

Gammon Construction Limited

Reprovisioning and Upgrading of Salt  
Water Service Reservoirs in Western  
District for Water Supplies Department:  
*Ninth Monthly Environmental  
Monitoring and Audit Report*

May 2008

**Environmental Resources Management**

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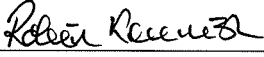
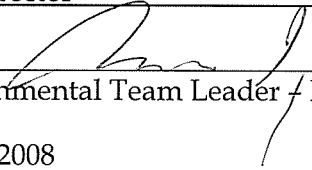
MONTHLY ENVIRONMENTAL  
MONITORING & AUDIT REPORT

Gammon Construction Limited

Reprovisioning and Upgrading of Salt  
Water Service Reservoirs in Western  
District for Water Supplies Department:  
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9<sup>th</sup> May 2008

Reference 0067560

For and on behalf of Environmental Resources Management
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Signed: <u></u>
Position: <u>Director</u>
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Date: <u>9<sup>th</sup> May 2008</u>

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## 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 ninth monthly Environmental Monitoring and Audit (EM&A) report presenting the EM&A work carried out during the period from 21 March 2008 to 20 April 2008 in accordance with the EM&A Manual.

### Summary of construction works undertaken during reporting period

The major construction works undertaken during the reporting month were excavation of the tunnel (top section) for Reservoir No.1 and excavation of tunnel (Lower down to Level +94 mPD and waterproofing work CHB51 to B80) for Reservoir No.2.

### Environmental Monitoring and Audit Progress

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

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

### Air Quality

Four 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

Four sets of 30-minute noise measurements were carried out at the designated monitoring stations NM1 & NM2 during the reporting period. No exceedance was recorded during the reporting period.

### 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) materials and non-inert C&D wastes. A total of 8,498 tonnes of inert C&D materials and no non-inert C&D waste were generated during the reporting

period. The inert C&D materials were transferred to the public fill barging point at Quarry Bay.

#### 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 excavation of the tunnel for Reservoir No. 1 and permanent arch lining of Reservoir No. 2.

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

# 1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by Gammon Construction Limited (the Contractor) 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 ninth EM&A report which summarizes the impact monitoring results and audit findings for the EM&A programme during the reporting period from **21 March 2008** to **20 April 2008**.

## 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, 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, 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 : **Conclusion**



## 2 PROJECT INFORMATION

### 2.1 BACKGROUND

Project background, associated construction works, organization chart and contact details are all detailed in *Section 2* of the first Monthly EM&A Report.

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*.

A Further Environmental Permit (FEP-01/279/2007) (FEP) for the construction phase of the Project was granted to Gammon Construction Limited on 23 October 2007.

### 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*

<b>Construction Activities Undertaken</b>
<ul style="list-style-type: none"><li>• Excavation of tunnel (top section) for Reservoir No.1; and</li><li>• Excavation of tunnel for Reservoir No.2 (Lower down to Level +94 mPD and waterproofing work CHB51 to B80).</li></ul>

### 2.3 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**

<b>Permit/ Licences/ Notification</b>	<b>Reference</b>	<b>Validity Period</b>	<b>Remarks</b>
Environmental Permit	EP-279/2007	Throughout the construction and operation of the Project	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.
Construction Noise Permit	GW-RS0652-07	14 November 2007 (0600 hour)	Permit granted on 9 October 2007
Construction Noise Permit	GW-RS0725-07	29 February 2008 (2300 hour)	Permit granted on 9 November 2007 and cancelled on 24 December 2007
Construction Noise Permit	GW-RS0810-07	16 June 2008 (2300 hour)	Permit granted on 24 December 2007
Further Environmental Permit	FEP-01/279/2007	Throughout the construction of the Project	Permit granted on 23 October 2007

### 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 B*.

**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 the next reporting period is shown in *Annex C*.

#### 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, $\mu\text{gm}^{-3}$	Limit Level, $\mu\text{gm}^{-3}$
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 m 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  $\pm 3$  °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 flow rate record sheet was set into the flow recorder;
- the flow rate of the HVS was checked and adjust at around 1.21 m<sup>3</sup>/min. The range specified in the EM&A Manual was between 0.6 – 1.7 m<sup>3</sup>/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 D*.

## 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 B*.

**Table 3.4** *Noise Monitoring Station*

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

### 3.2.2 Action and Limit Levels

Action and Limit (A/L) Levels provide an appropriate framework for the interpretation of monitoring results. Interpretation of monitoring results is undertaken through checking them against the Action and Limit (A/L) Levels defined in *Table 3.5*.

**Table 3.5 Action and Limit Level for Construction Noise Monitoring**

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received from any one of the sensitive receivers	75 dB(A) <sup>(Note)</sup>
<b>Note:</b>		
Acceptable Noise Levels for Area Sensitivity Rating of A/B/C. Limit Level is reduced to 70dB(A) for schools and 65dB(A) during school examination periods.		

### 3.2.3 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 the next reporting period is shown in *Annex C*.

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.

### 3.2.4 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 3.6*, complies with IEC 651: 1979 and 804:1985 (Type 1) specification. The calibration certificates of the sound level meters are given in *Annex D*.

**Table 3.6 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.

### 3.3 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 Antiquities and Monuments Office (AMO) of Leisure and Cultural Services Department (LCSD) (*Annex H*). 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 summarized in *Table 3.7*.

**Table 3.7** *Monitoring Frequency*

<b>Instrument</b>	<b>Monitoring Frequency</b>
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 3.8*.

**Table 3.8** *Alert, Action and Alarm Levels*

<b>Instrument</b>		<b>Alert Level</b>	<b>Action Level</b>	<b>Alarm Level</b>
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)

## IMPLEMENTATION STATUS OF ENVIRONMENTAL PROTECTION REQUIREMENTS

### *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, Further Environmental Permit and EM&A Manual. The implementation status of environmental protection and pollution control/mitigation measures is summarized in *Annex E*. The status of the submissions required under the EP and FEP during the reporting period is presented in *Table 4.1*.

**Table 4.1** *Status of Required Submission*

EP Condition	Submission	Submission Date
Condition 3.3	Submission of Seventh Monthly EM&A Report	4 March 2008

### *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. An effluent sample was tested by the Contractor during the reporting period and the test result indicated compliance.



## 5 MONITORING RESULTS

### 5.1 AIR QUALITY

Four 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 F*. The weather condition during the monitoring period varied from sunny to cloudy. The local impacts near the monitoring station were mainly associated with vehicular emissions from the road traffic along Pok Fu Lam Road. No exceedance of the Action and Limit Levels for 24-hour TSP was recorded during the reporting period.

### 5.2 NOISE

Four 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 G*. 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. No exceedance of the Action and Limit Levels for construction noise was recorded during the reporting period.

### 5.3 CULTURAL HERITAGE

The monitoring results of building settlement markers and tiltmeters were presented in *Annex H*. Abnormal readings were reported by tiltmeter TM9 on 1 April 2008 and investigations were conducted immediately by the Contractor. As a result of these investigations, it was confirmed that TM9 had been subject to human interference from surveying activities within the building and the condition of the instrument was rectified immediately. No abnormalities were reported subsequently.

Another abnormal reading was reported by tiltmeter TM10 on 20 April 2008. As the day was a Sunday and no works were undertaken on site, the Contractor considered the reading to be due to an instrumentation error. The relevant instrument was inspected and fixed immediately.

No exceedance of the Alert, Action and Alarm Levels for building movements other than the two abovementioned abnormalities 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 to the

Monthly Summary Waste Flow Table prepared by Gammon Construction Ltd (*Annex I*). The quantities of different types of wastes are summarized in *Table 5.1* 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 E*).

**Table 5.1** *Quantities of Different Waste*

Month / Year	Quantity		
	C&D Materials (inert) (a)	C&D Materials (non-inert) (b)	Chemical Waste
21 March - 20 April 2008	8,498 tonnes	0 tonne	0.0 litre

Notes:

(a) Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil and were disposed of at the Quarry Bay 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 25 March 2008; and 1, 8 and 15 April 2008. No non-compliance event was recorded during the reporting period.

Major findings and recommendations including observations are summarized as follows:

- (i) The Contractor was recommended to clear the stagnant water promptly to prevent mosquito breeding in the following locations:
  - (a) Peripheral u-channel at the northwest side of the Site;
  - (b) U-channel at the slope toe of Slope 11SW-A/C151;
  - (c) U-channel along the tennis court boundary;
  - (d) An excavated trench in the temporary saltwater reservoir works area;
  - (e) Drip trays placed under the air compressors and fuel can next to the SWSR1;
  - (f) Drip trays placed under a can of mould oil and a few cans of retarder in the temporary saltwater reservoir works area;
  - (g) Drip tray placed under the generator at the slope toe of Slope 11SW-A/C148;
  - (h) Drip trays placed under the air compressor at the demolished SWSR2 works area;
  - (i) A metal can holding some tools next to the Sub-contractor container;
  - (j) Refuse skip next to the SWSR1;
  - (k) Works area next to SWSR1;
  - (l) Works area next to tennis court; and
  - (m) I-beams at the trench excavation works area.

The Contractor was also recommended to clear the stagnant water regularly and to arrange ad hoc cleaning, if necessary. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

- (ii) The site haul road from the guard room to the temporary platform works area was observed to be dry. The Contractor was reminded to water the haul road regularly to prevent dust generation from vehicle movements on the road. The corrective action was undertaken as observed in the site audit conducted in the reporting period.

- (iii) Broken sand bag barriers were observed at the slope toe of Slope 11SW-A/C151. The Contractor was recommended to replace the broken sand bag promptly. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (iv) Oil stain was observed on the ground surface under the excavator in the demolished SWSR2 works area. The Contractor was recommended to remove the oil stains properly and promptly. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (v) Two breakers with lubricant oil on their surfaces were placed on the bare soil in the works area next to the tennis court without protective measures. Oil stains were also observed next to the breakers. The Contractor was recommended to place the oily equipment in a drip tray or on impervious sheeting to prevent soil contamination and to remove the oil stains properly and promptly for disposal as chemical waste. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (vi) Oil leakage was observed from the crawler drill rig operating in the works area next to the SWSR1. The Contractor was recommended to clear the oil stains promptly and properly and keep maintenance for all mechanical plant on site. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (vii) Rubbish was observed to be accumulated on the I-beams at the trench excavation works area. The Contractor was recommended to collect and dispose of the rubbish properly. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (viii) Site runoff was observed to be flowing from the slope crest next to the tennis court to the u-channel in the tennis court without passing through any silt removal facilities. The Contractor was recommended to provide additional sandbags at the slope crest to properly direct site runoff to silt removal facilities. The corrective action was undertaken as observed in the site audit conducted in the reporting period.
- (ix) Leaves and silt/grit were observed to have accumulated in the site runoff collection sump pit at the site exit. And so the site runoff was observed to have accumulated in the sump pit without free flow to the WetSep. The Contractor was reminded to remove the leaves and silt/grit in the site runoff collection sump pit promptly and regularly to ensure the site runoff collection facility is functioning properly at all times. 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 for 24-hour TSP and construction noise, and the Alert Level for building movements was recorded at monitoring stations during the reporting period.

### 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.

### 8.1 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**

---

- Excavation of the tunnel for Reservoir No. 1
  - Permanent arch lining of Reservoir No. 2
- 

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

### 8.2 MONITORING SCHEDULE FOR THE COMING MONTHS

The tentative schedule of TSP and construction noise monitoring for the next reporting period is presented in *Annex C*. 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.

The Environmental Monitoring and Audit (EM&A) Report presents the EM&A work undertaken during the period from 21 March 2008 to 20 April 2008 in accordance with the EM&A Manual and the requirement under EP-279/2007 and FEP-01/279/2007.

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

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 of 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  
Period, and updated  
Construction Programme



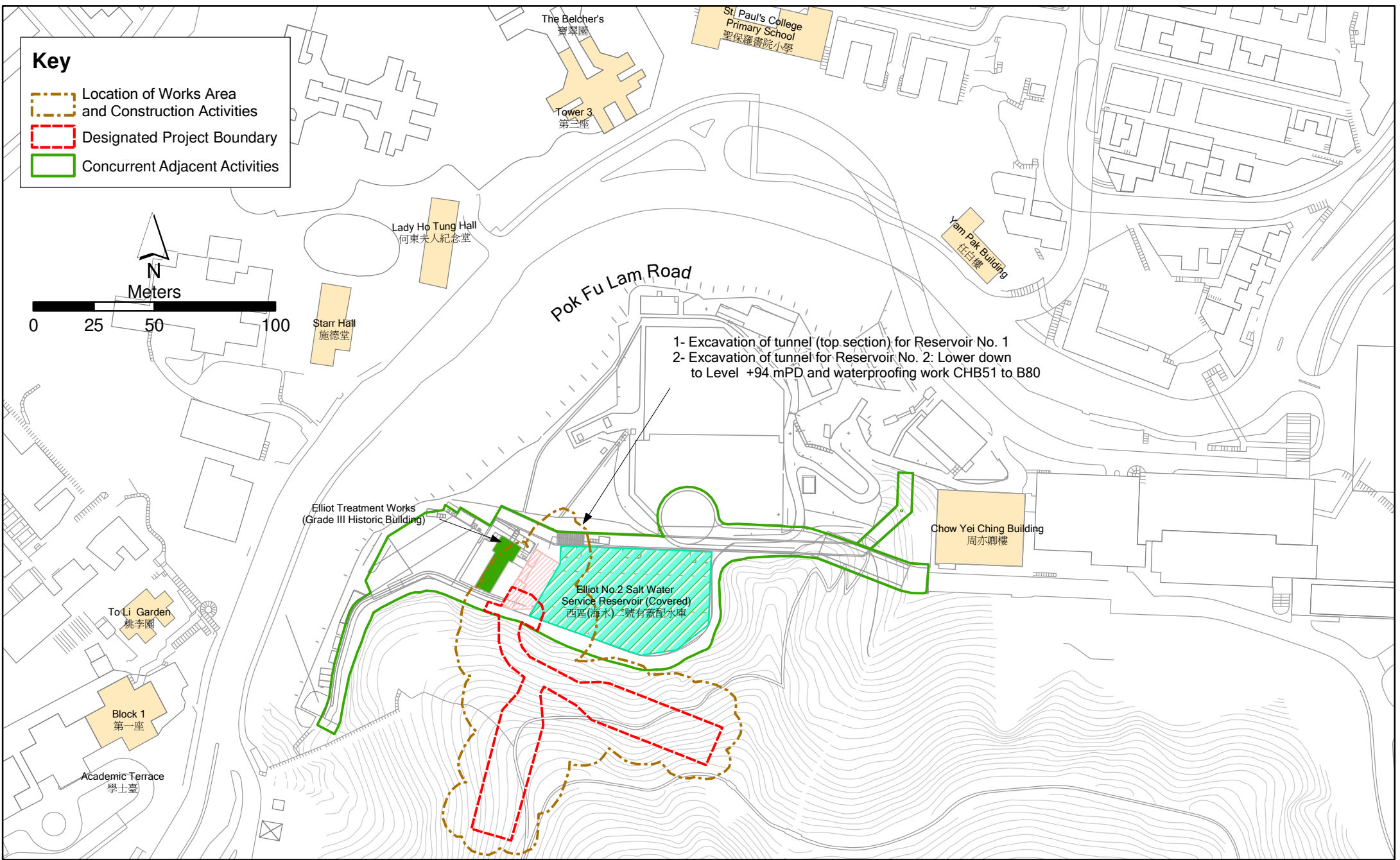
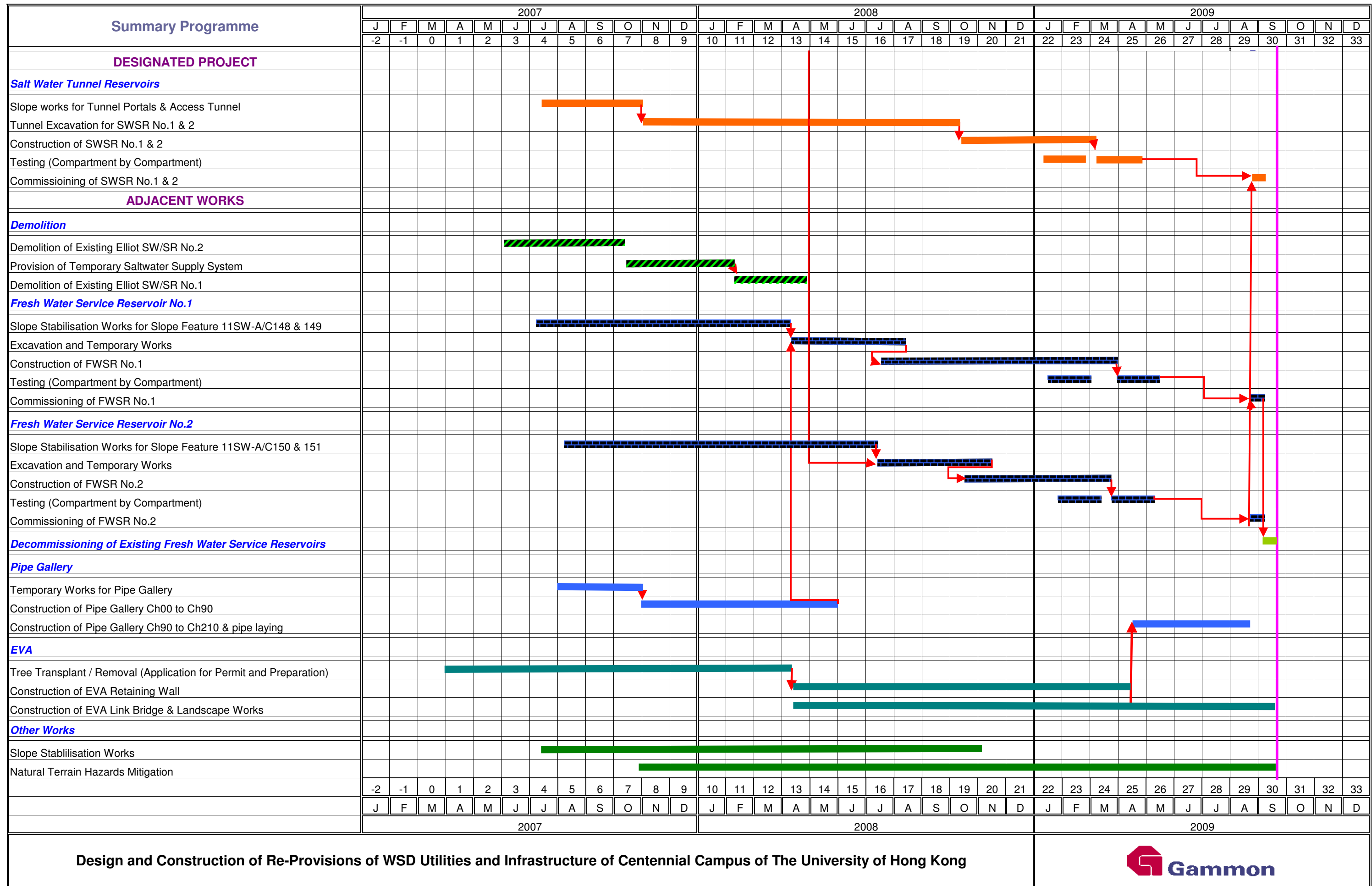





Figure A1

Project Location and Works Location



Activity ID	Activity Description	Early Start	Early Finish	2008										
				MAR					APR					
				3	10	17	24	31	7	14	21	28		
<b>DESIGNATED PROJECT</b>														
<b>Salt Water Service Reservoirs &amp; Tunnel</b>														
<b>Salt Water Service Reservoir No.1</b>														
TR10100	Tunnel Excavation for SWSR no. 1	25-OCT-07	26-SEP-08											
<b>Salt Water Service Reservoir No.2</b>														
TR20100	Tunnel Excavation for SWSR no. 2	25-OCT-07	26-SEP-08											
<b>ADJACENT WORKS</b>														
<b>Pipe Gallery</b>														
PG50120	Construction of Pipe Gallery Ch0~Ch90	19-DEC-07	28-MAY-08											
<b>Emergency Vehicle Access (EVA)</b>														
<b>Preliminaries</b>														
LC10300	Tree Relocation	29-AUG-07	04-OCT-07											
EV20150	Construct Temporary Works & Excavation	25-JUL-07	17-MAY-08											
<b>Slope Stabilization Works</b>														
<b>Feature 11SW-A/C148</b>														
SL80100	Slope Stablisation Works	16-JAN-08*	23-APR-08	Slope Stablisation Works										

2008									
MAR					APR				
3	10	17	24	31	7	14	21	28	

 Early Bar  
 Progress Bar  
 Critical Activity

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EP01

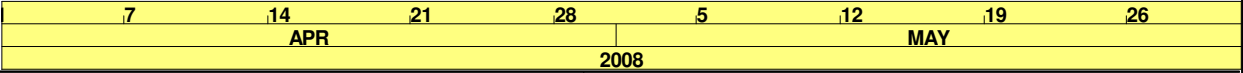
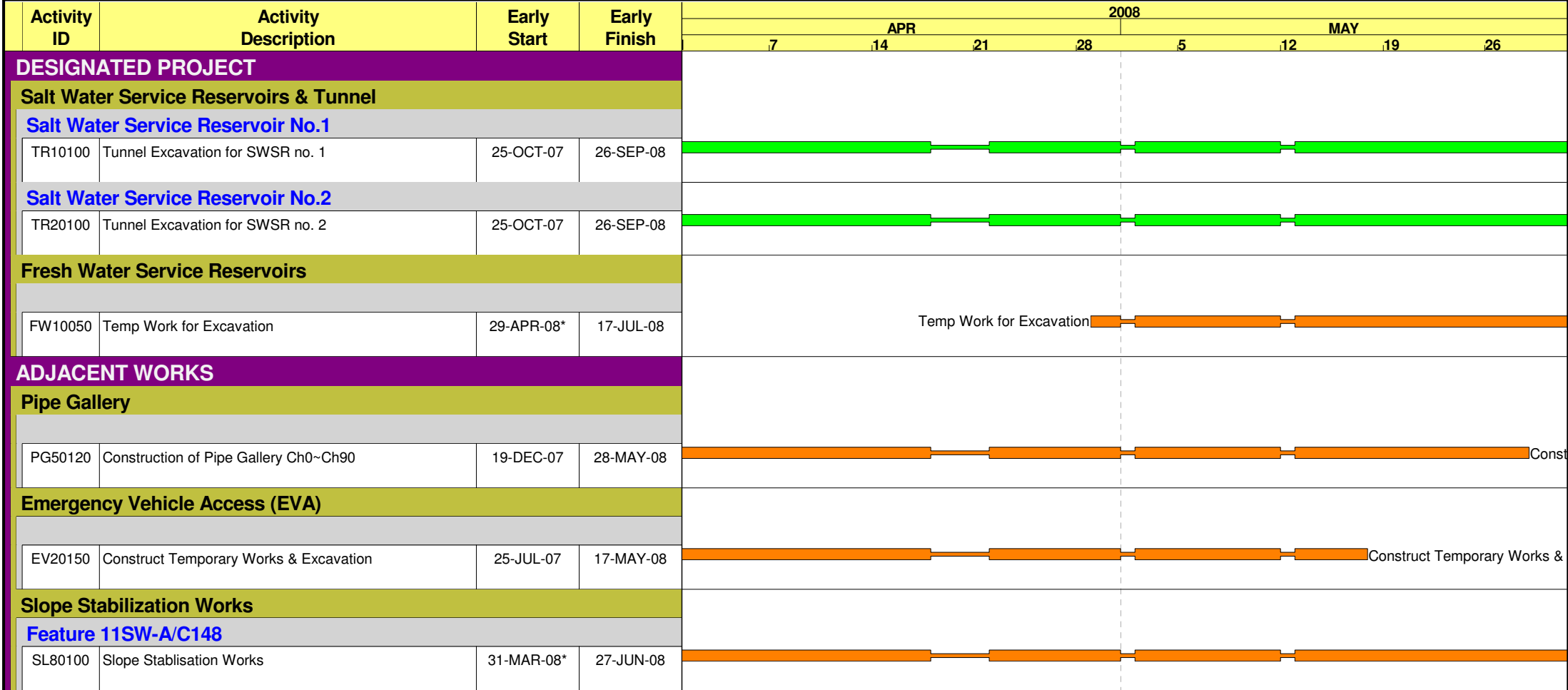
Reprovision of Salt Water Service Reservoirs in Western District




Construction Programme

(21 Mar to 20 Apr 08)

Sheet 1 of 1

Date	Revision	Checked	Approved



 Early Bar  
 Progress Bar  
 Critical Activity

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EP01

Reprovision of Salt Water Service Reservoirs in Western District

Construction Programme

(21 Apr to 20 May 08)

Sheet 1 of 1

Date	Revision	Checked	Approved

Annex B

Location of Monitoring  
Stations and Photographs  
showing Monitoring  
Stations

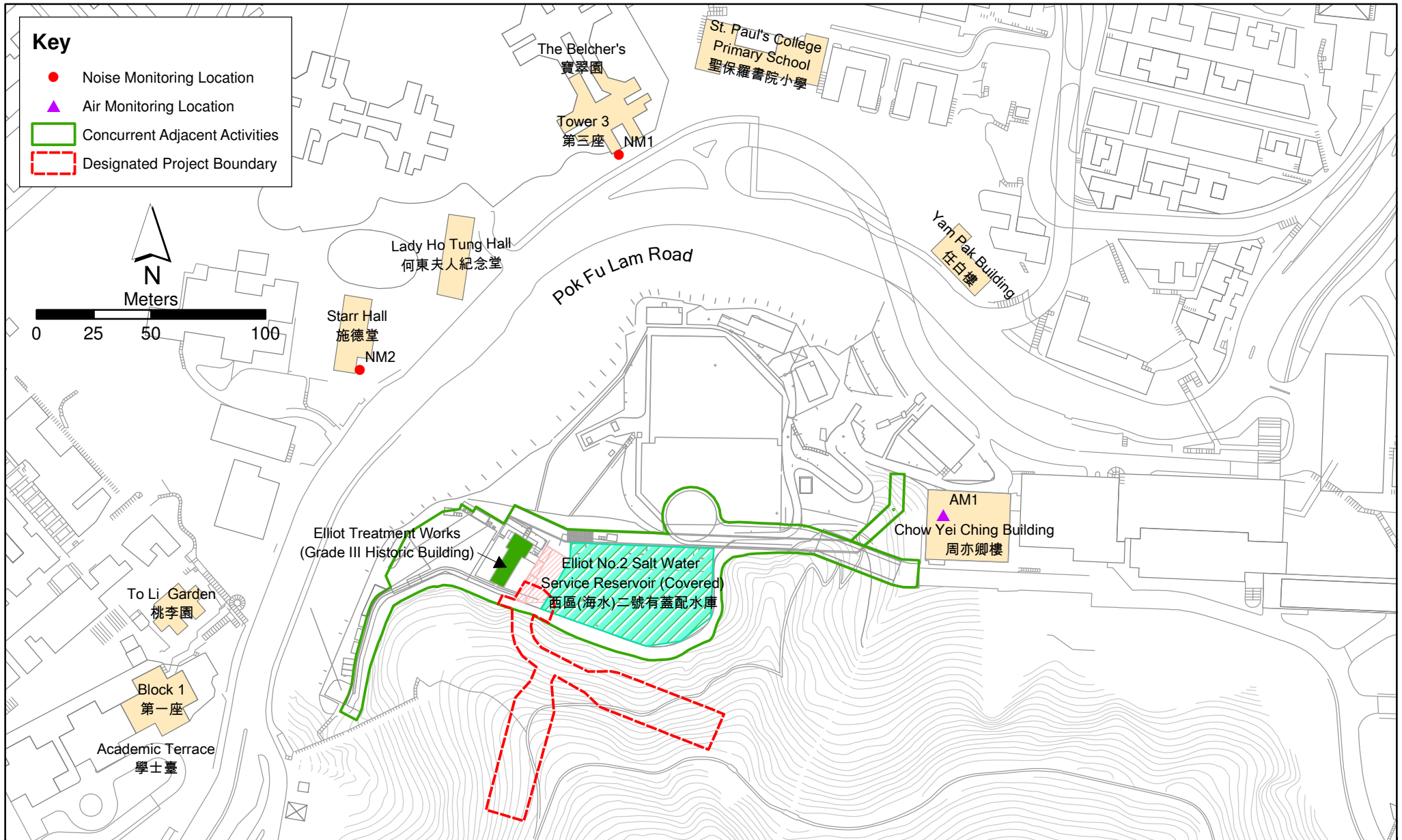


Figure B1

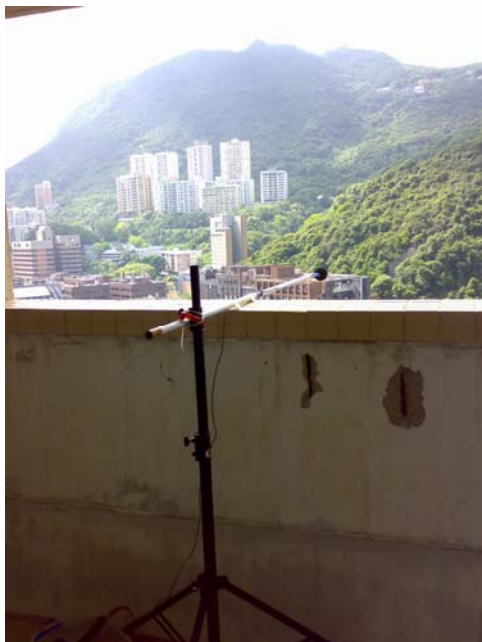
Air and Noise Monitoring Locations

*Air quality Monitoring Station*



Air Quality Monitoring Station (AM1)

*Noise Monitoring Station*



Noise Monitoring Station (NM1)



Baseline Noise Monitoring Station (NM2)

Annex C

## Monitoring Schedule



**Reprovisioning and Upgrading of Salt Water Service Reservoirs in Western District for Water Supplies Department  
Air Quality and Noise Monitoring Schedule - March 2008**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1-Mar
2-Mar	3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar
	Air Monitoring Noise Monitoring					
9-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar
	Air Monitoring Noise Monitoring					
16-Mar	17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar
	Air Monitoring Noise Monitoring					
23-Mar	24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar
		Air Monitoring Noise Monitoring				
30-Mar	31-Mar					
	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 - April 2008**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1-Apr	2-Apr	3-Apr	4-Apr	5-Apr
6-Apr	7-Apr	8-Apr	9-Apr	10-Apr	11-Apr	12-Apr
	Air Monitoring Noise Monitoring					
13-Apr	14-Apr	15-Apr	16-Apr	17-Apr	18-Apr	19-Apr
	Air Monitoring Noise Monitoring					
20-Apr	21-Apr	22-Apr	23-Apr	24-Apr	25-Apr	26-Apr
	Air Monitoring Noise Monitoring					
27-Apr	28-Apr	29-Apr	30-Apr			
	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 - May 2008**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1-May	2-May	3-May
4-May	5-May	6-May	7-May	8-May	9-May	10-May
	Air Monitoring Noise Monitoring					
11-May	12-May	13-May	14-May	15-May	16-May	17-May
		Air Monitoring Noise Monitoring				
18-May	19-May	20-May	21-May	22-May	23-May	24-May
	Air Monitoring Noise Monitoring					
25-May	26-May	27-May	28-May	29-May	30-May	31-May
			Air Monitoring Noise Monitoring			

Annex D

## Calibration Reports for HVSs and Sound Level Meter

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 Office 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

To = EPT  
Accn = Angela Tong  
pages = 4

**High-Volume TSP Sampler**  
**1-Point Calibration Record**

Location : HKU  
Calibrated by : K.T.Ho  
Date : 16/07/07

**Sampler**

Model : GMWS-2310 ACCU-VOL  
Serial Number : S/N 1060

**Calibration Office and Standard Calibration Relationship**

Serial Number : CM-AIR-43  
Service Date : 2 July 2007  
Slope (m) : 0.057452  
Intercept (b) : -0.026137  
Correlation Coefficient(r) : 0.999910

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1010  
Ta(K) : 303

**IC (Indicated flow)** : 40 cfm

**Actual flow** : 1.21 m<sup>3</sup>/min

Checked by: Magnum Fan

Date: 16/07/07

**High-Volume TSP Sampler**  
**1-Point Calibration Record**

Location : HKU  
Calibrated by : K.T.Ho  
Date : 13/09/07

**Sampler**

Model : GMWS-2310 ACCU-VOL  
Serial Number : S/N 1060

**Calibration Office and Standard Calibration Relationship**

Serial Number : CM-AIR-43  
Service Date : 2 July 2007  
Slope (m) : 0.057452  
Intercept (b) : -0.026137  
Correlation Coefficient(r) : 0.999910

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1011  
Ta(K) : 302

**IC (Indicated flow)** : 40 cfm

**Actual flow** : 1.21 m<sup>3</sup>/min

Checked by: Magnum Fan

Date: 14/09/07

High-Volume TSP Sampler  
5-Point Calibration Record

Location : HKU  
 Calibrated by : K.T.Ho  
 Date : 12/11/07  
Sampler  
 Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 1060

Calibration Office and Standard Calibration Relationship

Serial Number : CM-AIR-43  
 Service Date : 2 July 2007  
 Slope (m) : 0.057452  
 Intercept (b) : -0.026137  
 Correlation Coefficient(r) : 0.999910

Standard Condition

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

Calibration Condition

Pa (hpa) : 1011  
 Ta(K) : 298

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1 18 holes	9.6	3.087	1.563	57	56.8
2 13 holes	7.2	2.673	1.356	47	46.8
3 10 holes	6.5	2.538	1.289	41	42.8
4 7 holes	3.8	1.942	0.991	30	29.9
5 5 holes	2.5	1.575	0.806	22	21.9

Sampler Calibration Relationship

Slope(m): 45.961 Intercept(b): -15.562 Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 13/11/07



**High-Volume TSP Sampler**  
**1-Point Calibration Record**

Location : HKU  
Calibrated by : K.T.Ho  
Date : 12/11/07

**Sampler**

Model : GMWS-2310 ACCU-VOL  
Serial Number : S/N 1060

**Calibration Office and Standard Calibration Relationship**

Serial Number : CM-AIR-43  
Service Date : 2 July 2007  
Slope (m) : 0.057452  
Intercept (b) : -0.026137  
Correlation Coefficient(r) : 0.999910

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1011  
Ta(K) : 298

**IC (Indicated flow)** : 40 cfm

**Actual flow** : 1.21 m<sup>3</sup>/min

Checked by: Magnum Fan

Date: 13/11/07

T6 = ERM  
 Allen = Ng Angela Tong

High-Volume TSP Sampler  
5-Point Calibration Record

Location : HKU  
 Calibrated by : K.T.Ho  
 Date : 15/01/08  
Sampler  
 Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 1060

Calibration Office and Standard Calibration Relationship

Serial Number : CM-AIR-43  
 Service Date : 2 July 2007  
 Slope (m) : 0.057452  
 Intercept (b) : -0.026137  
 Correlation Coefficient(r) : 0.999910

Standard Condition

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

Calibration Condition

Pa (hpa) : 1011  
 Ta (K) : 290

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1   18 holes	12.6	3.578	1.808	65	65.5
2   13 holes	10.0	3.188	1.613	56	56.4
3   10 holes	8.0	2.851	1.445	50	50.4
4   7 holes	4.8	2.208	1.124	36	36.3
5   5 holes	3.0	1.746	0.893	26	26.2

Sampler Calibration Relationship

Slope(m): 42.641, Intercept(b): -11.724 Correlation Coefficient(r): 0.9996

Checked by: Magnum Fan

Date: 17/01/08

High-Volume TSP Sampler  
S-Point Calibration Record

Location : HKU  
 Calibrated by : K.T.Ho  
 Date : 17/03/08  
Sampler  
 Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 1060

Calibration Orifice and Standard Calibration Relationship

Serial Number : CM-AIR-43  
 Service Date : 2 July 2007  
 Slope (m) : 0.057452  
 Intercept (b) : -0.026137  
 Correlation Coefficient(r) : 0.999910

Standard Condition

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

Calibration Condition

Pa (hpa) : 1012  
 Ta(K) : 294


Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1   18 holes	12.6	3.516	1.766	65	64.4
2   13 holes	10.0	3.132	1.574	55	54.5
3   10 holes	8.0	2.802	1.409	50	49.5
4   7 holes	4.8	2.170	1.094	36	35.7
5   5 holes	3.1	1.744	0.881	25	24.8

Sampler Calibration Relationship

Slope(m): 43.644 Intercept(b): -12.923 Correlation Coefficient(r): 0.9979

Checked by: Magnum Fan

Date: 19/03/08



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. Lee*

The test equipment used for testing are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

c/o 4/F, Tsing Shau Wai 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



輝創工程有限公司  
Sun Creation Engineering Limited

Post-It® Fax Note	7671	Date	13/14/07	# of pages	4
To	Angela Tong	From	K. W. Fan		
Co./Dept.	ERT	Co.	Envirotech		
Phone #	22723000	Phone #	2868450		
Fax #	2723660	Fax #	2868113		

Report No. : C071448

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-31  
SERIAL NO. : 00410224

### TEST CONDITIONS

AMBIENT TEMPERATURE : (23 ± 2)°C  
RELATIVE HUMIDITY : (55 ± 20)%  
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 28 March 2007

JOB NO. : IC07-0797

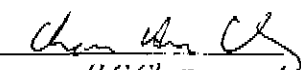
### TEST RESULTS

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

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Tested by :

  
H.C. Chan

Date : 29 March 2007

The test equipment used for testing are traceable to the National Standards as specified in this report.  
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# 輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C071448

## Calibration Report

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using the Laboratory Acoustical Calibrator was performed before the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C072023
CL281	Multifunction Acoustic Calibrator	LF060193

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Freq. (kHz)		
20 - 100	L	A	Fast	94.00	1	94.0	± 0.7

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Freq. (kHz)	
30 - 120	L	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

IEC 651 Type 1 Spec. : ± 0.4 dB per 10 dB step and + 0.7 dB for overall different.

- 6.2 Time Weighting

- 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Freq. (kHz)		
20 - 100	L	A	Fast	94.00	1	94.0	Ref.
			Slow			94.0	± 0.1

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# 輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C071448

## Calibration Report

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Burst Duration		
30 - 110	L	A	Fast	106.00	Continuous	106.0	Ref.
					200 ms	105.0	-1.0 ± 1.0
			Slow		Continuous	106.0	Ref.
					500 ms	102.0	-4.1 ± 1.0

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Freq.		
20 - 100	L	A	Fast	94.00	31.5 Hz	55.0	-39.4 ± 1.5
					63 Hz	68.1	-26.2 ± 1.5
					125 Hz	78.0	-16.1 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	94.8	+1.0 ± 1.0
					8 kHz	90.6	-1.1 (+1.5 ; -3.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Weight	Response	Level (dB)	Freq.		
20 - 100	L	C	Fast	94.00	31.5 Hz	91.4	-3.0 ± 1.5
					63 Hz	93.4	-0.8 ± 1.5
					125 Hz	94.0	-0.2 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.0	-0.8 ± 1.0
					8 kHz	88.7	-3.0 (+1.5 ; -3.0)

The test equipment used for testing are traceable to the National Standards as specified in this report.  
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**輝創工程有限公司**
**Sun Creation Engineering Limited Calibration and Testing Laboratory**

Report No. : C071448

# Calibration Report

## 6.4 Time Averaging

UUT Setting			Applied Value						UUT	IEC 60804
Range (dB)	Mode	Weight	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec (dB)
30 - 110	Leq	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
						1/10 <sup>2</sup>		90	90.0	± 0.5
			60 sec.			1/10 <sup>3</sup>		80	80.0	± 1.0
			5 min			1/10 <sup>4</sup>		70	70.0	± 1.0

Remarks : - Mfr's Spec. : IEC 651 &amp; IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5Hz - 125 Hz : ± 0.35 dB  
 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 104 dB : 1 kHz : ± 0.30 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

## Note :

The values given in this Calibration Report only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for testing are traceable to the National Standards as specified in this report.  
 This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

 C/O 41, Tsing Shan Wan Exchange Building, 1 Hoi Yee Lane, Tuen Mun, New Territories, Hong Kong  
 Tel: 2977 2696 Fax: 2744 8986 E-mail: collab@suncreation.com Website: www.suncreation.com



Annex E

## Summary of Implementation Status

## Annex E Environmental Mitigation Implementation Schedule

Environmental Protection Measures	Location	Implementation Agent	Implementation Status
<i>Construction Air Quality</i>			
The areas for temporary stockpiling of excavated materials should be provided with enclosed shelters.	Stockpile zone	Contractor	N/A.
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	√
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 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
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- Δ Deficiency of Mitigation Measures but rectified by Gammon
- N/A Not Applicable

<b>Environmental Protection Measures</b>	<b>Location</b>	<b>Implementation Agent</b>	<b>Implementation Status</b>
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	Δ
Excavation / earth moving operation should be sprayed with water.	Work areas	Contractor	√
Continuous 24-hour TSP monitoring should be conducted at designated location once per week throughout the construction period.	Designated location	ET	√
<b>Construction Noise</b>			
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 should be properly maintained to ensure that it is properly functioning throughout the construction stage of the Project.	Portal area	Contractor	√
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	√
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	√
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	√
<b>Construction Water Quality</b>			

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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	√
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	√
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	√

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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 (The re-circulated system is being connected.)
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	√
<b>Construction Waste</b>			
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	√
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
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	Δ

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Environmental Protection Measures	Location	Implementation Agent	Implementation Status
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	√
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	√

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<b>Environmental Protection Measures</b>	<b>Location</b>	<b>Implementation Agent</b>	<b>Implementation Status</b>
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	√
<b>Ecology</b>			
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	Δ
<b>Landscape and Visual</b>			
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	√
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
<b>Cultural Heritage</b>			
Fencing should be erected around the entire Elliot Treatment Works.	Elliot Treatment Works	Contractor	√

Remarks:

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Environmental Protection Measures	Location	Implementation Agent	Implementation Status
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:

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- N/A Not Applicable



Annex F

## 24-hour TSP Monitoring Results

## Impact 24-hr TSP Monitoring Results

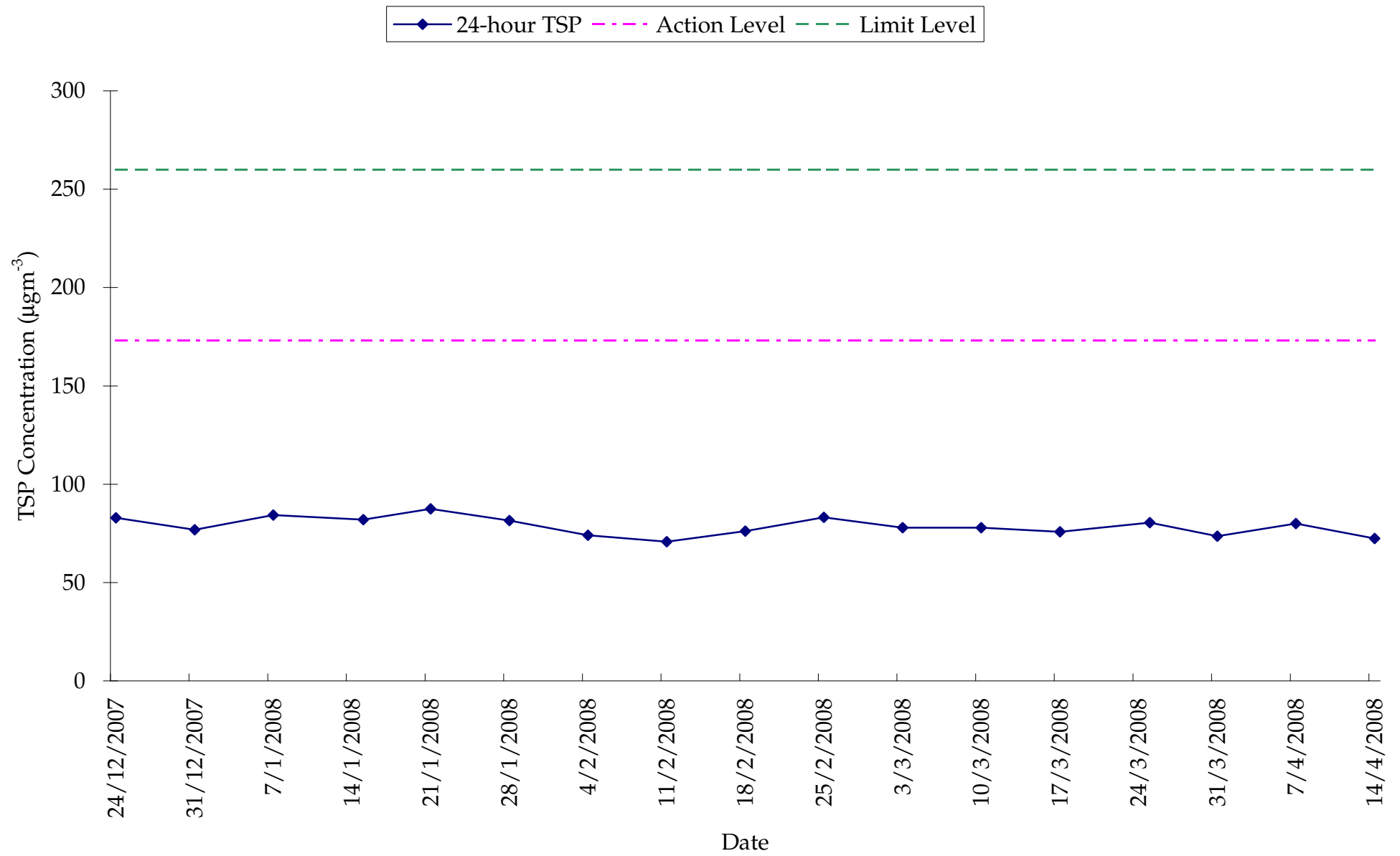
### 24-hour TSP Monitoring Results at Station AM1 (Rooftop of Chow Yei Ching Building)

Date	Filter Weight (g)		Flow Rate (m <sup>3</sup> /min.)		Elapse Time		Sampling Time(hrs.)	Conc. (µg/m <sup>3</sup> )	Weather Condition	Ave. Air Temp. (°C)	Particulate weight(g)	Av. flow (m <sup>3</sup> /min)	Total vol. (m <sup>3</sup> )
	Initial	Final	Initial	Final	Initial	Final							
25-Mar-08	2.7705	2.9107	1.21	1.21	10285.1	10309.1	24.0	80	Cloudy	21	0.1402	1.21	1742.4
31-Mar-08	2.7666	2.8947	1.21	1.21	10309.1	10333.1	24.0	74	Cloudy	20	0.1281	1.21	1742.4
7-Apr-08	2.7702	2.9095	1.21	1.21	10333.1	10357.1	24.0	80	Sunny	27	0.1393	1.21	1742.4
14-Apr-08	2.7547	2.8808	1.21	1.21	10357.1	10381.1	24.0	72	Fine	26	0.1261	1.21	1742.4
								Min	72				
								Max	80				
								Average	77				

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

Date	Weather	King's Park Station				
		Average Air Temperature (°C)	Average Wind Speed (km/h)	Average Relative Humidity (%)	Total Rainfall (mm)	Prevailing Wind Direction (Degrees)
25-Mar-08	Cloudy	19.0	7.1	75.0	0.0	100
31-Mar-08	Cloudy	18.6	18.4	95.0	3.0	100
7-Apr-08	Sunny	25.7	22.0	80.0	0.0	70
14-Apr-08	Fine	22.7	21.0	86.5	0.0	80

Figure F1 - Measured 24-hour TSP Concentration ( $\mu\text{g}\text{m}^{-3}$ ) at AM1



Annex G

## Construction Noise Monitoring Results

## Construction Noise Monitoring Results

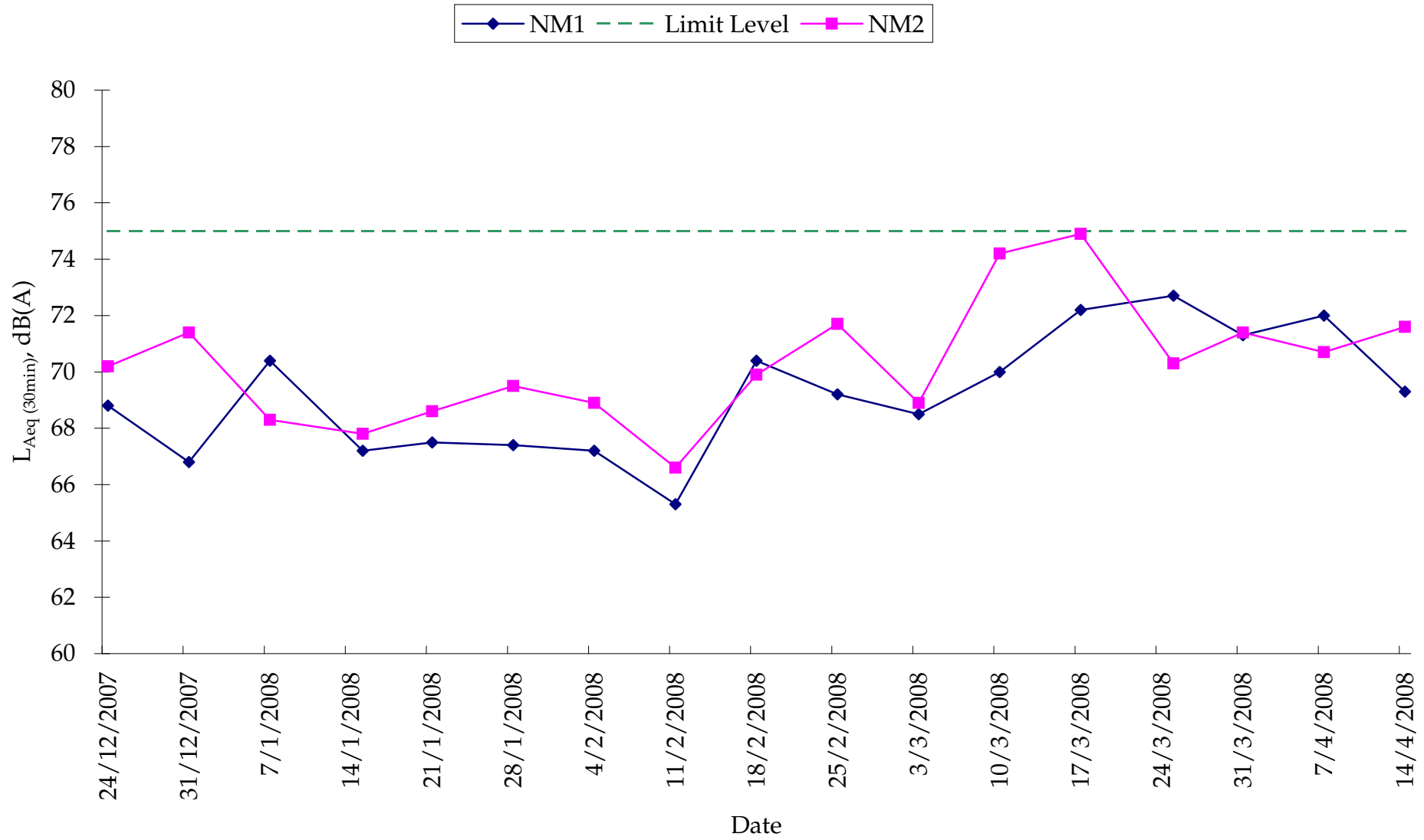
Monitoring Location: NM1 - Refuge Floor of Tower 3, The Belcher's

Date	Measurement Period, hours		Measured Noise Level, dB(A)			Noise Criteria, L <sub>eq(30mins)</sub> , dB(A)	Compliance (Y/N)	Remark
	Start	End	L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>			
25-Mar-08	13:20	13:50	72.7	76.1	67.6	75.0	Y	-
31-Mar-08	13:20	13:50	71.3	73.1	68.1	75.0	Y	-
7-Apr-08	10:00	10:30	72.0	74.6	68.0	75.0	Y	-
14-Apr-08	13:21	13:51	69.3	71.5	66.2	75.0	Y	-

Monitoring Location: NM2 - Roof of Starr Hall

Date	Measurement Period, hours		Measured Noise Level, dB(A)			Noise Criteria, L <sub>eq(30mins)</sub> , dB(A)	Compliance (Y/N)	Remark
	Start	End	L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>			
25-Mar-08	14:13	14:43	70.3	72.3	67.1	75.0	Y	-
31-Mar-08	14:06	14:36	71.4	73.4	68.3	75.0	Y	-
7-Apr-08	10:40	11:10	70.7	72.4	68.4	75.0	Y	-
14-Apr-08	14:05	14:35	71.6	73.5	68.7	75.0	Y	-

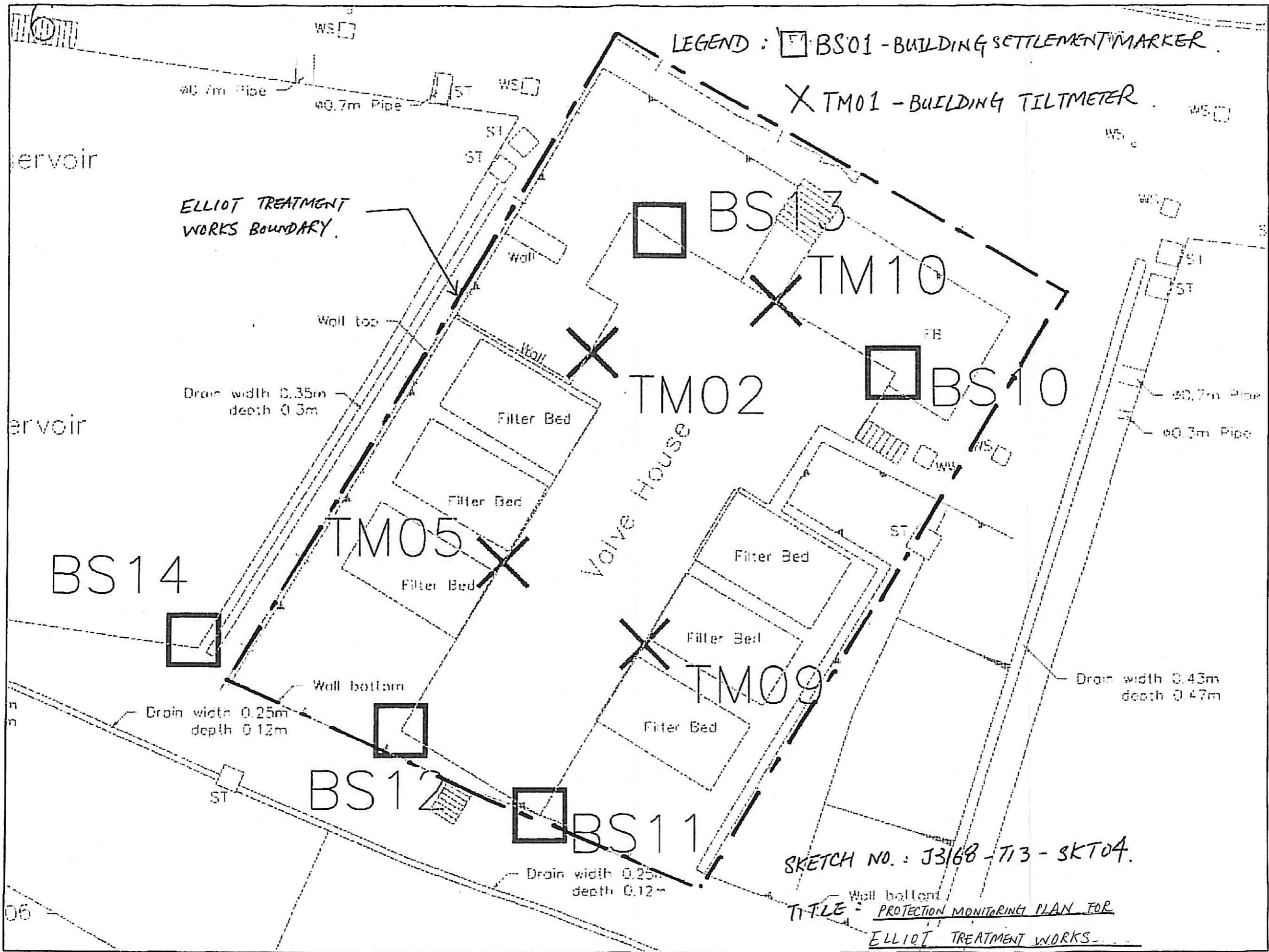
Figure G1 - Noise Monitoring Results ( $L_{eq, 30min}$ )



Annex H

# Cultural Heritage Monitoring Results







**Gammon**

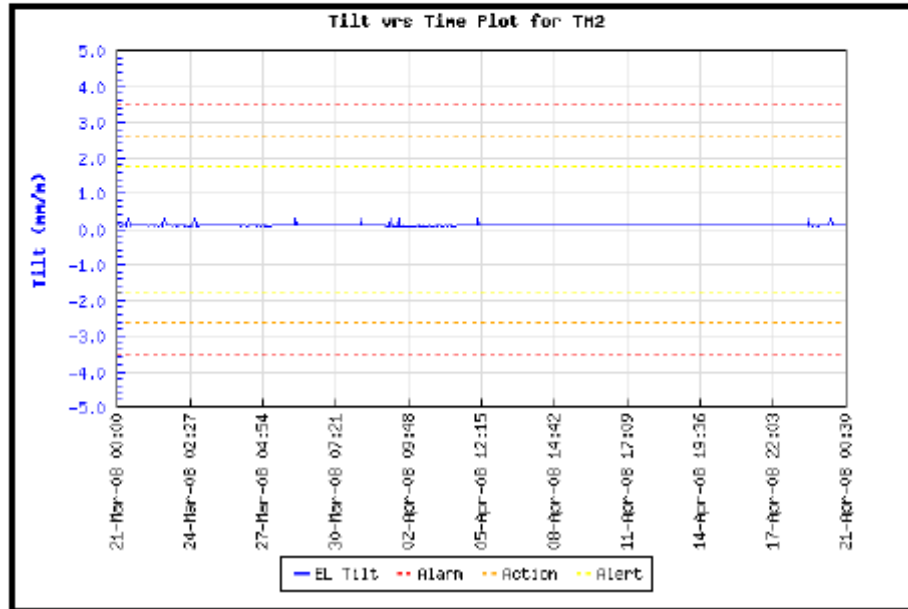
The University of Hong Kong  
Gammon J3168  
Provisioning and Infrastructure Works for HKU Centennial Campus

### ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM2  
Easting : 831797.083  
Location : Valve House  
Remark : Radio Transmitter Serial No. 50348; +ve Reading => Rotation towards West South

Type : Electro Level  
Northing : 816014.766

Initial Level : 92.664 mPD



**Gammon**

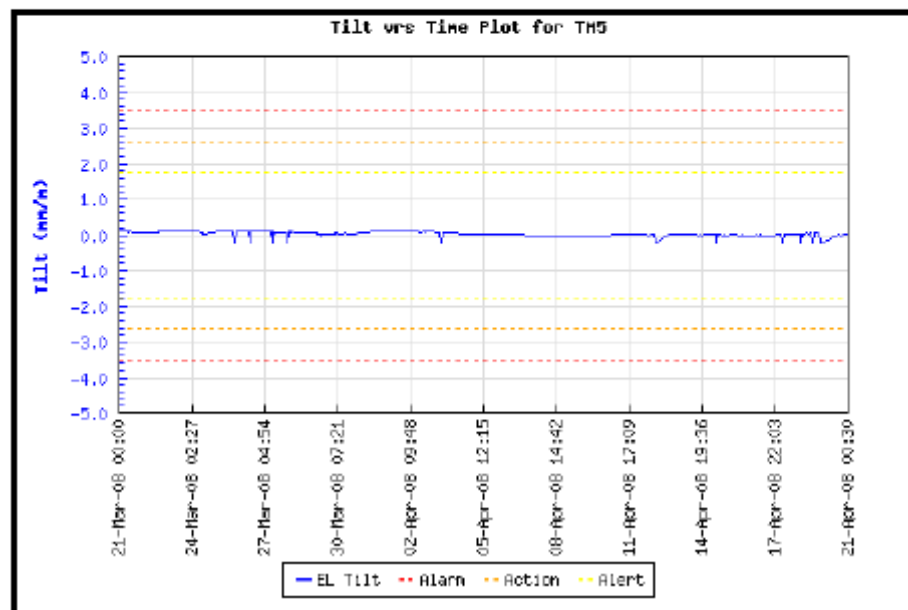
The University of Hong Kong  
Gammon J3168  
Provisioning and Infrastructure Works for HKU Centennial Campus

### ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET

Instrument ID : TM5  
Easting : 831792.223  
Location : Valve House  
Remark : Radio Transmitter Serial No. 50194; +ve Reading => Rotation towards West South

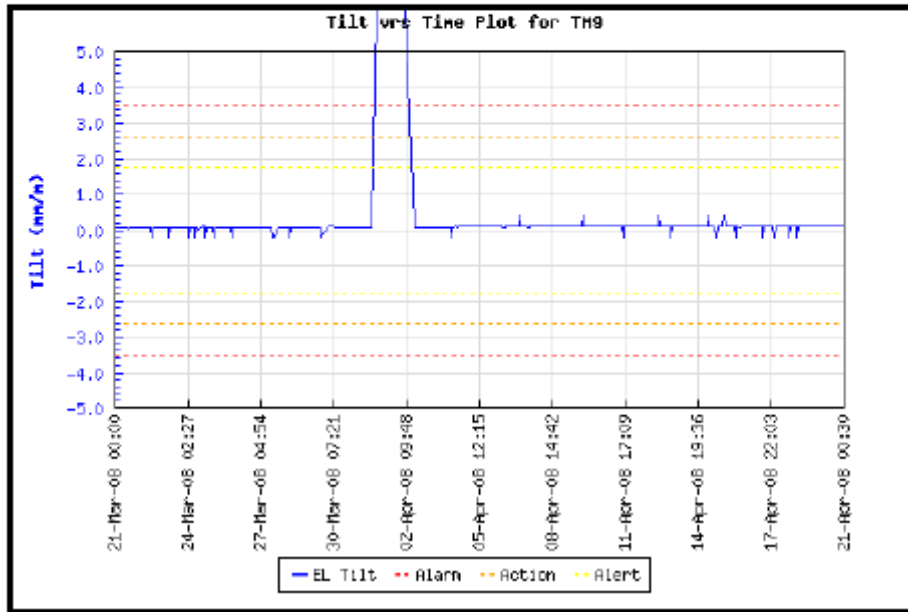
Type : Electro Level  
Northing : 816014.081

Initial Level : 92.714 mPD



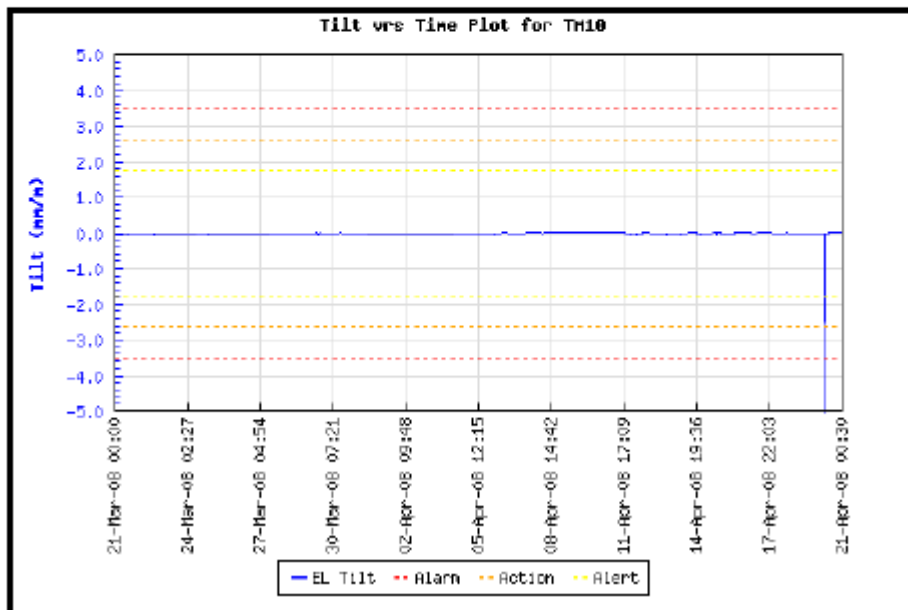
**ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET**

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. 50294; +ve Reading => Rotation towards North East



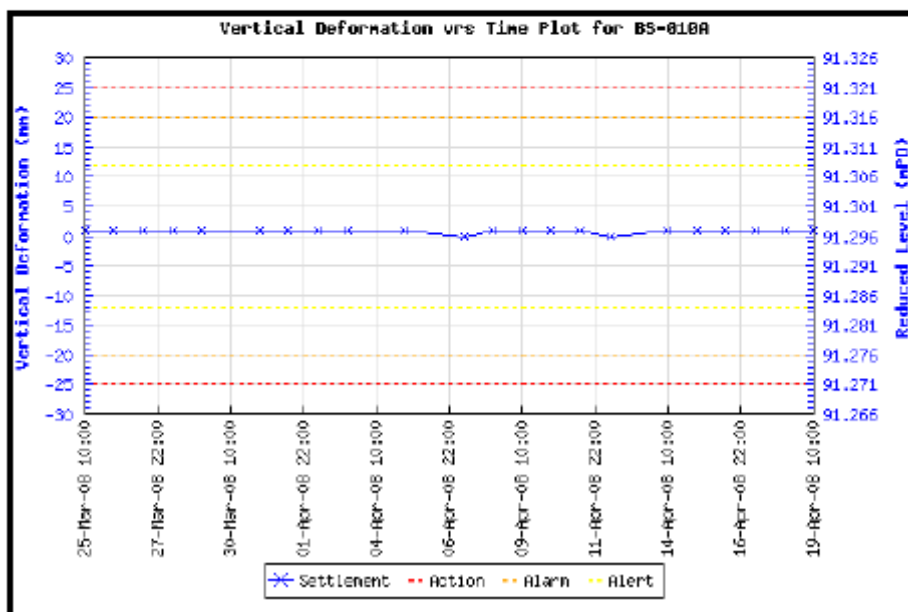
**ELECTROLEVEL TILT SENSOR MONITORING RECORD SHEET**

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



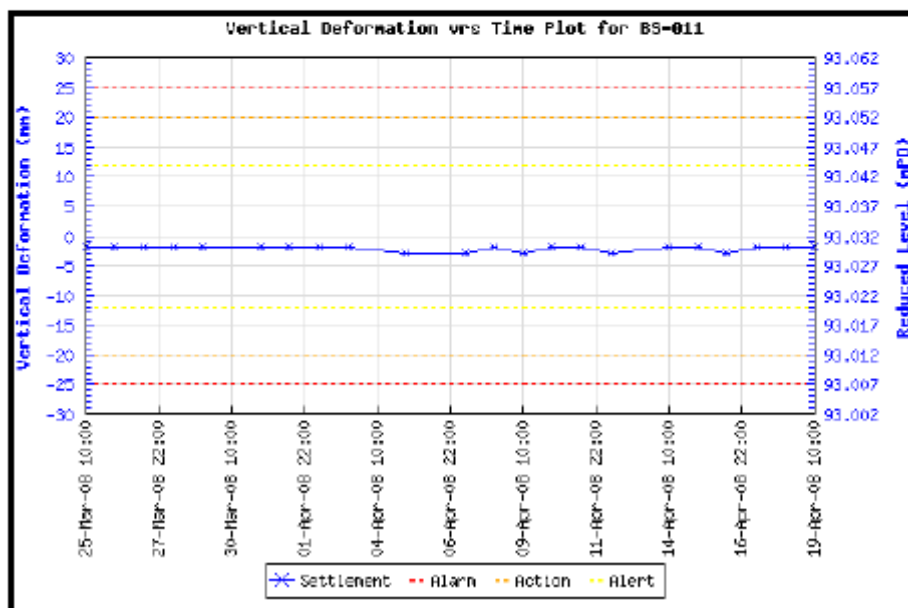
### SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-010A      Type : Building Settlement Marker Type DMP5  
Easting : 831808.247      Northing : 816016.001      Initial Level : 91.296 mPD  
Location : Valve House  
Remark :



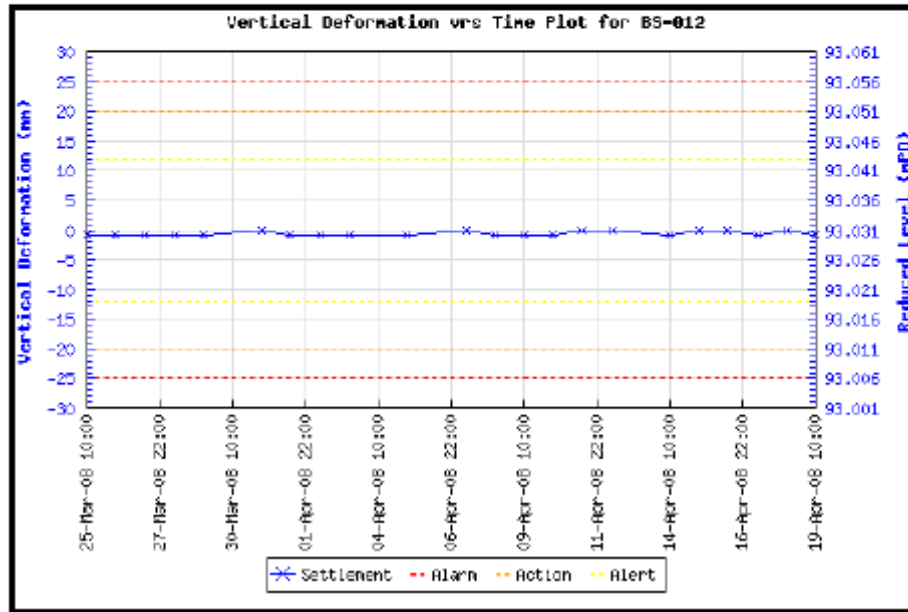
### SETTLEMENT MONITORING RECORD SHEET

Instrument ID : BS-011      Type : Building Settlement Marker Type DMP5  
Easting : 831795.830      Northing : 815997.133      Initial Level : 93.032 mPD  
Location : Valve House  
Remark :

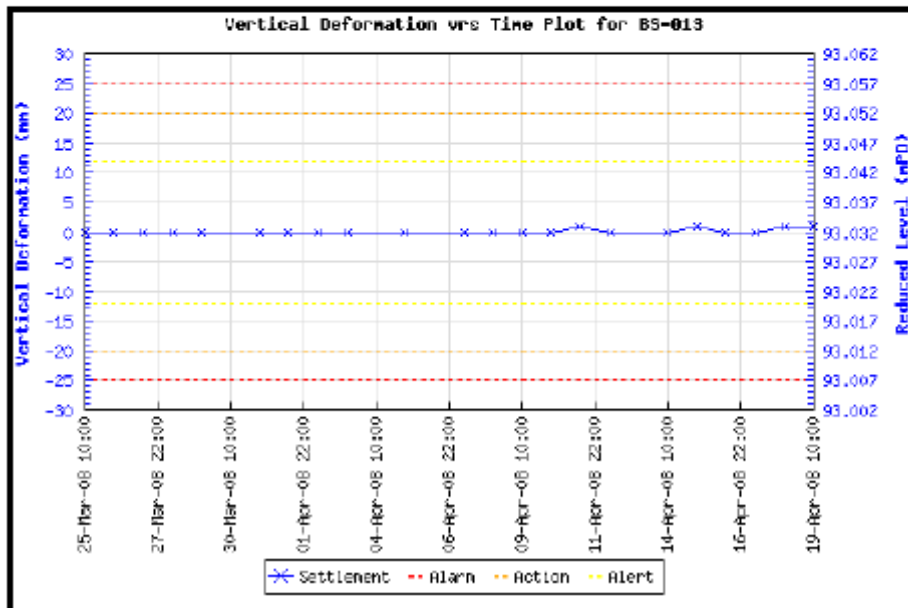


**SETTLEMENT MONITORING RECORD SHEET**

 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

**SETTLEMENT MONITORING RECORD SHEET**

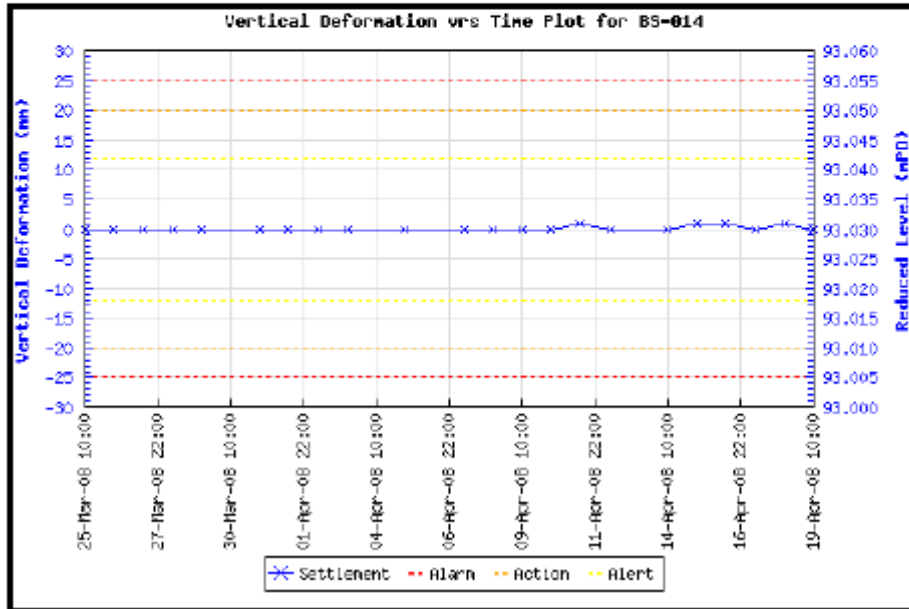
 Instrument ID : BS-013  
 Easting : 831800.805  
 Location : Valve House  
 Remark :

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


**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 I

## 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 2008

Period	Actual Quantities of inert C&D Materials (in 10 <sup>3</sup> Kg) <sup>(1)</sup>					Actual Quantities of C&D Wastes (in 10 <sup>3</sup> Kg) <sup>(4)</sup>								
	Total Quantity Generated	Broken Concrete <sup>(2)</sup>	Reused in the Contract	Reused in other Projects <sup>(3)</sup>	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 Dec 07 – 20 Jan 08	5877	0	0	0	5877	0	0	0	0	0	0	0	0	0
21 Jan 08 – 20 Feb 08	9895	0	0	0	9895	0	0	0	0	0	0	0	0	0
21 Feb 08 – 20 Mar 08	11640	0	0	0	11640	0	0	0	0	0	0	0	0	12
21 Mar 08 – 20 Apr 08	8498	0	0	0	8498	0	0	0	0	0	0	0	0	0
<b>Total</b>	35910	0	0	0	35910	0	0	0	0	0	0	0	0	12

Note: <sup>(1)</sup> Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.

<sup>(2)</sup> Broken concrete for recycling into aggregates.

<sup>(3)</sup> Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material

<sup>(4)</sup> C&D material includes metals, paper / cardboard packaging waste, chemical waste and other wastes such as general refuse.