



PROJECT NO.: TCS/00409/08

**DRAINAGE IMPROVEMENTS WORKS IN TAI PO
 TIN, PING CHE, MAN UK PIN AND LIN MA HANG**

**6TH QUARTERLY EM&A SUMMARY REPORT –
 FOR THE DESIGNATED WORKS UNDER THE
 PROJECT – CHANNELS MUP03A&B,
 MUP04A&B, MUP05 AND LMH01
 JUNE 2010 – AUGUST 2010**

**PREPARED FOR
 CHIU HING CONSTRUCTION &
 TRANSPORTATION COMPANY LIMITED**

Quality Index

Date	Reference No.	Prepared By	Certified by
29 September 2010	TCS00409/08/600/R0847v2	 Ray Cheung Assistant Environmental Consultant	 T.W. Tam Environmental Team Leader

Version	Date	Prepared by:	Certified by:	Description
1	15 September 2010	Ray Cheung	T.W. Tam	First submission
2	29 September 2010	Ray Cheung	T.W. Tam	Amended against IEC's comments on 20 Sep 10

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ENVIRON

Ref.: DSDFANLGEM01_0_0802L.10

29 September 2010

By Fax (26598323) and By Post

Engineer's Representative Office
Black & Veatch Hong Kong Ltd
503 Tai Po Tin, Ta Kwu Ling
Fanling, New Territories

Attention: Mr. Gilbert Ying

Dear Mr. Ying,

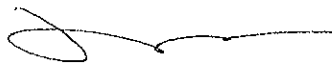
**Re: Contract No. DC/2007/08
Drainage Improvement Works at Tai Po Tin, Ping Che,
Man Uk and Lin Ma Hang
The Sixth Quarterly EM&A Summary Report for Channels MUP03A&B,
MUP04A&B, MUP05 and LMH01 for June 2010 – August 2010 (Rev. 2)**

Reference is made to the revised electronic copy of the Sixth Quarterly EM&A Summary Report for the Designated Project Channels MUP03A&B, MUP04A&B, MUP05 and LMH01 for June 2010 – August 2010 (Rev. 2) by the Environmental Team that was received by email on 29 September 2010, we would like to inform that we have no comment on the captioned report.

Please also note that the Quarterly EM&A Summary Report had been verified.

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

Yours sincerely,



David Yeung
Independent Environmental Checker

c.c. AUES

Attn: Mr. T.W.Tam

Fax: 29596079

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EXECUTIVE SUMMARY

- ES.01. Chiu Hing Construction & Transportation Company Limited (CHCT) was awarded the *Contract No. DC/2007/08 Drainage Improvement Works at Tai Po Tin, Ping Che, Man Uk Pin and Lin Ma Hang* by the Drainage Services Department (DSD). The project involves construction of many river channels; some classified as Designated Projects (DP) and some Non-Designated Projects (Non-DP) under the *Environmental Impact Assessment Ordinance* (Cap.499).
- ES.02. The Action-United Environmental Services and Consulting Co. Ltd. (AUES) was commissioned by CHCT to be the Environmental Team (ET) to implement an Environmental Monitoring & Audit (EM&A) programme. Findings are reported to the Environmental Protection Department (EPD) for record in a series of monthly reports and further summarized into quarterly and annual reports regularly.
- ES.03. For ease of reporting, it has been agreed among the Engineering Representative (ER), the Independent Environmental Checker (IEC), CHCT, ET and EPD that the EM&A report should be split into the following two stand-alone documents:
- EM&A Report for the Designated Projects – Channels MUP03A&B, MUP04A&B, MUP05 and LMH01 (under *Environmental Permit No.EP277/2007/A*)
 - EM&A Report for the Non-designated Projects - Channels TKL02, TKL07, MUP01 and MUP02 (without the need for an Environmental Permit).
- ES.04. This is the **6th Quarterly** EM&A Report highlighting the EM&A results for the DP works. It covers a period of time from **26 May 2010 to 25 August 2010** and contains information in five key issues: air quality, construction noise, water quality, ecology and waste management.
- ES.05. A summary of the monitoring activities undertaken in this quarter is listed below:

<u>Environmental Issues</u>	<u>MUP 03A&B, MUP 04A&B& MUP05</u>	<u>LMH01 (not yet commenced)</u>
• 1-hour TSP Monitoring	48 Events	0 Event
• 24-hour TSP Monitoring	*23 Events	0 Event
• Noise Monitoring	64 Events	0 Event
• Water Quality Monitoring	40 Monitoring Days	0 Monitoring Day
• Ecology	13 Monitoring Day	0 Monitoring Day
• Site Inspection Audit	13 Occasions	0 Occasion

* Power failure occurred on 6, 24, 30 June at MUP-A1, 13, 19, 24, 30 July at MUP-A3 and MUP-A2 throughout the quarter. We have liaised with Contractor to rectify the power problem as soon as possible.

- ES.06. For air quality and construction noise, monitoring results demonstrated no exceedance of relevant Action and Limit Levels. No NOE or associated corrective actions were, therefore, required.
- ES.07. However, total of 5 water quality criterion exceedances: 5 Limit Level exceedances of Suspended Solids were recorded. Based on the investigation reports, all exceedances were considered not related to the works of the Project. No associated corrective actions were therefore required.

Summary of Monitoring Exceedances

Environmental Issues	Parameters	Compliance %	Investigation & Corrective Actions
		MUP	
Air Quality	24-hour TSP	100%	No need, due to 100% compliance
	1-hour TSP	100%	No need, due to 100% compliance
Noise	Leq (30min) Daytime	100%	No need, due to 100% compliance
Water Quality	Suspended Solids	96.8%	Exceedances not related to Project
	Turbidity	100%	No need, due to 100% compliance
	Dissolved Oxygen	100%	No need, due to 100% compliance
	pH	100%	No need, due to 100% compliance

ES.08. No complaint, notification of summons or successful prosecution was received in any form, written or verbal, for any media during this quarter. No adverse environmental impacts were observed during the weekly site inspections and environmental audits, which indicated that the implemented mitigation measures for air quality, construction noise, water quality and ecology were effective. Minor deficiencies found in the weekly site inspections and audits were in general rectified within the specified deadlines. The overall environmental performance of the Project was, therefore, considered satisfactory.

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1 INTRODUCTION

BASIC PROJECT BACKGROUND

- 1.1 Chiu Hing Construction & Transportation Company Limited (CHCT) was appointed by the Drainage Services Department (DSD) to perform a contract – Contract No. DC/2007/08 Drainage Improvement Works at Tai Po Tin, Ping Che, Man Uk Pin and Lin Ma Hang (the Project). Total construction time is approximately 32 months.
- 1.2 The Project involves construction of various river channels: some classified as Designated Project (DP) and some Non-designated Project (Non-DP) under the Environmental Impact Assessment Ordinance (Cap. 499), as summarized in **Table 1-1**.
- 1.3 This report covers the DP works for Channels MUP03A&B, MUP04A&B, MUP05 and LMH01 only. A set of location plans showing all DP works covered in this report are illustrated in **Appendix A**.

Table 1-1 Summary of the Channels under the Project

Channel ID	Location	Designated / Non-Designated
TKL02	Tai Po Tin	Non-Designated
TKL07	Ping Che / Ta Kwu Ling	Non-Designated
MUP01	Man Uk Pin	Non-Designated
MUP02		Non-Designated
MUP03A and MUP03B		Designated (EP277/2007/A)
MUP04A and MUP04B		Designated (EP277/2007/A)
MUP05		Designated (EP277/2007/A)
LMH01	Lin Ma Hang	Designated (EP277/2007/A)

- 1.4 For effective implementation of mitigation measures recommended in the Environmental Study Report (the ‘ES’), the *Environmental Monitoring and Audit Manual - Designated and EM&A Manual - Non-designated* (EM&A Manual) have been prepared to guide the setup of the EM&A program for construction activities under the Project.
- 1.5 This is the **6th Quarterly** EM&A Report covering a period of time from **26 May 2010** to **25 August 2010** (the Reporting Period). This Report presents the monitoring results of air quality, construction noise, water quality and ecology for the DP works at Channel MUP03A&B, MUP04A&B, MUP05 and LMH01 under the Environmental Monitoring & Audit Manual [382486/83/Issue2].

REPORT STRUCTURE

- 1.6 This **6th** quarterly EM&A report has been written in accordance with the requirements set out in the EM&A Manual to contain the following:
- Executive summary;
 - Basic project information;
 - Environmental status;
 - Summary of EM&A requirements;
 - Implementation status;
 - Monitoring results;
 - Non-Compliance, complaints, notifications of summons and successful prosecutions; and
 - Others: future key environmental issues; comments; recommendations and conclusions.

2 PROJECT ORGANISATION AND CONSTRUCTION PROGRESS

ENVIRONMENTAL MANAGEMENT ORGANIZATION

- 2.1 The organization chart and lines of communication with respect to the on-site environmental management and the management structure are shown in *Appendix B*.

WORKS UNDERTAKEN DURING THE REPORTING PERIOD

- 2.2 Major construction activities implemented during the Reporting Period were:

26 May 2010 to 25 June 2010

<u>Channel</u>	<u>Construction Work Activities</u>
MUP03A&B, MUP04A&B; and MUP05	<ul style="list-style-type: none"> • Survey setting out • Construction of site access • Site clearance • Construction of retaining wall, access ramps and gabion wall
LMH01	Not yet commenced

26 June 2010 – 25 July 2010

<u>Channel</u>	<u>Construction Work Activities</u>
MUP03A&B, MUP04A&B; and MUP05	<ul style="list-style-type: none"> • Survey setting out • Construction of site access • Site clearance • Construction of access ramp, retaining wall and gabion wall
LMH01	Not yet commenced

26 July 2010 – 25 August 2010

<u>Channel</u>	<u>Construction Work Activities</u>
MUP03A&B, MUP04A&B; and MUP05	<ul style="list-style-type: none"> • Survey setting out • Construction of site access • Site clearance • Construction of access ramp, retaining wall and gabion wall
LMH01	Not yet commenced

ENVIRONMENTAL LICENSING STATUS

- 2.3 The environmental licensing status in the Reporting Quarter is summarized in *Table 2-1*.

Table 2-1 Status of Environmental Licenses and Permits

Item	Item Description	Permit Status
1	Environmental Permit No.EP277/2007/A	Issued on 1 Dec 2009
2	Air Pollution Control (Construction Dust)	Notification to EPD on 27/12/2007
3	Chemical Waste Producer Registration <ul style="list-style-type: none"> • 5213-652-C3251-04 • 5213-652-C3251-05 	Valid date: 23 July 2008 Valid date: 15 August 2008
4	Water Pollution Control (Discharge license) <ul style="list-style-type: none"> • W5/1G34/1 • W5/1G35/1 • W5/1I324/1 • W5/1I325/1 	Expiry date: 31 August 2013 Expiry date: 31 August 2013 Expiry date: 31 August 2013 Expiry date: 31 August 2013
5	Account for Disposal of Construction Waste No. 7006522	Valid date: 9 January 2008
6	Construction Noise Permit	Nil

3 SUMMARY OF ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

MONITORING PARAMETERS

- 3.1 The ET has compiled the EM&A requirements set out in the associated EM&A Manuals in an *Environmental Monitoring Methodology*, which has been agreed by the ER and IEC. The monitoring parameters are summarized below.

Table 3-1 Summary of Monitoring Parameters

Environmental Issue	Parameters	
Air Quality	<ul style="list-style-type: none"> 1-hour Total Suspended Particulate (1-hour TSP); and 24-hour Total Suspended Particulate (24-hour TSP). 	
Construction Noise	<ul style="list-style-type: none"> A-weighted equivalent continuous sound pressure level (30min) (Leq(30min)) during the normal working hours; and A-weighted equivalent continuous sound pressure level (5min) (Leq(5min)) for construction work during Restricted Hours. 	
Water Quality	In-Situ Measurement	temperature, Dissolved Oxygen (DO), Dissolved Oxygen Saturation (DOS), pH value, water depth, temperature & turbidity
	Laboratory Analysis	Suspended Solids (SS')
Ecology	MUP01&02	<ul style="list-style-type: none"> The stream conditions monitoring (in-situ measurements of DO, pH and turbidity; laboratory testing of SS); General site audit to report if the mitigation measures are properly implemented during the construction phase

MONITORING LOCATIONS

- 3.2 Most of the monitoring locations have been identified and the associated access has also been granted. Details of the monitoring locations are summarized in *Table 3-2* and shown in *Appendix C*.

Table 3-2 Summary of Monitoring Locations

Issue	Channel	Sensitive Receiver	Monitoring Location ID	Detailed Address	
Air	MUP04A	MUP04A-2	MUP-A3	Village house near Loi Tung	
	MUP05	MUP05-2 (same as MUP01/02-1)	MUP-A1 (same as MUP01/02-A1)	Village north of Loi Tung (same as Village house at Man Uk Pin)	
	MUP05	MUP05-4	MUP-A2a [#]	Village north of Loi Tung	
Noise	MUP04A	MUP04A-2	MUP-N4	Village house near Loi Tung	
	MUP05	MUP05-2 (same as MUP01/02-1)	MUP-N1 (same as MUP01/02-N1)	Village north of Loi Tung (same as Village house at Man Uk Pin)	
		MUP05-4	MUP-N2	Village north of Loi Tung	
		MUP05-6	MUP-N3	Village north of Loi Tung	
	LMH01	LMH01-1	LMH-N1*	LMH-N1*	Village of Lin Ma Hang(*Remark: Mobile station subject to the location of the construction works to be measured at Sensitive Receiver LMH01-1 or LMH01-2 or LMH01-3 or LMH01-4 or LMH01-5)
		LMH01-2			
		LMH01-3			
LMH01-4					
Water	MUP04A	Control Station	MUP-W3	Upstream of MUP04A works	
	MUP05	Control Station	MUP-W1 (same as MUP01/02-W1)	Upstream of MUP01 works	
		Control Station	MUP-W2 (same as MUP01/02-W2)	Upstream of MUP02 works	
		Impact Station	MUP-W4	Downstream of MUP05 works immediately at the discharge point to River Indus	

Issue	Channel	Sensitive Receiver	Monitoring Location ID	Detailed Address
		Temporary / Mobile Station	MUP-W5	Within MUP05, downstream of the discharge point of MUP01/02 and upstream of the discharge point of MUP04A
		Temporary / Mobile Station	MUP-W6	Within MUP05, downstream of the discharge point of MUP01/02 and MUP04A
Water	LMH01	Control Station	LMH-W1	Upstream of LMH01 works
		Control Station	LMH-W2	Upstream of LMH01 works
		Impact Station	LMH-W3	Downstream of all LMH01 works immediately at the discharge point to Shenzhen River
		Temporary / Mobile Station	LMH-W4	Upstream and downstream of particular group of LMH01 works
		Temporary / Mobile Station	LMH-W5	Upstream and downstream of particular group of LMH01 works
		Temporary / Mobile Station	LMH-W6	Upstream and downstream of particular group of LMH01 works
Ecology	MUP05 and LMH01	Water Quality of Stream		Upstream and downstream of Construction site
		General Site audit (with emphasis on ecological mitigation measures)		Along stream channel, within 100m upstream and downstream of construction site
	LMH01	Surveys of fish species		Along stream channel, within 100m upstream and downstream of construction site

MONITORING FREQUENCY

- 3.3 Impact monitoring should be conducted during the entire construction phase to ensure that the ambient environmental conditions comply with the environmental performance criteria i.e. Action and Limit Levels for the Project. The impact monitoring frequency specified 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 & 3 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 hours 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 such as time of sampling, DO Saturation, weather conditions and special phenomena.

Depths: All measurements will be carried out at three water depths, namely, 1m below water surface, mid-water depth, and 1m above river bed. If the water depth is less than 6m, the mid-depth measurement will be omitted. If the depth is less than 3m, only the mid-depth measurement will be taken.

Frequency: 3 days a week with an interval of at least 36 hours between two consecutive sampling days

Duration: During the construction period of the channel works

Ecology

3.4 According to the EM&A Manual [382486/83//Issue2], ecology monitoring is only required at the Channels **MUP05 & LMH01**. During the construction phase, the monitoring requirements are as below:

Parameters:

- (i) General site audit with emphasis on ecology mitigation measure;
- (ii) Water quality of stream (DO, pH, turbidity and SS); and

Frequency:

- (i) Once a week for general site audit throughout the construction period; and
- (ii) Three times per week for stream monitoring;

Duration:

Throughout the whole construction period

ENVIRONMENTAL QUALITY PERFORMANCE LIMITS

3.5 The Action/Limit (A/L) Levels for air quality, construction noise, water quality, ecology and landscape and visual impact are shown in **Tables 3-3, 3-4, 3-5, 3.6** and **3-7** respectively.

Table 3-3 Action and Limit Levels for Air Quality

Monitoring Station	Action Level ($\mu\text{g}/\text{m}^3$)		Limit Level ($\mu\text{g}/\text{m}^3$)	
	1-hour TSP	24-hour TSP	1-hour TSP	24-hour TSP
MUP-A1	>307	>156	> 500	> 260
MUP-A2a	>300	>149	> 500	> 260
MUP-A3	>299	>150	> 500	> 260

Table 3-4 Action and Limit Levels for Construction Noise

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

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

Table 3-5 Action and Limit Levels for Water Quality

Monitoring Location		DO (mg/L)		Turbidity (NTU)		pH (Unit)		SS (mg/L)	
ID	Station Type	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
MUP-W1	Control	NA	NA	NA	NA	NA	NA	NA	NA
MUP-W2	Control	NA	NA	NA	NA	NA	NA	NA	NA
MUP-W3	Control	NA	NA	NA	NA	NA	NA	NA	NA
MUP-W4	Impact	5.27	5.18	18.03	24.81	6.5-8.5	6.0-9.0	15.8	17.6
MUP-W5	Mobile	4.42	4.37	7.88	8.54	6.5-8.5	6.0-9.0	6.0	6.0
MUP-W6	Mobile	4.54	4.51	11.81	14.84	6.5-8.5	6.0-9.0	3.9	4.8
LMH-W1	Control	NA	NA	NA	NA	NA	NA	NA	NA
LMH-W2	Control	NA	NA	NA	NA	NA	NA	NA	NA
LMH-W3	Impact	3.96	3.62	11.31	12.10	6.5-8.5	6.0-9.0	8.8	10.6
LMH-W4	Mobile	4.34	3.98	5.33	5.95	6.5-8.5	6.0-9.0	3.0	3.0
LMH-W5	Mobile	2.14	2.07	31.46	35.33	6.5-8.5	6.0-9.0	25.0	29.8
LMH-W6	Mobile	2.67	2.65	12.32	13.02	6.5-8.5	6.0-9.0	4.8	6.6

Notes:

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

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

For pH, non-compliance of water quality limits occurs when monitoring result exceeds the Limit Levels.

Table 3-6 Action and Limit Levels for Ecology in Construction Phase at Channels MUP05 and LMH01

Parameter	Action Level	Limit Level
<ul style="list-style-type: none"> Any construction works do not cause adverse ecological impacts outside the work site of Channels Where natural banks are to be retained are protected from adverse effects of engineering works, including impacts to riparian vegetation along these banks The existing natural stream channel is protected from adverse effect of engineering works, including potential indirect impacts through increased sedimentation Rock/fines used to form the bottom of the widened channel have the appropriate physical characteristics to permit re-establishment of semi-natural stream conditions The recommended mitigation measures are properly implemented by the Contractor 	Non-conformity on one occasion	Repeated Non-conformity

Table 3-7 Action Level for Landscape and Visual Impact in Construction Phase

Parameter	Action Level	Limit Level
Any trespass by the contractor outside the limit of the works, including any damage to existing trees, woodland and vegetation	Non-conformity on one occasion	Repeated non-conformity

ENVIRONMENTAL MITIGATION MEASURES

3.6 In this reporting quarter, the construction work was only undertaken at MUP03A&B, MUP04A&B and MUP05. The environmental mitigation Implement is shown in *Table 3-8*.

Table 3-8 Environmental Mitigation Measures Undertake in Reporting Quarter

Location	Construction Activities	Environmental Mitigation Measures to be deployed
MUP03A&B, MUP04A&B; and MUP05	Construction of site access	<ul style="list-style-type: none"> Excavated area and stockpile of soil material was dampened / covered before dispose off-site
	Site clearance	<ul style="list-style-type: none"> Water spraying was provided before and during handling of excavated material.
	Survey setting out	<ul style="list-style-type: none"> Tree will be properly protected before works commenced.
	Installation of site hoardings and boundary wall	<ul style="list-style-type: none"> Excavated area and stockpile of soil material was dampened / covered before dispose off-site Retained tree will be properly protected before works commenced. Tree will be properly protected before works commenced.

4 MONITORING RESULTS

4.1 In this quarter, construction work was only undertaken at Channel MUP03A&B, MUP04A&B and MUP05. So environmental monitoring was only performed at those channels accordingly. Upon the commencement of construction works at Channels LMH01, more monitoring activities will be carried out and reported.

AIR QUALITY

4.2 In this quarter, a total of **48 events** of 1-hour TSP and **23 events** of 24-hour TSP measurements were conducted at Locations A1, A2a and A3. Initially there were 45 events of 24-hour TSP monitoring, power failure occurred on 5, 24, 30 June at MUP-A1, 13, 19, 24 and 30 July at MUP-A3 and failure at MUP-A2 throughout the quarter. We have liaised with Contractor to rectify the power problem as soon as possible.

4.3 For air quality monitoring results, no exceedances recorded at both 1-hour and 24-hour TSP Monitoring in this quarterly month period. No NOE was therefore issued and hence no associated corrective actions were, therefore, required.

4.4 A summary of 1-hour and 24-hour TSP measurements are presented in *Table 4-1*

Table 4-1 Summary of 1-hour and 24-hour TSP at MUP in the Reporting Period

Channel	Station	1-hour TSP			24-hour TSP		
		Max	Min	Mean	Max	Min	Mean
MUP	A1	89.3	75.0	84.2	136	15	34
Record Date		24-8-2010	26-5-2010	48 events	11-6-2010	17-8-2010	*12 events
MUP	A2a	89.3	77.0	83.1	--	--	--
Record Date		24-8-2010	14-7-2010	48 events			**
MUP	A3	89.3	76.3	83.6	57	4	22
Record Date		7-6-2010	18-8-2010	48 events	11-6-2010	7-7-2010	***11 events

* 3 events of power failure occurred on 5, 24 and 30 June 2010

** Power failure occurred on A2a throughout the quarter period

*** 4 events of power failure occurred on 13, 19, 24 and 30 July 2010

CONSTRUCTION NOISE

4.5 During this quarter, a total of **64 events** of construction noise monitoring were performed. No complaint was received and all noise levels measured at the identified monitoring stations: MUP: N1, N2, N3 and N4 were well below the Limit Level. A summary of construction noise data is presented in *Table 4-2*.

Table 4-2 Summary of Construction Noise at MUP in the Reporting Period

Channel	Station	Leq(30min)	
		Max	Min
MUP	N1	68.4	64.9
Record Date		14-7-2010	31-7-2010
MUP	N2	68.0	62.8
Record Date		12-8-2010	25-6-2010
MUP	N3	70.6	69.1
Record Date		26-5-2010	25-6-2010
MUP	N4	67.2	55.0
Record Date		31-7-2010	25-5-2010

WATER QUALITY

- 4.6 Water quality monitoring results at Channels MUP during the Reporting Period are tabulated in the relevant monthly reports, and graphical plots of trends of the monitored parameters are presented *Appendix E*.
- 4.7 For water quality monitoring, a total of 5 Limit Level exceedances were recorded, which included 5 Limit Level exceedances of Suspended solid (SS) as summarized in *Table 4.3*.
- 4.8 Based on the investigation reports for the causes of the exceedances, all the exceedances were concluded not related to the works of the project. The investigation reports revealed that turbid water was found discharged from other construction sites at upstream of captioned location and there are several events of heavy rainfall recorded at the captioned days. Therefore, no associated corrective actions were, therefore, required.

Table 4-3 Summary of Water Quality Exceedances of Existing Action and Limit Levels

Station	DO		Turbidity		pH Value		SS		Total Exceedance	
	Action	Limit	Action	Limit	Action	Limit	Action	Limit	Action	Limit
June 2010										
MUP-W4 ^(a)	0	0	0	0	0	0	0	0	0	0
MUP-W5 ^(b)	0	0	0	0	0	0	0	1	0	1
MUP-W6 ^(b)	0	0	0	0	0	0	0	0	0	0
Sub-total	0	0	0	0	0	0	0	1	0	1
July 2010										
MUP-W4 ^(a)	0	0	0	0	0	0	0	0	0	0
MUP-W5 ^(b)	0	0	0	0	0	0	0	0	0	0
MUP-W6 ^(b)	0	0	0	0	0	0	0	1	0	1
Sub-total	0	0	0	0	0	0	0	1	0	1
August 2010										
MUP-W4 ^(a)	0	0	0	0	0	0	0	0	0	0
MUP-W5 ^(b)	0	0	0	0	0	0	0	1	0	1
MUP-W6 ^(b)	0	0	0	0	0	0	0	2	0	2
Sub-total	0	0	0	0	0	0	0	3	0	3
Total number of exceedances	0	0	0	0	0	0	0	5	0	5

ECOLOGY

- 4.9 A total of 13 site visits were carried out on 27 May 2010, 4, 10, 19, 24 June 2010 and 2, 9, 15, 22, 29 July 2010, 6, 12, 19 August 2010 in this quarter by an ecological specialist, and no non-compliance was identified. The detailed findings and the checklists are shown in the relevant monthly reports.

SUMMARIES OF WEATHER CONDITIONS DURING THE REPORTING QUARTER

June 2010

- 4.10 June 2010 was gloomier and wetter than usual. The total bright sunshine duration was 92.5 hours, only 58 percent of the normal figure of 158.3 hours and the 6th lowest on record. The accumulated total bright sunshine duration since 1 January was 504.4 hours, about 30 percent below the normal figure of 723.8 hours for the same period, the lowest on record. The total rainfall in the month was 474.9 millimetres, about 22 percent above the normal figure of 388.1 millimetres. The accumulated rainfall since 1 January was 885.6 millimetres, about 16 percent below the normal figure of 1054.7 millimetres for the same period. Due to gloomier and wetter weather, June 2010 was also cooler than usual. The mean temperature for the month was 27.1 degrees, about 0.8 degrees below normal.

July 2010

- 4.11 July 2010 was hotter than usual. With eight very hot days (daily maximum temperature of 33.0 degrees or above) in the month, the mean temperature was 29.2 degrees, about 0.5 degrees above normal. Despite a hot month, the two heavy rain episodes which necessitated the issuance of the Black Rainstorm Warning on 22 and 28 July respectively made the month wetter than usual. The total monthly rainfall was 469.4 millimetres, about 25 percent above the normal figure of 374.4 millimetres. The accumulated rainfall since 1 January was 1355.0 millimetres, about 5 percent below the normal figure of 1429.1 millimetres for the same period.

August 2010

- 4.12 Dominated by a relatively strong Pacific ridge, August 2010 was hotter and sunnier than usual. The mean temperature for the month was 28.8 degrees, about 0.4 degrees above normal. Meanwhile, the total bright sunshine duration for the month was 213.4 hours, about 12 percent above normal. The month was also drier than usual. The total rainfall in the month was 350.3 millimetres, about 21 percent below the normal figure of 444.6 millimetres. The accumulated rainfall since 1 January was 1705.3 millimetres, about 9 percent below the normal figure of 1873.7 millimetres for the same period.

5 COMPLIANCE, COMPLAINT AND PROSECUTION

DATA COMPLIANCE

- 5.1 As concluded in *Section 4*, although **5** exceedances were respective recorded in water quality monitoring, investigations concluded that the exceedances were unlikely to be due to the construction works. Therefore, in effect, it was concluded that no non-compliance of environmental quality performance criteria was recorded at Channel MUP during the Reporting Quarter.

ENVIRONMENTAL COMPLAINT

- 5.2 No written or verbal complaints, written or oral, were received during the quarter.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTION

- 5.3 No notification of summons or successful prosecution was reported during this quarter.

6 WASTE MANAGEMENT, SITE INSPECTION & AUDIT

SOLID AND LIQUID WASTE MANAGEMENT STATUS

6.1 The quantities of waste for disposal or reuse in this quarter are summarized in *Tables 6-1* and *6-2*.

Table 6-1 Summary of Waste Quantities for Disposal

Type of Waste	Quantity			Disposal Locations
	Jun 10	Jul 10	Aug 10	
C&D Materials Disposed (Inert) (in '000m ³)	0	0	0	Tuen Mun 38 Fill Bank
	1.991	2.706	0.52	Reused in other Projects
C&D Materials (Non-Inert) (in '000m ³)	0	0	0	NENT
Chemical Waste (in '000kg)	0	0	0	NA
General Refuse (in '000m ³)	0	0.017	0.017	N/A

Table 6-2 Summary of Waste Quantities for Reuse/Recycling

Type of Waste	Quantity			Disposal Locations
	Jun 10	Jul 10	Aug 10	
Metals for Recycling (in '000kg)	0	0.1	0	NA
Paper for Recycling (in '000kg)	0	0	0	NA
Plastics for Recycling (in '000kg)	0	0	0	NA

6.2 There was no site effluent discharged but an estimated volume of 50m³ of surface runoff was discharged in each month.

SITE INSPECTION AND ENVIRONMENTAL AUDIT

6.3 A total of **13** occasions of weekly environmental site inspection and audit were conducted jointly by the ER, EO and ET during the Reporting Period. Minor deficiencies found in the site inspection and audits were in general rectified within the specified deadlines. Findings of the site inspection and environmental audit are listed in *Table 6-3*.

Table 6-3 Summary of Findings of Site Inspection and Environmental Audit

Date	Findings / Deficiencies	Follow-Up Status
27 th May 2010	<ul style="list-style-type: none"> The cut-off slope should implement relative mitigation measures to prevent any surface runoff. (MUP 02) Retained tree within the site was damaged, the contractor was reminded to protect the tree from works properly. (MUP 02) The soil stockpiled on the site should be covered with tarpaulin sheets in order to minimize the dust nuisance. (TKL 07) 	The deficiencies have been improved during site inspection on 3 rd June 2010
3 rd June 2010	<ul style="list-style-type: none"> As a reminder, after rainfall the contractor was reminded to clear the stagnant water within the site to prevent muddy water run-off. (TKL 02 & MUP 02) 	The deficiencies have been improved during site inspection on 11 th June 2010
11 th June 2010	<ul style="list-style-type: none"> General refuse to be removed from drainage channel. Stagnant water was observed. Larvidical oil or pumped out should be undertaken to prevent mosquitoes breeding 	The deficiencies have been improved during site inspection on 17 th June 2010
17 th June 2010	<ul style="list-style-type: none"> Stagnant water was observed. Larvidical oil or pumped out should be undertaken to prevent mosquitoes breeding (TKL02 & MUP 05) The contractor was reminded to deploy rock barrier or any protective layer at the discharge point in order to prevent stirring up turbidity of water body. (MUP 05) 	The deficiencies have been improved during site inspection on 24 th June 2010

Date	Findings / Deficiencies	Follow-Up Status
24 th June 2010	<ul style="list-style-type: none"> • Stagnant water was observed. Larvidical oil or pumped out should be undertaken with higher frequency to prevent mosquitoes breeding (MUP 05) • The contractor was reminded to remove the C&D waste floating on stagnant water and the stagnant water should be pumped away to prevent mosquitoes breeding (TKL 02) 	The deficiencies have been improved during site inspection on 2 nd July 2010
2 nd July 2010	<ul style="list-style-type: none"> • The C&D waste and chemical container was observed, the contractor was reminded to keep the site clean and tidy (MUP 05) • As a general reminder, the contractor was reminded to replace the muddy water in wheel-washing facility regularly (MUP 05) 	The deficiencies have been improved during site inspection on 9 th July 2010
9 th July 2010	<ul style="list-style-type: none"> • Exposed stockpile should be covered to prevent loose material and surface runoff discharged in the stream. (TKL 02) • As a general reminder, the contractor was reminded to apply water spraying on the haul road for dust suppression (TKL 07) 	The deficiencies have been improved during site inspection on 15 th July 2010
15 th July 2010	<ul style="list-style-type: none"> • The contractor was reminded to improve the water mitigation measures such as applying more rigid rock barriers (TKL 02) • Dark smoke from excavator was observed, the contractor was reminded to carry out maintenance for the plants regularly (TKL 07) • As a general reminder, the contractor was reminded to review the capacity of sediment tank for discharging. (TKL 07) • The exposed slope has to be covered with tarpaulin sheet or cement soil to prevent soil runoff to water body. (MUP05) 	The deficiencies have been improved during site inspection on 22 nd July 2010
22 nd July 2010	<ul style="list-style-type: none"> • The contractor was reminded to remove the stagnant water within the stand (TKL 07) • Damaged earthbund was observed at TKL07. The Contractor is reminded rectify the damage especially in rainy season 	The deficiencies have been improved during site inspection on 29 th July 2010
29 th July 2010	<ul style="list-style-type: none"> • Free standing chemical container was observed, the contractor was reminded to provide trip tray or put the chemical to storage area(TKL 02) • Floating C&D waste should be removed to keep the channel clean and clear. (TKL02) 	The deficiencies have been improved during site inspection on 6 th August 2010
6 th August 2010	<ul style="list-style-type: none"> • Free standing chemical container was observed, the contractor was reminded to provide trip tray or put the chemical to storage area(TKL 02) • The rock barrier was damaged, the contractor was reminded to repair the barrier regularly especially in rainy season (MUP05) • The contractor was reminded to avoid burning on the site. (MUP05) • As a general reminder, the contractor would provide more rubbish bins within the site for improving site tidiness and carry out regular maintenance for the plants to prevent dark smoke emission or oil leakage. (TKL02 and MUP) 	The deficiencies have been improved during site inspection on 12 th August 2010
12 th August 2010	<ul style="list-style-type: none"> • Stagnant water was observed during the site inspection. Larvidical oil or pumping out should be undertaken to prevent mosquitoes breeding (TKL 02) • After tree prune or cutting, the debris of tree trunk or branch or leaf was observed to retain within the site, as reminded contractor properly to maintain the site tidiness and removed 	The deficiencies have been improved during site inspection on 19 th August 2010

Date	Findings / Deficiencies	Follow-Up Status
	the waste regular. (MUP05) <ul style="list-style-type: none"> • As a general reminder, the contractor was reminded to re-cover the exposed slope regularly to avoid surface runoff. (MUP05) 	
19th August 2010	<ul style="list-style-type: none"> • Free standing chemical containers without drip tray and label was observed at the site area, the contractor was reminded to provide drip tray and proper label for all chemical containers. (TKL 02 & MUP 05) 	Will be reported on next month

7 CONCLUSIONS AND RECOMMENDATIONS

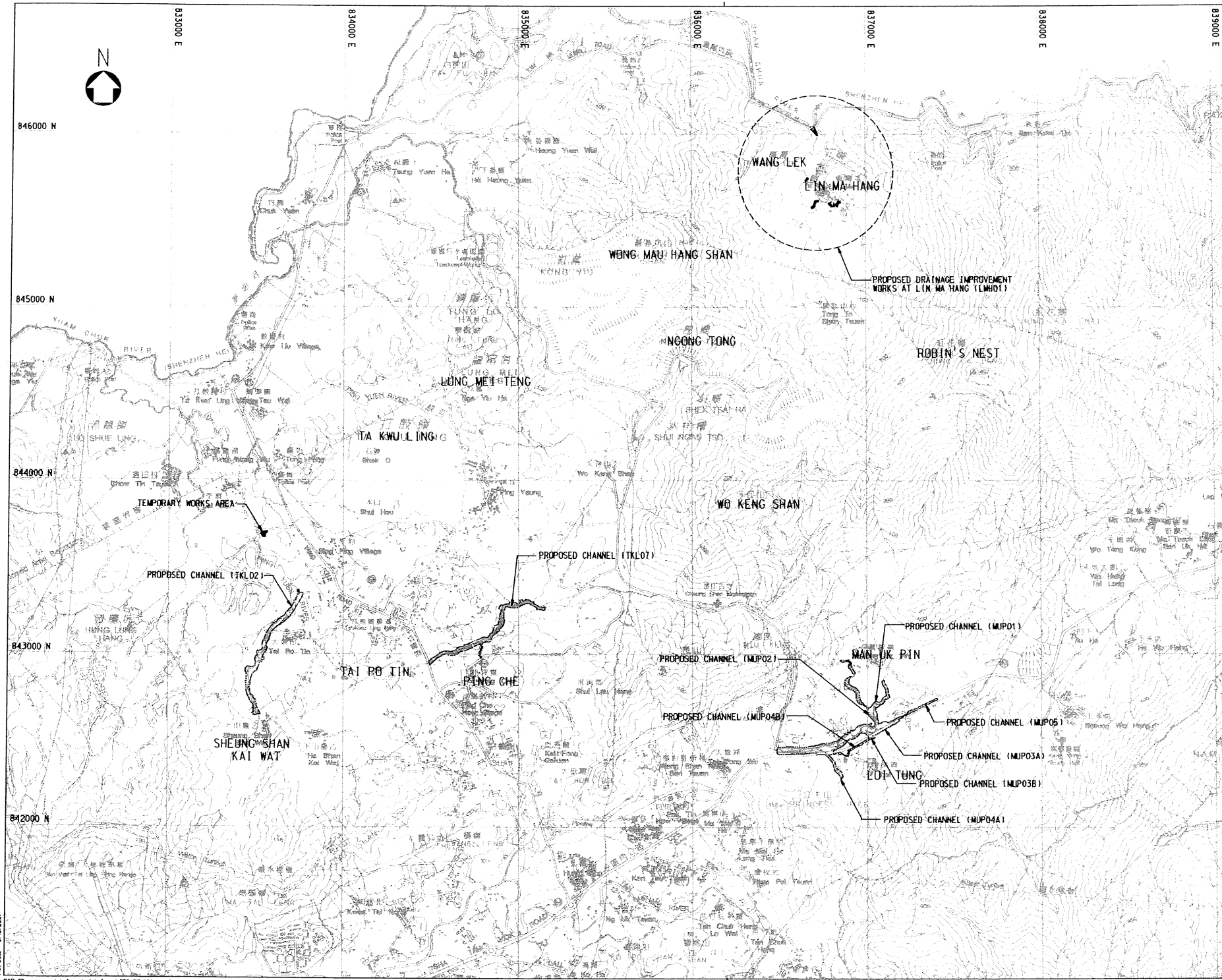
- 7.1 This is the 6th Quarterly EM&A Report for DP works from 26 May 2010 to 25 August 2010 on five environmental key issues: air quality, noise, water, ecology and waste management only.
- 7.2 This report mainly presents the monitoring results of Channels MUP03A&B, MUP04A&B and MUP05 since the construction works at Channels LMH01 have not yet commenced.
- 7.3 For air quality and construction noise, monitoring results demonstrated no exceedance of relevant Action and Limit Levels. No NOE or associated corrective actions were, therefore, required.
- 7.4 Also, a total of 5 water quality criterion exceedances: 5 Limit Level exceedances were recorded for Suspended Solids(SS). Based on the investigation reports, all exceedances were considered not related to the works of the Project. No associated corrective actions were therefore required.
- 7.5 No written or verbal complaints, notifications of summons or successful prosecutions were reported during this quarter.
- 7.6 No adverse environmental impacts were observed during the weekly site inspection and environmental audit which indicated that the implemented mitigation measures for air quality, construction noise, water quality and ecology were effective. Minor deficiencies found in the weekly site inspection and were in general rectified within the specified deadlines. The environmental performance of the Project was, therefore, considered satisfactory.
- 7.7 For prudence, attention should be paid to construction noise and other environmental issues recommended in the EM&A Manual when more works will commence in the coming quarter. The mitigation measures recommended in the ES and summarized in the Mitigation Measure Implementation Schedule should be fully implemented.
- 7.8 As wet season have come, water quality mitigation measures to avoid ingress of surface runoff into the channels should be properly installed and maintained, as appropriate. In particularly, open stockpiles and exposed slope should be covered thoroughly with tarpaulin sheet and applied with hydroseeding in order to prevent surface runoff to water body.

END OF TEXT

Appendix A

Location Plan of the Project

LEGEND
 SITE BOUNDARY



Revision	Date	Description	Initial
Initial	KSC	YST	LWS PFL
Date	05/07	05/07	05/07 05/07

Approve

Contract no. DC/2007/08

Contract title
 DRAINAGE IMPROVEMENT WORKS AT
 TAI PO TIN, PING CHE, MAN UK PIN AND
 LIN MA HANG

Drawing title
 LOCATION PLAN
 FOR PROPOSED CHANNELS IN
 TAI KWU LING AND SHA TAU KOK

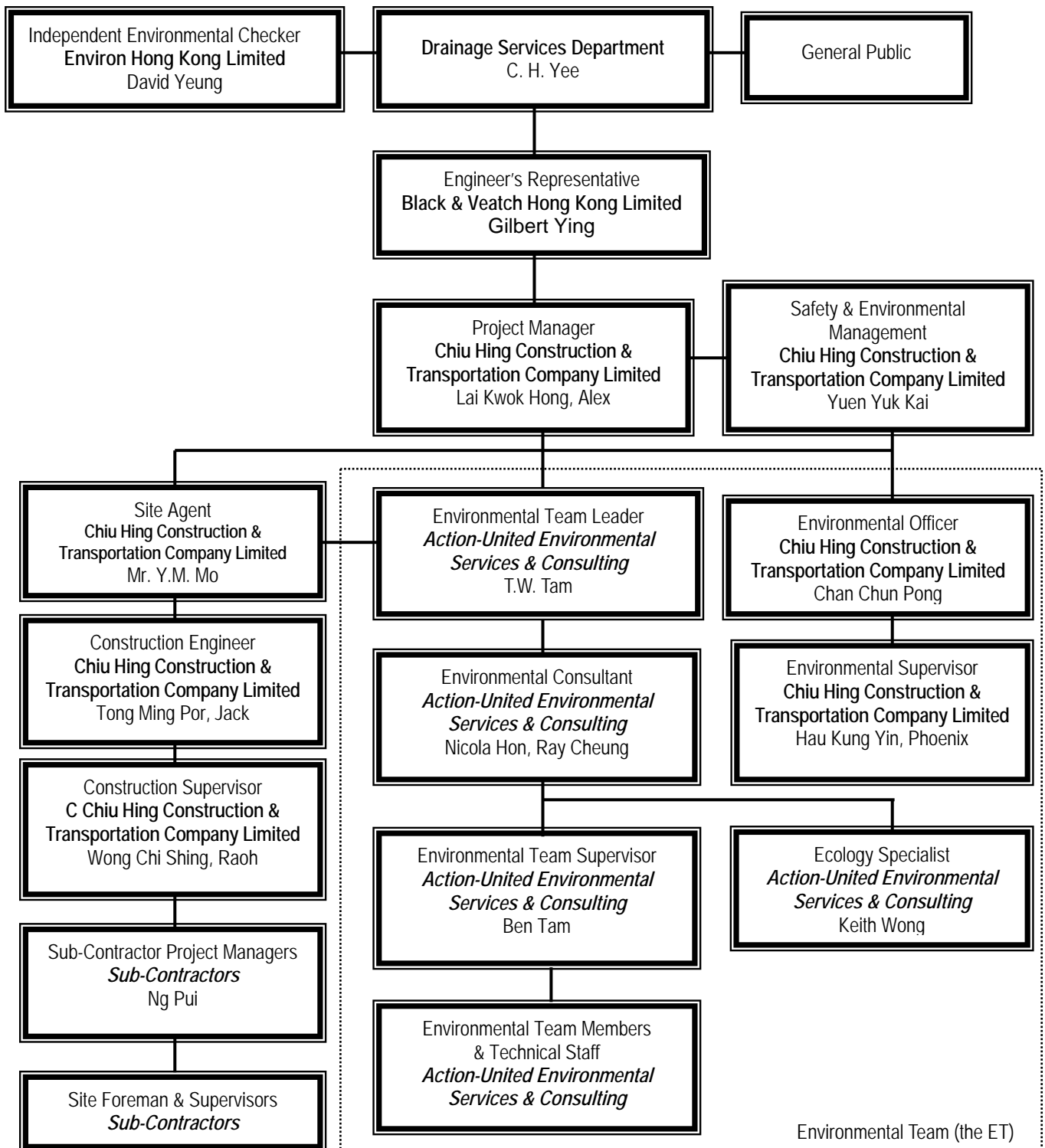
Drawing no. 001	Scale A1 1:10000 A3 1:20000
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 香港特別行政區政府渠務署
 THE GOVERNMENT OF THE
 HONG KONG
 SPECIAL ADMINISTRATIVE REGION
 DRAINAGE SERVICES DEPARTMENT

 BLACK & VEATCH HONG KONG LIMITED
 博達工程顧問有限公司

Appendix B

Environmental Management Organization and Contacts of Key Personnel



Environmental Management Organization

Contact Details of Key Personnel

Organization	Project Role	Name of Key Staff	Tel No.	Fax No.
DSD	Employer	Mr. C. H. Yee	2594-7347	2827-8700
B&V	Engineer's Representative	Mr. Gilbert Ying	2659-8787	2659-8323
Environ	Independent Environmental Checker	Mr. David Yeung	3743-0788	3548-6988
CHCT	Project Manager	Mr. Lai Kwok Hong, Alex	2659-8221	2659-8232
CHCT	Safety & Environmental Manager	Mr. Yuen Yuk Kai	2659-8221	2659-8232
CHCT	Site Agent	Mr. Y.M. Mo	2659-8221	2659-8232
CHCT	Construction Engineer	Mr. Tong Ming Por, Jacky	2659-8221	2659-8232
CHCT	Construction Supervisor	Mr. Roah Wong	2659-8221	2659-8232
CHCT	Structural Engineer	Mr. Kwok Chin Ming	2659-8221	2659-8232
CHCT	Site Forman	Mr. Chung Ping Kai	2659-8221	2659-8232
CHCT	Environmental Officer	Mr. C. P. Chan	2659-8221	2659-8232
CHCT	Environmental Supervisor	Miss Phoenix Hau	2659-8221	2659-8232
Kin Tat	Sub-contractor Project Manager	Mr. Ng Pui	2659-8221	2659-8232
AUES	Environmental Team Leader	Mr. T.W. Tam	2959-6059	2959-6079
AUES	Environmental Consultant	Miss Nicola Hon	2959-6059	2959-6079
AUES	Assistant Environmental Consultant	Mr. Ray Cheung	2959-6059	2959-6079
AUES	Environmental Team Supervisor	Mr. Ben Tam	2959-6059	2959-6079
AUES	Ecologist	Dr. Keith Wong	2959-6059	2959-6079

Legends:

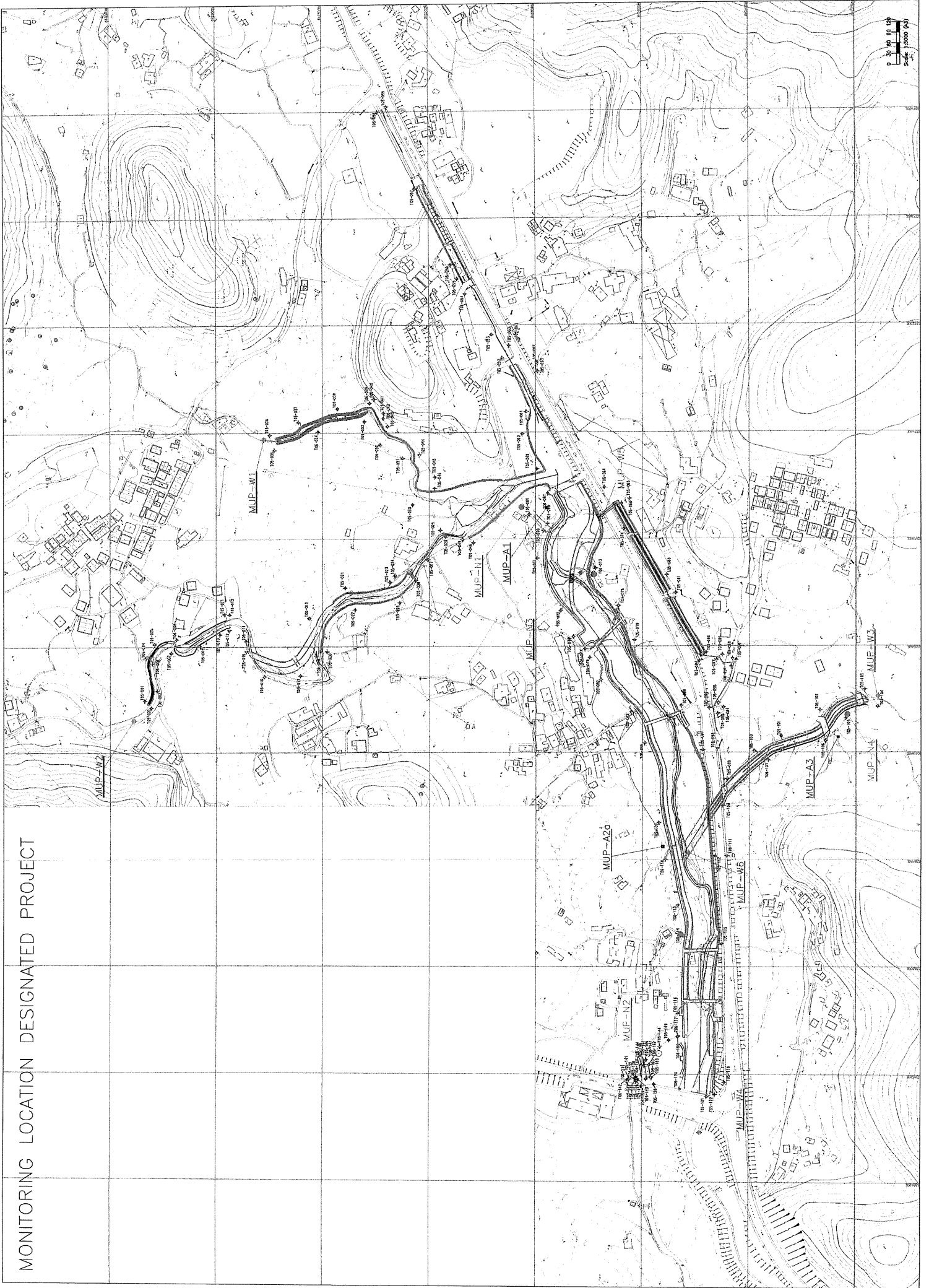
- DSD (Employer) – Drainage Services Department
- B&V (Engineer) – Black & Veatch Hong Kong Limited
- CHCT (Main Contractor) – Chiu Hing Construction & Transportation Company Limited
- Environ (IEC) – Environ Hong Kong Limited
- AUES (ET) – Action-United Environmental Services & Consulting

Appendix C

Environmental Monitoring Locations

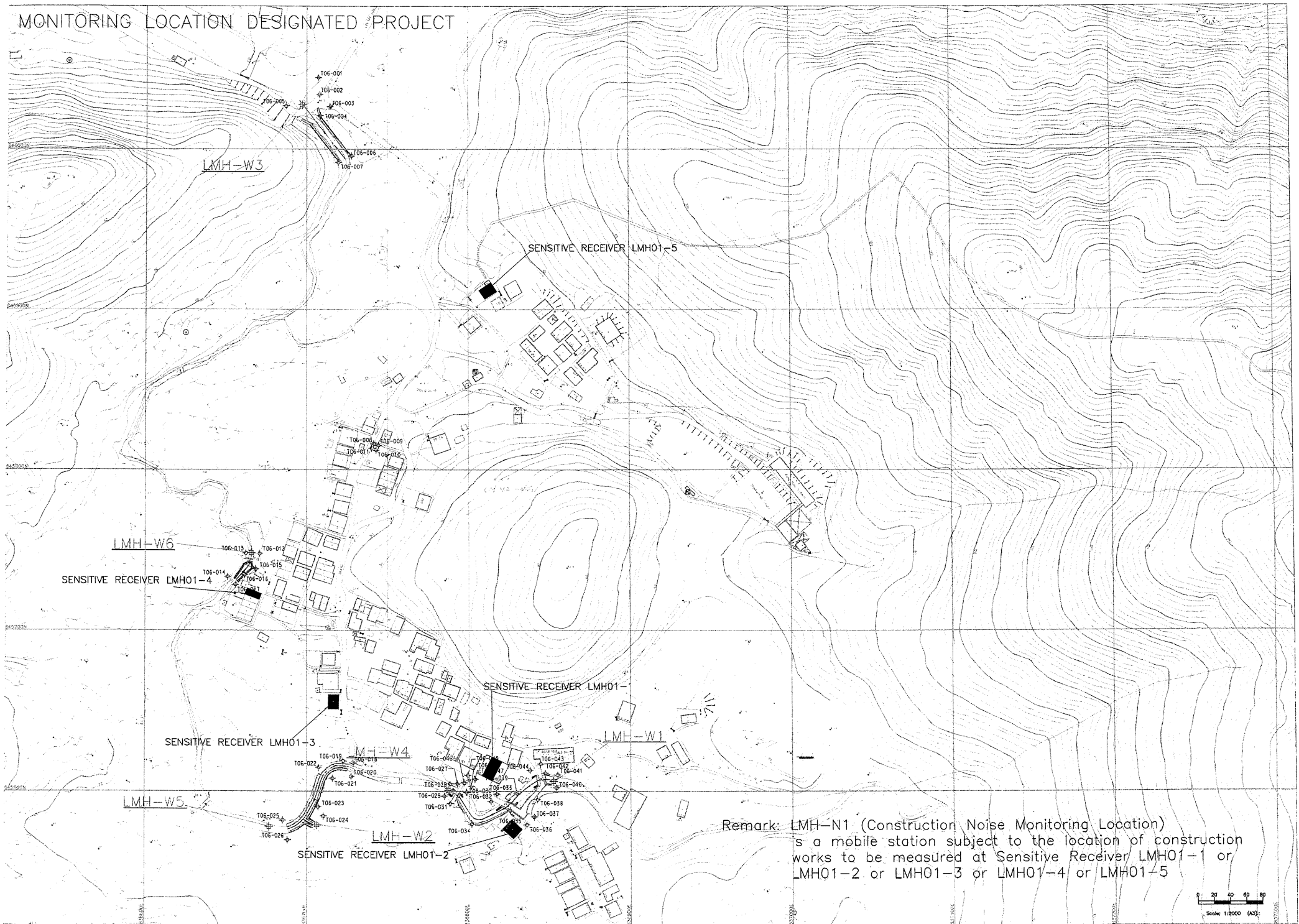
Channel MUP

MONITORING LOCATION DESIGNATED PROJECT

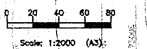


Channel LMH01

MONITORING LOCATION DESIGNATED PROJECT



Remark: LMH-N1 (Construction Noise Monitoring Location) is a mobile station subject to the location of construction works to be measured at Sensitive Receiver LMH01-1 or LMH01-2 or LMH01-3 or LMH01-4 or LMH01-5



Appendix D

Environmental Mitigation Measure Implementation Schedule

Implementation Schedule of Water Quality Impact Assessment

ES Ref	EM&A Ref	Environmental Protection 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									
**	4.9.2	The Contractor shall observe and comply with the Water Pollution Control Ordinance and its subsidiary regulations. The Contractor shall carry out the Works in such a manner as to minimize adverse impacts on the water quality during execution of the works. In particular he shall arrange his method of working to minimize the effect 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
**	4.9.3	Proper site 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. The Contractor shall follow the practices, and be responsible for the design, construction and maintenance of all the mitigation measures as specified in ProPECC PN 1/94 "Construction Site Drainage". The design of the mitigation measures shall be submitted by the Contractor to the Engineer for approval. These mitigation measures shall include the following practices to minimize site surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge: (i) Before commencing any site formation work, all sewer and drainage connections	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance ProPECC PN 1/94

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
		<p>shall be sealed to prevent debris, soil, sand etc. from entering public sewers / drains.</p> <p>(ii) Provision of perimeter channels to intercept storm-runoff from outside the site. These shall be constructed in advance of site formation works and earthworks.</p> <p>(iii) Temporary ditches such as channels, earth bunds or sand bag barriers shall be included to facilitate runoff discharge into the stormwater drain, via a sand/silt basin/trap.</p> <p>(iv) Works programmes shall be designed to minimize works areas at any one time, thus minimizing exposed soil areas and reducing the potential for increased siltation and runoff.</p> <p>(v) Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove the sand/silt particles from run-off. These facilities shall be properly and regularly cleaned and maintained. These facilities shall be carefully planned to ensure that they would be installed at appropriate locations to capture all surface water generated on site.</p> <p>(vi) Carefully programming of the works to</p>							

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
**	4.9.4	<p>minimize excavation works during the rainy season.</p> <p>(vii) Temporary access roads shall be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely.</p> <p>(viii) Open stockpiles of construction materials on-site shall be covered with tarpaulin or similar fabric during rainstorms to prevent erosion.</p> <p>The use of containment structures and diversion channels is recommended wherever practicable to facilitate a dry or at least confined excavation within watercourses. By limiting or confining the works areas the extent of disturbance to the surrounding water bodies will be significantly reduced, and thus resulting impacts on water quality from sediment resuspension will be reduced. Furthermore, excavation works shall be carried out during periods of low flow (dry season) as far as possible to minimize impacts on downstream water quality and sensitive receivers.</p>	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance ProPECC PN 1/94
**	4.9.5	Portable toilets shall be provided by the Contractors, where necessary, to handle sewage from the workforce. To prevent spillage of fuels and solvents to water courses, all fuel tanks and storage areas shall be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank.	To minimize adverse water quality impact during construction	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance ProPECC PN 1/94
**	4.9.6	The Contractor shall not discharge directly or	To minimize adverse	All works site /	Construction		√		Water Pollution

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
		indirectly or cause or permit or suffer to be discharged into any public sewer, stormwater drain, channel, stream-course or sea any trade effluent or foul or contaminated water or cooling or hot water without the prior written consent of the Engineer in consultation with the Director of Environmental Protection and Director of Water Supplies, who may as a condition of granting his consent require the Contractor to provide, operate and maintain at the Contractor's own expense to the satisfaction of the Engineer suitable works for the treatment and disposal of such trade effluent or foul or contaminated or cooling or hot water. The design of such treatment works shall be submitted to the Engineer for approval not less than one month before the commencement of the relevant works.	water quality impact during construction	during construction	Contractor				Control Ordinance ProPECC PN 1/94
**	4.9.7	If any office, site canteen or toilet facilities is erected, foul water effluent shall be directly to a foul sewer or to a sewage treatment and disposal facility either directly or indirectly by means of pumping or other means approved by the Engineer.	To minimize adverse water quality impact during construction.	All works site / during construction	Construction Contractor		√		Water Pollution Control Ordinance ProPECC PN 1/94

D = Design, C = Construction, O = Operation

Implementation Schedule of Waste

ES Ref	EM&A Ref	Environmental Protection 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									
7.5.2	5.1.2	<p><i>General</i></p> <p>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 include among other environmental nuisances abatement measures 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 should 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 ES Report.</p>	Waste reduction, reuse, recycle and proper disposal of waste	All works site / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
7.5.3	5.1.3	The contractor also should refer to the Construction and Demolition Material Management Plan (C&DMMP) conducted under the Project when preparing the EMP.	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.4	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, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.5	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, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.6	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 as described below should be followed. A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D materials and solid wastes at public filling	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 31/2004

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
7.5.7	5.1.7	facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No. 31/2004 for details. Regular cleaning and maintenance of the waste storage area should be provided.	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.8	5.1.8	<i>On-site Sorting, Reuse and Recycling</i> All waste materials should be segregated into categories covering: <ul style="list-style-type: none"> • 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, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.9	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, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.10	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	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
7.5.11	5.1.11	<p>provide a temporary storage area for those sorted materials 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.</p> <p>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.</p>	<p>waste</p> <p>Waste reduction, reuse, recycle and proper disposal of waste</p>	All work sites / during construction	Construction Contractor		√		<p>ETWB TCW No. 19/2005, 31/2004</p> <p>Waste Disposal Ordinance</p> <p>ETWB TCW No. 19/2005</p>

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
7.5.12	5.1.12	Prior to export of material from the site, the 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.	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.13	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, recycle 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
7.5.14	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	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
		stream bed material. This is dependent on size of rock fragments but can be achieved by appropriate use of a crusher.							
7.5.15	5.1.15	<p><i>Site Clearance / Demolition Materials</i></p> <p><i>Excavated Materials</i></p> <p>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. 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.</p>	Waste reuse, proper waste reduction, recycle and disposal of	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 31/2004
7.5.16	5.1.16	Excavated sediment from existing stream should be reuse on-site as backfilling material.	Waste reuse, proper waste reduction, recycle and disposal of	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005
7.5.17	5.1.17	Good quality reusable topsoil should be stockpiled for later landscaping works. Stockpiles	Waste reuse, proper waste reduction, recycle and disposal of	All work sites / during	Construction Contractor		√		Waste Disposal Ordinance

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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7.5.18	5.1.18	<p>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 minimize dust generation.</p> <p>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:</p> <ul style="list-style-type: none"> • 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 tarpaulins especially 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 equipped with silt traps should be installed at the stockpiling area. 	<p>proper disposal of waste</p> <p>Waste reduction, reuse, recycle and proper disposal of waste</p>	<p>construction</p> <p>All work sites / during construction</p>	Construction Contractor		√		<p>ETWB TCW No. 19/2005</p> <p>Waste Disposal Ordinance</p> <p>ETWB TCW No. 19/2005</p>
7.5.19	5.1.19	The Public Fill Committee (PFC) of CBDD should be consulted on designated outlets (e.g.	Waste reduction, reuse, recycle and	All work sites / during	Construction Contractor		√		Waste Disposal Ordinance

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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7.5.20	5.1.20	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 30% (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. 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.	proper disposal of waste Waste reuse, proper waste	construction All work sites / during construction	Construction Contractor		√		ETWB TCW No. 19/2005 Waste Disposal Ordinance
7.5.21	5.1.21	C&D materials should be disposed of at designated public filling facilities or landfills. Disposal of these materials for use at other construction projects is subject to the approval of the 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.	Waste reuse, proper waste	reduction, recycle and disposal of All work sites / during construction	Construction Contractor		√		ETWB TCW No. 19/2005 Waste Disposal Ordinance ETWB TCW No. 19/2005, 31/2004
7.5.22	5.1.22	<i>Chemical Waste</i> Where the construction processes produce chemical waste, the contractor must register with	Waste reuse,	reduction, recycle and All work sites / during	Construction Contractor		√		Waste Disposal (Chemical Waste) (General)

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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		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.	proper disposal of waste	construction.					Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
7.5.23	5.1.23	Storage, handling, transport and disposal of chemical waste should be arranged in accordance with the 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.	Waste reduction, reuse, recycle and proper disposal of 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
7.5.24	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	Waste reduction, reuse, recycle and proper disposal of 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

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to be addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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7.5.25	5.1.25	<p>m height or height of tallest container with adequate ventilation and space.</p> <p>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 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.</p>		Work sites / During construction	Construction Contractor		√		Waste Disposal (Chemical Waste) (General) Regulation, Code of Practice on the Packaging Labelling and Storage of Chemical Waste
7.5.26	5.1.26	<p>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.</p>	Waste reduction, reuse, recycle and proper disposal of 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

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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7.5.27	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 reuse, recycle and proper disposal of 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
7.5.28	5.1.28	No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.	Waste reuse, recycle and proper disposal of 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
7.5.29	5.1.29	<i>Concrete Waste</i> 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 reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002
7.5.30	5.1.30	<i>Wooden Materials</i> 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	Waste reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No.

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
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7.5.31	5.1.31	should be sorted out from other waste and stored separately from all inert waste before being disposed of to landfill. 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 timber used on construction sites. Metallic alternatives to timber are readily available and should be used rather than new timber. Precast concrete units should be adopted wherever feasible to minimize the use of timber formwork.	waste Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		19/2005, 33/2002 Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002 WBTC No. 19/2001
7.5.32	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-usable materials on-site.	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No. 19/2005, 33/2002
7.5.33	5.1.33	<i>Municipal Waste</i> 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	Waste reduction, reuse, recycle and proper disposal of waste	All work sites / during construction	Construction Contractor		√		Waste Disposal Ordinance ETWB TCW No.

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
7.5.34	5.1.34	<p>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.</p> <p>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.</p>	<p>waste</p> <p>Waste reduction, reuse, recycle and proper disposal of waste</p>	All work sites / during construction	Construction Contractor		√		<p>19/2005</p> <p>Waste Disposal Ordinance</p> <p>ETWB TCW No. 19/2005</p>
7.5.35	5.1.35	<p>The burning of refuse on-site is prohibited under the Air Pollution Control Ordinance (APCO) (Cap.311).</p>	<p>Waste reduction, reuse, recycle and proper disposal of waste, minimize air quality impacts from burning of refuse on-site</p>	All work sites / during construction	Construction Contractor		√		<p>Waste Disposal Ordinance</p> <p>ETWB TCW No. 19/2005</p> <p>Air Pollution Control Ordinance</p>
7.9.1	5.1.43	<p><i>Land Contamination</i></p> <p>A site at TKL10 to be resumed may have the potential of contaminated land (Figure 7.1). As</p>	<p>To investigate the potential of</p>	TKL10 (as per Figure 7.1) / prior	Construction Contractor's		√		ProPECC PN 3/94

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
Figure 7.1	Figure 5.1	detailed site investigation study cannot be undertaken at the design stage, it is recommended that the contractor shall engaged an Environmental Team (ET) to conduct detailed site investigation and if necessary prepare a Contamination Assessment Plan for approval by EPD prior to commencement of construction works.	contaminated land at TKL10	to commencement of construction	Environmental Team				
7.9.2	5.1.44	The ET shall conduct a full site inspection to review the validity of the preliminary CAP and define the exact number of sampling points, sampling locations and sampling parameters for site investigation, taking into account the contractor's site clearance / excavation works in the areas. If necessary, the ET shall then prepare an updated CAP in accordance with EPD's Guidance Notes for Investigation and Remediation of Contaminated Sites for Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops and ProPECC PN 3/94 – Contaminated Land Assessment and Remediation for EPD's endorsement prior to commencement of the site sampling	To investigate the potential of contaminated land at TKL10	TKL10 (as per Figure 7.1) / prior to commencement of construction	Construction Contractor's Environmental Team		√		ProPECC PN 3/94
7.9.3	5.1.45	The ET shall conduct a site contamination assessment and remediation (if necessary) for the identified location in accordance with the endorsed CAP. The ET shall complete the corresponding laboratory tests, prepare and complete the Contamination Assessment Report	To investigate the potential of contaminated land at TKL10	TKL10 (as per Figure 7.1) / prior to commencement of construction	Construction Contractor's Environmental Team		√		ProPECC PN 3/94

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						D	C	O	
7.6.24	5.1.46	<p>(CAR) and Remediation Action Plan (RAP), where necessary and submit to EPD for approval prior to the commencement of any construction works in order to avoid or minimise any associated risks or hazards</p> <p>Should contaminated materials be identified, the contractor shall carry out the following environmental health and safety precautionary measures, or any other measures as instructed by the Engineer:</p> <p>(1) Site workers should wear appropriate personal protective equipment (gloves, dust mask) when exposed to contaminated materials.</p> <p>(2) The stockpile of contaminated materials, if permitted by the Engineers, should be segregated from the uncontaminated ones. In addition, the contaminated materials (whether stockpiled or being transported) should be properly covered during wet seasons to avoid leaching out of contaminants.</p> <p>(3) Eating, drinking and smoking should not be allowed in contaminated areas to avoid inadvertent ingestion of contaminants. Adequate washing facilities should be provided.</p>	To ensure health and safety to the workers in the event contaminated soil is found at TKL10	TKL10 (as per Figure 7.1) / during construction	Construction Contractor's Environmental Team		√		ProPECC PN 3/94

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
		(4) Bulk earth moving equipment should be utilised as much as possible to minimize workers' handling and contact of the contaminated materials. (5) The stockpiling area should be separated from the nearby water drainage network.							

D = Design, C = Construction, O = Operation

Implementation Schedule of Sediment Quality Investigation

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
6.7.1	5.1.38	Excavated sediment from existing stream should be reused on-site as backfilling material.	To minimize offsite disposal of sediment	For channels where sediment removal is required / during construction	Construction Contractor		√		
6.7.2	5.1.39	To minimize the potential impacts on water quality, sediment must be excavated with care	To minimize offsite disposal of sediment	For channels where sediment removal is required / during construction	Construction Contractor		√		
6.7.3	5.1.40	The use of containment structures (e.g, bunds) and diversion channels is recommended wherever practicable to facilitate a dry or at least confined excavation within water courses. By limiting or confining the works areas, the extent of disturbance to the surrounding water bodies will be significantly reduced, and thus the resulting impacts on water quality from sediment re-suspension will also be reduced. Furthermore, excavation works should be carried out during periods of low flow (during dry season) as far as practicable to minimize impacts on downstream water quality and sensitive receivers	To minimize offsite disposal of sediment	For channels where sediment removal is required / during construction	Construction Contractor		√		
6.7.4	5.1.41	The impact arising from water being pumped from streams into adjacent streams, channels or temporary ponds should be mitigated to avoid pollutants. The water should be pumped to temporary sedimentation or other silt removal facilities to allow settlement of suspended solids before any water is discharged into local water courses. If large volumes of water need to be removed from the works area, temporary dams should be constructed using sandbags to prevent mixing of polluted and turbid water with cleaner water blow the dam.	To minimize offsite disposal of sediment	For channels where sediment removal is required / during construction	Construction Contractor		√		
6.7.5	5.1.42	After dewatering of the streams, the sediments should be allowed to dry before excavation. This will facilitate excavation of the sediment and also minimize the risk of drained water following back into water courses as the sediment is handled. Where time or weather constraints require handling of wet sediment, care should be taken in the removal of the sediment and the storage area should be banded to prevent silty runoff entering water courses.	To minimize offsite disposal of sediment	For channels where sediment removal is required / during construction	Construction Contractor		√		

D = Design, C = Construction, O = Operation

Implementation Schedule of Noise Mitigation Measures

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
2.6.2 – 2.6.5	Table 3.4	<p><i>Level 1 Mitigation – Use of Quiet Plant</i></p> <p>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.</p> <p>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.</p> <p>The Contractor should take note of ETWB TCW No. 19/2005 – Environmental Management on Construction Sites which sets out the policy and procedure requiring contractors to among others, adopt Quality Power Mechanical Equipment (QPME)</p>	To Protect NSRs from noise during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 2/93
2.6.7 – 2.6.8 (Figures 2.9 – 2.15)	Table 3.4	<p><i>Level 2 Mitigation – Use of Temporary Noise Barriers</i></p> <p>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 7kg/m³. Noise barrier should be provide for noisy construction activities that would be undertaken close (about 25m or less) to NSRs. The noise barriers should have a vertical height of at least 2.5m 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. It should have no gaps or opening at joints. The Contractor should regularly inspect and maintain the noise barrier to ensure its effectiveness.</p> <p>For the construction works which have the potential to exceed the noise standards on nearby NSR and shoes line of sight cannot be effectively blocked by the temporary noise barrier, movable (mobile) barriers should be provided. Movable barriers of at least 2.5m 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 5m 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.</p>	To Protect NSRs from noise during construction	Locations as per Figures 2.9 – 2.15 of ES or all works site located at 25m or less from NSRs / during construction	Construction Contractor		√		ProPECC PN 2/93

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
2.9.1	3.8.1	The location of the temporary noise barriers should be further reviewed during the detailed design stage by the detailed design engineer or by the Environmental Team (ET) Leader during construction stage based on the latest construction programme and contemporary site conditions, including any changes with respect to NSRs.	To ensure the proposed temporary noise barriers are effectively implemented	Locations as per Figures 2.9 – 2.15 of ES or all works site located at 25m or less from NSRs / during construction	Detailed Design Engineer / Construction Contractor	√	√		ProPECC PN 2/93
2.6.2 – 2.6.5	Table 3.4	<p><i>Good Site Practices</i></p> <p>In general, potential construction noise impact can be minimized or avoided by imposing a combination of the following good site practices as mitigation measures:</p> <p>(a) Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction period.</p> <p>(b) Construction plant should be sited away from NSRs.</p> <p>(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.</p> <p>(d) Equipment known to emit sound strongly in one direction should be orientated such that the noise is directed away from nearby NSRs.</p> <p>(e) Material stockpiles and other structures (such as site offices) should be effectively utilized to shield on-site construction activities.</p> <p>(f) Stationary equipment should be located within the channel when weather conditions permit (e.g. dry season).</p> <p>(g) The Contractor shall devise, arrange methods of working and carrying out the works in such manner as to minimize noise impacts on the surrounding environment and shall provide experienced personnel with suitable training to ensure that these measures are implemented properly.</p> <p>(h) In the event that new schools are built near the works area, the contractor should minimize construction noise exposure to the school (especially during examination periods). The Contractor should liaise with the school and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract and to avoid noisy activities during these periods.</p>	To Protect NSRs from noise during construction	All works site / during construction	Construction Contractor		√		ProPECC PN 2/93
2.6.14	Table 3.4	<p><i>Public Relation Strategy</i></p> <p>To maintain an effective communication channel with the public, a 24-hour hotline system should be established by the project office for the Contractor to receive any enquiry and complaint lodged by the public in the respect of the Project.</p>	To promote good public relation and maintain effective communication	All works site / during construction	Project Office (Engineer) & Construction		√		-----

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
		Upon receipt of enquiry / complaint, the Contractor (or its ET) should investigate the causes of the incident and take the appropriate action to rectify the situation. Periodic newsletters, information leaflets, notices or other means of communication should be provided to the affected villages, communities, and residents advising them the current progress, the schedule of works in future, the potential environmental impacts arising from the works and the corresponding mitigation measures.	during construction		Contractor				
2.9.1	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 Environmental Team (ET) Leader and verified by the Independent Environmental Checker (IEC) to ensure the intended noise reduction effectiveness can be achieved.	To ensure proper implementation of noise mitigation measures by the Contractor	All works site / during construction	Construction Contractor		√		ProPECC PN 2/93

D = Design, C = Construction, O = Operation

Implementation Schedule of Landscape and Visual Impact Measures

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
5.2.51 – 5.2.52	7.5.10 – 7.5.11	<p>Landscape Mitigation -TKL02</p> <p>To minimize cutting of native tree species at the proposed channel's beginning, the alignment should be adjusted to reduce tree felling. Where unavoidable, re-vegetation efforts should concentrate on using native species. One of the area's landscape features are the mature bamboo growth clusters. They have been retained in the latest design.</p> <p>The current drainage design includes gabion walls with a tiled angle of 10 degree. This would allow vegetation to establish better when combined with the application of a growth medium, providing more micro-habitat space.</p>	To minimize landscape and visual impact form the Project	TKL02 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006
5.2.58 – 5.2.60	7.5.12 – 7.5.14	<p>Landscape Mitigation - TKL07</p> <p>To minimize cutting of native tree species at the proposed channel's centre section. Where unavoidable, re-vegetation efforts should concentrate on using native species.</p> <p>To compensate for the loss of riparian habitat due to the river training works and to create breeding and foraging habitats for wetland dependent wildlife, the retained meanders may be developed into marshes.</p> <p>The current drainage design includes gabion walls with a tiled angle of 10 degree. This would allow vegetation to establish better when combined with the application of a growth medium, providing more micro-habitat space.</p>	To minimize landscape and visual impact form the Project	TKL07 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006
5.2.76 – 5.2.79	7.5.16 – 7.5.19	<p>Landscape Mitigation - MUP01 & MUP02</p> <p>The design modifies to the existing streamcourse only in those areas where there is a particular risk of flooding. Some localized bank stabilization will use materials permitting decolonization by riparian vegetation such as gabion baskets.</p> <p>The proposed treatment would be beneficial, especially in the less disturbed up-stream areas providing roosting and foraging grounds for at least 36 wetland dependent species, the highest number of all studied sites.</p> <p>Natural stream bottom should be retained in situ and works involving disturbance to the stream bottom should be restricted to short sections proceeding upstream to permit survival and subsequent decolonization of worked areas by stream fauna.</p> <p>To minimize cutting of native tree species at southern section of MUP01 and MUP02, the alignment should be adjusted as much as possible so to reduce the need for tree felling (this section represents approximately 200m to 280m downstream from the proposed channel start). If removal of trees remains unavoidable, re-vegetation efforts after work completion should focus on the use of native species as found in the affected areas.</p>	To minimize landscape and visual impact form the Project	MUP01 and MUP02 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
5.3.41 – 5.3.42	7.5.26 – 7.5.27	Visual Mitigation – TKL02 To minimize cutting of native tree species at the proposed channel's beginning, the alignment should be adjusted to reduce tree felling and maintain this visual amenity. The current drainage design includes gabion walls with a tilted angle of 10 degree. This would allow vegetation to establish better when combined with the application of a growth medium, providing more micro-habitat space, reducing visual impacts furthermore.	To minimize landscape and visual impact form the Project	TKL02 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006
5.3.46 – 5.3.47	7.5.28 – 7.5.29	Visual Mitigation – TKL07 As much as possible, riverside tree cover should be retained. The current drainage design includes vertical gabion walls. The current drainage design includes gabion walls with a tilted angle of 10 degree. This would be allow vegetation to establish better when combined with the application of a growth medium, providing more micro-habitat space.	To minimize landscape and visual impact form the Project	TKL07 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006
5.3.60	7.5.31	Visual Mitigation – MUP01 and MUP02 To minimize cutting of the Fung Shui woodland at the southern section of MUP01, the alignment should be adjusted. If removal of trees remains unavoidable, re-vegetation efforts after work completion should focus on the use of native species as found in the affected areas.	To minimize landscape and visual impact form the Project	MUP01 and MUP02 / during detailed design and construction	Detailed Design Engineer & Construction Contractor	√	√		ETWB TCW No. 3/2006

D = Design, C = Construction, O = Operation

Implementation Schedule of Ecological Impact Measures

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
		MUP01/02							
3.16.15	6.5.15	<i>Existing stream course</i> The proposed works within the stream channel should be carried out within the dry season (1 st October – 31 st March)	Minimize ecological impact on MUP01/02 during construction	All works sites at MUP01/02 during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004
3.16.16	6.5.16	Appropriate site management procedures during the construction phase should be adopted, as recommended in ETWB TCW No. 5/2005, to minimize 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.	Minimize ecological impact on MUP01/02 during construction	All works sites at MUP01/02 during construction			√		ETWB TCW No. 5/2005
3.16.17	6.5.17	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 deposited naturally.	Minimize ecological impact on MUP01/02 during construction	All works sites at MUP01/02 during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004
3.16.18	6.5.18	<i>Stream banks and riparian vegetation</i> The nature of the works limits the extent to which minimization of adverse impacts during the construction stage is feasible. However, where possible native riparian trees which would be impacted during construction works should be transplanted to suitable locations within the project area. Impacts to mature native trees close to the stream should be avoided by retaining the trees in-situ wherever possible, especially in those areas of riparian woodland along MUP02 which are to be retained (e.g. along the bypassed meander).	Minimize ecological impact on MUP01/02 during construction in riparian trees	All works sites at TKL02 and TKL07 during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004
		TKL02 & 07							
3.16.20	6.5.20	<i>Existing stream course</i> Appropriate site management procedures during the construction phase should be adopted, as recommended in ETWB TCW No. 5/2005, to minimize 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.	Minimize ecological impact on TKL02 and TKL07 during construction	All works sites at TKL02 and TKL07 during construction	Construction Contractor		√		ETWB TCW No. 5/2005
3.16.21	6.5.21	Potential ecological value of the channelised stream beds will be considerably influenced by the extent to which the grasscrete area has the potential to be colonized by a range of facultative or obligate wetland plant species. Accordingly the grasscrete paving should be not more than 33% concrete (i.e. not	Minimize ecological impact on MUP01/02 during construction	All works sites at TKL02 and TKL07 during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
		less than 67% "hole")							
3.16.22	6.5.22	<p><i>Stream banks and riparian vegetation</i></p> <p>The nature of the woks limits the extent to which minimization of adverse impacts during the construction stage is feasible. However, where possible native riparian trees which would be impacted during construction works should be transplanted to suitable locations within the project area. Impacts to mature native trees close to the stream should be avoided by retaining the trees in-situ wherever possible,</p>	Minimize ecological impact on MUP01/02 during construction in particular riparian trees	All works sites at TKL02 and TKL07 during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004
3.6.23	6.5.23	<p><i>Proposed Site Management Measures during Construction</i></p> <p>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:</p> <ul style="list-style-type: none"> • Construction activities should be restricted to works area that should be clearly demarcated. • Excavation works should be carried out during the dry season where stream flow is low. Where adequate spare is available, works should be carefully phased such that only on side of the channel is constructed and not all of the stream is impacted at any time, to provide refuge for aquatic organisms. 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 by containment structures, such as using bounds or sandbag barriers (wrapped with getextile fabric) or other similar techniques, to facilitate a dry or at least confined excavation within the water courses and 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 carefully planned and located to minimize disturbance to the substrate of stream and riparian vegetation by construction equipment. Temporary access track 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. 	Minimize ecological impact on the proposed streams during construction	All works sites / during construction	Construction Contractor		√		DSD Technical Circular No. 2/2004 ETWB TCW No. 5/2005

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Time	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
						D	C	O	
		<ul style="list-style-type: none"> 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 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. 							
3.16.24	6.5.24	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.							
3.16.27 Tables 3.78 & 3.79 Figures 3.42 – 3.48	6.5.27 Tables 6.5 & 6.6	<p><i>Proposed Measures to Mitigate for Adverse Ecological Impacts</i></p> <p>Mitigation planting of native trees, shrubs and bamboos should be undertaken in locations where the project area includes sufficient space adjacent to the stream but outside the channel itself. Appropriate locations for tree and bamboo planting are detail on Figures 3.42 – 3.48 (of ES Report). Table 3.78 details appropriate species of trees and bamboos for streamside planting, whilst Table 3.79 details appropriate species for woodland planting</p> <p>Tree and bamboo species for riparian planting at TKL02 and TKL07:</p> <ul style="list-style-type: none"> <i>Celtis tetranda (sinensis)</i> <i>Ficus hispida</i> <i>Ficus virens (superba)</i> <i>Sapium sebiferum</i> <i>Schefflera octophylla</i> <i>Bambusa eutuldoides</i> 	To mitigate for the loss of shaded stream sections due to loss of bank side trees at TKL02 and TKL07	Mitigation planting at TKL02 and TKL07 in locations as shown in Figures 3.42 – 3.48 (of ES Report) / during construction	Construction Contractor		√		
3.16.28	6.5.28	Detailed planting plans showing location, species and numbers of trees (together with any trees to be transplanted) as part of the Landscape Plan should be prepared and adopted prior to commencement of the project.	To mitigate for the loss of shaded stream sections due to loss of bank side trees at TKL02 and TKL07	Mitigation planting at TKL02 and TKL07 in locations as shown in Figures 3.42 – 3.48 (of ES Report) / during construction	Construction Contractor		√		

Implementation Schedule of Air Quality Impact Assessment

ES Ref	EM&A Ref	Environmental Protection 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									
**	2.9.2	<p><i>General</i></p> <p>General requirements for air pollution control as stated in the EPD's recommended Pollution Control Clauses for Construction Contracts are listed below:</p> <p>(i) The Contractor shall observed and comply with the Air Pollution Control Ordinance and its subsidiary regulations, particularly the Air Pollution Control (Open Burning) Regulation and Air Pollution Control (Construction Dust) Regulation and Air Pollution Control (Smoke) Regulation.</p> <p>(ii) The Contractor shall undertake at all times to prevent dust nuisance and smoke as a result of his activities.</p> <p>(iii) The Contractor shall ensure that there will be adequate water supply / storage for dust suppression.</p> <p>(iv) The Contractor shall devise, arrange methods of working and carrying out the works in such a manner so as to minimise dust impacts on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are</p>	To prevent air quality impacts on sensitive receivers during construction	All works site / during construction	Construction Contractor		√		<p>Air Pollution Control Ordinance</p> <p>Air Pollution Control (Open Burning) Regulation</p> <p>Air Pollution Control (Construction Dust) Regulation</p> <p>Air Pollution Control (Smoke) Regulation</p>

ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
**	2.9.3	<p>implemented.</p> <p>(v) Before the commencement of any work, the Engineer may require the methods of working, plant, equipment and air pollution control system to be used on the site to be made available for inspection and approval to ensure that they are suitable for the project.</p> <p><i>Dust</i></p> <p>The following good construction practices are recommended to be adopted on-site to minimize potential air quality impacts from dust emissions:</p> <p>(i) Use of regular watering (at least twice daily) to reduce dust emissions from exposed site surfaces, particularly during dry weather.</p> <p>(ii) Side enclosure and covering of any aggregate or dusty material stockpiles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be employed to aggregate fines.</p> <p>(iii) Tarpaulin covering of all dusty vehicle loads transported to and from site locations.</p>	To prevent dust nuisance on sensitive receivers during construction	All works site / during construction	Construction Contractor		√		<p>Air Pollution Control Ordinance</p> <p>Air Pollution Control (Construction Dust) Regulation</p>
**	2.9.4	<p><i>Odour</i></p> <p>The following site practices are recommended to minimize potential air quality impacts from odour nuisance:</p> <p>(i) Any odorous excavated material shall be</p>	To prevent odour nuisance on sensitive receivers during construction	All works site / during construction	Construction Contractor		√		

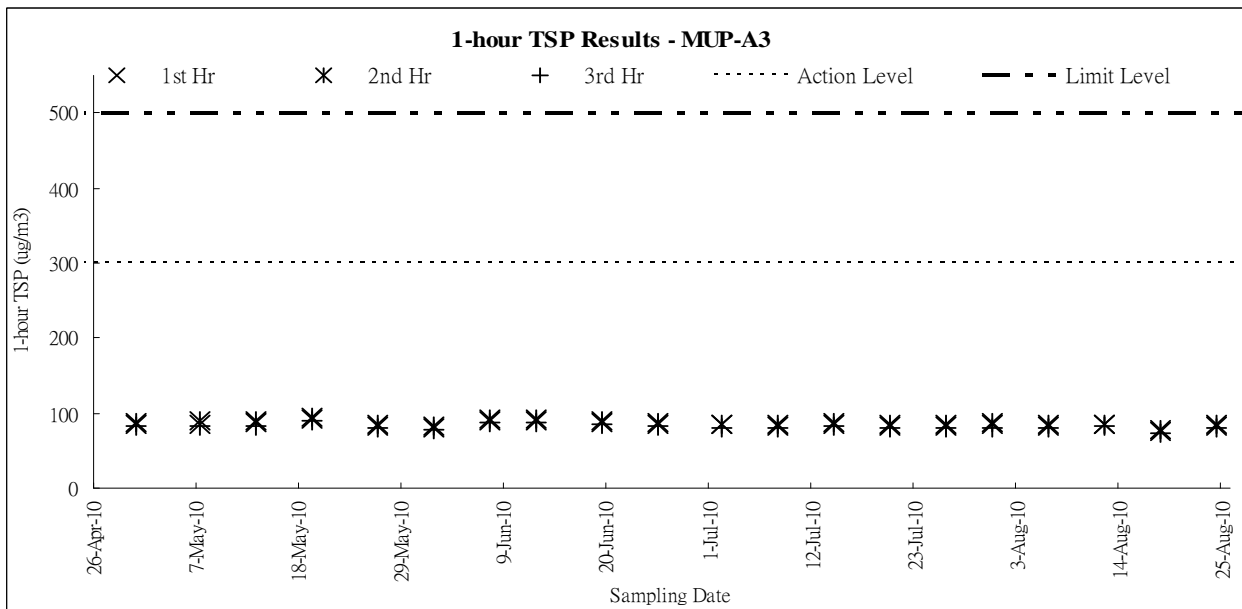
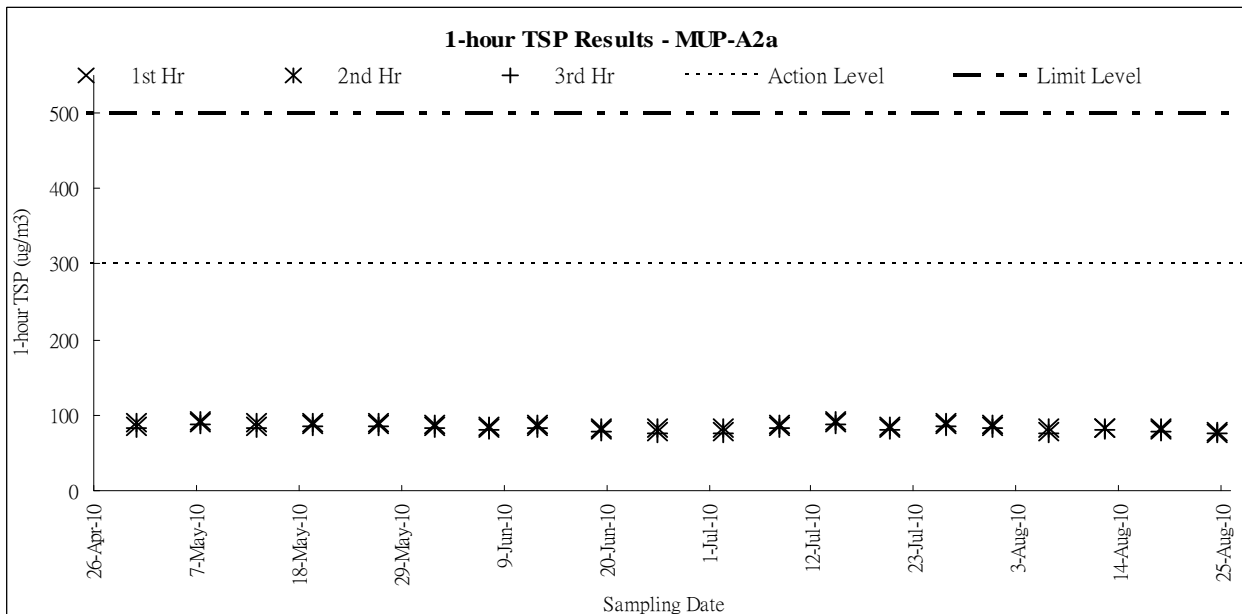
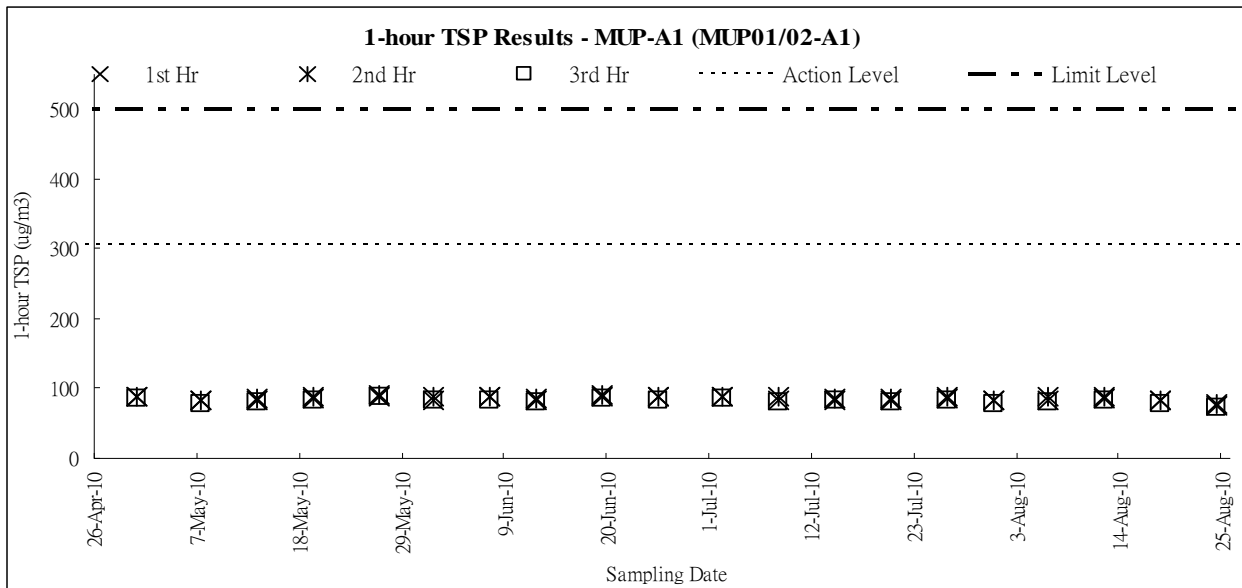
ES Ref	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measures and Main Concerns to addressed	Location / Timing	Implementation Agent	Implementation Stages *			Relevant Legislation & Guidelines
						D	C	O	
		placed as far away from receivers as possible. (ii) Any stockpiles of odorous excavated material shall be covered with tarpaulin sheets. (iii) Any odorous stockpiled material shall be removed from site as soon as possible (within 3 days) to reduce the amount of time available for decomposition of organic matter.							

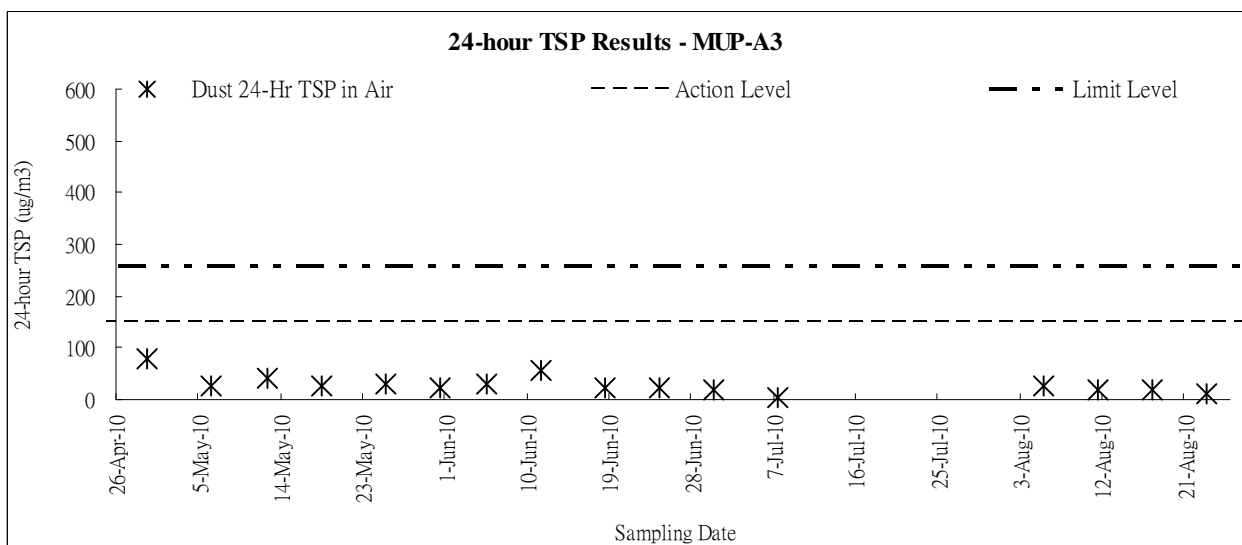
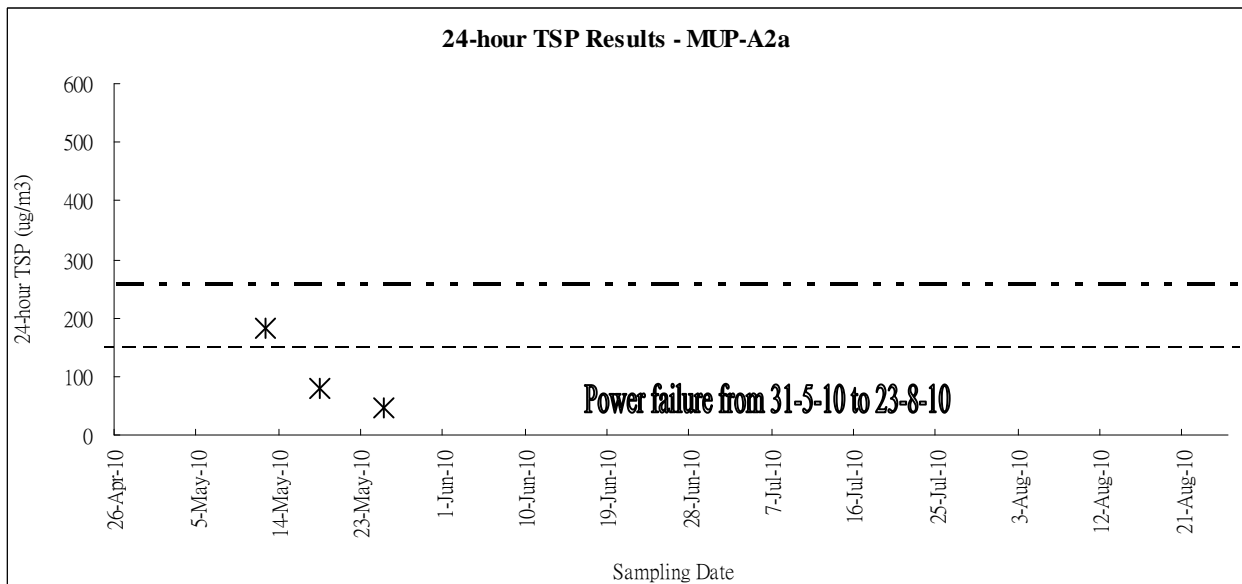
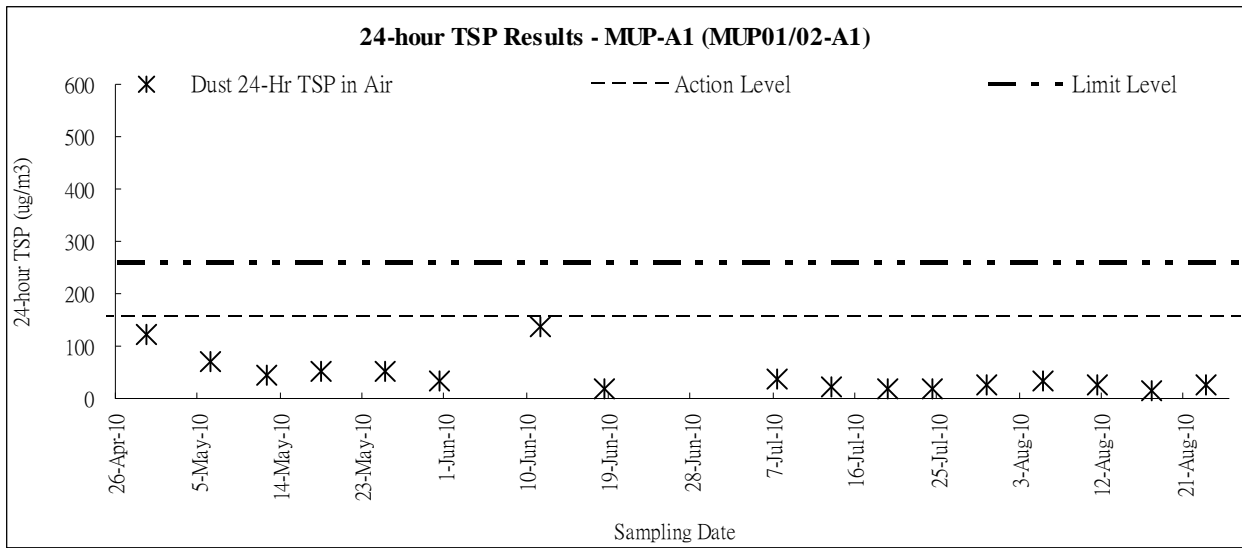
D = Design, C = Construction, O = Operation

Appendix E

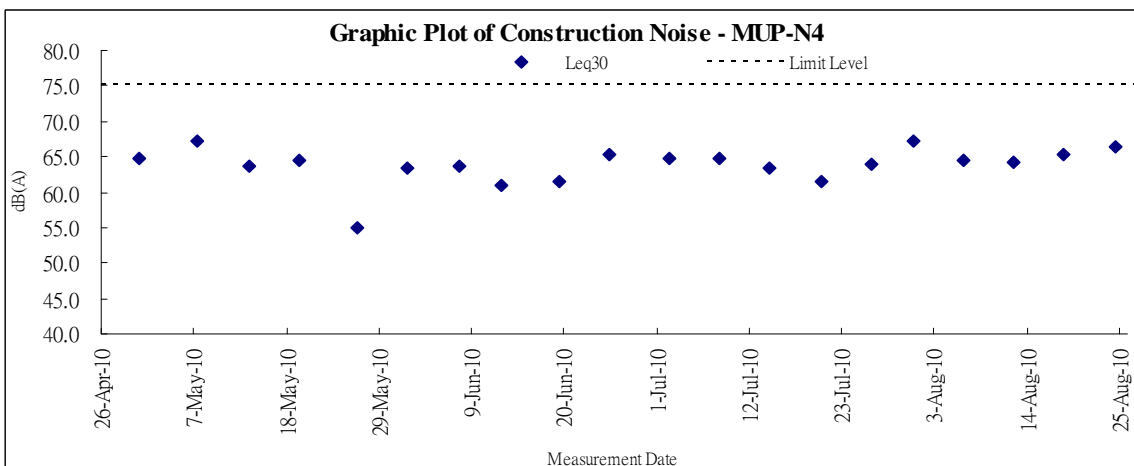
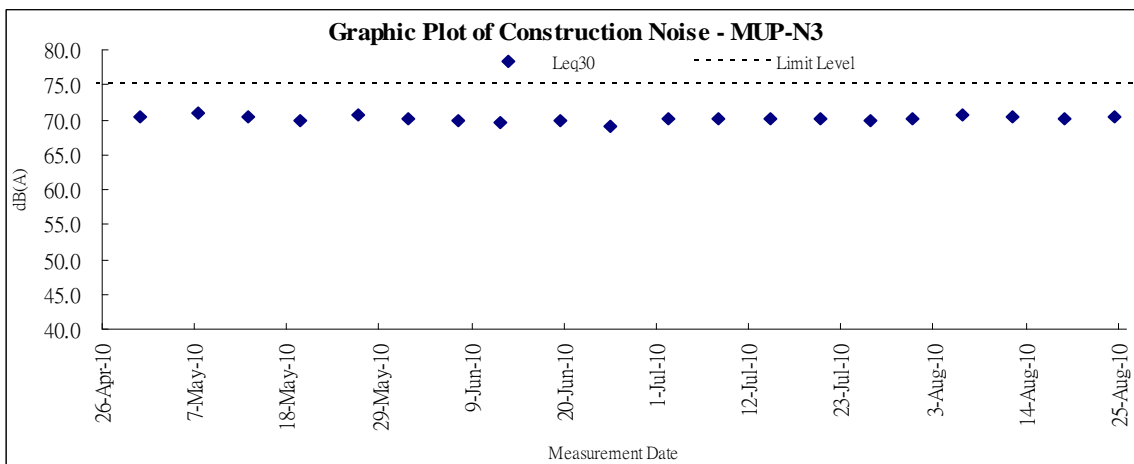
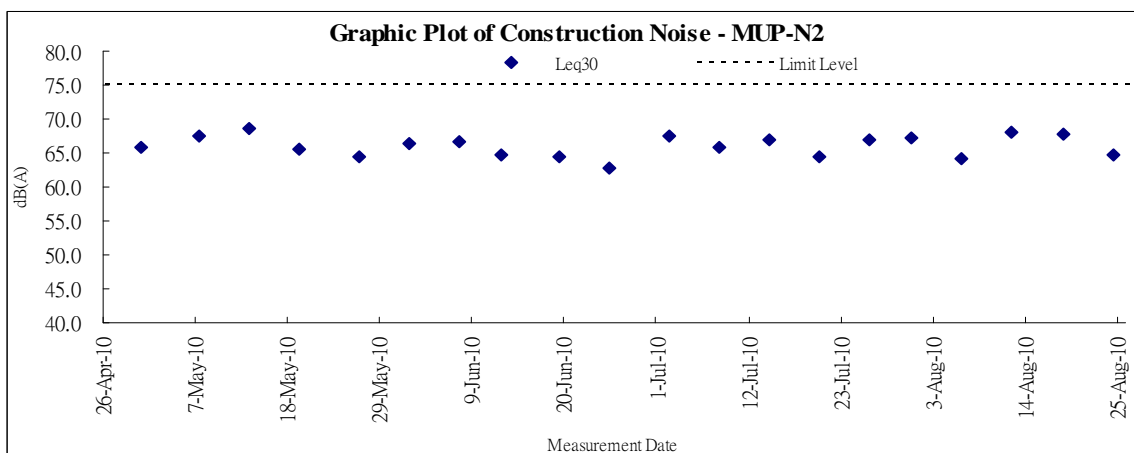
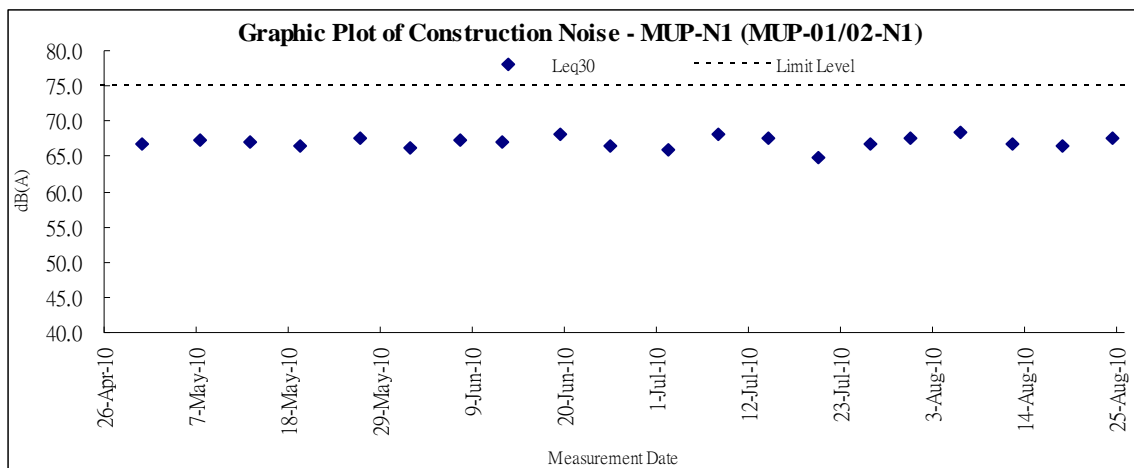
- Graphic Plots of**
- (a) Air Quality**
 - (b) Construction Noise**
 - (c) Water Quality**

(a) Air Quality





(b) Construction Noise



(c) Water Quality

