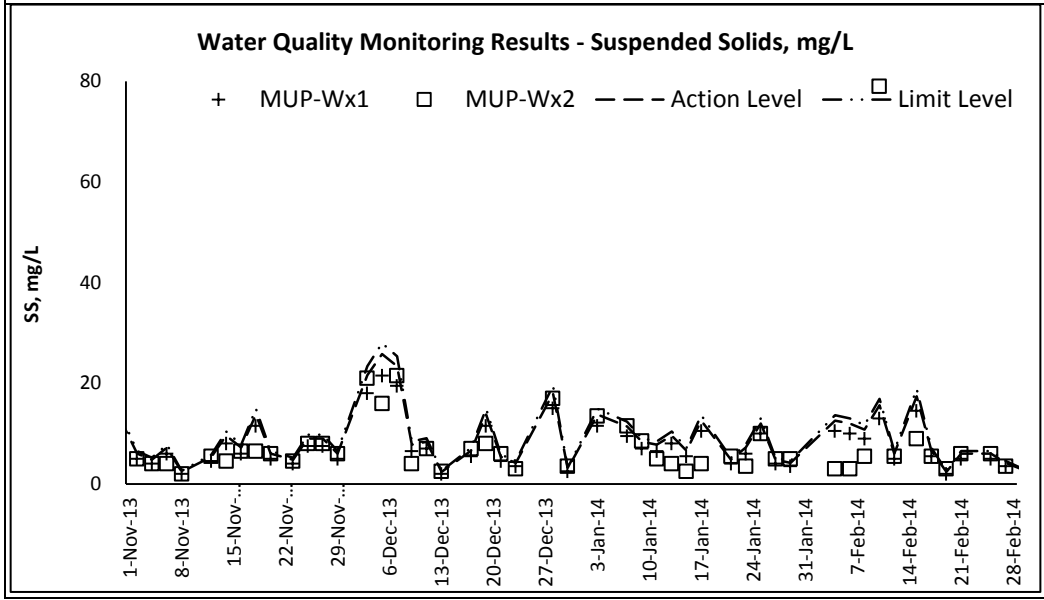


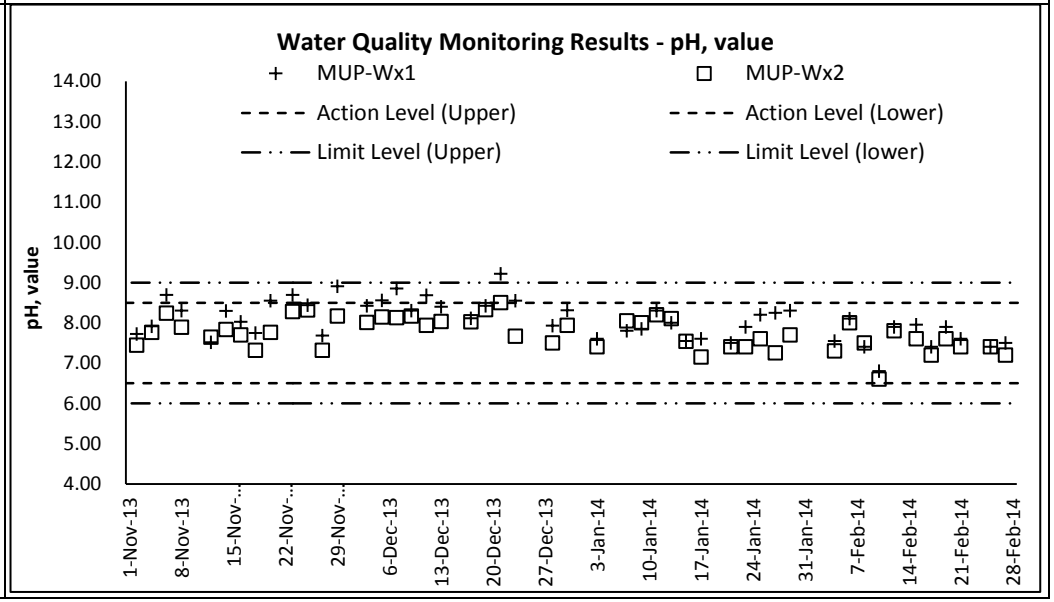


C) ***WATER QUALITY***









ANNEX J

METEOROLOGICAL DATA

Meteorological Data from HKO for the Reporting Period

Date		Weather	Total Rainfall (mm)	Ta Kwu Ling			
				Mean Air Temp. (°C)	Wind Speed (km/h)	Mean Relative Humidity (%)	Wind Direction
1-Feb-14	Sat	Warm with sunny periods during the day. Light to moderate east to southeasterly winds.	0	19.7	6.5	70.5	E/NE
2-Feb-14	Sun	Warm with sunny periods during the day. Light to moderate east to southeasterly winds.	0	19.2	6	70.5	W/SW
3-Feb-14	Mon	Cloudy with a few rain patches. Fresh easterly winds, strong at times.	0	19.1	5	68.7	N/NW
4-Feb-14	Tue	Cloudy. One or two rain patches later. Moderate to fresh easterly winds, strong at times.	Trace	17.2	9.7	78.5	E/SE
5-Feb-14	Wed	Cloudy with one or two rain patches. Fresh easterly winds, strong at times.	Trace	18.1	10.5	73.2	E
6-Feb-14	Thu	Mainly cloudy. Sunny intervals in the afternoon. Moderate easterly winds.	Trace	20	8.5	77.7	E
7-Feb-14	Fri	Cloudy, mist ,sunny periods. Light to moderate easterly winds.	Trace	20.7	8.8	81.2	E
8-Feb-14	Sat	Cold and cloudy with a few rain patches. Fresh northerly winds.	0.3	15.3	16.2	91	E/SE
9-Feb-14	Sun	Cold and cloudy with a few rain patches. Fresh northerly winds.	13.1	11.8	10.9	84.7	W/NW
10-Feb-14	Mon	Cold and cloudy with a few rain patches. Fresh northerly winds.	0.3	7	18.8	70	N
11-Feb-14	Tue	Cold, cloudy, rain.Moderate to fresh north to northeasterly winds.	Trace	6.1	14	58.7	N
12-Feb-14	Wed	Cold, cloudy to overcast with a few rain patches. Moderate northeasterly winds.	0.4	8.3	6.2	79	N
13-Feb-14	Thu	Cloudy, very cold. Moderate to fresh north to northeasterly winds	21.4	6.8	10.4	84.5	N/NW
14-Feb-14	Fri	Dry, sunny periods, Mainly cloudy, cold. Moderate to fresh north to northeasterly winds.	0	10.4	13.7	55	N
15-Feb-14	Sat	Dry, sunny periods, Mainly cloudy, cold. Moderate to fresh north to northeasterly winds.	Trace	9.6	6.5	60.7	E
16-Feb-14	Sun	Cloudy, very cold. Moderate to fresh north to northeasterly winds	Trace	14.5	11.7	82.5	E/SE
17-Feb-14	Mon	Humid with fog. Sunny intervals at first. Moderate northerly winds.	0	19.3	8.8	84	E/SE
18-Feb-14	Tue	Humid with fog. Sunny intervals at first. Moderate northerly winds.	Trace	16.8	9.7	83.5	W/SW
19-Feb-14	Wed	Cloudy and cold. A few rain patches at first. Fresh to strong northerly winds.	3.8	8.3	13.7	72	N
20-Feb-14	Thu	Sunny periods, mainly cloudy. Fresh easterly winds, strong at times.	0	20.6	7	57.5	E/SE
21-Feb-14	Fri	Sunny periods, mainly cloudy. Fresh easterly winds, strong at times.	0	11.3	8.3	72.7	E/NE
22-Feb-14	Sat	Sunny periods, mainly cloudy. Fresh easterly winds, strong at times.	0.2	15.3	9.1	62.2	E
23-Feb-14	Sun	Mainly cloudy with a few light rain patches at first. Moderate easterly winds.	0	17.4	11.4	67.5	E/NE
24-Feb-14	Mon	Mainly cloudy with a few light rain patches at first. Moderate easterly winds.	Trace	18	11.8	71.5	E
25-Feb-14	Tue	Mainly cloudy with a few light rain patches at first. Moderate easterly winds.	0	19.7	11.7	77	E
26-Feb-14	Wed	Sunny periods, cloudy, rain. Moderate east to northeasterly winds.	Trace	21.4	5.5	80	E/SE
27-Feb-14	Thu	Sunny periods, cloudy, rain. Moderate east to northeasterly winds.	0	20.4	10	84	E
28-Feb-14	Fri	Sunny periods, cloudy, rain. Moderate east to northeasterly winds.	Trace	18.9	12.8	80.2	E/SE

ANNEX K

WASTE FLOW TABLE AND SUMMARY OF WORKS PROCESSES OR ACTIVITIES REQUIRING TIMBER FOR TEMPORARY WORKS

Name of Department: CEDD

Monthly Summary Waste Flow Table for 2014

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics	Chemical Waste	Others, e.g. general refuse
	(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	0	0	0	0	0	16.571	0	0	0	0	0.85
FEB	**0**	**0**	**0**	**0**	**0**	**18.672**	**0**	**0**	**0**	**0**	**0.005**
MAR											
APRIL											
MAY											
JUN											
Sub Total	0	0	0	0	0	35.243	0	0	0	0	0.855
JUL											
AUG											
SEP											
OCT											
NOV											
DEC											
Total	0	0	0	0	0	35.24	0	0	0	0	0.855

Notes:

Summary Table for Work Processes or Activities Requiring Timber for Temporary Works

Contract No.: **DC/2011/06**

Contract Title: ***Reprovisioning of Boundary Patrol Road and Associated Security Facilities between Ping Yuen River and Pak Fu Shan and Drainage Works in North District***

Report Period: Feb-14

Item No	Description of Works Process or Activity [see note (a) below]	Justifications for Using Timber in Temporary Construction Works	Est. Quantities of Timber Used (m^3)	Actual Quantities used (m^3)	Remarks
1	Transition formwork & falsework (Portion A,B,E)	Temperary formwork & falsework design	10	9	
2	Transition formwork & falsework (Portion A,B,C)	Temperary formwork & falsework design	25	18	
3	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	52	40	
4	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	77	72	
5	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	102	86	
6	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	115	103	
7	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	121	112	
8	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	145	139	

Notes

(a) The Contractor shall list out all the work items requiring timber for use in temporary construction works. Several minor work items may be grouped into one for ease of updating.

(b) The summary table shall be submitted to the Engineer's Representative monthly together with the Waste Flow Table for review and monitoring

Summary Table for Work Processes or Activities Requiring Timber for Temporary Works

Contract No.: **DC/2011/06**

Contract Title: ***Reprovisioning of Boundary Patrol Road and Associated Security Facilities between Ping Yuen River and Pak Fu Shan and Drainage Works in North District***

Report Period: Feb-14

Item No	Description of Works Process or Activity [see note (a) below]	Justifications for Using Timber in Temporary Construction Works	Est. Quantities of Timber Used (m^3)	Actual Quantities used (m^3)	Remarks
9	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	154	151	
10	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	156	155	
11	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	157	156	
12	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	160	157	
13	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	160	157	
14	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	171	166	
15	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	178	173	
16	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	191	186	

Notes

(a) The Contractor shall list out all the work items requiring timber for use in temporary construction works. Several minor work items may be grouped into one for ease of updating.

(b) The summary table shall be submitted to the Engineer's Representative monthly together with the Waste Flow Table for review and monitoring

Summary Table for Work Processes or Activities Requiring Timber for Temporary Works

Contract No.: **DC/2011/06**

Contract Title: ***Reprovisioning of Boundary Patrol Road and Associated Security Facilities between Ping Yuen River and Pak Fu Shan and Drainage Works in North District***

Report Period: Feb-14

Item No	Description of Works Process or Activity [see note (a) below]	Justifications for Using Timber in Temporary Construction Works	Est. Quantities of Timber Used (m^3)	Actual Quantities used (m^3)	Remarks
17	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	200	194	
18	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	205	201	
19	Transition formwork & falsework (Portion A,B,C,E)	Temperary formwork & falsework design	215	212	

Notes

(a) The Contractor shall list out all the work items requiring timber for use in temporary construction works. Several minor work items may be grouped into one for ease of updating.

(b) The summary table shall be submitted to the Engineer's Representative monthly together with the Waste Flow Table for review and monitoring