MONTHLY ENVIRONMENTAL
MONITORING & AUDIT REPORT

Gammon Construction Limited

Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department: *First Monthly Environmental Monitoring and Audit Report (Revision A)*

October 2007

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Gammon Construction Limited

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3rd October 2007

Reference 0067560

For and on behalf of
Environmental Resources Management

Approved by: Dr Robin Kennish

Signed:

Position: Director

Certified by:
(Environmental Team Leader – Marcus Ip)

Date: 3 October 2007

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LIST OF ANNEXES

EXECUTIVE SUMMARY

The construction works for Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department commenced on 21 July 2007. This is the first monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A works carried out during the period from 21 July 2007 to 20 August 2007 in accordance with the EM&A Manual.

Summary of construction works undertaken during reporting period

The major construction works undertaken during the reporting month include construction of horizontal pipe piles for supporting the tunnel portal; construction of the footings of the noise enclosure at the tunnel portal; and excavation works for the access ramp to the tunnel.

Environmental Monitoring and Audit Progress

A summary of the monitoring activities in this reporting period is listed below:

24-hour TSP monitoring	5 times
Construction Noise Monitoring	5 times
Joint environmental site auditing	4 times

Air Quality

Five sets of 24-hour TSP measurements were carried out at the designated monitoring station AM1 during the reporting period. No exceedance was recorded during the reporting period.

Noise

Five sets of 30-minute noise measurements were carried out at the designated monitoring stations NM1 & NM2 during the reporting period. A Notification of Exceedance with a detailed investigation report was issued during the reporting period for a noise exceedance recorded at NM2. The result of the investigation concluded that the exceedance was likely due to other adjacent projects rather than works of the Designated Project.

Cultural Heritage

Monitoring of potential building movements of the Elliot Treatment Works (ETW) during construction of the Designated Project was conducted during the reporting period. No exceedance of Alarm, Action and Alert Levels in this respect was recorded during the reporting period.

Construction Waste Management

Wastes from this Project include inert construction and demolition (C&D) wastes and non-inert C&D wastes. A total of 890 tonnes of inert C&D wastes and 2.55 tonnes of non-inert C&D materials were generated during the reporting period. The non-inert C&D wastes were disposed of at the South East New Territories (SENT) Landfill and the inert C&D materials were transferred to the public fill barging point at Quarry Bay.

Environmental Site Auditing

Four weekly joint environmental site audits were carried out by the representatives of Gammon Construction Ltd and the Environmental Team (ET). Details of the audit findings and implementation status are presented in *Section 6*.

Environmental Non-compliance

No non-compliance event was recorded during the reporting period.

No environmental complaint and summons was received in this reporting period.

Future Key Issues

Works to be undertaken in the coming monitoring period are the installation of noise enclosure and the construction of the tunnel.

Potential environmental impacts arising from the construction activities in the coming month are expected to be mainly associated with dust, site runoff, and construction noise.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by Gammon Construction Limited as the Environmental Team (ET) to implement the Environmental Monitoring and Audit (EM&A) programme for the Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department (the Project).

1.1 PURPOSE OF THE REPORT

This is the first EM&A report which summarizes the impact monitoring results and audit findings for the EM&A programme during the reporting period from **21 July 2007** to **20 August 2007**.

1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1 : **Introduction**
Details the scope and structure of the report.

Section 2 : **Project Information**
Summarizes background and scope of the project, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3 : **Environmental Monitoring Requirement**
Summarizes the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, Event / Action Plans, environmental mitigation measures as recommended in the EIA report and relevant environmental requirements.

Section 4 : **Implementation Status on Environmental Mitigation Measures**
Summarizes the implementation of environmental protection measures during the reporting period.

Section 5 : **Monitoring Results**
Summarizes the monitoring results obtained in the reporting period.

Section 6 : **Environmental Site Auditing**
Summarizes the audit findings of the weekly site inspections undertaken within the reporting period.

Section 7 : **Environmental Non-conformance**
Summarizes any monitoring exceedance, environmental complaints and environmental summons within the reporting period.

Section 8 : **Future Key Issues**
Summarizes the impact forecast and monitoring schedule for the next three months.

Section 9 : **Conclusions**

2 PROJECT INFORMATION

2.1 BACKGROUND

The works for the Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department (the Project) will be constructed in rock beneath the northern hill slopes of Lung Fu Shan immediately adjacent to the present Water Supplies Department (WSD) facilities, south of Pok Fu Lam Road. The works areas of the Project are illustrated in *Annex A*.

The rock cavern will comprise two salt water storage tunnels connected to a common section leading to an access portal. It will be excavated using a non-explosive drill-and-break tunnelling method. The cavern will be lined with concrete and the water storage reservoirs will be constructed from reinforced concrete. Each of the two water storage tunnels of the rock cavern will be approximately 60 m in length and 17 m in span. These storage tunnels will be connected to a common section of approximately 40 m in length and 8 m in span, which will lead to an access portal on the hill slope. The internal tank dimensions of each of the salt water service reservoirs will be 46.8m (L) x 15m (W) x 9m (H) approximately. The two reservoirs are designed to provide a combined saltwater storage capacity of 12,000m^3. Construction activities will involve:

- Slope work and portal / access tunnel construction;
- Tunnel excavation for Salt Water Services Reservoirs (SWSR) No. 1;
- SWSR No. 1 Construction;
- Tunnel excavation for SWSR No. 2; and
- SWSR No. 2 Construction

As the Site can be accessed via the access road leading from Pok Fu Lam Road to the existing WSD facilities, formation of new access road and/or haul road will not be required.

The potential environmental impacts of the Project have been presented in the Project Profile (PP) *"Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department"* (Application No. DIR-150/2007), and an Environmental Permit (EP-279/2007) (EP) for the Project was granted on 4 June 2007. Under the requirements of Condition 3.2 of Environmental Permit EP-279/2007, an EM&A programme as set out in the EM&A Manual is required to be implemented. In accordance with the EM&A Manual, baseline monitoring of air quality and noise is required for the Project.

The construction works commenced on 21 July 2007 and are scheduled to be completed by December 2008. An updated construction programme is shown in *Annex A*.

2.2 CONSTRUCTION ACTIVITIES

A summary of the major construction activities undertaken in this reporting period is shown in ***Table 2.1***. The locations of the construction activities are shown in *Annex A*.

Table 2.1 Summary of Construction Activities Undertaken during the Reporting Period

Construction Activities Undertaken
• Construction of horizontal pipe piles for supporting tunnel portal
• Construction of footing of the noise enclosure at the tunnel portal
• Excavation works for the access ramp to the tunnel

2.3 PROJECT ORGANISATION

The Project organization chart and contact details are shown in *Annex B*.

2.4 STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project is presented in *Table 2.2*.

Table 2.2 Summary of Environmental Licensing, Notification and Permit Status

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	EP-279/2007	Throughout the Contract	Permit granted on 4 June 2007
Notification of Construction Works under Air Pollution Control (Construction Dust) Regulation	--	--	Reference Number for Notification Pursuant to APC (Construction Dust) Regulation: 001019768
Effluent Discharge Licence	EP880/W10/XX0275	N/A	Discharge of industrial trade effluent into communal storm water drain
Chemical Waste Producer Registration	5919-141-G2336-17	N/A	Chemical waste types: spent paint, acid, alkaline, adhesive, diesel fuel, lubricating oil and bitumen.

3.1 AIR QUALITY MONITORING

3.1.1 Monitoring Location

In accordance with the EM&A Manual, monitoring of ambient 24-hour Total Suspended Particulates (TSP) level was conducted at the monitoring station listed in *Table 3.1*. The map and photographs showing the monitoring station are presented in *Annex C*.

Table 3.1 Air Monitoring Station

Monitoring Station	Description
AM1	Chow Yei Ching Building, HKU

3.1.2 Monitoring Parameter, Frequency and Programme

Weekly 24-hour TSP monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. The monitoring programme for this and next reporting period is shown in *Annex D*.

3.1.3 Action and Limit Levels

The Action and Limit levels have been established in accordance with the EM&A Manual and are presented in *Table 3.2*.

Table 3.2 Action and Limit Levels for Air Quality

Parameter	Air Monitoring Station	Action Level, μgm^{-3}	Limit Level, μgm^{-3}
24-hour TSP	AM1	173	260

3.1.4 Monitoring Equipment

Continuous 24-hour TSP monitoring was performed using High Volume Samplers (HVS) with appropriate sampling inlets installed, located at the designated monitoring station. The performance specification of HVS complies with the standard method "*Determination of Suspended Particulate Matter in the Atmosphere (High Volume Method)*" as stipulated in *US EPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50 Appendix B)*. *Table 3.3* summarizes the equipment that was used in the 24-hour TSP monitoring.

Table 3.3 TSP Monitoring Equipment

Monitoring Station	Equipment	Model (HVS, Calibration Kit)
AM1	HVS, Calibration Kit	GMWS-2310, CM-AIR-43

3.1.5 Monitoring Methodology

Installation

The HVS at AM1 were placed at the rooftop of Chow Yei Ching Building at about 33 meters above local ground level. The HVS was free-standing with no obstruction.

The following criteria were considered in the installation of the HVS:

- appropriate support to secure the samplers against gusty wind was provided at AM1;
- a minimum of 2-metre separation from walls, parapets and penthouses was required for rooftop samplers;
- no furnace or incinerator flues were nearby;
- airflow around the sampler was unrestricted; and
- permission was obtained to set up the samplers and to gain access to the monitoring stations.

Preparation of Filter Papers by SGS Hong Kong Ltd

- glass fibre filters were labelled and sufficient filters that were clean and without pinholes were selected;
- all filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was 40%; and
- SGS Hong Kong Ltd, a HOKLAS accredited laboratory, implements comprehensive quality assurance and quality control programmes.

Field Monitoring

- the power supply was checked to ensure that the HVS was working properly;
- the filter holder and the area surrounding the filter were cleaned;
- the filter holder was removed by loosening the foul bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully;
- the filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter;
- the swing bolts were fastened to hold the filter holder down to the frame. The pressure applied should be sufficient to avoid air leakage at the edges;

- then the shelter lid was closed and secured with the aluminium strip;
- the HVS was warmed-up for about 5 minutes to establish run-temperature conditions;
- a new flowrate record sheet was set into the flow recorder;
- the flow rate of the HVS was checked and adjust at around 1.21 m^3/min. The range specified in the EM&A Manual was between 0.6 – 1.7 m^3/min;
- the programmable timer was set for a sampling period of 24 hours ± 1 hour, and the starting time, weather condition and the filter number were recorded;
- the initial elapsed time was recorded;
- at the end of sampling, the sampled filter was removed carefully and folder in half length so that only surfaces with collected particulate matter were in contact;
- it was then placed in a clean plastic envelope and sealed;
- all monitoring information was recorded on a standard data sheet; and
- filters were sent to SGS Hong Kong Ltd for analysis.

Maintenance and Calibration

- the HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply; and
- the flow rate of HVS with mass flow controller were calibrated using an orifice calibrator. Initial calibrations of the dust monitoring equipments were conducted upon installation and prior to commissioning. Five-point calibration was carried out for HVS using Tisch TE-5025 A Calibration Kit. The calibration records for the HVS are given in *Annex E*.

3.1.6 Event Action Plan

The Event / Action Plan (EAP) for air quality monitoring is presented in *Annex F*.

3.2 NOISE MONITORING

3.2.1 Monitoring Location

In accordance with the EM&A Manual, monitoring of construction noise impact was conducted at the monitoring stations listed in *Table 3.4*. The map and photographs showing the monitoring stations are presented in *Annex C*.

Table 3.4 Noise Monitoring Station

Monitoring Station	Description
NM1	Tower 3 of The Belcher's
NM2	Starr Hall, HKU

3.2.2 Monitoring Parameters, Frequency and Programme

Weekly construction noise monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual. The monitoring programme for this and next reporting period is shown in *Annex D*.

The construction noise levels were measured in terms of A-weighted equivalent continuous sound pressure level (L_{eq}) in decibels dB(A). Supplementary information for data auditing, two statistical sound levels L_{10} and L_{90}; the levels exceeded for 10 and 90 percent of the time respectively, were also recorded during the monitoring for reference.

3.2.3 Monitoring Equipment and Methodology

Noise measurements were conducted in accordance with the calibration and measurement procedures as stated in *Annex – General Calibration and Measurement Procedures* of *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (*GW-TM*) issued under the *Noise Control Ordinance* (*NCO*) (Cap.400).

The sound level meters and calibrator used for the noise measurement, as listed in *Table 3.5*, complies with IEC 651: 1979 and 804:1985 (Type 1) specification. The calibration certificates of the sound level meters are given in *Annex E*.

Table 3.5 Noise Monitoring Equipment

Monitoring Station	Monitoring Equipment
NM1	Rion NL-31
NM2	Rion NL-31

Immediately prior to and following the noise measurements, the accuracy of the measurement equipment was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were accepted as the calibration level from before and after the noise measurement agree to within 1.0 dB.

3.2.4 Event / Action Plan

The Event / Action Plan (EAP) for noise monitoring is presented in *Annex F*.

3.3 CULTURAL HERITAGE

3.3.1 Monitoring Location and Methodology

Building settlement markers and building tiltmeters were installed at the monitoring locations which have been agreed with with Antiquities and Monuments Office (AMO) of Leisure and Cultural Services Department (LCSD) (*Annex J*). Building settlement marker BS10 was moved for a small distance of about 2m to BS10a due to difficulties in accessing BS10 after the provision of a security office. The monitoring frequency during the reporting period is summarised in *Table 3.6*.

Table 3.6 Monitoring Frequency

Instrument	Monitoring Frequency
Building settlement markers	Monitoring was taken every day except Sundays and general holidays
Building tiltmeters	Monitoring was taken every hour

3.3.2 Alert, Action and Alarm Levels

The Alert, Action and Alarm Levels which were agreed with AMO are presented in *Table 3.7*.

Table 3.7 Alert, Action and Alarm Levels

Instrument		Alert Level	Action Level	Alarm Level
Building settlement markers	Vertical	12 mm or 4 mm/day	20 mm or 6 mm/day	25 mm or 8 mm/day
	Tilt	1:1000	1:600	1:500
	Horizontal	4 mm	6 mm	8 mm
Building tiltmeters		0.1 Degree (±1.75mm/m)	0.15 Degree (±2.62mm/m)	0.2 Degree (± 3.49mm/m)

3.3.3 Event / Action Plan

The Event / Action Plan (EAP) for building movements monitoring is presented in *Annex F*.

Environmental Control Requirements under EIAO

The Contractor has implemented environmental mitigation measures and requirements as stated in the Project Profile (DIR-150/2007), the Environmental Permit and EM&A Manual. The implementation status of environmental protection and pollution control / mitigation measures is summarized in *Annex G*. Status of required submissions under the EP during the reporting period is presented in *Table 4.1*.

Table 4.1 Status of Required Submission

EP Condition	Submission	Submission Date
Condition 1.12	Notification on commencement of construction of the Project	6 July 2007
Condition 2.2	Notification on Management Organization of the Main Construction Company	6 July 2007
Condition 2.3	Submission of EM&A Manual	27 June 2007
Condition 2.7(a)	Submission of Noise Enclosure Design Plan	6 July 2007
	Submission of revised Noise Enclosure Design Plan	2 August 2007
Condition 3.2	Submission of Baseline Monitoring Report	6 July 2007

Other Environmental Control Requirements

Mitigation measures including the provision of temporary drainage system, wastewater treatment facilities and sedimentation tanks were implemented by the Contractor to manage and treat construction effluents and runoff. In accordance with the discharge licence issued under *Water Pollution Control Ordinance* (WPCO), effluent sampling and testing for suspended solids is required to be conducted monthly to ensure that the quality of treated effluent at designated discharge points complies with the criteria stipulated in the discharge licence. Two effluent samples were tested by the Contactor during the reporting period and the test results indicated compliance.

5 MONITORING RESULTS

5.1 AIR QUALITY

Five sets of 24-hour TSP measurements were carried out at monitoring station AM1 during the reporting period. The monitoring data for 24-hour TSP together with wind data and graphical presentations are presented in *Annex H*. The weather condition during the monitoring period was sunny. The local impacts near the monitoring station were mainly associated with vehicle emissions along Pok Fu Lam Road. No exceedance of Action and Limit Levels of 24-hr TSP were recorded during the reporting period.

5.2 NOISE

Five sets of 30-minute construction noise measurements were carried out at monitoring stations NM1 & NM2 during the reporting period. The monitoring results together with graphical presentations are presented in *Annex I*. The local impacts observed near the monitoring stations were mainly traffic noise from Pok Fu Lam Road and the concurrent projects undertaken in the vicinity.

The noise exceedance recorded during the reporting period and investigation result is summarized in *Table 5.1*. A Notification of Exceedance with the detailed investigation report was issued to EPD immediately when the exceedance was identified.

Table 5.1 Summary of Record of Exceedance

Station	Record of Exceedance	Result of Investigation
NM2	Exceedance of Limit Level on 30 July 2007	An excavator and a breaker were being operated to demolish the existing salt water service reservoir, which is not associated with the Project, and only site preparation work associated with the Project was being operated. The dominant noise sources were identified as the demolition work of other concurrent project. It is therefore concluded that the exceedance was likely due to other works rather than works of the Designated Project.

5.3 CULTURAL HERITAGE

The monitoring results of building settlement markers and tiltmeters were presented in *Annex J*. There were instrumentation errors for tiltmeters TM5 & TM10 on 17 and 3 Aug 2007 respectively and the relevant instruments were fixed immediately. No exceedance of Alert, Action and Alarm Levels for building movements was recorded during the reporting period.

5.4 WASTE MANAGEMENT

Wastes from this Project include mainly inert construction and demolition (C&D) wastes and non-inert C&D wastes. Reference has been made on the Monthly Summary Waste Flow Table prepared by Gammon Construction Ltd (*Annex K*). The quantities of different types of wastes are summarized in *Table 5.2* with reference to relevant handling records and trip tickets for this Project. Appropriate measures have been implemented by the Contractor to minimise dust impact associated with waste management (*Annex G*).

Table 5.2 Quantities of Different Waste

	Quantity		
Month / Year	**C&D Materials (inert) [a]**	**C&D Materials (non-inert) [b]**	**Chemical Waste**
21 July – 20 August 2007	890 tonnes	2.55 tonnes	0 Litre

Notes:

(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil and were disposed of at the Quarry Bay temporary public fill barging point.

(b) Non-inert C&D materials after segregation were disposed of at SENT Landfill.

Weekly site inspections were carried out by the representatives of Gammon Construction Ltd and the ET. Four site inspections were conducted on 24 July, 31 July, 7 August and 14 August 2007. There was no non-compliance recorded during the site audit.

Major findings and recommendations are summarized as follows:

(i) It was recommended to provide a chemical waste storage area on site and wheel washing facilities at the site exit. The corrective action was being undertaken as observed in the site audit conducted in the reporting period.

(ii) It was recommended to provide a concrete bund along the site boundary near the SWSR1 works area to prevent site runoff from flowing into the u-channel directly without passing through the silt removing facilities. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(iii) It was recommended to place the oily equipment in a drip tray or impervious sheeting underneath to prevent soil contamination. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(iv) It was recommended to replace the damaged sandbag and provide addition sandbags around the grout mixing area to prevent wastewater overflowing to nearby drainage during the grout mixing process. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(v) It was recommended to cover the broken concrete with tarpaulin or spray with water regularly to prevent dust generation. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(vi) It was recommended to provide proper connection for directing any silty water collected for proper treatment and disposal. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(vii) It was recommended to remove the rubbish scattered on site and to provide rubbish bin in the site area. The Contractor was also reminded to educate the workers to maintain good housekeeping on site. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

(viii) It was recommended to provide drip tray for containing oil drums. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

7 ENVIRONMENTAL NON-CONFORMANCE

7.1 SUMMARY OF MONITORING EXCEEDANCE

No exceedance of the Action Level of 24-hour TSP and Alert Level of building movements was recorded at monitoring stations during the reporting period.

A Notification of Exceedance with a detailed investigation report was issued during the reporting period for noise exceedance recorded at NM2. Details of the exceedance recorded are given in *Section 5.2*.

7.2 SUMMARY OF ENVIRONMENTAL NON-COMPLIANCE

No non-compliance event was recorded during the reporting period.

7.3 SUMMARY OF ENVIRONMENTAL COMPLAINT

No complaint was received during the reporting period.

7.4 SUMMARY OF ENVIRONMENTAL SUMMON AND SUCCESSFUL PROSECUTION

No summons was received during the reporting period.

8 FUTURE KEY ISSUES

8.1 KEY ISSUES FOR THE COMING MONTH

Works to be undertaken for the coming monitoring period are summarized in *Table 8.1.*

Table 8.1 Construction Works to be Undertaken in the Coming Month

Work to be taken
• Installation of the noise enclosure
• Excavation of the tunnel

Potential environmental impacts arising from the above construction activities are mainly associated with dust, site runoff and waste management.

8.2 MONITORING SCHEDULE FOR THE COMING MONTHS

The tentative schedule of TSP and noise monitoring for the next reporting period is presented in *Annex D*. The environmental monitoring will be conducted at the same monitoring locations in this reporting period. The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress.

9 CONCLUSION

The Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 21 July 2007 to 20 August 2007 in accordance with EM&A Manual and the requirement under EP-279/2007.

No exceedance in the 24-hour TSP level and building movements was recorded at the monitoring stations during the reporting period.

A Notifications of Exceedance (NOE) was issued during the reporting period to record noise monitoring result exceeding Limit Level at station NM2 on 30 July 2007. The result of investigation concluded that the exceedance was likely due to other works rather than works related to the Designated Project.

No non-compliance event was recorded during the reporting period.

There was no complaint and summons/prosecution received during the reporting period.

The ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Annex A

Locations of Works Areas and Construction Activities during the Reporting Month, and updated Construction Programme

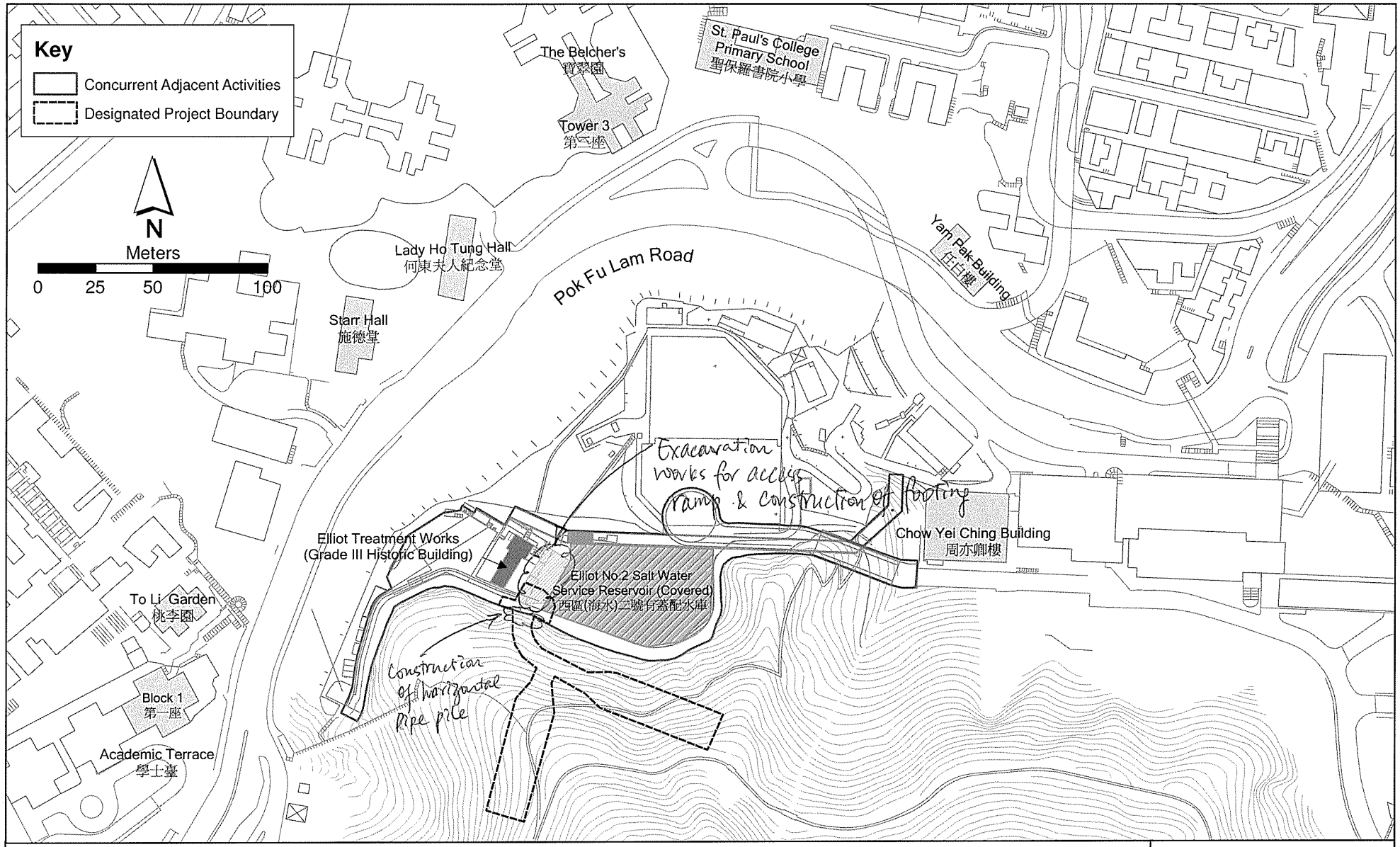

Figure A1

Project Location and Works Location

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Environmental Resources Management

ERM

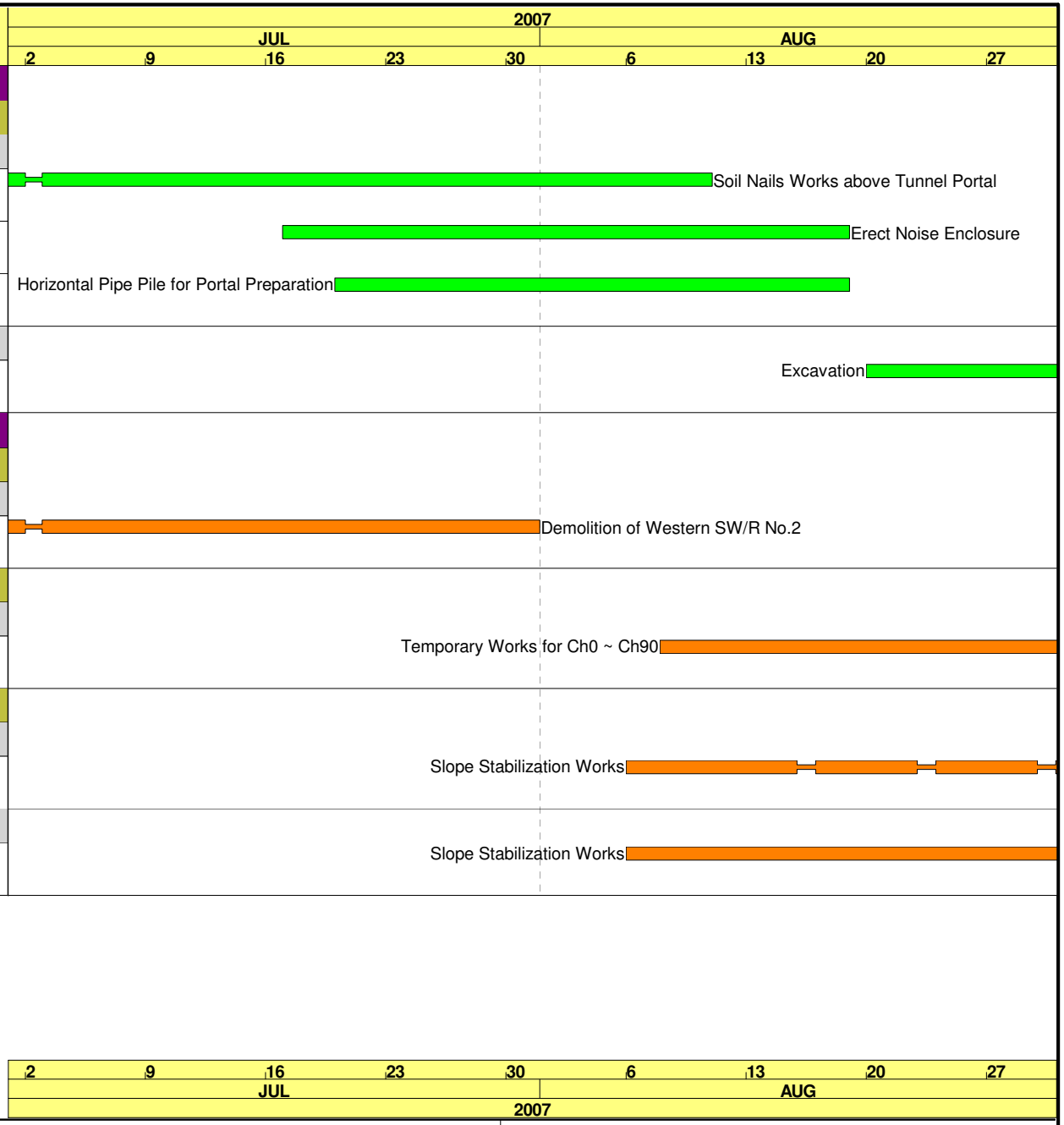
Summary Programme

	2007												2008												2009											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
DESIGNATED PROJECT																																				
Salt Water Tunnel Reservoirs																																				
Slope works for Tunnel Portals & Access Tunnel																																				
Tunnel Excavation for SWSR No.1 & 2																																				
Construction of SWSR No.1 & 2																																				
Testing (Compartment by Compartment)																																				
Commissioining of SWSR No.1 & 2																																				
ADJACENT WORKS																																				
Demolition																																				
Demolition of Existing Elliot SW/SR No.2																																				
Provision of Temporary Saltwater Supply System																																				
Demolition of Existing Elliot SW/SR No.1																																				
Fresh Water Service Reservoir No.1																																				
Slope Stabilisation Works for Slope Feature 11SW-A/C148 & 149																																				
Excavation and Temporary Works																																				
Construction of FWSR No.1																																				
Testing (Compartment by Compartment)																																				
Commissioning of FWSR No.1																																				
Fresh Water Service Reservoir No.2																																				
Slope Stabilisation Works for Slope Feature 11SW-A/C150 & 151																																				
Excavation and Temporary Works																																				
Construction of FWSR No.2																																				
Testing (Compartment by Compartment)																																				
Commissioning of FWSR No.2																																				
Decommissioning of Existing Fresh Water Service Reservoirs																																				
Pipe Gallery																																				
Temporary Works for Pipe Gallery																																				
Construction of Pipe Gallery Ch00 to Ch90																																				
Construction of Pipe Gallery Ch90 to Ch210 & pipe laying																																				
EVA																																				
Tree Transplant / Removal (Application for Permit and Preparation)																																				
Construction of EVA Retaining Wall																																				
Construction of EVA Link Bridge & Landscape Works																																				
Other Works																																				
Slope Stablilisation Works																																				
Natural Terrain Hazards Mitigation																																				
	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
	2007												2008												2009											

Design and Construction of Re-Provisions of WSD Utilities and Infrastructure of Centennial Campus of The University of Hong Kong

Gammon

Activity ID	Activity Description	Early Start	Early Finish
DESIGNATED PROJECT			
Salt Water Service Reservoirs & Tunnel			
Preliminaries			
TR00850	Soil Nails Works above Tunnel Portal	25-JUN-07*	10-AUG-07
TR00860	Erect Noise Enclosure	17-JUL-07	18-AUG-07
TR00855	Horizontal Pipe Pile for Portal Preparation	20-JUL-07*	18-AUG-07
SWSR Portal / Access Tunnel Excavation			
TR01000	Excavation	20-AUG-07	18-OCT-07
ADJACENT WORKS			
Demolition Works			
DW40300	Demolition of Western SW/R No.2	20-JUN-07*	31-JUL-07
Pipe Gallery			
PG50110	Temporary Works for Ch0 ~ Ch90	08-AUG-07*	29-SEP-07
Slope Stabilization Works			
Feature 11SW-A/C149			
SL60300	Slope Stabilization Works	06-AUG-07*	13-NOV-07
Feature 11SW-A/C150			
SL70200	Slope Stabilization Works	06-AUG-07*	27-SEP-07



Early Bar
Progress Bar
Critical Activity

EP01

Sheet 1 of 1

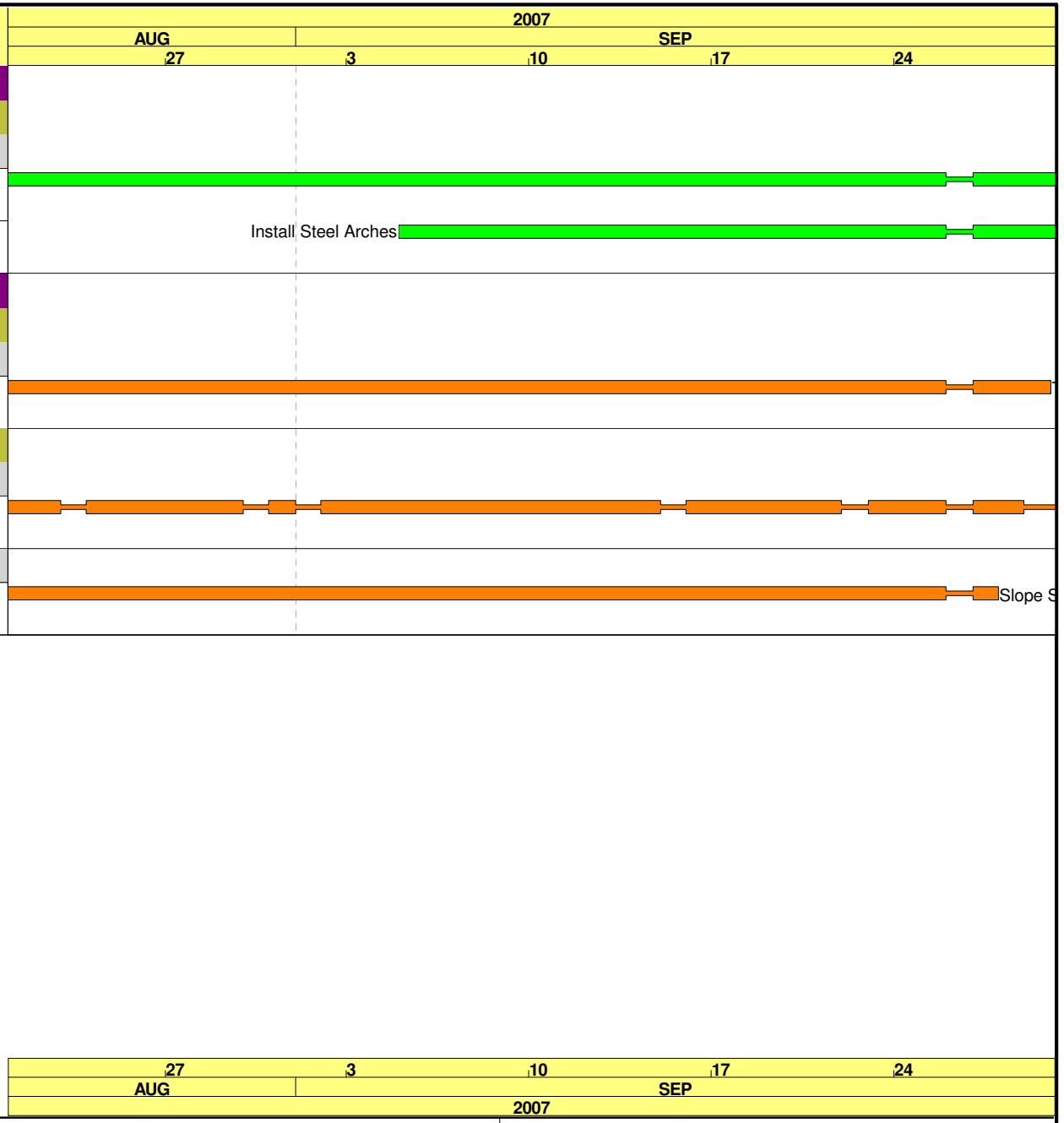
Reprovision of Salt Water Service Reservoirs in Western District

Construction Programme

(21 Jul 07to 20 Aug 07)

Date	Revision	Checked	Approved

Activity ID	Activity Description	Early Start	Early Finish
DESIGNATED PROJECT			
Salt Water Service Reservoirs & Tunnel			
SWSR Portal / Access Tunnel Excavation			
TR01000	Excavation	20-AUG-07	18-OCT-07
TR00990	Install Steel Arches	05-SEP-07	24-OCT-07
ADJACENT WORKS			
Pipe Gallery			
PG50110	Temporary Works for Ch0 ~ Ch90	08-AUG-07*	29-SEP-07
Slope Stabilization Works			
Feature 11SW-A/C149			
SL60300	Slope Stabilization Works	06-AUG-07*	13-NOV-07
Feature 11SW-A/C150			
SL70200	Slope Stabilization Works	06-AUG-07*	27-SEP-07



Early Bar
Progress Bar
Critical Activity

EP01

Sheet 1 of 1

Reprovision of Salt Water Service Reservoirs in Western District

Construction Programme

(21 Aug 07 to 20 Sep 07)

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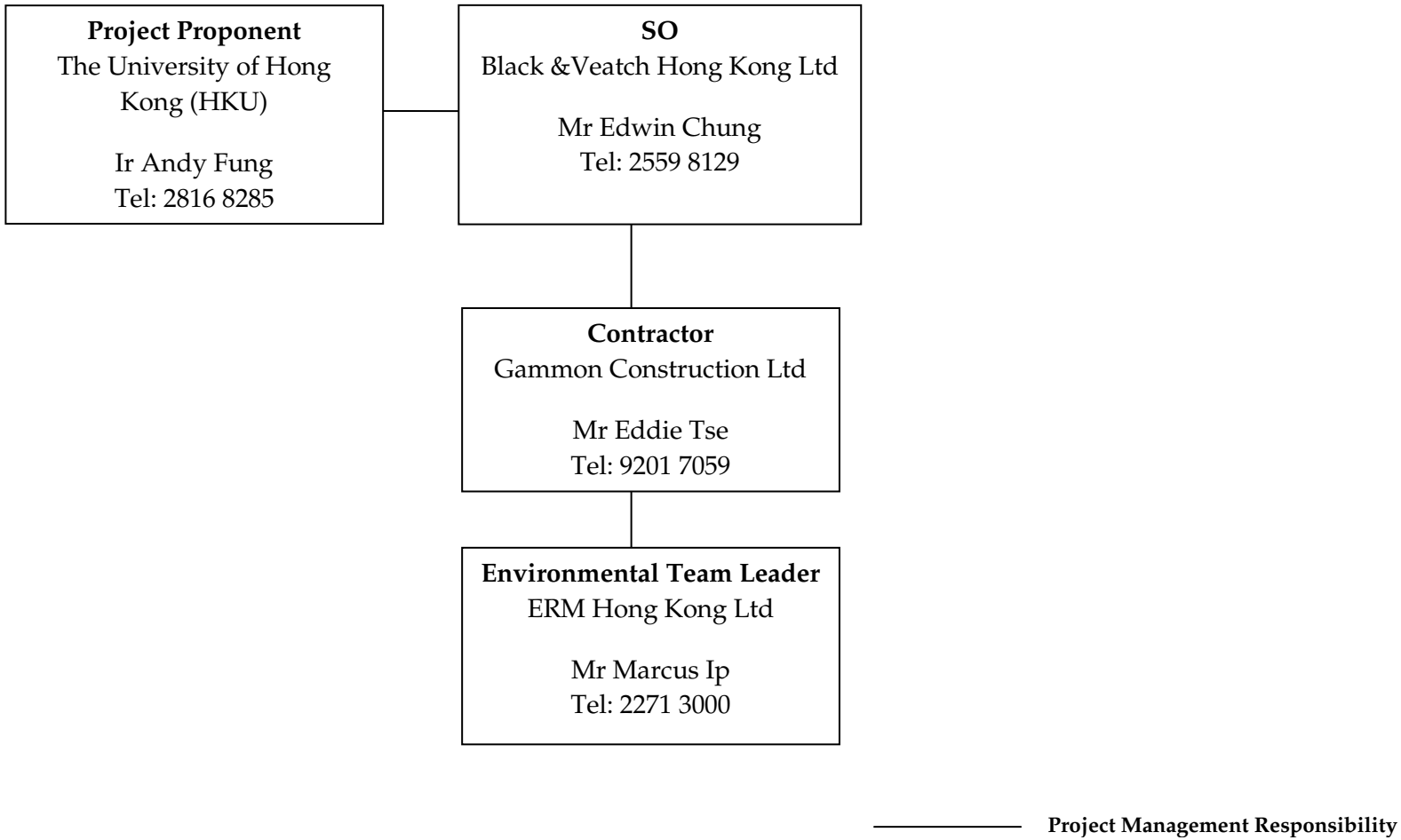
Annex B

Project Organization Chart and Contact Detail

Project Organization (with contact details)



Annex C

Location of Monitoring Stations and Photographs showing Monitoring Stations

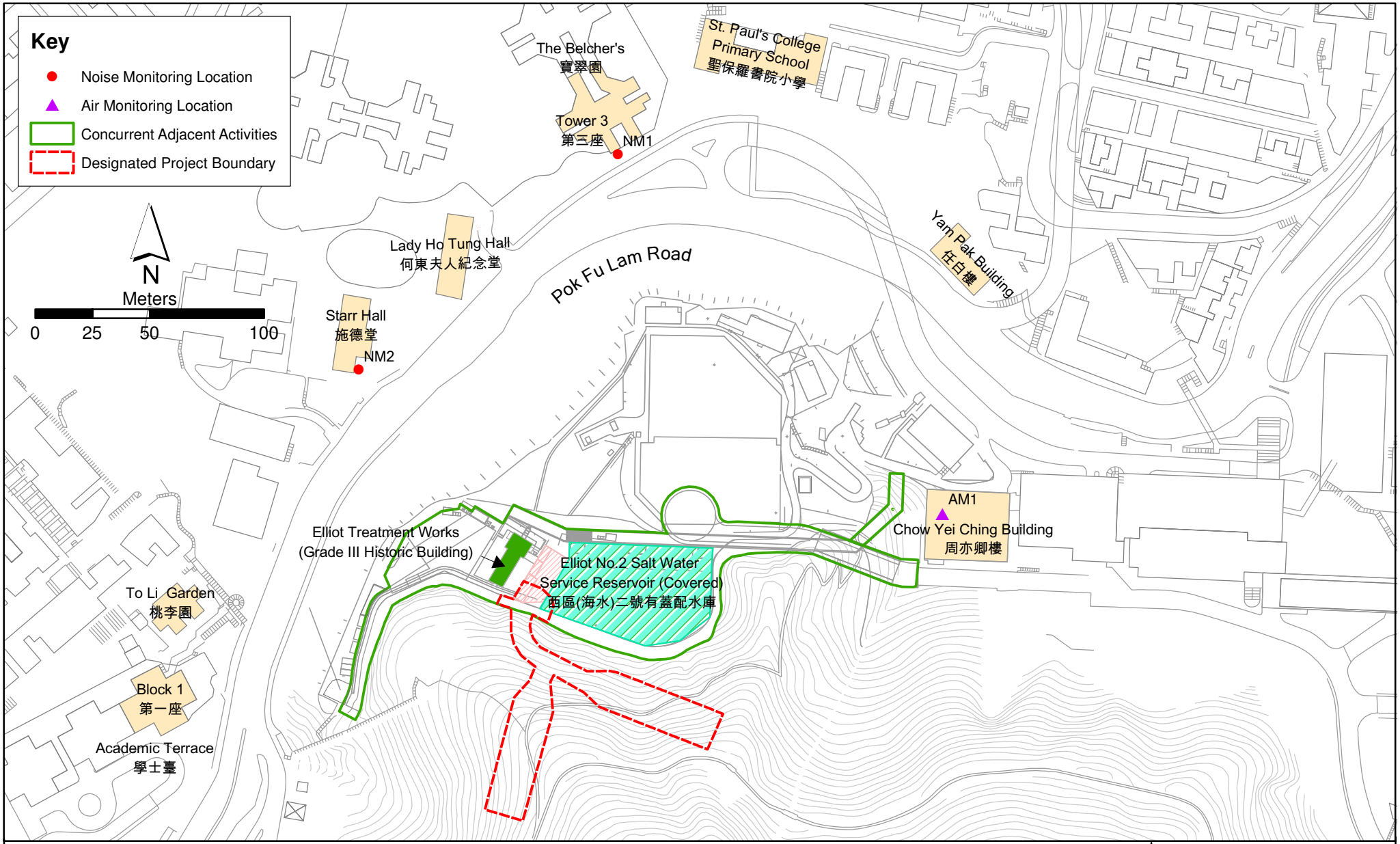


Figure C1

Air and Noise Monitoring Locations

File: 0067560_3.mxd
Date: 03/07/2007

Environmental
Resources
Management

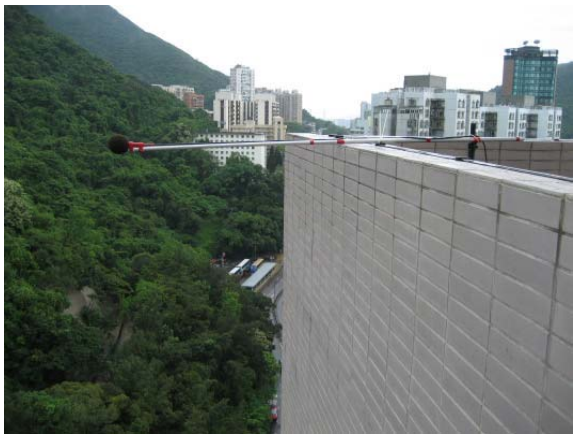
ERM

Air quality Monitoring Station

Air Quality Monitoring Station (AM1)

Noise Monitoring Station

Noise Monitoring Station (NM1)



Baseline Noise Monitoring Station (NM2)

Annex D

Monitoring Schedule

Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department
Air Quality and Noise Monitoring Schedule - July 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01-Jul	02-Jul	03-Jul	04-Jul	05-Jul	06-Jul	07-Jul
08-Jul	09-Jul	10-Jul	11-Jul	12-Jul	13-Jul	14-Jul
15-Jul	16-Jul	17-Jul	18-Jul	19-Jul	20-Jul	21-Jul
22-Jul	23-Jul	24-Jul	25-Jul	26-Jul	27-Jul	28-Jul
	Air Monitoring Noise Monitoring					
29-Jul	30-Jul	31-Jul				
	Air Monitoring Noise Monitoring					

Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department
Air Quality and Noise Monitoring Schedule - August 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01-Aug	02-Aug	03-Aug	04-Aug
05-Aug	06-Aug	07-Aug	08-Aug	09-Aug	10-Aug	11-Aug
	Air Monitoring Noise Monitoring					
12-Aug	13-Aug	14-Aug	15-Aug	16-Aug	17-Aug	18-Aug
	Air Monitoring Noise Monitoring					
19-Aug	20-Aug	21-Aug	22-Aug	23-Aug	24-Aug	25-Aug
	Air Monitoring Noise Monitoring					
26-Aug	27-Aug	28-Aug	29-Aug	30-Aug	31-Aug	
	Air Monitoring Noise Monitoring					

Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department
Air Quality and Noise Monitoring Schedule - September 2007

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						01-Sep
02-Sep	03-Sep	04-Sep	05-Sep	06-Sep	07-Sep	08-Sep
	Air Monitoring Noise Monitoring					
09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep	15-Sep
	Air Monitoring Noise Monitoring					
16-Sep	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep
	Air Monitoring Noise Monitoring					
23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep
	Air Monitoring Noise Monitoring					
30-Sep						

Annex E

Calibration Reports for HVSs and Sound Level Meters

High-Volume TSP Sampler
5-Point Calibration Record

Location	:	HKU (24-hr)
Calibrated by	:	K.T.Ho
Date	:	16/05/07
Sampler		
Model	:	GMWS-2310 ACCU-VOL
Serial Number	:	S/N 1060

Calibration Orfice and Standard Calibration Relationship

Serial Number	:	CM-AIR-43
Service Date	:	18 May 2006
Slope (m)	:	0.057363
Intercept (b)	:	-0.025638
Correlation Coefficient(r)	:	0.999913

Standard Condition

Pstd (hpa)	:	1013
Tstd (K)	:	298.18

Calibration Condition

Pa (hpa)	:	1010
Ta(K)	:	300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1	18 holes	9.4	3.054	1.546	56	55.8
2	13 holes	7.4	2.710	1.374	48	47.8
3	10 holes	6.0	2.440	1.240	40	39.8
4	7 holes	3.8	1.942	0.991	30	29.9
5	5 holes	2.4	1.543	0.792	22	21.9

Sampler Calibration Relationship

Slope(m):44.968 Intercept(b): -14.397 Correlation Coefficient(r): 0.9977

Checked by: Magnum Fan Date: 20/05/07

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

Certificate No. : C071448

Certificate of Calibration

This is to certify that the equipment

Description : Sound Level Meter

Manufacturer : Rion

Model No. : NL-31

Serial No. : 00410224

has been calibrated for the specific items and ranges.
The results are shown in the Calibration Report No. C071448.

The equipment is supplied by

Co. Name : Envirotech Services Co.

Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road, Hong Kong

Date of Issue : 29 March 2007

Certified by : K. C. Lee

The test equipment used for testing are traceable to the National Standards as specified in this report.

Calibration and Testing Laboratory of Sun Creation Engineering Limited
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
Tel: 2927 2606 Fax: 2744 8986 E-mail: callab@suncreation.com Website: www.suncreation.com

Annex F

Event and Action Plans

Table F1 Event and Action Plan for Air Quality Monitoring

Event	Action		
	ET Leader	**Contractor**	**SO**
Action Level			
Exceedance for one sample	1. Notify SO and Contractor. 2. Investigate the source(s) of exceedance. 3. Report the investigation results and whether exceedance is due to contractor's works to the Contractor and SO. 4. Review Contractor's air quality mitigation proposal and advise accordingly. 5. Ensure remedial measures are properly implemented. 6. Review subsequent monitoring results and report the findings to Contractor and SO.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice accordingly. 2. Submit air mitigation proposal to ET and SO for agreement if ET indicates that exceedance is related to the construction works. 3. Implement agreed proposal within a time scale as agreed with ET and SO.	1. Confirm receipt of notification of exceedance in writing. 2. Require Contractor to submit air mitigation proposal. 3. Supervise the implementation of remedial measures.
Exceedance for two or more consecutive samples	1. Notify SO and Contractor. 2. Investigate the source(s) of exceedances. 3. Report the investigation results and whether exceedances are due to contractor's works to the Contractor and SO. 4. Review Contractor's air mitigation proposal and advise accordingly. 5. Supervise and ensure remedial measures are properly implemented. 6. Increase monitoring frequency to twice per week if exceedances are considered related to contractor's works until exceedance stops, and report the findings to Contractor and SO. 7. If exceedances continue after 2 consecutive monitoring events, request meeting with Contractor and SO to discuss remedial actions.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice accordingly. 2. Submit air mitigation proposal to ET and SO for agreement if ET indicates that exceedances are related to the construction works. 3. Implement agreed proposal within a time scale as agreed with ET and SO. 4. If exceedances continue after 2 consecutive monitoring events, meet with ET and the SO to formulate and implement further remedial measures until exceedance ceases.	1. Confirm receipt of notification of exceedances in writing. 2. Require Contractor to submit air mitigation proposal. 3. Supervise the implementation of remedial measures. 4. If exceedances continue after 2 consecutive monitoring events, arrange meeting with ET and the Contractor to formulate further remedial works until exceedance ceases.

Event	Action		
	ET Leader	**Contractor**	**Supervising Officer**
Limit Level			
Exceedance for one sample	1. Notify EPD, Contractor and SO. 2. Investigate the source(s) of exceedance. 3. Report the investigation results and whether exceedance is due to contractor's works to EPD, Contractor and SO. 4. Review Contractor's air mitigation proposal and advise accordingly. 5. Ensure remedial measures are properly implemented. 6. Increase monitoring frequency to twice per week if exceedance is considered related to contractor's works until exceedance stops, and report the results to EPD, Contractor and SO.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. Submit air mitigation proposal to ET and SO for agreement if ET indicates that exceedance is related to the construction works. 3. Implement agreed proposal within a time scale as agreed with ET and The SO.	1. Confirm receipt of notification of exceedances in writing. 2. Require Contractor to submit air mitigation proposal. 3. Supervise the implementation of remedial measures.
Exceedance for two or more consecutive samples	1. Notify EPD, Contractor and SO. 2. Investigate the source(s) of exceedances. 3. Report the investigation results and whether exceedance is due to contractor's works to EPD, Contractor and SO. 4. Review Contractor's air mitigation proposal and advise accordingly. 5. Ensure remedial measures are properly implemented. 6. Increase monitoring frequency to daily if exceedances are considered related to contractor's works until exceedance stops, and report the results to EPD, Contractor and SO. 7. If exceedances continue after 2 consecutive monitoring events, request meeting with Contractor and SO to discuss remedial actions.	1. Take immediate action to avoid further exceedance and rectify any unacceptable practice. 2. Submit air mitigation proposal to ET and SO for agreement within 3 working days of notification if ET indicates that exceedances are related to the construction works. 3. Implement agreed proposal within a time scale as agreed with ET and SO. 4. Amend working methods and proposal if appropriate. 5. If exceedances continue after 2 consecutive monitoring events, meet with ET and the SO to formulate and implement further remedial measures, or stop relevant portion(s) of works as advised by the ET and / or as required by SO.	1. Confirm receipt of notification of failure in writing. 2. Require Contractor to submit air mitigation proposal. 3. Supervise the implementation of remedial measures. 4. If exceedances continue after 2 consecutive monitoring events, arrange meeting with ET and the Contractor to formulate further remedial works and to consider what portion(s) of works should be further mitigated or have to stop.

Table F2 Event and Action Plan for Construction Noise

Event	Action		
	ET Leader	**Contractor**	**SO**
Action Level			
Exceedance of Action Level	1. Notify the Contractor and SO. 2. Investigate the causes and check compliance of the Contractor. 3. Report the investigation results to the Contractor and SO. If the exceedance (complaint) is related to construction works, classify the complaint as "valid", and discuss with the Contractor for their formulation of noise mitigation proposal. 4. Review the noise mitigation proposal by the Contractor and advise accordingly. 5. Ensure noise mitigation proposal are properly implemented, and conduct additional monitoring to verify the mitigation effectiveness. 6. Produce complaint investigation report detailing complaint, investigation findings, actions taken and their effectiveness to the Contractor and SO.	1. Take immediate action to avoid further exceedance. 2. Submit noise mitigation proposals to ET and SO. 3. Implement noise mitigation proposal within the agreed time frame. 4. Upon the receipt of complaint investigation report from ET, in consultation with the SO, provide responses to the complainant.	1. Confirm receipt of notification of exceedance (complaint) in writing. 2. If the exceedance (complaint) is related to construction works, require Contractor to submit noise mitigation proposal for the analyzed noise problem. 3. Supervise the implementation of noise mitigation proposal.

Event	Action		
	ET Leader	**Contractor**	**SO**
Limit Level			
Exceedance of Limit Level	1. Notify the Contractor, SO and EPD. 2. Conduct additional noise monitoring and analyze Contractor's working procedures to determine possible cause(s) of exceedance. 3. Provide interim report to the Contractor, SO and EPD on the causes and proposed actions to be taken for the exceedances if exceedance is related to construction works. 4. Review Contractor's proposals for remedial actions and advise accordingly. 5. Assess effectiveness of remedial actions by additional monitoring and report the results to the Contractor, SO and EPD. 6. If exceedance continues, request meeting with Contractor and SO to discuss further remedial actions. 7. If exceedance stops, cease additional monitoring.	1. Take immediate action to avoid further exceedance. 2. In responding to the interim report provided by the ET, prepare and submit proposals for remedial actions to ET and SO within 3 working days. 3. Implement the agreed proposals. 4. Resubmit proposals if problem still not under control. 5. Meet with the ET and the SO to determine further remedial actions, and stop the relevant portion of works as advised by the ET and instructed by the SO until the exceedance is abated.	1. Confirm receipt of notification of exceedance in writing. 2. Require Contractor to submit proposals for remedial actions for the analyzed noise problem. 3. Supervise the implementation of remedial measures. 4. If exceedance continues, arrange meeting with the Contractor and ET to determine further remedial actions, and consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.

Table F3 Event and Action Plan for Monitoring of Potential Building Movements

Event	Action		
	ET Leader	**Contractor**	**SO**
Exceedance of Alert Level	1. Notify the EPD and AMO. 2. Review the action plan prepared by the Contractor and advise accordingly. 3. Ensure action plan are properly implemented, review subsequent monitoring results to verify the mitigation effectiveness.	1. Notify the SO and ETL immediately. 2. Submit a brief report describing the works being undertaken close by and other relevant observations. 3. Propose a suitable plan of action which may include the installation of additional instruments and/or increasing the monitoring frequency. 4. Submit a report to review the instrument responses, including differential deformations assess the effects on the monitored elements in the light of the relevant construction activities and predict further responses and their effect, based on the data trend to date. 5. Submit a detailed action plan to the SO describing the measure to be taken in the event of an alarm trigger level being attained. The action plan will be subject to the approval of the SO. 6. Report subsequent monitoring results to SO and ETL. 7. Make preparations for implementing the Alarm Level trigger actions, in accordance with the approved action plan.	1. Review the brief report submitted by the Contractor. 2. Review and approve the action plan prepared by the Contractor. 3. Supervise the implementation of action plan upon approval, review subsequent monitoring results and verify the mitigation effectiveness.

Event	Action		
	ET Leader	**Contractor**	**SO**
Exceedance of Action Level	1. Notify EPD and AMO immediately. 2. Review the emergency plan prepared by the Contractor and advises accordingly. 3. Ensure remedial proposal are properly implemented. 4. Ensure action plan are properly implemented, review subsequent monitoring results to verify the mitigation effectiveness. 5. Review the investigation report and report findings to EPD and AMO accordingly.	1. Notify the SO and ETL immediately 2. Undertake a joint inspection of the works with the SO. 3. Implement the Alarm Level trigger actions, phased as appropriate, so that the Action Level is not reached in accordance with the action plan. 4. Within 48 hours of exceeding an Action Level, devise and submit an emergency plan describing the measures to be taken in the event of an Alarm Level being attained. 5. Discuss with the SO on the instrument response and review the effectiveness of the emergency plan. 6. Agree with the SO, undertake additional measures in the affected area to avoid reaching the Action Level. 7. Within 7 days, submit an investigation report to review the instrument responses, including differential deformations, assess the effect on monitored elements in the light of the relevant construction activities and predict further responses and their effect, based on the data trend to date.	1. Undertake a joint inspection of works with the Contractor. 2. Review and approve the emergency plan prepared by the Contractor. 3. Supervise the implementation of action plan upon approval, review subsequent monitoring results and verify the mitigation effectiveness. 4. Review and approve the investigation report.
Exceedance of Alarm Level	1. Notify EPD and AMO immediately. 2. Review the emergency plan prepared by the Contractor and advises accordingly. 3. Ensure remedial proposal are properly implemented. 4. Ensure action plan are properly implemented, review subsequent monitoring results to verify the mitigation effectiveness. 5. Review the investigation report and report findings to EPD and AMO accordingly.	1. Suspend all works within 30m of the instrument. 2. Notify the SO and ETL immediately 3. Undertake a joint inspection of the works with the SO. 4. Implement emergency trigger action(s) based on the emergency plan approved by the SO. These emergency trigger actions will include measures to diminish the deformations and ground responses. 5. Within 3 days, provide an investigation report to examine the construction method and a detailed report to review the deformation and ground response history and the trigger actions adopted related to the construction activities.	1. Undertake a joint inspection of works with the Contractor. 2. Confirm the Contractor has stopped relevant construction works. 3. Review and approve the emergency plan prepared by the Contractor. 4. Supervise the implementation of action plan upon approval, review subsequent monitoring results and verify the mitigation effectiveness. 5. Review and approve the investigation report.

Annex G

Summary of Implementation Status

Annex G Environmental Mitigation Implementation Schedule

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Construction Air Quality			
The areas for temporary stockpiling of excavated materials should be provided with enclosed shelters.	Stockpile zone	Contractor	N/A. Temporary stockpiling area is not set up yet.
Stockpile of dusty material outside the cavern and the stockpile zone shelters should be covered entirely with impervious sheeting or sprayed with water or a dust suppression chemical to keep the entire surface wet.	Work areas	Contractor	N/A
Skip hoist for material transport should be totally enclosed by impervious sheeting.	Work areas	Contractor	N/A
Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving a construction site.	Work areas	Contractor	√
The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.	Work areas	Contractor	√
Where a site boundary adjoins a road, streets or other accessible to the public, hoarding of not less than 2.4 m high from ground level should be provided along the entire length except for a site entrance or exit.	Work areas	Contractor	√
Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the 3 sides.	Work areas	Contractor	√
All dusty materials should be should be sheltered, covered entirely or sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.	Work areas	Contractor	√
The height from which excavated materials dropped should be controlled to a minimum practical height to limit fugitive dust generation from unloading.	Work areas	Contractor	√
The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure dust materials do not leak from the vehicle.	Work areas	Contractor	√

Remarks:

√ Compliance of Mitigation Measures
<> Compliance of Mitigation but need improvement
x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by Gammon
Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Diesel-powered equipment should be properly maintained to control gaseous emissions.	Work areas	Contractor	√
Regular watering should be provided to the unpaved haul road and dusty material.	All unpaved haul roads, bulldozed material, exposed site areas	Contractor	√
Excavation / earth moving operation should be sprayed with water.	Work areas	Contractor	Δ
Continuous 24-hour TSP monitoring should be conducted at designated location once per week throughout the construction period.	Designated location	ET	√
Construction Noise			
Noise enclosure at the portal of the Project should be provided in accordance with the submitted noise enclosure design plan.	Portal area	Contractor	√ (Noise enclosure is being constructed)
Noise enclosure should be properly maintained to ensure that it is properly functioning throughout the construction stage of the Project.	Portal area	Contractor	N/A
Idling PME should be switched off.	Work areas	Contractor	√
Noisy PME should be placed inside the cavern or sited as far away from the NSRs as practicable.	Work areas	Contractor	N/A
Quiet PME should be used as far as practicable.	Work areas	Contractor	√
Stored materials and temporary structures, if applicable, should be sited in practical locations to screen NSRs from noisy on-site construction activities.	Work areas	Contractor	N/A
Work sequences should be scheduled to avoid the simultaneous use of noisy PME in close proximity to NSRs.	Work areas	Contractor	√
Quieter power units of stationary and earth moving plant with partial or full enclosures or vibratory isolation	All areas	Contractor	√
All plant and equipment to be used on the construction site shall be properly maintained in good operating condition.	All areas	Contractor	√
Construction noise monitoring should be conducted at designated locations once per week throughout the construction period	Designated locations	ET	√
Construction Water Quality			

Remarks:

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x Non-compliance of Mitigation Measures
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Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Discharge license for discharge of effluent from the construction site should be applied under the WPCO. The discharge quality must meet the requirements specified in the discharge license. All the runoff and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the TM-DSS.	-	Contractor	√
Provide proper sewage treatment and disposal facilities in the form of chemical toilets for site staff and workers.	Work areas	Contractor	√
Open stockpiles of construction material on the work site should be covered with tarpaulin or similar fabric during rainstorms.	Work areas	Contractor	N/A
Treatment facility (e.g. WetSep) should be provided on site to treat all tunneling groundwater.	Work areas	Contractor	√
All runoff should be properly collected and treated prior to discharge to the stormwater drain.	Work areas	Contractor	Δ
Peripheral interceptor drains around the site boundary should be provided to segregate surface runoff.	Site boundary	Contractor	√
Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times	Work areas	Contractor	Δ
Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary.	Work areas	Contractor	N/A
Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.	Work areas	Contractor	N/A

Remarks:

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x Non-compliance of Mitigation Measures
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Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers. Discharge of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	Work areas	Contractor	√
Water used in ground boring and drilling or rock /soil anchoring should as far as practicable be re-circulated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.	Work areas	Contractor	N/A
A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfall to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.	Wheel washing bay	Contractor	√
Wastewater generated from building construction activities including concreting, plastering, cleaning of works and similar activities should not be discharged into the stormwater drainage system. If the wastewater is to be discharged into foul sewers, it should undergo the removal of settleable solids in a silt removal facility, and pH adjustment as necessary.	Work areas	Contractor	√
Construction Waste			
Contractor should register as a chemical waste producer if chemical wastes would be produced from the construction activities.	-	Contractor	√
Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container.	Work areas	Contractor	N/A (Chemical waste store is being set up)
The Contractor shall use a licensed collector to transport and dispose of the chemical wastes in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.	Work areas	Contractor	N/A

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x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by Gammon
Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Training to site personnel in proper waste management and chemical handling procedures should be provided.	Work areas	Contractor	√
Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors should be conducted.	Work areas	Contractor	√
Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers should be implemented.	Work areas	Contractor	√
Sufficient waste disposal points and regular collection of waste should be provided.	Work areas	Contractor	√
Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (ie soil, broken concrete, metal, etc) should be implemented.	All areas	Contractor	√
Different types of waste should be segregate and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.	Work areas	Contractor	√
Encourage collection of aluminum cans by individual collectors by providing separate labeled bins to enable this waste to be segregated from other general refuse generated by the work force.	Work areas	Contractor	√
Proper storage and site practices should be implemented to minimize the potential for damage to contamination of construction materials.	Work areas	Contractor	√
Construction materials should be carefully planned and stocked to minimize amount of waste generated and avoid unnecessary generation of waste.	Work areas	Contractor	√
General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. Preferably an enclosed and covered area should be provided to reduce the occurrence of 'wind blown' light material.	Work areas	Contractor	√

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x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by Gammon
Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
A Waste Management Plan should be prepared in accordance with ETWB TCW No. 19/2005 and to be implemented throughout the construction stage.	Work areas	Contractor	√
A recording system with details on the amount of wastes and construction and demolition material generated, recycled and disposed (including the disposal sites) should be developed in accordance with ETWB TCW No.31/2004.	Work areas	Contractor	√
Ecology			
No construction works should be carried out on the ground surface within the secondary woodland habitat as shown in Figure 2 of Environmental Permit EP-279/2007. Fence or hoardings should be provided along the boundary to prevent vehicles movement, and encroachment of personnel, onto adjacent woodland areas.	Woodland areas	Contractor	√
No construction discharge should be discharged into the two natural seasonal streams as shown in Figure 2 of Environmental Permit EP-279/2007.	Work areas	Contractor	√
Storm water runoff should be directed into existing drainage channel via silt removal facility.	Work areas	Contractor	√
Channels, bunds or sand bag barriers will be provided on site to properly direct site runoff to such silt removal facilities.	Work areas	Contractor	√
Landscape and Visual			
Site hoarding, roof covers, noise barriers and offices should be coloured to complement the surrounding landscape and to minimize visual impacts.	Site boundary	Contractor	√
The Contractor should maintain the site in a neat and tidy state during construction phase.	All areas	Contractor	Δ
The portal should be finished with materials and finishes that complement the surrounding landscape and are of low reflectivity.	All areas	Contractor	N/A
New plantings should be installed at the location that is not conflicts with the completion of the reprovisioning works.	All areas	Contractor	N/A

Remarks:

√ Compliance of Mitigation Measures
<> Compliance of Mitigation but need improvement
x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by Gammon
Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
Cultural Heritage			
Fencing should be erected around the entire Elliot Treatment Works.	Elliot Treatment Works	Contractor	√
Concurrent construction works of the Project with the adjacent works should be carefully planned to minimize the potential building movement on the Elliot Treatment Works.	Elliot Treatment Works	Contractor	√
Monitoring should be conducted at designated locations in accordance with the EM&A Manual.	Designated locations	Contractor	√

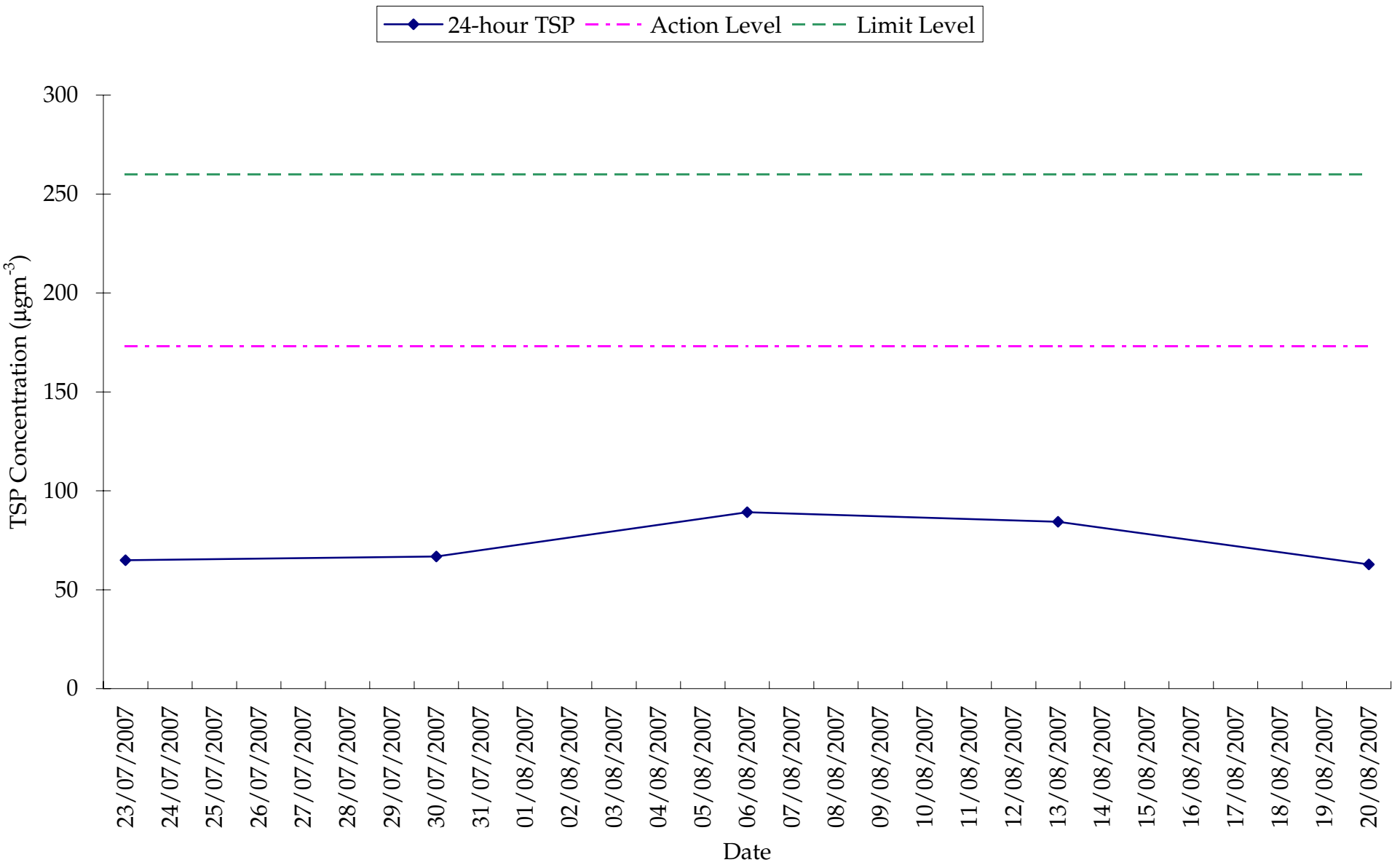
Remarks:

√ Compliance of Mitigation Measures
<> Compliance of Mitigation but need improvement
x Non-compliance of Mitigation Measures
▲ Non-compliance of Mitigation Measures but rectified by Gammon
Δ Deficiency of Mitigation Measures but rectified by Gammon
NA Not Applicable

Annex H

24-hour TSP Monitoring Results

Figure H1 - Meausred 24-hour TSP Concentration (µgm^{-3}) at AM1



Impact 24-hr TSP Monitoring Results

24-hour TSP Monitoring Results at Station AM1 (Rooftop of Chow Yei Ching Building)

Date	Filter Weight (g)		Flow Rate (m^3/min.)		Elapse Time		Sampling Time(hrs.)	Conc. (µg/m^3)	Weather Condition	Ave. Air Temp. (^oC)	Particulate weight(g)	Av. flow (m^3/min)	Total vol. (m^3)
	Initial	Final	Initial	Final	Initial	Final							
23-Jul-07	2.8884	3.0014	1.21	1.21	9445.1	9469.1	24.0	65	Sunny	31	0.1130	1.21	1742.4
30-Jul-07	2.8864	3.0027	1.21	1.21	9469.1	9493.1	24.0	67	Sunny	32	0.1163	1.21	1742.4
06-Aug-07	2.8862	3.0416	1.21	1.21	9493.1	9517.1	24.0	89	Sunny	32	0.1554	1.21	1742.4
13-Aug-07	2.8502	2.9971	1.21	1.21	9517.1	9541.1	24.0	84	Sunny	29	0.1469	1.21	1742.4
20-Aug-07	2.9018	3.0112	1.21	1.21	9541.1	9565.1	24.0	63	Fine	30	0.1094	1.21	1742.4

Min	63
Max	89
Average	74

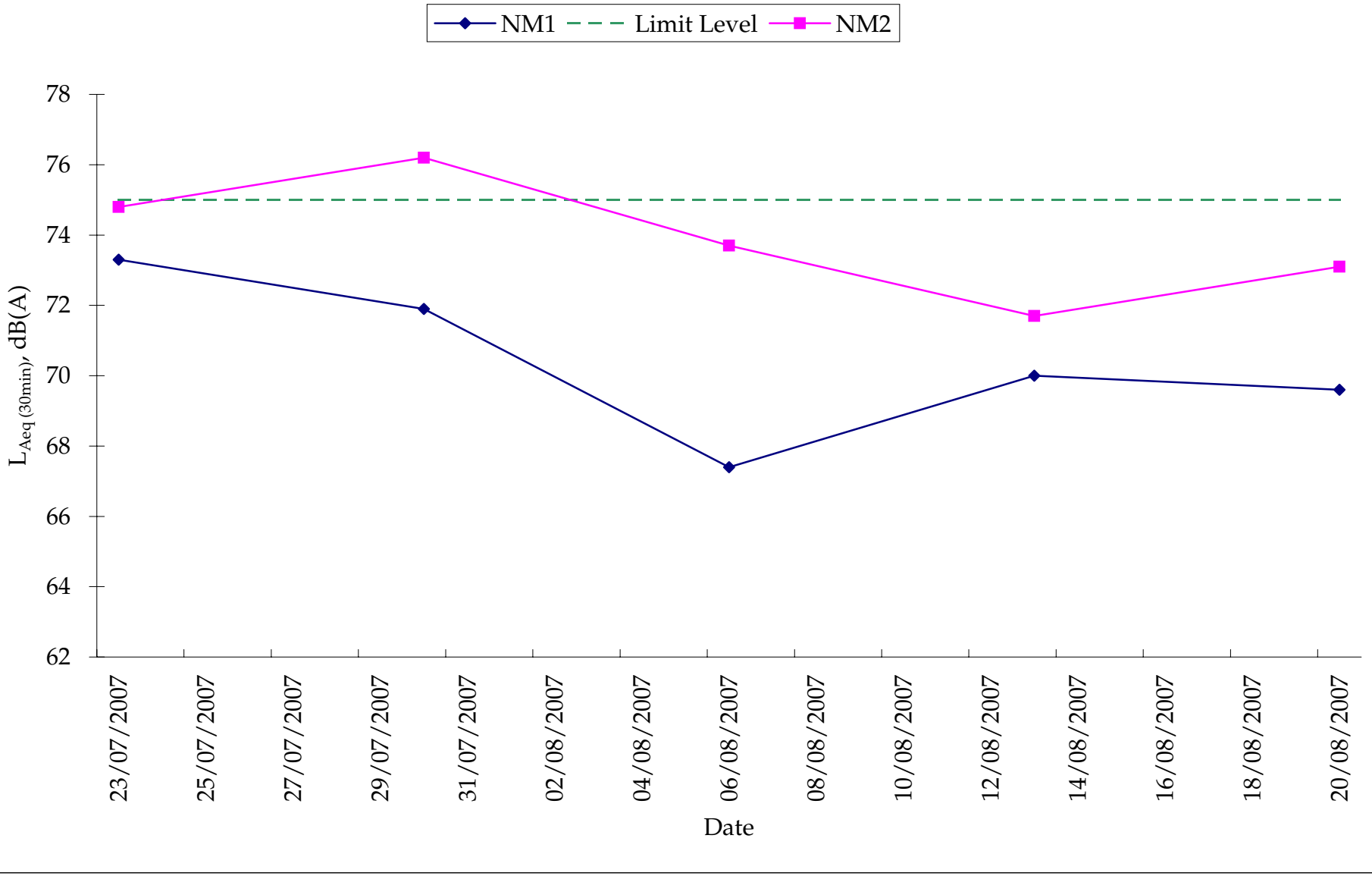
Meteorological Data Extracted from King's Park Stations of the Hong Kong Observator

Date	Weather	King's Park Station				
		Average Air Temperature (℃)	Average Wind Speed (km/h)	Average Relative Humiditiy (%)	Total Rainfall (mm)	Prevailing Wind Direction (Degrees)
23-Jul-07	Sunny	31.0	10.2	77.0	0.0	280
30-Jul-07	Sunny	32.0	5.0	76.0	0.5	170
06-Aug-07	Sunny	32.0	17.0	85.0	100.4	230
13-Aug-07	Sunny	29.0	18.0	85.0	Trace	90
20-Aug-07	Fine	30.0	20.0	81.0	Trace	90

Annex I

Construction Noise Monitoring Results

Figure I1 - Noise Monitoring Results ($L_{eq, 30min}$)



Construction Noise Monitoring Results

Monitoring Location: NM1 - Refuge Floor of Tower 3, The Belcher's

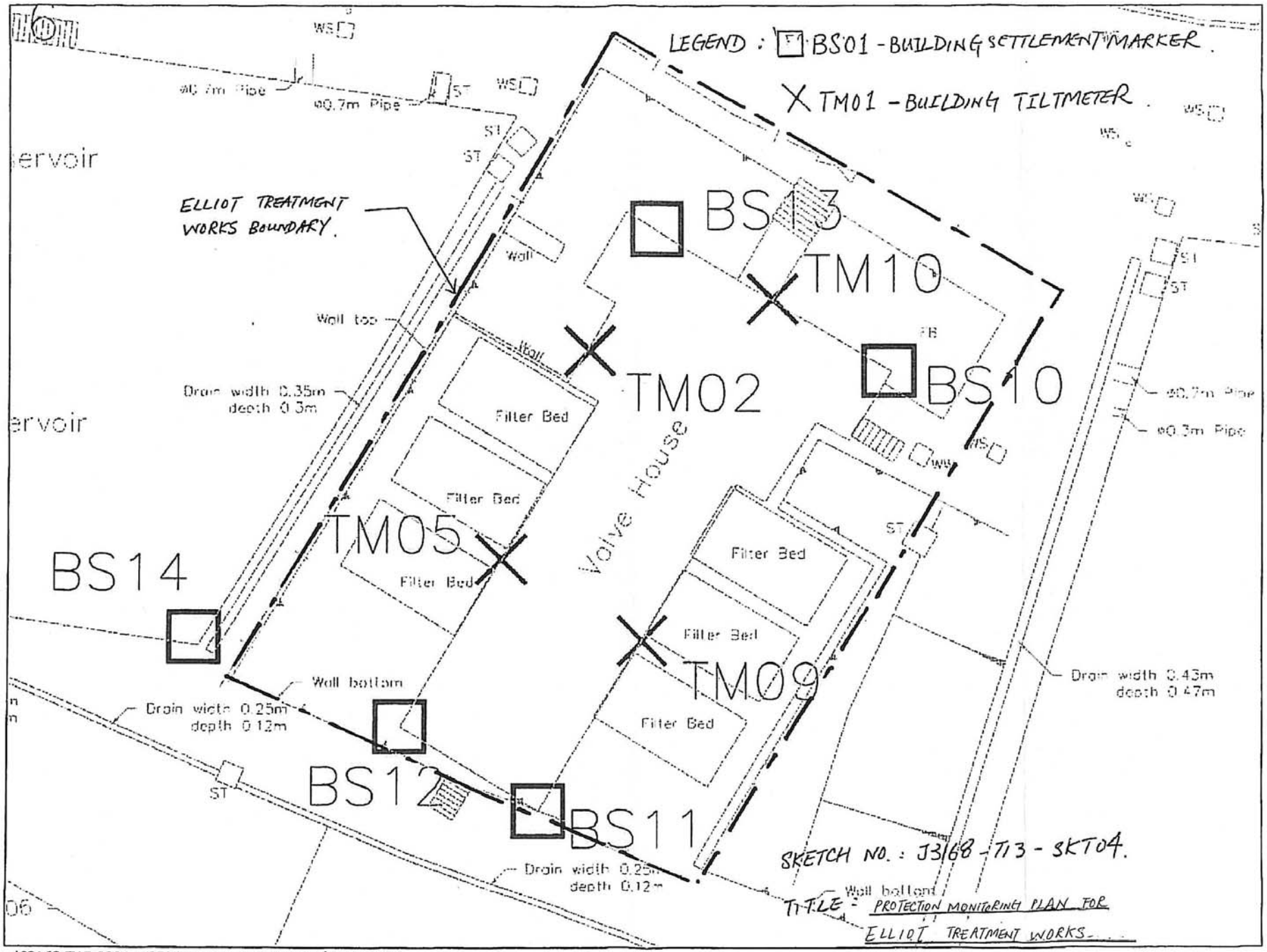
Date	Measurement Period, hours		Measured Noise Level, dB(A)			Noise Criteria, $L_{eq(30mins)}$, dB(A)	Compliance (Y/N)	Remark
	Start	End	L_{eq}	L_{10}	L_{90}			
23-Jul-07	09:55	10:25	73.3	76.2	69.1	75.0	Y	-
30-Jul-07	13:30	14:00	71.9	74.2	68.6	75.0	Y	-
06-Aug-07	13:35	14:05	67.4	69.3	64.6	75.0	Y	-
13-Aug-07	13:38	14:08	70.0	71.5	68.0	75.0	Y	-
20-Aug-07	13:25	13:55	69.6	71.8	66.3	75.0	Y	-

Monitoring Location: NM2 - Roof of Starr Hall

Date	Measurement Period, hours		Measured Noise Level, dB(A)			Noise Criteria, $L_{eq(30mins)}$, dB(A)	Compliance (Y/N)	Remark
	Start	End	L_{eq}	L_{10}	L_{90}			
23-Jul-07	10:40	11:10	74.8	77.4	71.5	75.0	Y	-
30-Jul-07	14:15	14:45	76.2	79.2	71.2	75.0	N	The exceedance was likely due to other project rather than Project works.
06-Aug-07	14:18	14:48	73.7	75.4	71.6	75.0	Y	-
13-Aug-07	14:22	14:52	71.7	73.7	68.6	75.0	Y	-
20-Aug-07	14:10	14:40	73.1	75.1	70.0	75.0	Y	-

Annex J

Cultural Heritage Monitoring Results



...U3168-T17-9004-1(070516).dgn 2007/6/1 下午 02:23:58

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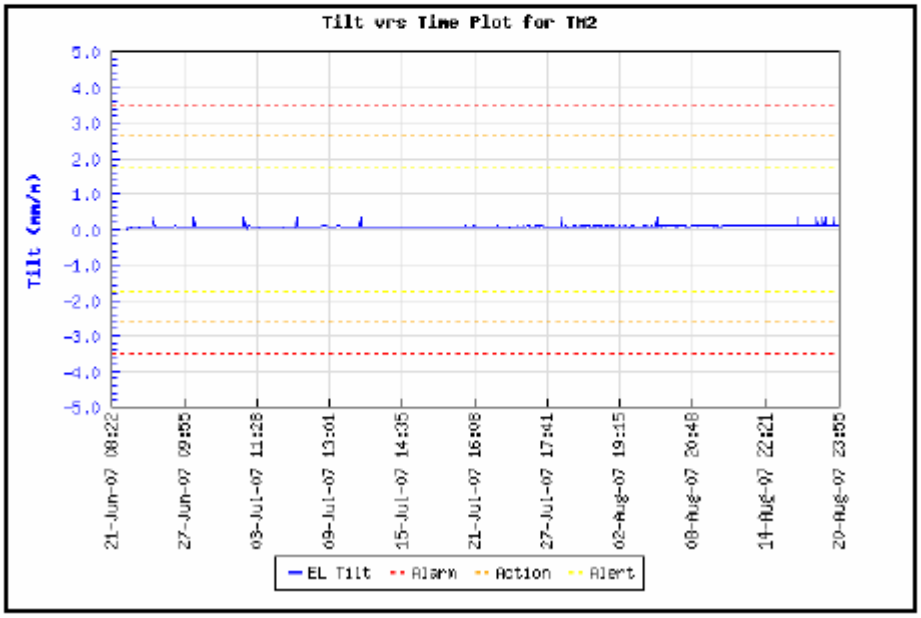
ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM2 Type : Electro Level
Easting : 831797.083 Northing : 816014.766 Initial Level : 92.664 mPD
Location : Valve House
Remark : Radio Transmitter Serial No. 50348; +ve Reading => Rotation towards West South



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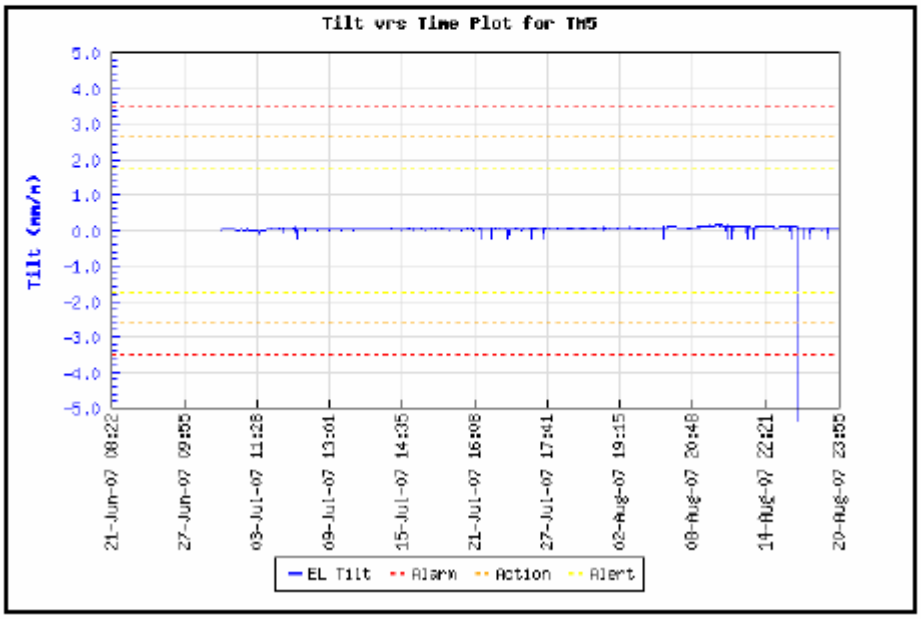
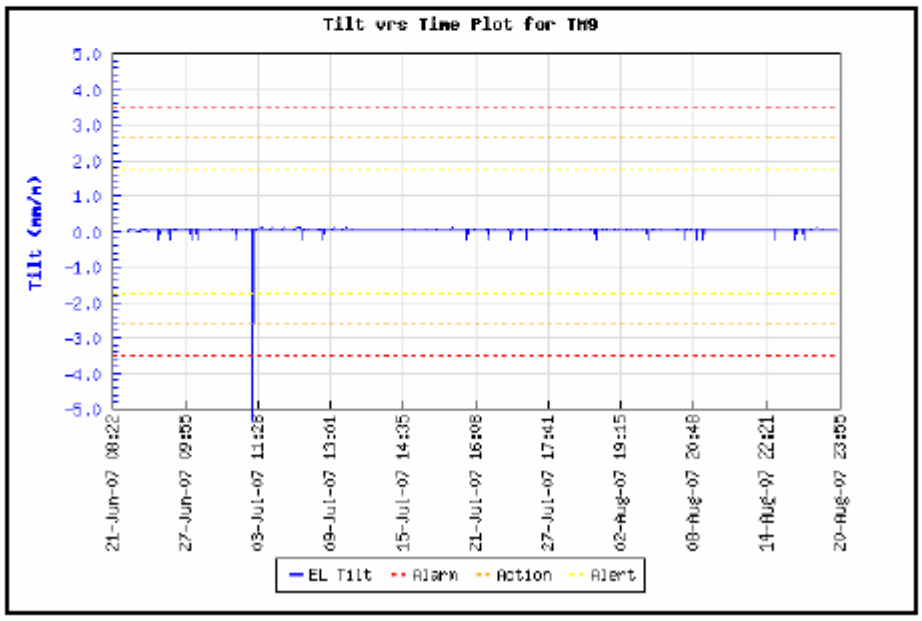
ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM5 Type : Electro Level
Easting : 831792.223 Northing : 816014.081 Initial Level : 92.714 mPD
Location : Valve House
Remark : Radio Transmitter Serial No. 50194; +ve Reading => Rotation towards West South



ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM9 Type : Electro Level
Easting : 831797.988 Northing : 816000.532 Initial Level : 92.709 mPD
Location : Valve House
Remark : Radio Transmitter Serial No. 50284; +ve Reading => Rotation towards North East



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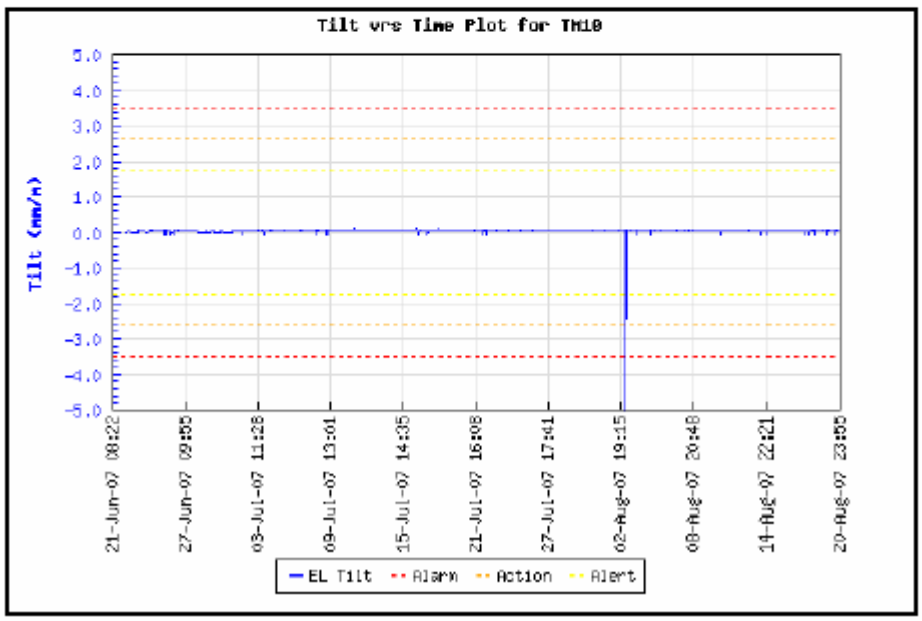
ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM10 Type : Electro Level
Easting : 831805.802 Northing : 816017.577 Initial Level : 92.744 mPD
Location : Valve House
Remark : Radio Transmitter Serial No. 50318; +ve Reading => Rotation towards West North



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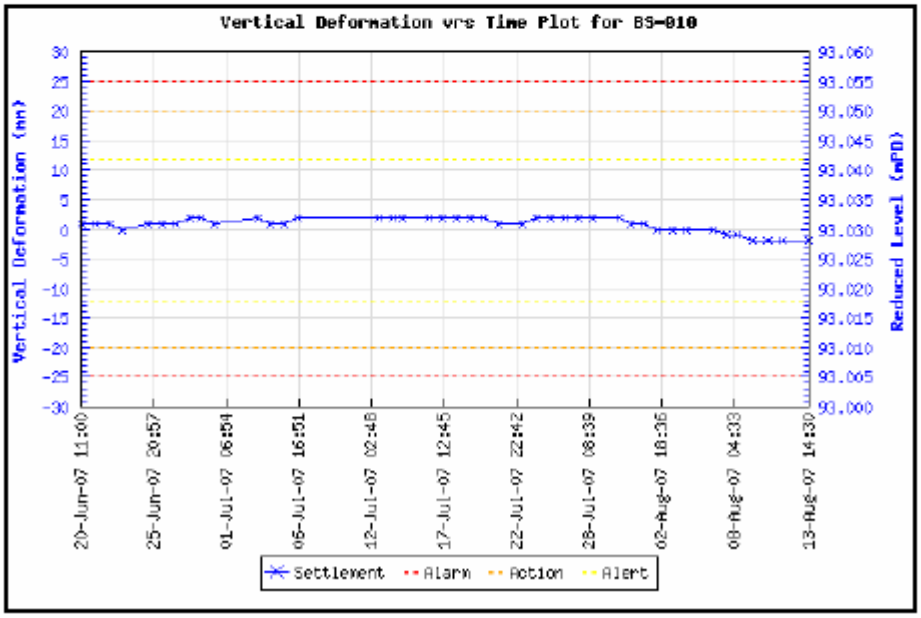
SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-010
Easting : 831809.941
Location : Valve House
Remark :

Type : Building Settlement Marker Type DMP5
Northing : 816014.944 Initial Level : 93.030 mPD



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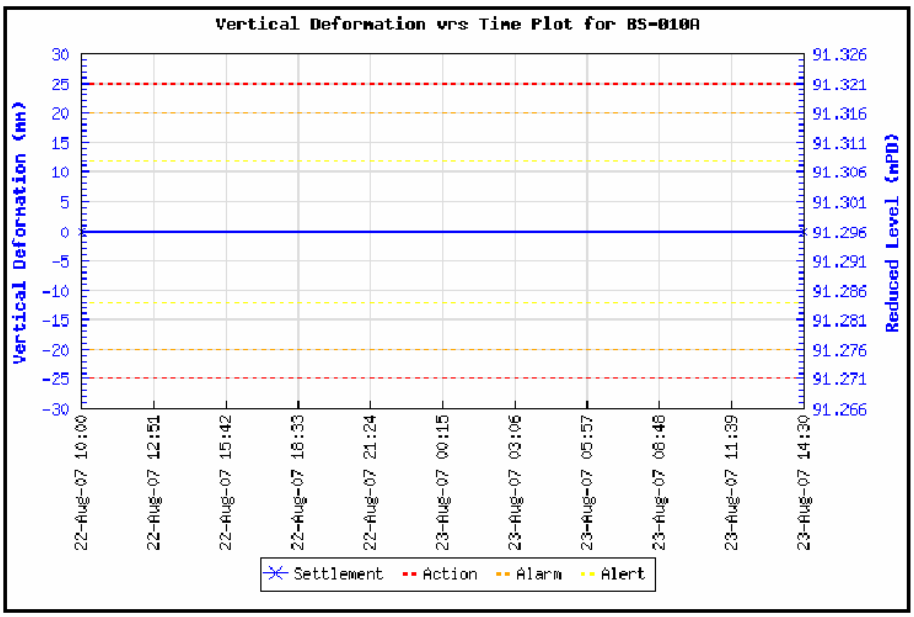
SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-010A
Easting : 831808.247
Location : Valve House
Remark :

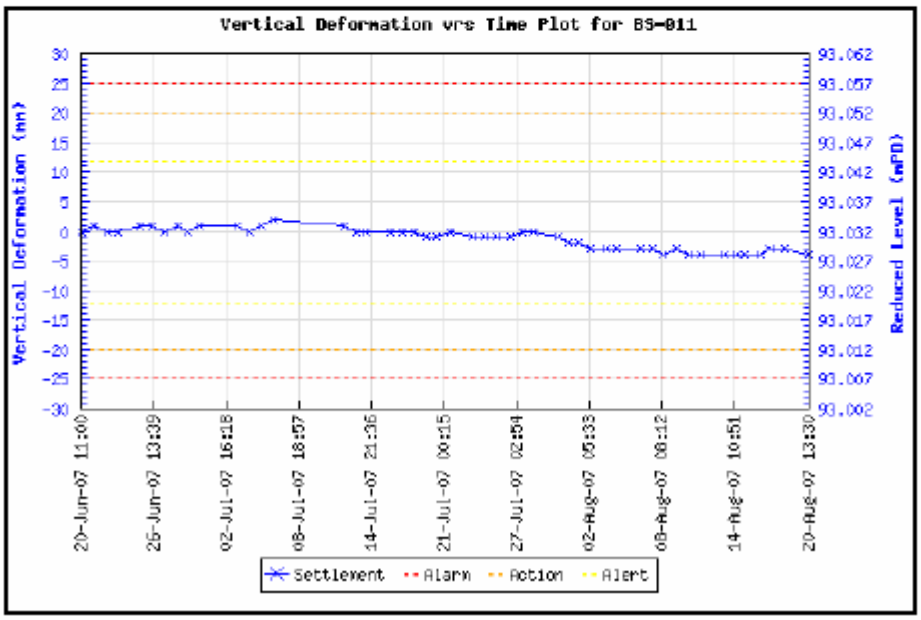
Type : Building Settlement Marker Type DMP5
Northing : 816016.001 **Initial Level :** 91.296 **mPD**



SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-011
Easting : 831795.830
Location : Valve House
Remark :

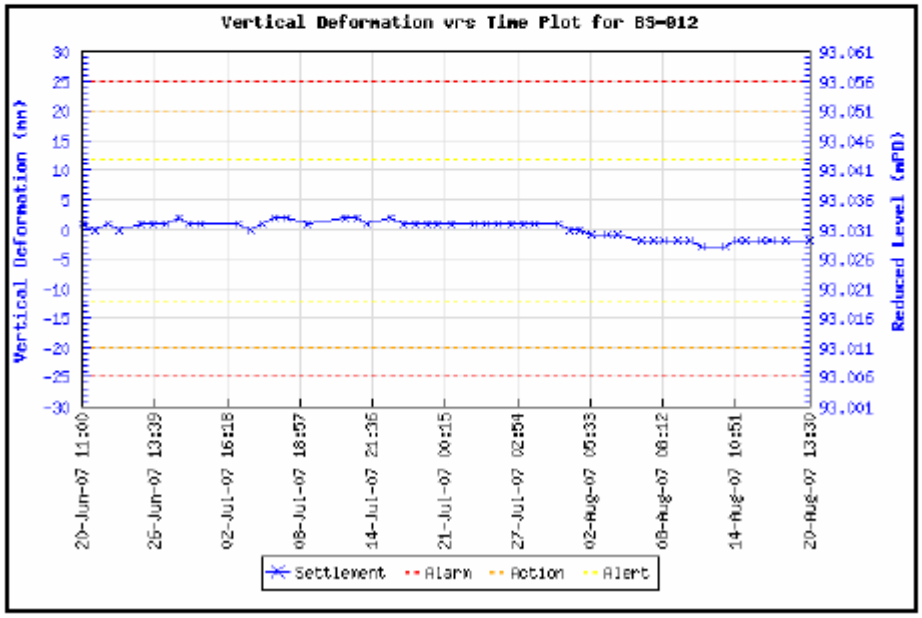
Type : Building Settlement Marker Type DMP5
Northing : 815997.133 Initial Level : 93.032 mPD



SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-012
Easting : 831796.239
Location : Valve House
Remark :

Type : Building Settlement Marker Type DMP5
Northing : 816000.503 Initial Level : 93.031 mPD



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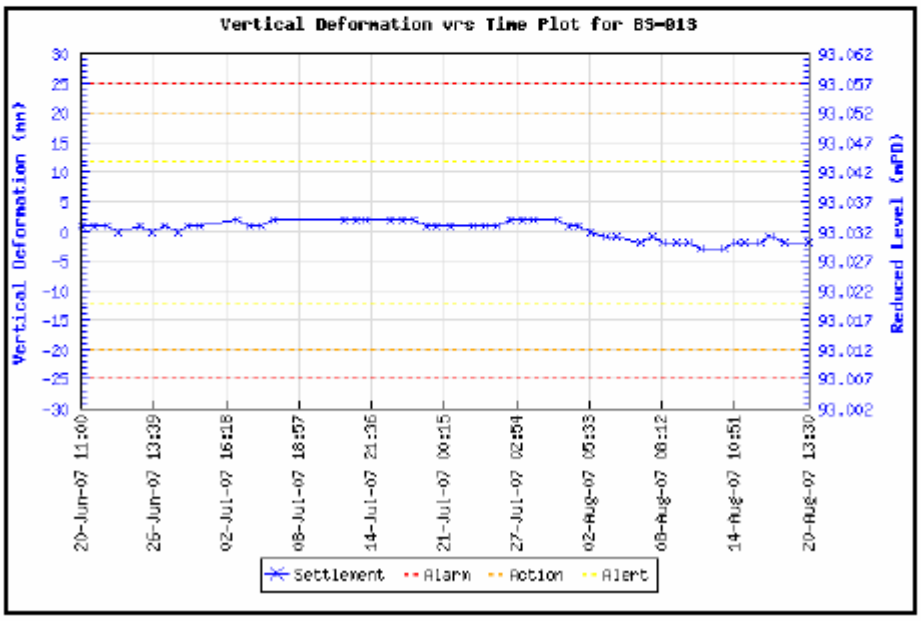
SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-013
Easting : 831800.605
Location : Valve House
Remark :

Type : Building Settlement Marker Type DMP5
Northing : 816020.664 Initial Level : 93.032 mPD



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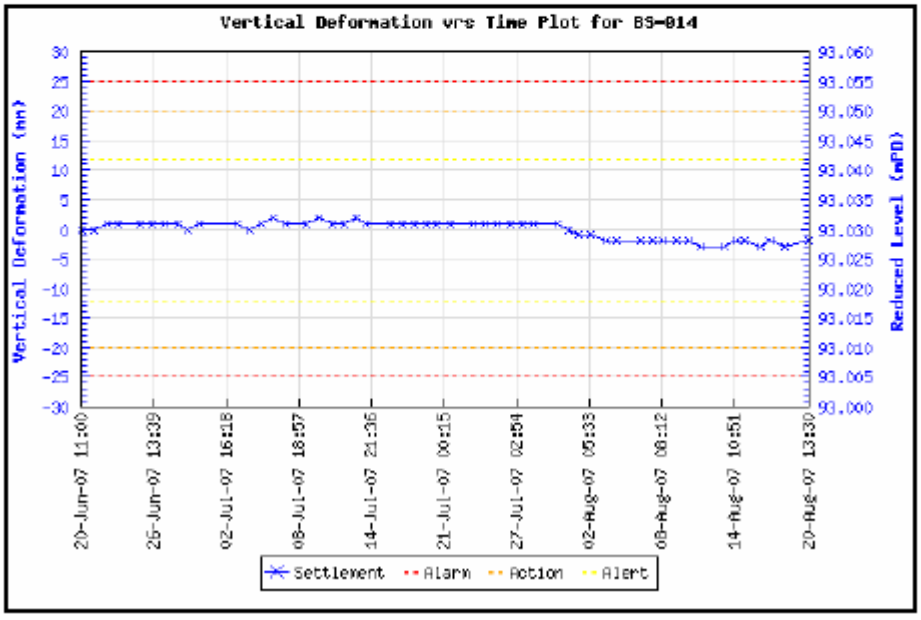
SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-014
Easting : 831781.965
Location : Reservoir
Remark :

Type : Building Settlement Marker Type DMP5
Northing : 816004.142 Initial Level : 93.030 mPD



Annex K

Waste Flow Table

Re-provisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department

Name of Project Proponent: The University of Hong Kong
Project Commencement Date: 21 July 2007
Construction Completion Date: December 2008

Monthly Summary Waste Flow Table for Year 2007

Period	Actual Quantities of inert C&D Materials (in 10^3 Kg) [1]					Actual Quantities of C&D Wastes (in 10^3 Kg) [4]								
	Total Quantity Generated	Broken Concrete [2]	Reused in the Contract	Reused in other Projects [3]	Disposed as Public Fill	Metals		Plastic		Paper/cardboard packaging		Chemical Waste (L)		Other waste (e.g. general refuse)
	(a)	(b)	(c)	(d)	(a)-(b)-(c)-(d)	Recycle	Disposal	Recycle	Disposal	Recycle	Disposal	Recycle	Disposal	Disposal
21 July – 20 Aug 2007	890	0	10	0	880	0	0	0	0	0	0	0	0	2.55
Total	890	0	10	0	880	0	0	0	0	0	0	0	0	2.55

Note: [1] Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.
[2] Broken concrete for recycling into aggregates.
[3] Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material
[4] C&D material includes metals, paper / cardboard packaging waste, chemical waste and other wastes such as general refuse.