

東業德勤測試顧問有限公司  
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**TEST REPORT**

***DRAINAGE SERVICES DEPARTMENT***

**CONTRACT NO. DC/2006/15 BUILDING AND  
CIVIL MAINTENANCE AND MINOR WORKS OF  
DSD PLANTS AND FACILITIES (2007-2009)**

**GROUNDWATER MONITORING AT  
NGONG PING STW AND EFFLUENT EXPORT  
PIPE**

**MONTHLY EM&A REPORT**

**(SEPTEMBER 2008)**

Prepared by:

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Checked and  
Approved by:

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Our Ref: 840/08-0027

13 October 2008

*By POST and FAX (2827 8526)*

Drainage Services Department  
42<sup>nd</sup> Floor  
Revenue Tower  
5 Gloucester Road  
Wan Chai  
Hong Kong

**Attn: Mr. Ringo Mok**

Dear Sir,

**Re: Ngong Ping Sewerage Project  
Groundwater Monitoring at Ngong Ping STW and Effluent Export Pipe  
EM&A Report (September 2008)**

---

I refer to the Environmental Permit (EP-157/2003) and the email from the environmental monitoring team, ETS-Testconsult Limited with the report on 11 October 2008 for the captioned. I do not have comment and have verified the captioned report.

Yours sincerely,

Claudine Lee  
Independent Environmental Checker

*CL/ys*

Cc. OAP – Mr. T N Chan (By Email)  
ETS-Testconsult – Ms Linda Law (By Email and Fax: 2695 3944)



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## **EXECUTIVE SUMMARY**

This monthly EM&A report (No.10) has been prepared by the Environmental Team (ET) of ETS-Testconsult Ltd for groundwater monitoring under "Contract No. DC/2006/15 Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2007-2009) – Groundwater Monitoring at Ngong Ping STW and Effluent Export Pipeline" (the Project) during the operation period from 01 to 30 September 2008.

Under the requirements of Section 5 of "the Environmental Permit (No. EP-157/2003/A)" (the EP), EM&A programme as set out in the EM&A Manual and the EIA Report (Register No.: AEIAR-065/2002) is required to be implemented. In accordance with the EM&A manual and the EIA Report, groundwater monitoring is required for the Project during operation phase

### **Environmental Monitoring Progress**

The summary of the monitoring activities in this monitoring month is listed below:

- *Groundwater Monitoring: 1 Occasion at 3 designated boreholes.*

### **Groundwater Monitoring**

Groundwater monitoring was carried out at WM10, WM11 and WM12 on 29 September 2008.

Test results of the groundwater during this monitoring show no contamination of ground water by any treated effluent. In other words, it is evident that there was no leakage of treated effluent from the Ngong Ping Sewage Treatment Works or its effluent export pipeline into the water gathering ground.

### **Environmental Complaints**

No complaints were received in this reporting month.

### **Notification of summons and successful prosecutions**

There were no notification of summons and prosecutions with respect to environmental issues in this month.

### **Future Key Issues**

Future Key issues to be considered for the prevention of contamination of the water gathering ground are as follows:

- The provision of leakage containment system for the section of pipeline in the close proximity of the reservoir;
- Removing waste in a timely manner and disposing of outside the water gathering ground;
- Locating the chemical storage area at a safe environment with adequate space; and
- Reminding the workers not to discharge any sewage or wastewater into the nearby environment.



## 1.0 INTRODUCTION

The construction works of Ngong Ping Sewage Treatment Works (NPSTW) was certificated completed on 09 March 2006 and the NPSTW was handed over to "Drainage Sewage Department" (DSD) for operation and maintenance from 10 March 2006. "ETS-Testconsult Limited" (ETL) has been commissioned as Environmental Team (ET) to carry out groundwater monitoring at Ngong Ping according to the EM&A Manual.

This monthly EM&A report presents the results of groundwater monitoring during the reporting period from 01 to 31 September 2008.

## 2.0 PROJECT INFORMATION

### 2.1 Background

Master Plan (OI SMP) Study in December 1994 and drew up a SMP for Lantau Island, Cheung Chau, Lamma Island, Peng Chau and other smaller and less populated islands. The SMP comprises provisions for upgrading and expanding the sewerage systems to cover unsewered areas.

This sewerage project is the Stage 1 works under the OI SMP and can be divided into 3 packages as follows:

*Package 1 – Ngong Ping STW with tertiary treatment*

*Package 2 – Ngong Ping main trunk sewer and effluent export pipeline*

*Package 3 – Ngong Ping village sewerage system*

This Project only covers the operation phase of Package 1 and Package 2. The general layout plan of the project is shown in Appendix D (Drawing No. 23400/EN/098).

The existing treatment facilities at Ngong Ping include grease traps and septic tanks, with discharge locally to soakaways. Following the opening of the Statue of Buddha in December 1993, the number of visitors to Ngong Ping increased significantly. Besides, the Cable Car system linking Tung Chung and Ngong Ping was being planned for commissioning in June 2006. It will certainly further increase the number of visitors in Ngong Ping. The existing treatment and disposal facilities were found to be inadequate, with significant quantities of sewage being directly discharged into the local stream. It was under this setting that the recommendation to provide a local sewerage system and a centralised treatment system for Ngong Ping was put forward in the OI SMP in 1994.

The Project was planned, designed, operated and maintained by the DSD. During the operation phase of NPSTW, DSD will follow the environmental monitoring recommendation stated at the M&A Manual that was prepared with reference to the EIA Report (Register No.: AEIAR-065/2002) to avoid the contamination of the water gathering ground.

### 2.2 Site Description

The general layout plan of the project is shown in Appendix D. The groundwater monitoring locations are also shown in the Drawing No. 23400/R/VS/406.

### 2.3 Project Organization and Management Structure

The line of communication of project organization with respect to the on-site environmental management and monitoring program are shown in Appendix A.



## 2.4 Contact Details of Key Personnel

The key personnel contact names and telephone numbers, and construction programme are shown in table 2.1.

Table 2.1 Contact Details of Key Personnel

Organization	Project Role	Name of Key Staff	Tel. No.	Fax No.
DSD	Contractor	Mr. P C Wu	2594 7199	2827 6657
Allied Environmental Consultants Limited	Independent Environmental Checker	Ms. Claudine Lee	2815 7028	2815 5399
ETL	Contractor's Environmental Team	Mr. C L Lau (ET Leader)	2946 7791	2695 3944

## 3.0 GROUNDWATER QUALITY MONITORING

### 3.1 Monitoring Locations

Groundwater quality monitoring was undertaken at three designated sampling points shown in Table 3.1.

Table 3.1 Locations of Groundwater Quality Monitoring

Sampling Point	Location
WM10	Ngong Ping Village
WM11	Ngong Ping Village
WM12	Ngong Ping Village

### 3.2 Monitoring Parameters

Monitoring of the groundwater monitoring parameters are listed below:

- Biochemical Oxygen Demand (BOD<sub>5</sub>), mg/L;
- Ammonia Nitrogen (NH<sub>4</sub><sup>+</sup>-N), mg/L;
- Nitrate + Nitrite Nitrogen (NO<sub>2</sub><sup>-</sup>+NO<sub>3</sub><sup>-</sup>), mg/L;
- pH value;
- Turbidity, NTU;
- Oil & Grease (O&G), mg/L;
- Total Phosphates (TP), mg/L;
- Synthetic detergents, mg/L;
- E-coli, cfu/100ml.



### 3.3 Monitoring Frequency

The monitoring frequency of the groundwater monitoring is summarized in Table 3.3.

Table 3.3 The frequency of the Groundwater Monitoring

Parameter	Frequency	No. of Boreholes
Biochemical Oxygen Demand	Once per month	3
Ammonia Nitrogen		
Nitrate + Nitrite		
pH value		
Turbidity		
Oil & Grease		
Total Phosphates		
Synthetic detergents		
E-coli		

### 3.4 Monitoring Methodology and Equipment Used

A water sampler comprising a transparent PVC cylinder, with a capacity of not less than 2 liters, was lowered into the water body at the predetermined depth. The opening ends of the sampler were then closed accordingly and water samples were collected.

The sample container, made by high-density polythene / glass, was rinsed with a portion of the water sample. The groundwater sample was then transferred to the container, labeled with a unique sample ID and sealed with a screw cap. The water samples were stored in a cool box maintained at 4°C. The groundwater samples were then delivered to a local HOKLAS-accredited laboratory (Environmental Laboratory, ETS-Testconsult Ltd, HOKLAS Registration No. 022) on the same day for analysis.

In accordance with the requirement of HOKLAS, the laboratory testing of the monitoring parameters were carried out with QA/QC results shown in Appendix E. The summary of testing methods of testing parameters as recommended by EIA or required by EPD were shown in Table 3.4.

Table 3.4 Summary of testing procedures

Laboratory Analysis	Testing Procedure	Detection Limit
Biochemical Oxygen Demand	In house method TPE/001/W or BS 6068 : Section 2.14 : 1990	2.0 mg/L
Ammoniacal Nitrogen	In house method TPE/016/W, refer to APHA 19ed 4500-NH <sub>3</sub> F & G	0.13 mg/L
Nitrate + Nitrite	In house method TPE/023/W, refer to APHA 19ed 4500-NO <sub>3</sub> B	0.004 mg/L
pH (at 25°C)	In house method TPE/003/W, refer to APHA 19ed APHA 4500-H <sup>+</sup> B	Detection range: 4.0-10.0
Turbidity	In house method TPE/005/W, refer to APHA 19ed 2130B	0.5 NTU
Oil & Grease	APHA 19ed 5520 B	5.0 mL
Total Phosphate	In house method base on ASTM D 515-88	0.05 mg/L
Synthetic detergents	In house method based on APHA 19ed 5540 C & D	0.1 mg/L
E-coli	DoE Section 7.8 & 7.9 plus in-site urease test	<1 cfu/100ml



### 3.5 Groundwater Monitoring Results

In this reporting month, groundwater monitoring was carried out at WM10, WM11 and WM12 on 29 September 2008. The groundwater quality measurement results are detailed in Appendix B. Graphical presentation of the monitoring parameters for this reporting month is shown in Appendix C.

Test results of the groundwater during this monitoring show no contamination of ground water by any treated effluent. In other words, it is evident that there was no leakage of treated effluent from the Ngong Ping Sewage Treatment Works or its effluent export pipeline into the water gathering ground.

### 4.0 ENVIRONMENTAL NON-CONFORMANCE

#### 4.1 Summary of Groundwater Quality Monitoring

According to the results of all testing parameters, they show no contamination of ground water by any treated effluent. In other words, it is evident that there was no leakage of treated effluent from the Ngong Ping Sewage Treatment Works or its effluent export pipeline into the water gathering ground.

#### 4.2 Summary of Environmental Complaints

No complaints were received in this reporting month.

#### 4.3 Summary of Notification of Summons and Prosecution

There was no notification of summons respect to environmental issues registered in this month.

### 5.0 IMPLEMENTATION STATUS

#### 5.1 Implementation Status of Environmental Mitigation Measures

DSD has been implementing the required environmental mitigation measures indicating in Clause 4.5.20 of the EM&A manual.

#### 5.2 Implementation Status of Environmental Complaint Handling

No complaints were received in this reporting month. The details of the complaint-log are presented in Table 5.1.

Table 5.1 Statistical Summary of Environmental Complaints

Reporting Month	Complaint Statistics			
	Frequency	Cumulative	Aspect	Investigation Results and Follow up Actions
November 07	0	0	---	---
December 07	0	0	---	---
January 08	0	0	---	---
February 08	0	0	---	---
March 08	0	0	---	---
April 08	0	0	---	---
May 08	0	0	---	---
June 08	0	0	---	---
July 08	0	0	---	---
August 08	0	0	---	---
September 08	0	0	---	---





### **5.3 Implementation Status of Notification of Summons and Prosecution**

There were no notifications of summons respect to environmental issues registered in this reporting month.

### **6.0 CONCLUSION**

In this reporting month, groundwater monitoring was carried out at WM10, WM11 and WM12 on 29 September 2008.

According to the results of all testing parameters, they show no contamination of ground water by any treated effluent. In other words, it is evident that there was no leakage of treated effluent from the Ngong Ping Sewage Treatment Works or its effluent export pipeline into the water gathering ground.

### **7.0 FUTURE KEY ISSUES**

DSD will continue to carry out operation and maintenance works of NPSTW in the coming month. Future Key issues to be considered for the prevention of contamination of the water gathering ground are as follows:

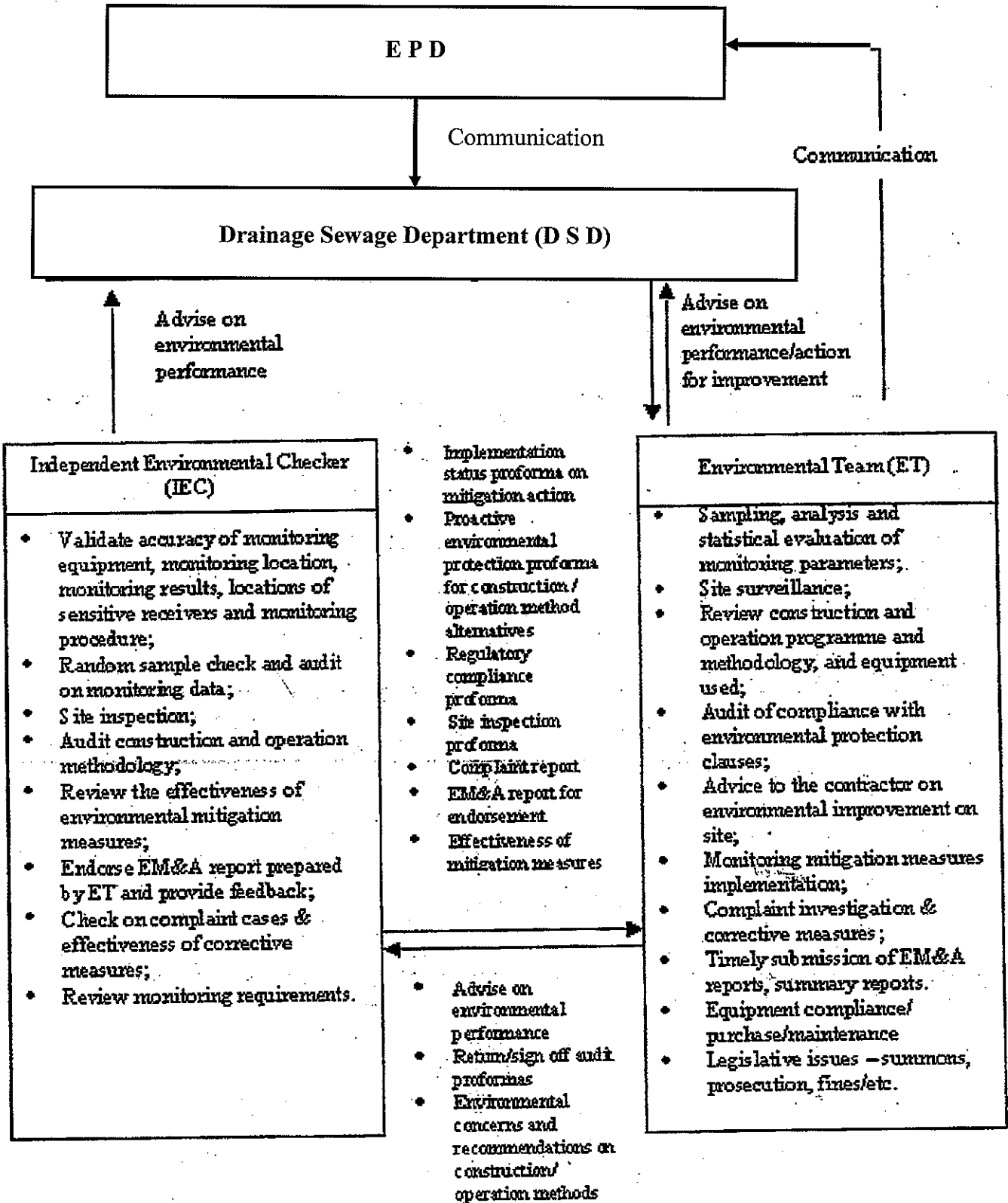
- The provision of leakage containment system for the section of pipeline in the close proximity of the reservoir;
- Removing waste in a timely manner and disposing of outside the water gathering ground;
- Locating the chemical storage area at a safe environment with adequate space; and
- Reminding the workers not to discharge any sewage or wastewater into the nearby environment.



東業德勤測試顧問有限公司  
ETS-TESTCONSULT LIMITED

## **Appendix A**

### **Lines of Communication**





## **Appendix B**

# **Groundwater Monitoring Results and Photos of Groundwater Monitoring at Boleholes**



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**TEST REPORT**

Form : E/EN/R/01/Issue 4 (1/1) [08/02]

**Environmental Testing of Water & Wastewater**

Report No. : ENA81035  
Date of issue : 08 October 2008  
Page No. : 1 of 3

**Information provided by Customer**

Customer name : Welcome Construction Co Ltd  
Customer address : Flat 01, 19/F, Westley Square, 48 Hoi Yuen Road, Kwun Tong, Kowloon  
Sample Source : DC/2006/15 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2007-2009) - Groundwater Monitoring at Ngong Ping STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 29 September 2008  
Sample Description : The sample was collected in 200ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 200ml sterilized glass bottle (for E-coli only), 500ml and 1L plastic bottles (for other testing parameters). Sample for Ammonia and Nitrate + Nitrite Nitrogen was preserved by adding conc. H<sub>2</sub>SO<sub>4</sub> to pH<2. Sample for Oil & Grease was preserved by adding conc. HCl to pH<2. All samples were chilled immediately after collection.

**Laboratory information**

Date Received : 29 September 2008

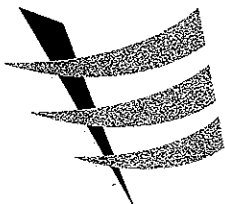
**Result**

Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM10	W23802 (01)	pH Value	In house method TPE/003/W	6.2 (at 25°C)	29 September 2008
		Turbidity	In house method TPE/005/W	30 NTU	29 September 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	<2.0 mg/L	29 September 2008 (17:00) to 04 October 2008 (17:00)
	W23802 (04)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.30 mg/L	03 October 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	30 September 2008
	W23802 (10)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	30 September 2008
	W23802 (07)	Total Phosphates	In house method TPE/019/W	<0.10 mg/L	30 September 2008
	W23802 (16)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	02 October 2008
W23802 (13)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	4 cfu/100ml	29 September to 01 October 2008	

Remark (if any) : The tests marked with "\*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was carried out at WM10, WM11 and WM12. The reporting limit of Total Phosphates and Ammonia were <0.10mg/L and <0.25mg/L instead of <0.010mg/L and <0.025mg/L correspondingly since the samples were diluted 10-fold before analysis due to matrix effect.

Checked by :   
LAW, Sau Yee  
Senior Chemist

Approved by :   
LAU, Chi Leung  
Chief Chemist



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**Environmental Testing of Water & Wastewater**

Report No. : ENA81035  
Date of issue : 08 October 2008  
Page No. : 2 of 3

**Information provided by Customer**

Customer name : Welcome Construction Co Ltd  
Customer address : Flat 01, 19/F, Westley Square, 48 Hoi Yuen Road, Kwun Tong, Kowloon  
Sample Source : DC/2006/15 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2007-2009) - Groundwater Monitoring at Ngong Ping STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 29 September 2008  
Sample Description : The sample was collected in 200ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 200ml sterilized glass bottle (for E-coli only), 500ml and 1L plastic bottles (for other testing parameters). Sample for Ammonia and Nitrate + Nitrite Nitrogen was preserved by adding conc. H<sub>2</sub>SO<sub>4</sub> to pH<2. Sample for Oil & Grease was preserved by adding conc. HCl to pH<2. All samples were chilled immediately after collection.

**Laboratory information**

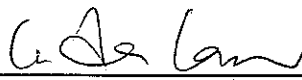
Date Received : 29 September 2008

**Result**


Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM11	W23802 (02)	pH Value	In house method TPE/003/W	7.3 (at 25°C)	29 September 2008
		Turbidity	In house method TPE/005/W	62 NTU	29 September 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	4.2 mg/L	29 September 2008 (17:00) to 04 October 2008 (17:00)
	W23802 (05)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.50 mg/L	03 October 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	30 September 2008
	W23802 (11)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	30 September 2008
	W23802 (08)	Total Phosphates	In house method TPE/019/W	0.13 mg/L	30 September 2008
	W23802 (17)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	02 October 2008
W23802 (14)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	4 cfu/100ml	29 September to 01 October 2008	

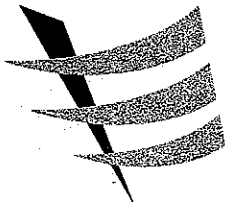
Remark (if any) : The tests marked with "\*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was carried out at WM10, WM11 and WM12. The reporting limit of Total Phosphates and Ammonia were <0.10mg/L and <0.25mg/L instead of <0.010mg/L and <0.025mg/L correspondingly since the samples were diluted 10-fold before analysis due to matrix effect.

Checked by :

  
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Sample Type : Groundwater  
Date of sampling : 29 September 2008  
Sample Description : The sample was collected in 200ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 200ml sterilized glass bottle (for E-coli only), 500ml and 1L plastic bottles (for other testing parameters). Sample for Ammonia and Nitrate + Nitrite Nitrogen was preserved by adding conc. H<sub>2</sub>SO<sub>4</sub> to pH<2. Sample for Oil & Grease was preserved by adding conc. HCl to pH<2. All samples were chilled immediately after collection.

**Laboratory information**


Date Received : 29 September 2008

**Result**


Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM12	W23802 (03)	pH Value	In house method TPE/003/W	7.2 (at 25°C)	29 September 2008
		Turbidity	In house method TPE/005/W	150 NTU	29 September 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	<2.0 mg/L	29 September 2008 (17:00) to 04 October 2008 (17:00)
	W23802 (06)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.19 mg/L	03 October 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	30 September 2008
	W23802 (12)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	30 September 2008
	W23802 (09)	Total Phosphates	In house method TPE/019/W	<0.10 mg/L	30 September 2008
	W23802 (18)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	02 October 2008
W23802 (15)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	370 cfu/100ml	29 September to 01 October 2008	

Remark (if any) : The tests marked with "" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was carried out at WM10, WM11 and WM12. The reporting limit of Total Phosphates and Ammonia were <0.10mg/L and <0.25mg/L instead of <0.010mg/L and <0.025mg/L correspondingly since the samples were diluted 10-fold before analysis due to matrix effect.

Checked by :

  
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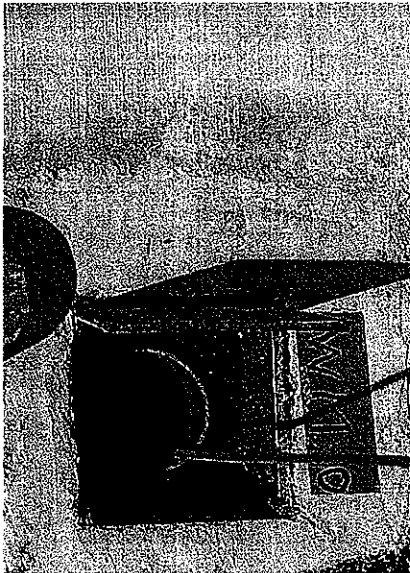
Project : DC/2006/15 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2007-2009)

Date of sampling and photo taking : 29 September 2008

Report No. : ENA81035

Date of issue : 08 October 2008

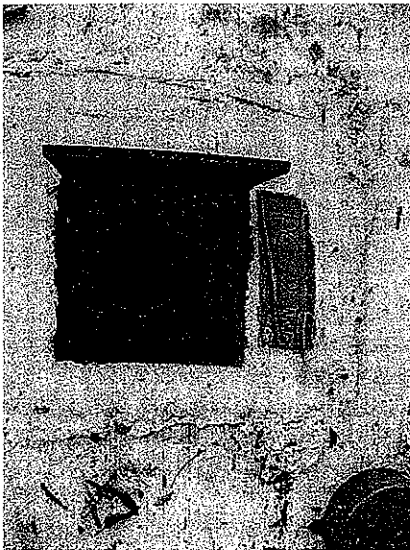
**WM10**



**WM11**



**WM12**





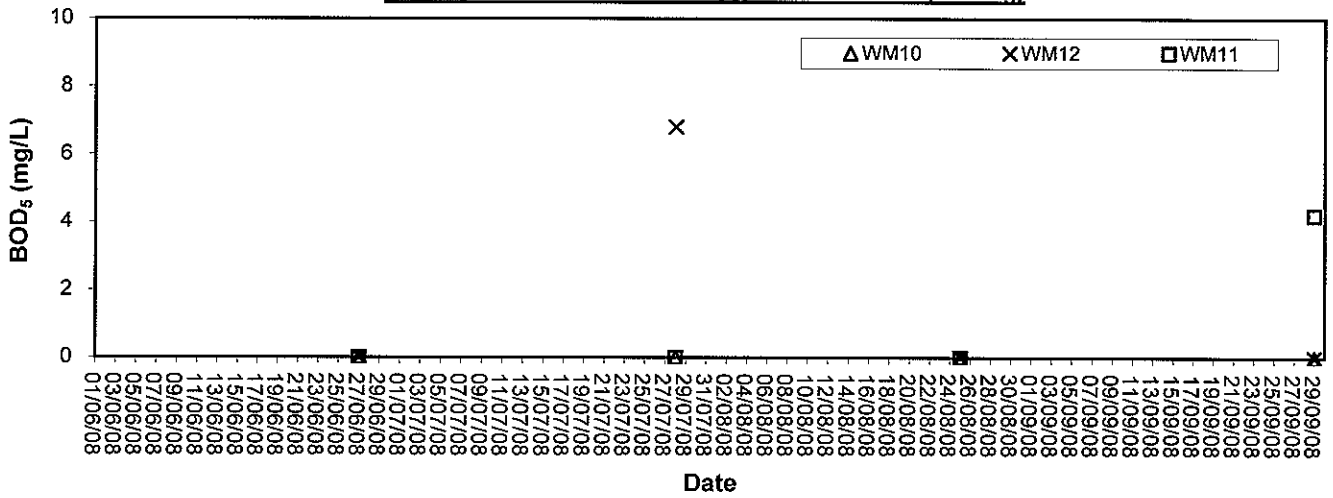


## Appendix C

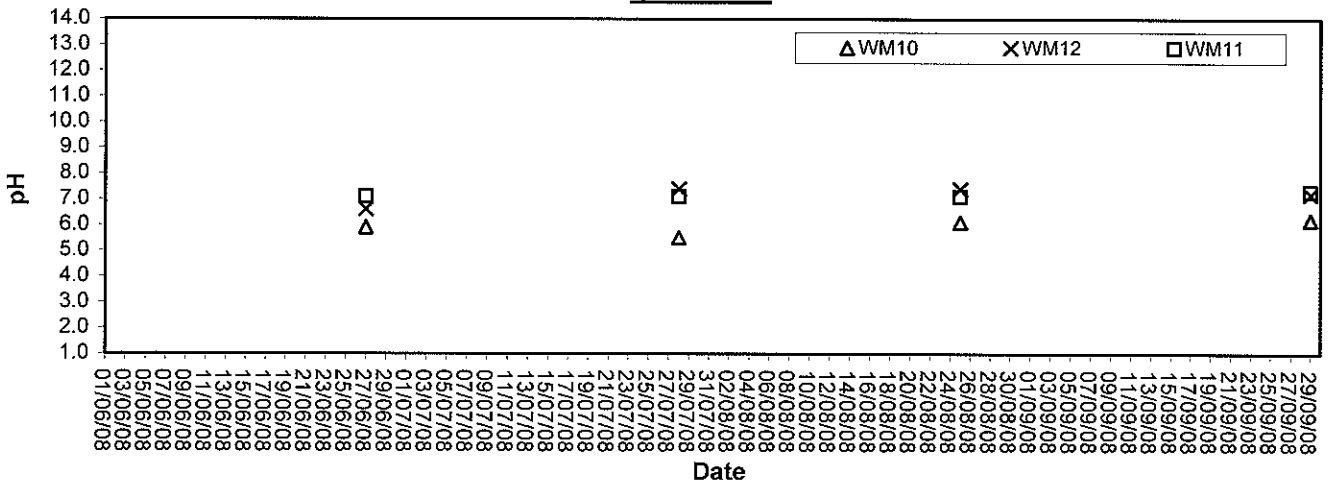
### Graphical Plots of Groundwater Monitoring Data



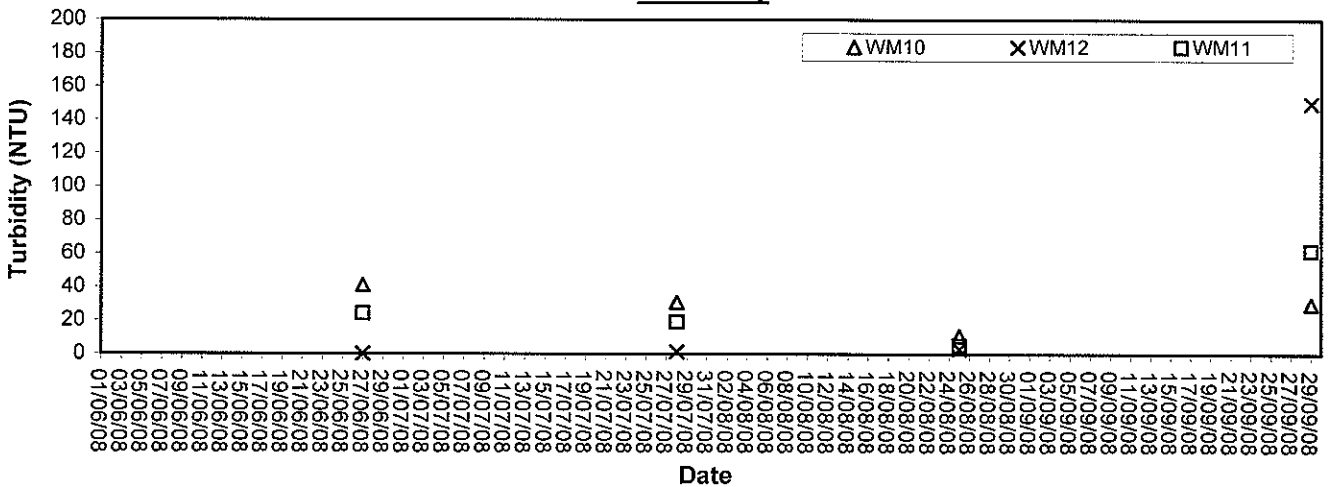
### 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>)



### pH Value



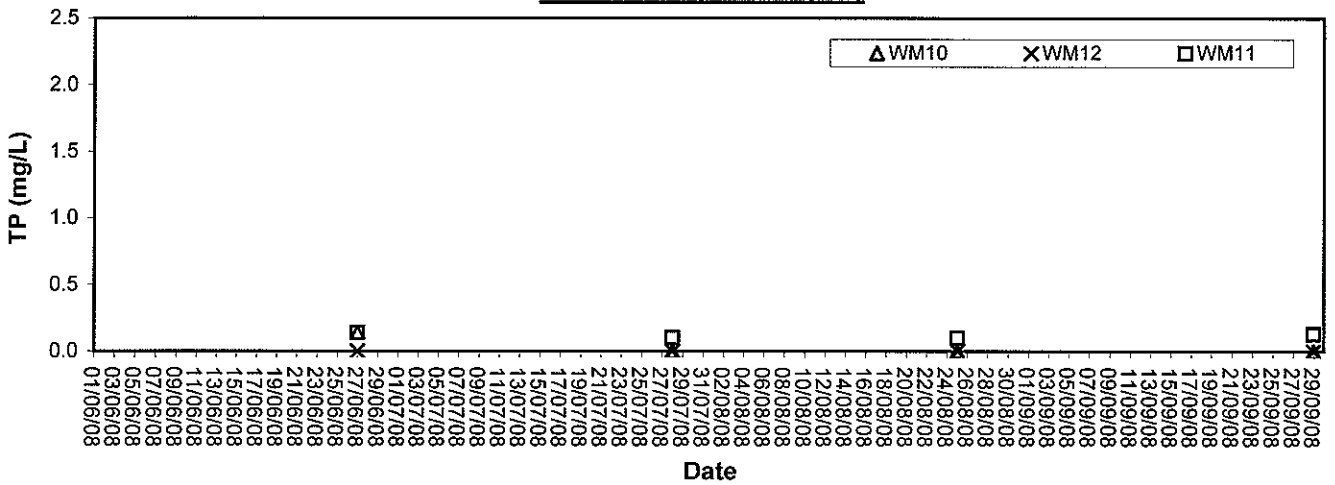
### Turbidity



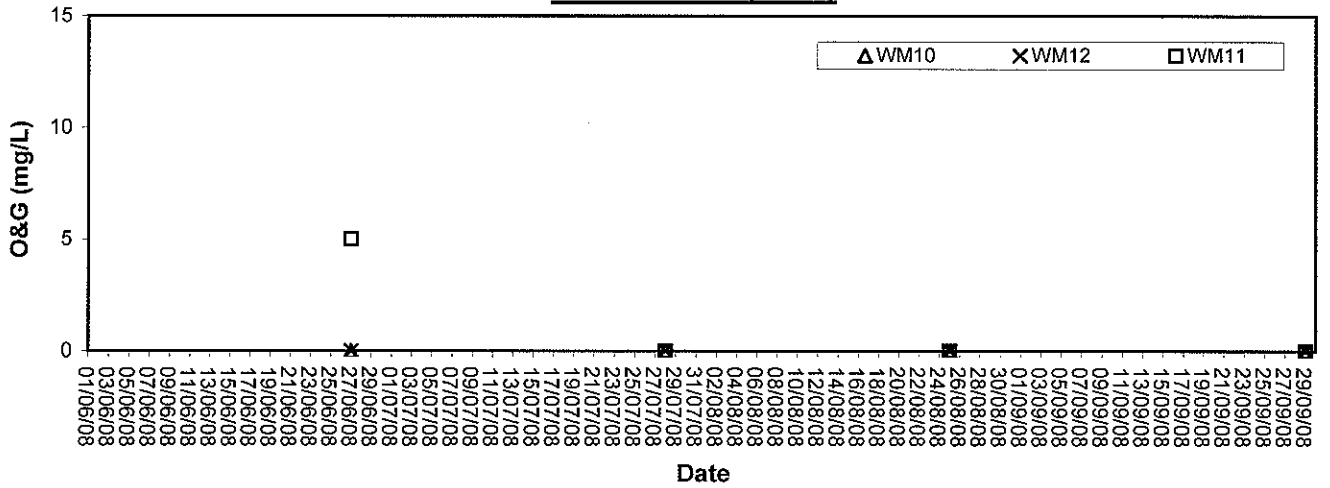




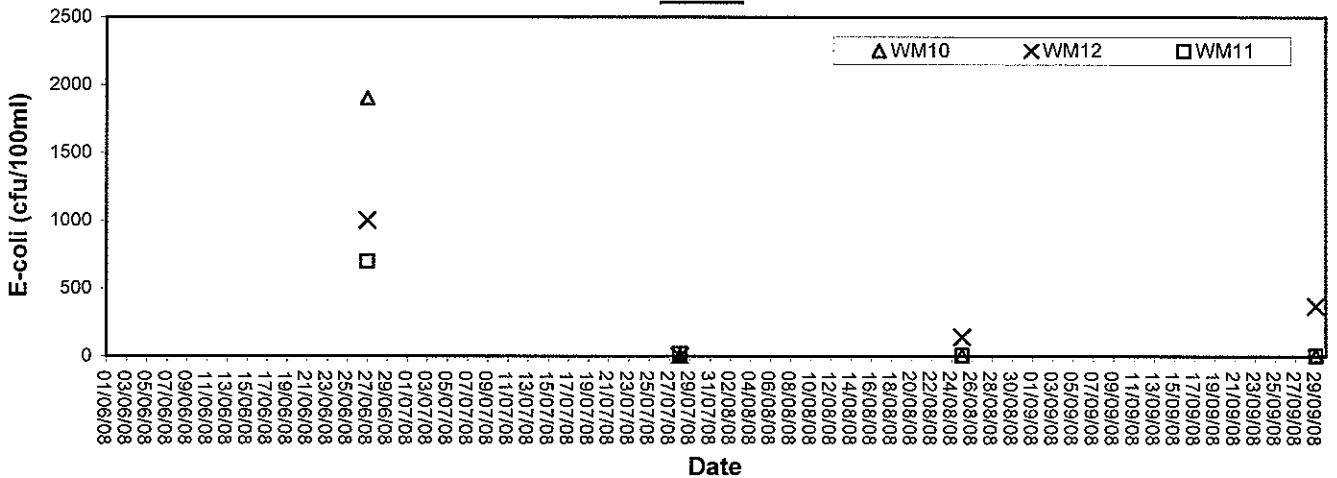
### Total Phosphates (TP)



### Oil & Grease (O&G)



### E-coli

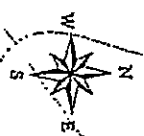
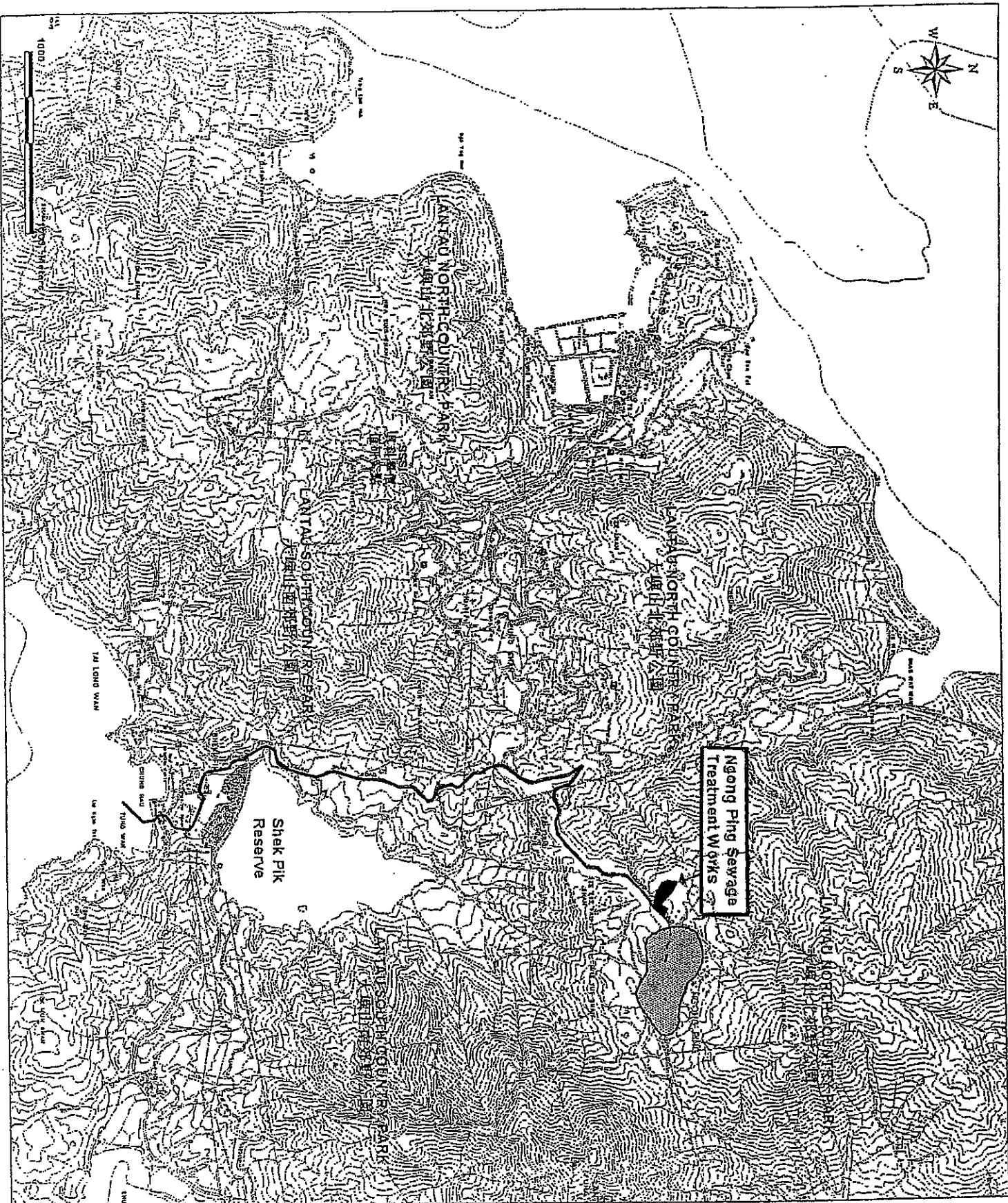




東業德勤測試顧問有限公司  
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## **Appendix D**

### **General Layout Plan**



Ngong Ping Sewerage Treatment Works

**Legend:**

-  Proposed Effluent Export Pipeline
-  Proposed Trunk Sewer of Ngong Ping Sewerage
-  Ngong Ping Sewerage Catchment Area

No.	DATE	BY	FOR


**ARUP**

AGREEMENT NO. CE 2801  
 OUTLYING ISLANDS STAGE 1  
 NGONG PING SEWERAGE TREATMENT  
 WORKS AND SEWERAGE

Ngong Ping Sewerage Project  
 Scheme - General Layout

23400/EN/098

KC Feb 03 AC AC  
 1:20000@A3 Preliminary



香港特別行政區政府  
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 SPECIAL ADMINISTRATIVE REGION



## **Appendix E**

### **QA/QC Results**



## QA/QC Results of Laboratory Analysis of Testing Parameters

Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
Turbidity	98.4	WM10	1.0	---	---
Nitrate + Nitrite	95.0	---	---	---	---
Oil & Grease	98.3	---	---	---	---
Ammoniacal Nitrogen	107.0	---	---	---	---
Synthetic detergents	---	---	---	---	---
Biochemical Oxygen Demand (5-day)	96.5	---	---	---	---
Total Phosphates	101.4	WM10	---	WM10	106.7
Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	Difference between Duplicates +	Sample ID	% Recovery @
pH Value(at 25°C)	---	WM10	0.03 unit	---	---

Note: (\* ) % Recovery of QC sample should be between 80% to 120%.  
 (# ) % Error of Sample Duplicate should be between -10% to 10%.  
 (@ ) % Recovery of Sample Spike should be between 80% to 120%.  
 (+ ) Difference between Duplicates should be less than 0.1 unit for pH value.





## Figures

