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**DRAINAGE SERVICES DEPARTMENT (DSD)**

**CONTRACT No. DC/2004/08**



**PENG CHAU SEWAGE TREATMENT WORKS UPGRADE**

**ENVIRONMENTAL MONITORING AND AUDIT (EM&A)**

**BASELINE MONITORING REPORT**

PREPARED FOR

Necso-ATAL Joint Venture (NAJV)

Quality Index			
Date	Reference No.	Prepared by	Certified By
27 July 2005	TCS/00280/05/600/R0032	Kin Hoo Ho (Project Consultant) 	Cliff Lam (Project Manager) 

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**BMT Asia Pacific Limited**

1 August 2005  
Our Ref: 8261/0077

By Post/Fax (2424 9114) & Email

CDM International Inc.,  
4305-12 Metroplaza Tower 1,  
223 Hing Fong Road, Kwai Fong,  
Hong Kong

For the attention of Mr. Alfred Cheung/Mr. Stephen Ng

Dear Sirs,

**RE: BASELINE MONITORING REPORT**  
**Contract No. DC/2004/08 Upgrading of Peng Chau Sewage**  
**Treatment Works**

With reference to the revised Baseline Monitoring Report (ET's ref.: TCS/00280/05/800/R0032 issue no.1 provided to IEC on 1<sup>st</sup> August 2005 by email), we have no critical comments on the Baseline Monitoring Report if EPD approves the proposed alternative use of wind data of HKO Cheung Chau Station and laboratory testing methods for water quality.

Thank you for your kind attention and should you require any further information, please do not hesitate to contact the undersigned at 2241 9807.

Yours sincerely

  
Antony Wong  
Project Independent Environmental Checker  
RCL/anw

cc.  
Nesco-ATAL JV - Ir. William Chan/Ir. Mingo LI (by fax: 2573 5417/2956 3696)  
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### Executive Summary

- ES.01 Necso-ATAL Joint Venture (NAJV) has been awarded the DSD Contract DC/2004/08 (Project) for the Peng Chau Sewage Treatment Works Upgrade in May 2005. The Project requires an Environmental Monitoring & Audit (EM&A) program to be implemented by an Environmental Team (ET) throughout the contract period in compliance with the requirements as stated in the project Environmental Permit (EP-203/2004) and the project EM&A manual.
- ES.02 Action-United Environmental Services and Consulting (AUES) has been commissioned by NAJV to be an independent environmental team (ET) to implement the EM&A program in compliance with the EP and the project EM&A Manual. As part of the project EM&A program, baseline monitoring is required to determine the ambient environmental conditions.
- ES.03 The baseline EM&A program was carried out by ET in compliance with the project EM&A Manual during the period between 14 July and 27 July 2005 at the designated locations as verified by the Independent Environmental Checker (IEC) and approved by the Engineer (ER). The baseline EM&A program consists of air quality, marine water quality and noise monitoring.
- ES.04 The baseline marine water monitoring took place from 27 June to 22 July 2005. Owing to the residents' refusal of providing access to the designated locations, an alternative air and noise monitoring station was proposed to EPD and was approved on 14 July 2005. The baseline air and noise monitoring was completed on 28 July 2005.
- ES.05 Action and Limit (A/L) levels for air, water and noise impact have been developed according to the criteria set out in the project EM&A Manual. The A/L levels will be used to evaluate the environmental impact in association with the project and to determine if the required environmental mitigation measures are adequate.

### Action and Limit Levels for Air Quality and Noise

Monitoring Location	Action Level ( $\mu\text{g}/\text{m}^3$ )		Limit Level ( $\mu\text{g}/\text{m}^3$ )	
	1-Hr	24-Hr	1-Hr	24-Hr
AN1	346	To be Determined	500	260

Parameter	Action Level in dB(A)	Limit Level in dB(A)
0700-1900 hrs on normal weekdays	When one or more documented complaints are received	75 dB(A)

### Action and Limit Levels for Marine Water Quality

Parameter		Action	Limit
DO mg/L	Surface & Mid-depth	4.1	3.9
	Bottom	3.3	2.0
Turbidity, NTU		6.2 or 120% of upstream control station's SS at the same tide of the same day.	7.5 or 130% of upstream control station's SS at the same tide of the same day.
SS, mg/L		17.6 or 120% of upstream control station's SS at the same tide of the same day.	20.2 or 130% of upstream control station's SS at the same tide of the same day.
NH <sub>3</sub> -N, mg/L		0.16	0.22
TIN, mg/L		0.91	0.94
<i>E.Coli</i> , cfu/100mL		374	610

- ES.06 During the baseline monitoring the dominant source of air quality and noise impact observed by the ET was daily domestic activities by local residents. No particular construction activities or other external influencing factors were observed.
- ES.07 The installation of a wind monitoring station at the sensitive receivers or site offices was confirmed impractical. The ET Leader proposed the use of meteorological data provided by the Cheung Chau Station of the Hong Kong Observatory (HKO). The proposal was verified by the IEC (Ref: 8261/0062) and approved by the ER (Ref: DC200408/M45/700/()00081).

## 1.0 INTRODUCTION

- 1.01 Necso-ATAL Joint Venture (NAJV) has been awarded the DSD Contract DC/2004/08 (Project) for the upgrading of Peng Chau Sewage Treatment Works in May 2005. The Project requires an Environmental Monitoring & Audit (EM&A) program to be implemented by an Environmental Team (ET) throughout the contract period in compliance with the requirements as stated in the project Environmental Permit (EP-203/2004) and the project EM&A manual. The location of the project site is presented in **Appendix A**.
- 1.02 The works to be executed under the Project mainly comprise the following:
- Upgrade and reconstruct the existing Peng Chau Sewage Treatment Works (STW);
  - Construct an emergency overflow, storm tanks and submarine outfall;
  - Provide de-odourization facilities and associated sludge treatment facilities, and extend inlet pumping mains and construct an equalization tank;
  - Demolish the existing treatment facilities;
  - Construct sludge drying bed; and
  - Construct remaining works.
- 1.03 Action-United Environmental Services and Consulting (AUES) has been commissioned by NAJV to be the independent environmental team (ET) for implementation of the EM&A program in accordance with the requirements as set out in the EP and the project EM&A manual.
- 1.04 The baseline EM&A program was carried out by ET in compliance with the project EM&A Manual during the period between 14 July and 27 July 2005 at the designated locations as verified by the Independent Environmental Checker (IEC) and approved by the Engineer (ER). The baseline EM&A program consists of air quality, marine water quality and noise monitoring.
- 1.05 This baseline EM&A report presents the details of the baseline monitoring exercise including project background, monitoring methodology, results and findings, and Action/Limit (A/L) levels established for the subsequent impact EM&A program.

### Report Structure

- 1.05 The baseline EM&A report is structured into the following sections:
- |                  |   |
|------------------|---|
| <b>Section 1</b> | Introduction                                |
| <b>Section 2</b> | Summary of Baseline Monitoring Requirements |
| <b>Section 3</b> | Baseline Monitoring Methodology             |
| <b>Section 4</b> | Baseline Monitoring Results                 |
| <b>Section 5</b> | Conclusions                                 |

## 2.0 SUMMARY OF BASELINE MONITORING REQUIREMENTS

2.01 Environmental monitoring and audit requirements are set out in the project EM&A manual. Air, marine water and construction noise have been identified to be the key environmental issues during the impact phase of the project.

2.02 A summary of the EM&A requirements for air quality, marine water quality and construction noise monitoring are shown in **Table 2-1**. The designated locations of the air quality, noise and marine water monitoring stations are shown in **Appendix B**.

**Table 2-1 Summary of EM&A Requirements**

Environmental Aspect	Monitoring Parameters
Air Quality	1-Hr TSP
	24-Hr TSP
Construction Noise	Leq 30min during normal working hours
	Supplementary L10 and L90 for reference.
Marine Water Quality	<ul style="list-style-type: none"> <li>• Dissolved Oxygen (DO);</li> <li>• Temperature;</li> <li>• Turbidity;</li> <li>• pH;</li> <li>• Salinity;</li> <li>• Suspended Solids (SS);</li> <li>• Ammonia Nitrogen;</li> <li>• Total Inorganic Nitrogen; and</li> <li>• <i>E.Coli</i></li> </ul>

2.03 Baseline air monitoring shall be carried out for a period of 14 days at one designated monitoring station. The 24-Hr TSP monitoring shall be carried out daily and the 1-Hr TSP monitoring three times per day.

2.04 Baseline noise monitoring shall be conducted for a period of 2 weeks at one designated monitoring station. Measurements of Leq 30min shall be taken between 0700 and 1900 with supplementary L10 and L90 data collected.

2.05 The baseline monitoring program shall be conducted prior to commencement of the construction of the Project.

2.06 A summary of derivation of Action/Limit (A/L) Levels for air quality, marine water quality and construction noise is shown in **Tables 2-2, 2-3** and **2-4**.

**Table 2-2 Action and Limit Levels for Air Quality**

Parameter	Action Level in ug/m <sup>3</sup>	Limit Level in ug/m <sup>3</sup>
1-Hr TSP	For baseline level ≤ 384 ug/m <sup>3</sup> , Action level = (Baseline*1.3 + Limit level)/2; For baseline level > 384 ug/m <sup>3</sup> , Action level = Limit level.	500
24-Hr TSP	For baseline level ≤ 200 ug/m <sup>3</sup> , Action level = (Baseline*1.3 + Limit level)/2; For baseline level > 200 ug/m <sup>3</sup> , Action level = Limit level.	260

**Table 2-3 Action and Limit Levels for Construction Noise**

Parameter	Action Level in dB(A)	Limit Level in dB(A)
0700-1900 hrs on normal weekdays	When one or more documented complaints are received	75 dB(A)

**Table 2-4 Action and Limit Levels for Marine Water Quality**

Parameters	Action	Limit
DO in mg/ L (Surface, Middle and Bottom).	Surface and Middle 5%-ile of baseline data for surface and middle layer <u>Bottom</u> 5%-ile of baseline data for bottom layer	Surface and Middle 4 mg/ L or 1%-ile of baseline data for surface and middle layer <u>Bottom</u> 2 mg/ L or 1%-ile of baseline data for bottom layer
SS in mg/ L (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline data or 130% of upstream control station's SS at the same tide of the same day
Unionised Ammonia in mg/ L (depth-averaged)	95%-ile of baseline data or 0.021 mg/ L	99%-ile of baseline data or 0.021 mg / L
<i>E.Coli</i> (depth-averaged)	95%-ile of baseline data	99%-ile of baseline data or 610 cfu/100mL as geometric mean
Turbidity in NTU (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's turbidity at the same tide of the same day	99%-ile of baseline data or 130% of upstream control station's turbidity at the same tide of the same day
TIN in mg/ L (depth averaged)	95%-ile of baseline data	99%-ile of baseline data

Notes:

- "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths;
- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- For Turbidity, SS and TIN, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered necessary.



### 3.0 BASELINE MONITORING METHDOLOGY

#### MONITORING LOCATIONS

- 3.01 There is one designated air and noise monitoring location and four (4) designated water monitoring stations. Their locations are shown in **Tables 3-1 and 3-2** and geographically in **Appendix B**.
- 3.02 Owing to the residents' refusal of providing access to the designated air and noise locations, an alternative air and noise monitoring station was proposed and was approved by EPD (Ref: (2) EP2/N9/F/93 IV) on 14 July 2005. The approved alternative air and noise station is located at the abutment (Portion P) within the site boundary next to the sensitive receiver Sea Crest Villa.

**Table 3-1 Location of Alternative Air Quality and Noise Monitoring Station**

Station ID	Description
AN1	Abutment at Portion P next to Sea Crest Villa

**Table 3-2 Locations of Water Quality Monitoring Stations**

Station	Description	Easting	Northing
W1	Predicted Dredging Non-Impact Zone	821279.0	816452.1
W2	Live Coral Area	821573.2	816769.7
C1	Control Station	821919.0	817155.0
C2	Control Station	821443.2	816257.4

- 3.03 The installation of a wind monitoring station at the sensitive receivers or site offices was confirmed impractical. The ET Leader proposed the use of meteorological data provided by the Cheung Chau Station of the Hong Kong Observatory (HKO). The proposal was verified by the IEC (Ref: 8261/0062) and approved by the ER (Ref: DC200408/M45/700/()00081).

#### MONITORING FREQUENCY AND PERIOD

##### 1-Hr TSP Monitoring

- 3.04 The baseline 1-Hr TSP monitoring was conducted at the EPD-approved alternative station three times a day for 14 days during the baseline monitoring period from 14 July to 28 July 2005.

##### 24-Hr TSP Monitoring

- 3.05 The baseline 24-Hr TSP monitoring was conducted at the EPD-approved alternative station daily for 14 days during the baseline monitoring period from 14 July to 28 July 2005.

##### Noise Monitoring

- 3.06 The baseline noise monitoring was undertaken at the EPD-approved alternative station daily for two weeks during the baseline monitoring period from 14 July to 28 July 2005. Measurements of Leq 30min were taken between 0700 and 1900 hrs with supplementary L10 and L90 data collected.

**Marine Water Quality Monitoring**

3.07 The baseline marine water quality monitoring was undertaken at the designated stations 3 days a week for four consecutive weeks, at mid ebb and mid flood tides. A total of 12 monitoring days were undertaken during the baseline water monitoring.

**MONITORING EQUIPMENT**

3.08 The monitoring equipment used by the ET in the baseline EM&A program is presented in the following table:

**Table 3-3 Monitoring Equipment Used in Baseline EM&A Program**

Parameters	Monitoring Equipment	
Marine Quality	Dissolved Oxygen	YSI DO Meter 85
	Temperature	YSI DO Meter 85
	Turbidity	HACH 2100P
	pH	Hanna Serial 247167
	Salinity	YSI DO Meter 85
Air Quality	1-Hr TSP	Sibata LD-3
	24-Hr TSP	Tisch High Volume Sampler 515N
Noise	Leq30	B&K Type 2238
	On-site Calibration	B&K Type 4231

**24-Hr TSP Monitoring**

3.09 24-Hr TSP monitoring was carried out by a High volume sampler (HVS) in compliance with the project EM&A Manual. The HVS employed complied with the PS specifications including.

- Power supply of 220v/50 hz for 24-hour continuous operation;
- 0.6-1.7 m<sup>3</sup>/min (20-60 SCFM) adjustable flow rate;
- A 7-day mechanical timer for 24-hour operation;
- An elapsed time indicator with  $\pm 2$  minutes accuracy for 24-Hr operation;
- Minimum exposed area of 63 in<sup>2</sup>;
- Flow control accuracy of  $\pm 2.5\%$  deviation over 24-Hr operation;
- An anodized aluminum shelter to protect the filter and sampler;
- A motor speed-voltage control to control mass flow rate with accuracy of  $\pm 2.5\%$  deviation over 24-hr sampling period;
- Provision of a flow recorder for continuous monitoring;
- Provision of a peaked roof inlet;
- Incorporation with a manometer; and
- An 8"x10" stainless steel filter holder to hold, seal and easy to change the filter paper.

3.10 The filter papers used in 24-Hr TSP monitoring were of size 8"x10" and provided by a local HOKLAS-accredited laboratory, ALS Techichem Pty (HK) Limited (HOKLAS No. 66). The filters papers after measurements were returned to the laboratory for the required treatment and analysis.

**1-Hr TSP Monitoring**

3.11 Measurements of 1-Hr TSP monitoring were taken by a Sibata LD-3 Laser Dust Meter that is a portable and battery-operated laser photometer capable of performing real time 1-Hr TSP measurements. The use of direct reading equipment for 1-Hr TSP monitoring is approved by EPD and is commonly used in HK construction projects. A comparison test with HVS was carried out in compliance with the EM&A requirements and a conversion factor for direct reading dust meter has been established.

**WIND DATA MONITORING**

- 3.12 The installation of a wind monitoring station at the sensitive receivers or site offices was confirmed impractical. The ET Leader proposed the use of meteorological data provided by the Cheung Chau Station of the Hong Kong Observatory (HKO). The proposal was verified by the IEC (Ref: 8261/0062) and approved by the ER (Ref: DC200408/M45/700/()00081).

**Noise Monitoring**

- 3.13 Noise measurements were taken in terms of the A-weighted equivalent sound pressure level (Leq) measured in decibels (dB). Supplementary statistical results such as L<sub>10</sub> and L<sub>90</sub> were also obtained for reference.
- 3.14 Hand-held sound level meters (B&K Model 2238) and associated acoustical calibrators in compliance with the International Electrotechnical Commission (IEC) Publication 651:1979 (Type 1) and 804:1985 (Type 1) specification were used for taking the baseline noise measurements.
- 3.15 Windshield was fitted in all measurements. All noise measurements were made with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (Leq).
- 3.16 No noise measurement was made in the presence of fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s.

**Marine Water Quality Monitoring**

- 3.17 The marine water quality monitoring was carried out in compliance with the project EM&A requirements. Monitored parameters include Dissolved Oxygen (DO), Temperature, Turbidity, Salinity, pH, Suspended Solids (SS), Total Inorganic Nitrogen (TIN), *E.Coli* and Ammonia Nitrogen.
- 3.18 DO, temperature, turbidity, pH and salinity were measured in-situ whereas SS, ammonia nitrogen, *E.Coli* and TIN were determined in a HOKLAS accredited laboratory.
- 3.19 The marine water monitoring was conducted during mid-ebb and mid-flood at specified depths in compliance with the project EM&A Manual. Duplicate in-situ measurements were taken and duplicate samples were collected in accordance with HOKLAS requirements for QA/QC purposes.

**LABORATORY MEASUREMENT/ANALYSIS**

- 3.20 Analyses of SS, TIN, ammonia nitrogen and *E.Coli* were carried out by a local HOKLAS-accredited laboratory, ALS Techichem Pty (HK) Limited (HOKLAS No. 66). All four specified testing services provided by ALS as shown in Table 3-5 are accredited under the HOKLAS Scheme.

**Table 3-4 Analytical Methods applied to Marine Water Quality Samples**

Determinant	Standard Method	Detection Limit
Suspended solids (mg/L)	ALS Method EA-025	2.0 mg/L
Total Inorganic Nitrogen (mg/L)	ALS Method EK-055A	0.01 mg/L
Ammonia Nitrogen (mg/L)	ALS Method EK-055A	0.01 mg/L
<i>E.Coli</i>	ALS Method EM-002	1 cfu/100 mL

#### EQUIPMENT CALIBRATION

- 3.18 Initial calibration of the HVS was performed upon installation and thereafter at bi-monthly intervals in accordance with the manufacturer's instruction using the NIST-certified standard calibrator (Tisch Calibration Kit Model TE-5025A). The calibration data are properly documented and the records are maintained by ET for future reference.
- 3.19 The 1-Hr TSP meter was calibrated by the supplier prior to purchase. Zero response of the equipment was checked before and after each monitoring event. A comparison test was carried out with a HVS. A conversion factor (K) of 4.0 was generated in accordance with the equipment manufacturer's instruction. The meter counts in minutes multiplied by the conversion factor will theoretically generate the equivalent dust concentration by HVS. The comparison test results are presented in **Appendix C**
- 3.20 The sound level meters were calibrated using an acoustic calibrator prior to and after measurements. The meters are regularly calibrated in accordance with the manufacturer's instructions. Prior to and following each noise measurement, the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were considered valid only if the calibration levels before and after the noise measurement agree to within 1.0 dB.
- 3.21 All in-situ water monitoring instruments were checked, calibrated and certified by a HOKLAS accredited laboratory before use and subsequently re-calibrated at 3-monthly intervals. Responses of sensors and electrodes are checked with standard solutions before each use.
- 3.22 The calibration certificates of the monitoring equipment used during the baseline monitoring program are attached in **Appendix C**.

#### DATA MANAGEMENT AND DATA QA/QC CONTROL

- 3.23 The baseline monitoring data were handled by the ET's systematic data recording and management, which complies with in-house certified (ISO 9001:2000) Quality Management System. Standard Field Data Sheets (FDS) were used in the baseline monitoring program.
- 3.24 The monitoring data recorded in the equipment eg. 1-Hr TSP meters and noise meters were downloaded directly from the equipment at the end of each monitoring day. The downloaded monitoring data were input into a computerized database properly maintained by the ET. The laboratory results were input directly into the computerized database and QA/QC checked by personnel other than those who input the data.
- 3.25 For monitoring activities require laboratory analysis, the local laboratory follows the QA/QC requirements as set out under the HOKLAS scheme for all laboratory testing.

**4.0 BASELINE MONITORING RESULTS**

4.01 The baseline EM&A program commenced on 27 June and was successfully completed on 28 July 2005. The baseline monitoring schedules are presented in **Appendix D** and the monitoring results are detailed in the following sub-sections.

**AIR QUALITY**

4.02 The baseline air quality monitoring data are summarized in **Tables 4-1**. Graphical plots of the 24-Hr TSP and 1-Hr TSP results are shown in **Appendix D** respectively.

**Table 4-1 Summary of 24-Hr and 1-Hr TSP Monitoring Results**

Date	24-Hr TSP (ug/m <sup>3</sup> )	1-Hr TSP (ug/m <sup>3</sup> )			
		Start Time	1 <sup>st</sup> TSP Measurement	2 <sup>nd</sup> TSP Measurement	3 <sup>rd</sup> TSP Measurement
14-Jul-05	33	14:20	48 (721)	43 (644)	49 (736)
15-Jul-05	21	13:46	28 (414)	24 (361)	25 (370)
16-Jul-05	28	10:22	30 (452)	24 (361)	25 (370)
17-Jul-05	36	13:02	132 (1980)	129 (1935)	128 (1920)
18-Jul-05	114	12:32	317(4761)	365 (5483)	322 (4832)
19-Jul-05	141	12:56	425 (6385)	352 (5278)	270 (4049)
20-Jul-05	Power Shortage	12:50	481 (7218)	325 (4875)	269 (4036)
21-Jul-05	49	12:45	214 (3211)	135 (2032)	152 (2287)
22-Jul-05	37	13:34	52 (781)	71 (1067)	89 (1339)
23-Jul-05	80	10:30	135 (2032)	157 (2364)	172 (2587)
24-Jul-05	28	11:00	198 (2970)	236 (3540)	185 (2777)
25-Jul-05	33	13:59	56 (837)	53 (791)	49 (732)
26-Jul-05	35	13:00	75 (1126)	92 (1383)	73 (1097)
27-Jul-05	32	12:56	67 (1005)	75 (1127)	72 (1087)
28-Jul-05	Lab in Progress	-	-	-	-
Average (Range)			148 (24 - 481)		

\* Figures in bracket denote meter counts recorded from the direct reading equipment. The 1-Hr TSP concentration is calculated by multiplying the meter counts in minute with a conversion factor (K) of 4.0 obtained from the comparison test with the High Volume Sampler.

4.03 The meteorological data during the baseline monitoring period are summarized in **Appendix E**.

**DERIVATION OF ACTION/LIMIT LEVELS FOR AIR QUALITY**

4.04 Following the criteria shown in **Table 2-2**, the A/L levels for 24-Hr and 1-Hr TSP have been derived as illustrated in **Table 4-2**.

**Table 4-2 Action and Limit Levels for 24-Hr TSP and 1-Hr TSP Monitoring**

Monitoring Location	Action Level (µg /m <sup>3</sup> )		Limit Level (µg/m <sup>3</sup> )	
	1-Hr TSP	24-Hr TSP	1-Hr TSP	24-Hr TSP
AN1	346	To be Determined	500	260

**NOISE**

4.05 The baseline noise monitoring results are summarized in **Table 4-3, 4-4 and 4-5**. Graphical plots of the monitoring data are presented in **Appendix D**. There was no rain and the wind speed was below 5m/s during all baseline noise measurements.

**Table 4-3 Summary of Noise Monitoring Results**

Date	Start Time	1st Leq5	2nd Leq5	3rd Leq5	4th Leq5	5th Leq5	6th Leq5	Leq30	Corrected* Leq30
14-Jul-05	14:27	57.3	54.0	61.0	56.9	56.7	57.7	58	61
15-Jul-05	13:46	54.4	53.5	53.9	49.8	49.5	58.1	54	57
16-Jul-05	13:03	50.2	45.8	54.9	50.0	46.8	49.2	51	54
17-Jul-05	10:45	53.2	49.8	50.0	47.8	47.0	48.3	50	53
18-Jul-05	12:30	53.6	55.7	54.4	52.7	45.8	48.2	53	56
19-Jul-05	12:51	54.7	52.8	50.8	55.1	45.6	46.4	52	55
20-Jul-05	12:50	54.6	51.3	49.3	48.3	49.2	48.2	51	54
21-Jul-05	12:58	50.1	60.8	53.4	51.3	54.3	59.2	57	60
22-Jul-05	13:35	55.5	55.4	50.3	58.2	53.9	49.3	55	58
23-Jul-05	13:52	48.5	50.2	48.0	58.7	47.4	45.7	53	56
24-Jul-05	13:00	46.0	44.2	47.1	47.5	50.4	50.0	48	51
25-Jul-05	13:55	48.6	47.9	50.6	47.8	49.0	50.7	49	52
26-Jul-05	13:00	53.4	53.5	50.7	49.6	48.2	50.5	51	54
27-Jul-05	12:50	50.9	47.6	45.3	46.5	47.8	53.3	50	53
<b>Average (Range)</b>		<b>51.2 (44.2 – 61.0)</b>						<b>52</b>	<b>55</b>

\* A façade correction of +3 dB(A) has been added according to acoustical principles and EPD guidelines.

**Table 4-4 Summary of L<sub>10</sub> Noise Monitoring Results**

Date	1st L <sub>10</sub>	2nd L <sub>10</sub>	3rd L <sub>10</sub>	4th L <sub>10</sub>	5th L <sub>10</sub>	6th L <sub>10</sub>	Average L <sub>10</sub>
14-Jul-05	60.0	55.5	64.5	59.5	59.0	59.0	60
15-Jul-05	55.5	56.0	56.0	51.0	50.5	59.5	59
16-Jul-05	56.0	48.5	57.5	52.0	48.5	48.0	53
17-Jul-05	55.5	53.0	52.5	50.3	49.5	51.0	52
18-Jul-05	55.0	62.5	56.0	54.5	46.8	50.5	67
19-Jul-05	56.5	55.5	52.0	57.5	47.5	47.0	54
20-Jul-05	55.5	54.0	49.5	49.5	53.5	50.5	53
21-Jul-05	57.5	64.5	55.5	53.0	55.5	62.5	60
22-Jul-05	59.0	57.0	52.0	60.5	58.0	50.5	57
23-Jul-05	49.5	52.0	50.5	61.0	48.0	46.5	55
24-Jul-05	48.5	45.0	50.4	49.3	53.2	53.0	51
25-Jul-05	53.2	53.0	55.5	51.3	52.5	51.6	53
26-Jul-05	56.7	56.0	53.6	53.0	52.4	53.0	54
27-Jul-05	53.0	50.4	47.7	50.6	50.0	55.7	52
<b>Average (Range)</b>	<b>53.6 (45.0 – 64.5)</b>						<b>56</b>

**Table 4-5 Summary of L<sub>90</sub> Noise Monitoring Results**

Date	1st L <sub>90</sub>	2nd L <sub>90</sub>	3rd L <sub>90</sub>	4th L <sub>90</sub>	5th L <sub>90</sub>	6th L <sub>90</sub>	Average L <sub>90</sub>
14-Jul-05	50.5	50.5	57.5	51.5	53.5	56.0	54
15-Jul-05	48.0	50.0	49.5	48.0	47.5	49.5	49
16-Jul-05	42.0	43.0	49.0	47.0	43.5	43.5	45
17-Jul-05	47.0	42.0	48.0	43.0	44.0	43.5	45
18-Jul-05	45.0	46.0	44.5	43.5	42.5	42.0	44
19-Jul-05	45.0	45.5	45.0	41.5	42.0	45.0	44
20-Jul-05	47.0	46.0	45.5	44.0	45.0	44.0	45
21-Jul-05	48.0	52.0	51.0	49.5	50.0	49.0	50
22-Jul-05	47.0	45.5	47.0	47.5	49.0	47.0	47
23-Jul-05	47.5	48.0	45.5	47.0	46.0	44.5	47
24-Jul-05	44.0	43.0	45.0	44.0	46.0	45.4	45
25-Jul-05	44.4	44.8	47.1	43.6	43.0	46.4	45
26-Jul-05	47.2	46.5	44.4	44.1	44.6	45.0	46
27-Jul-05	44.3	43.2	42.4	44.3	43.2	48.0	45
Average (Range)	46.2 (41.5 – 57.5)						47

**MARINE WATER QUALITY**

4.06 The baseline water monitoring results are presented in **Appendix F** and **Appendix G** shows the graphical plots of the water monitoring results. **Table 4-5** presents the calculated Action and Limit levels for marine water quality.

**Table 4-6 Action and Limit Levels for Marine Water Quality**

Parameter		Action	Limit
DO mg/L	Surface & Mid-depth	4.1	3.9
	Bottom	3.3	2.0
Turbidity, NTU		6.2 or 120% of upstream control station's SS at the same tide of the same day.	7.5 or 130% of upstream control station's SS at the same tide of the same day.
SS, mg/L		17.6 or 120% of upstream control station's SS at the same tide of the same day.	20.2 or 130% of upstream control station's SS at the same tide of the same day.
NH3-N, mg/L		0.16	0.22
TIN, mg/L		0.91	0.94
<i>E.Coli</i> , cfu/100mL		374	610

## 5.0 CONCLUSIONS

- 5.01 A project baseline monitoring program was carried out by the ET in compliance with the project EM&A Manual during the period between 27 June and 27 July 2005. The baseline monitoring program consists of air quality, marine water and noise monitoring.
- 5.02 The baseline water monitoring was carried out at four designated water monitoring stations during the period from 27 June to 22 July 2005. A total of 12 monitoring days were taken in the baseline program.
- 5.03 Owing to the residents' refusal of providing access to the designated locations, an alternative air and noise monitoring station was proposed to EPD and was approved on 14 July 2005. The baseline air and noise monitoring was completed on 28 July 2005. A total of 14 monitoring events were taken for the parameters of noise and 24-Hr TSP, and 42 events for 1-Hr TSP.
- 5.04 Action and Limit (A/L) levels for the air quality, marine water and noise have been developed respectively according to the criteria as set out in the project EM&A Manual. The A/L levels will be used to evaluate the environmental impact in association with the project and to determine if the required environmental mitigation is adequate.
- 5.05 During the baseline monitoring the dominant source of air quality and noise impact observed by the ET was daily domestic activities by local residents. No particular construction activities or other external influencing factors were observed.