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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

(JULY 2008)

Prepared by:

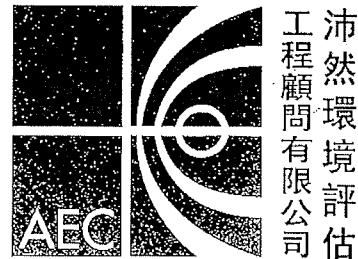
LAW, Sau Yee
Senior Environmental Officer

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LAU, Chi Leung
Environmental Team Leader

Allied Environmental Consultants Limited
Acousticians & Environmental Engineers

1001, Shanghai Industrial Investment Building, 48 Hennessy Rd., Wanchai, H.K.
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Our Ref: 840/08-0024

20 August 2008

By POST and FAX (2827 8526)

Drainage Services Department
42nd 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 (July 2008)

I refer to the Environmental Permit (EP-157/2003) and the email from the environmental monitoring team, ETS-Testconsult Limited with the revised report, dated 8 August 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)

FAXED
20 AUG 08

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EXECUTIVE SUMMARY

This monthly EM&A report (No.9) 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 31 July 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 28 July 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 July 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 nine 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 (BOD₅), mg/L;
- Ammonia Nitrogen (NH₄⁺-N), mg/L;
- Nitrate + Nitrite Nitrogen (NO₂⁻+NO₃⁻), 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

<i>Parameter</i>	<i>Frequency</i>	<i>No. of Boreholes</i>
<i>Biochemical Oxygen Demand</i>	<i>Once per month</i>	<i>9</i>
<i>Ammonia Nitrogen</i>		
<i>Nitrate + Nitrite</i>		
<i>pH value</i>		
<i>Turbidity</i>		
<i>Oil & Grease</i>		
<i>Total Phosphates</i>		
<i>Synthetic detergents</i>		
<i>E-coli</i>		

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

<i>Laboratory Analysis</i>	<i>Testing Procedure</i>	<i>Detection Limit</i>
<i>Biochemical Oxygen Demand</i>	<i>In house method TPE/001/W or BS 6068 : Section 2.14 : 1990</i>	<i>2.0 mg/L</i>
<i>Ammoniacal Nitrogen</i>	<i>In house method TPE/016/W, refer to APHA 19ed 4500-NH₃ F & G</i>	<i>0.13 mg/L</i>
<i>Nitrate + Nitrite</i>	<i>In house method TPE/023/W, refer to APHA 19ed 4500-NO₃ B</i>	<i>0.004 mg/L</i>
<i>pH (at 25°C)</i>	<i>In house method TPE/003/W, refer to APHA 19ed APHA 4500-H⁺ B</i>	<i>Detection range: 4.0-10.0</i>
<i>Turbidity</i>	<i>In house method TPE/005/W, refer to APHA 19ed 2130B</i>	<i>0.5 NTU</i>
<i>Oil & Grease</i>	<i>APHA 19ed 5520 B</i>	<i>5.0 m/L</i>
<i>Total Phosphate</i>	<i>In house method base on ASTM D 515-88</i>	<i>0.05 mg/L</i>
<i>Synthetic detergents</i>	<i>In house method based on APHA 19ed 5540 C & D</i>	<i>0.1 mg/L</i>
<i>E-coli</i>	<i>DoE Section 7.8 & 7.9 plus in-site urease test</i>	<i><1 cfu/100ml</i>



3.5 Groundwater Monitoring Results

In this reporting month, groundwater monitoring was carried out at WM10, WM11 and WM12 on 28 July 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	---	---



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 28 July 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

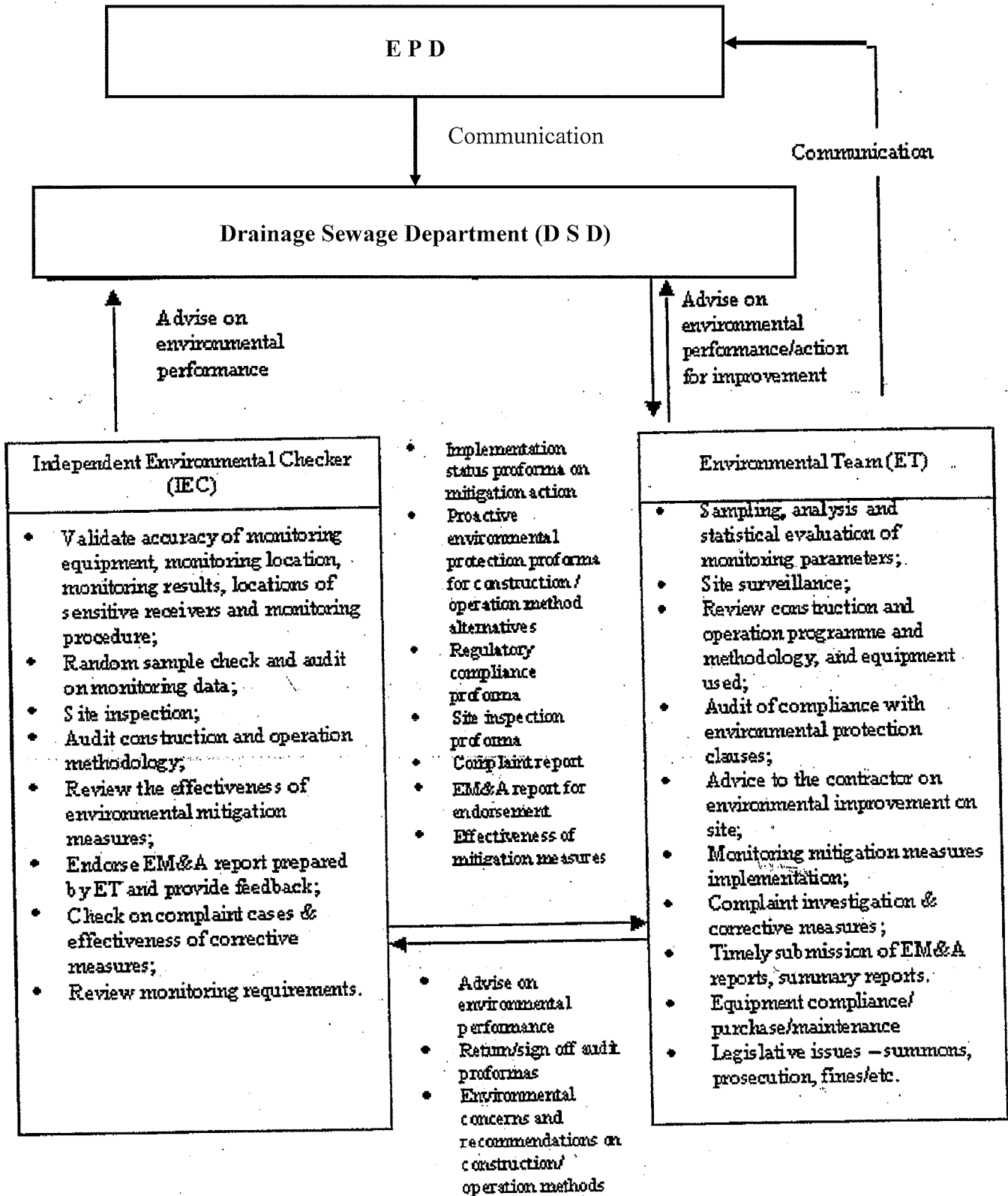
DSD will continue to carry out operation and maintenance works of NPSTW in the coming month. Future Key issues to be considered for the prevention of contamination of the water gathering ground are as follows:

- 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.



Appendix A

Lines of Communication



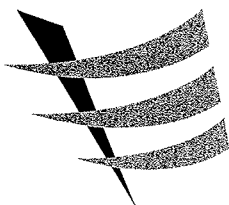


Appendix B

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. : ENA80818
Date of issue : 05 August 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 : 28 July 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. H₂SO₄ 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 : 28 July 2008

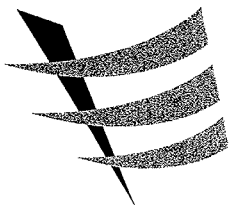
Result

Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM10	W23556 (01)	pH Value	In house method TPE/003/W	5.5 (at 25°C)	28 July 2008
		Turbidity	In house method TPE/005/W	31 NTU	28 July 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	<2.0 mg/L	28 July 2008 (17:00) to 02 August 2008 (17:00)
	W23556 (04)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.24 mg/L	01 August 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	29 July 2008
	W23556 (07)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	29 July 2008
	W23556 (10)	Total Phosphates	In house method TPE/019/W	<0.10 mg/L	29 July 2008
	W23556 (13)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	29 July 2008
W23556 (16)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	28 to 30 July 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.

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. : ENA80818

Date of issue : 05 August 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 : 28 July 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. H₂SO₄ 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 : 28 July 2008

Result

Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM11	W23556 (02)	pH Value	In house method TPE/003/W	7.1 (at 25°C)	28 July 2008
		Turbidity	In house method TPE/005/W	19 NTU	28 July 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	<2.0 mg/L	28 July 2008 (17:00) to 02 August 2008 (17:00)
	W23556 (05)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.57 mg/L	01 August 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	29 July 2008
	W23556 (08)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	29 July 2008
	W23556 (11)	Total Phosphates	In house method TPE/019/W	0.10 mg/L	29 July 2008
	W23556 (14)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	29 July 2008
W23556 (17)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	17 cfu/100ml	28 to 30 July 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.

Checked by : Law Sau Yee
 LAW, Sau Yee
 Senior Chemist

Approved by : Chi Leung
 LAU, Chi Leung
 Chief Chemist



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Sample Type : Groundwater
Date of sampling : 28 July 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. H₂SO₄ 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 : 28 July 2008

Result

Customer Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM12	W23556 (03)	pH Value	In house method TPE/003/W	7.4 (at 25°C)	28 July 2008
		Turbidity	In house method TPE/005/W	1.4 NTU	28 July 2008
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	6.8 mg/L	28 July 2008 (17:00) to 02 August 2008 (17:00)
	W23556 (06)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	<0.04 mg/L	01 August 2008
		Ammonia	In house method TPE/016/W	<0.25 mg/L	29 July 2008
	W23556 (09)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	29 July 2008
	W23556 (12)	Total Phosphates	In house method TPE/019/W	<0.10 mg/L	29 July 2008
	W23556 (15)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	29 July 2008
	W23556 (18)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	28 to 30 July 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.

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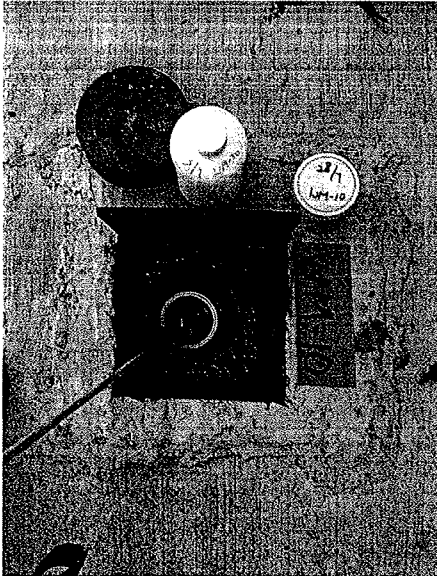
Project : DC/2006/15 - Building and Civil Maintenance and
Minor Works to DSD Plants and Facilities (2007-2009)

Date of sampling and photo taking : 28 July 2008

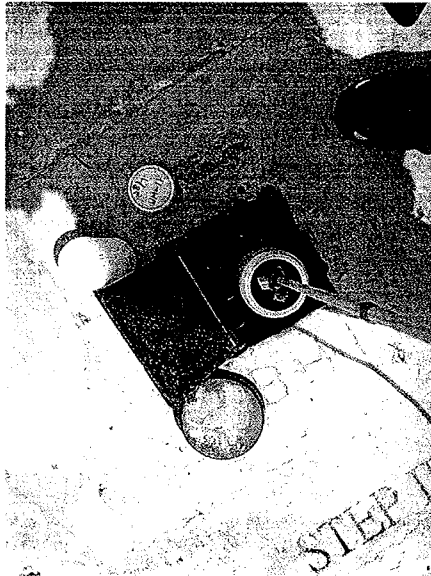
Report No. : ENA80818

Date of issue : 05 August 2008

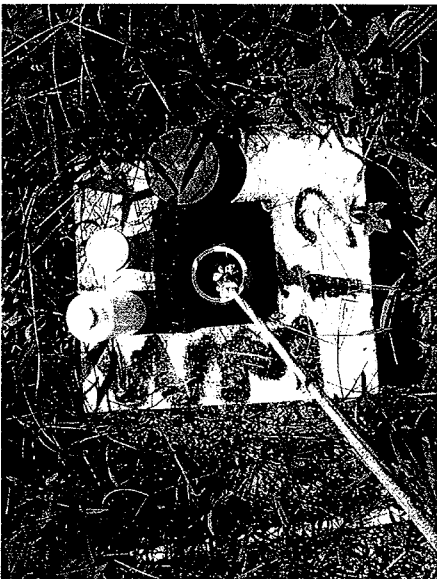
WM10



WM11



WM12



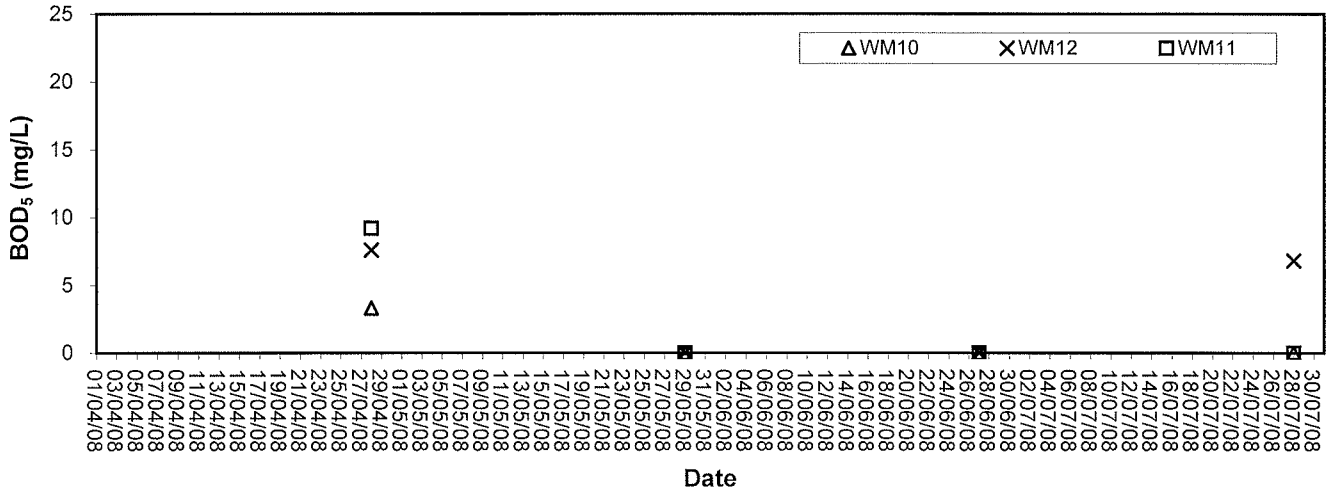


Appendix C

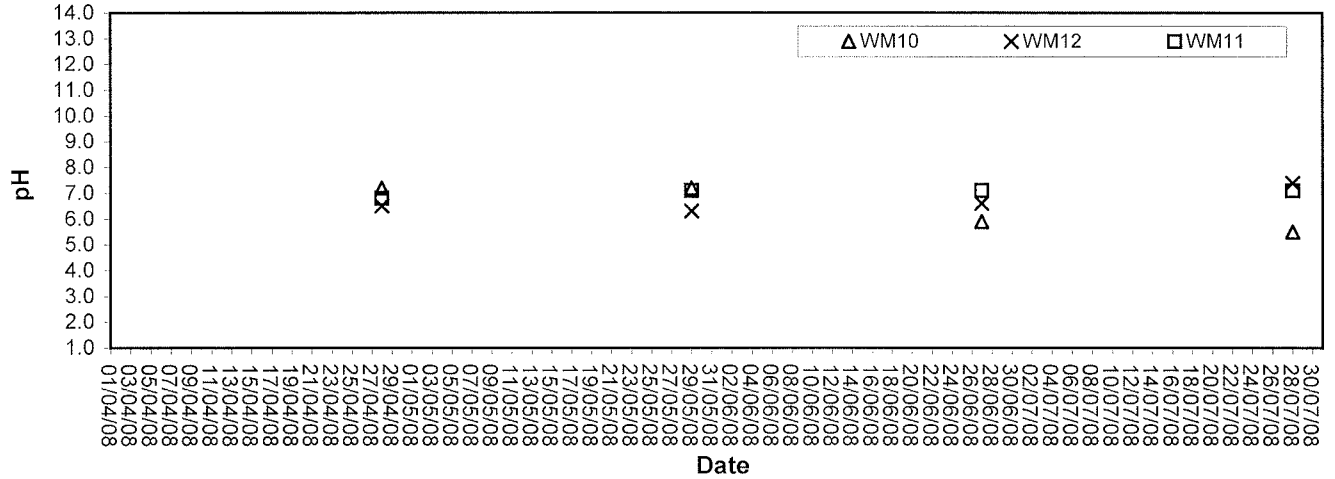
Graphical Plots of Groundwater Monitoring Data



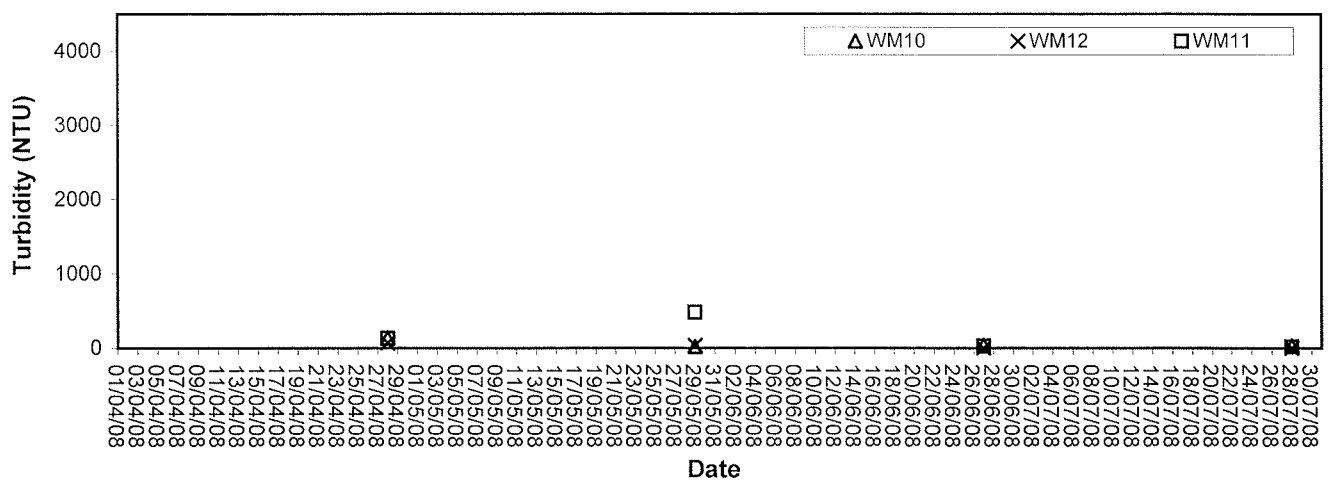
5-day Biochemical Oxygen Demand (BOD₅)



pH Value

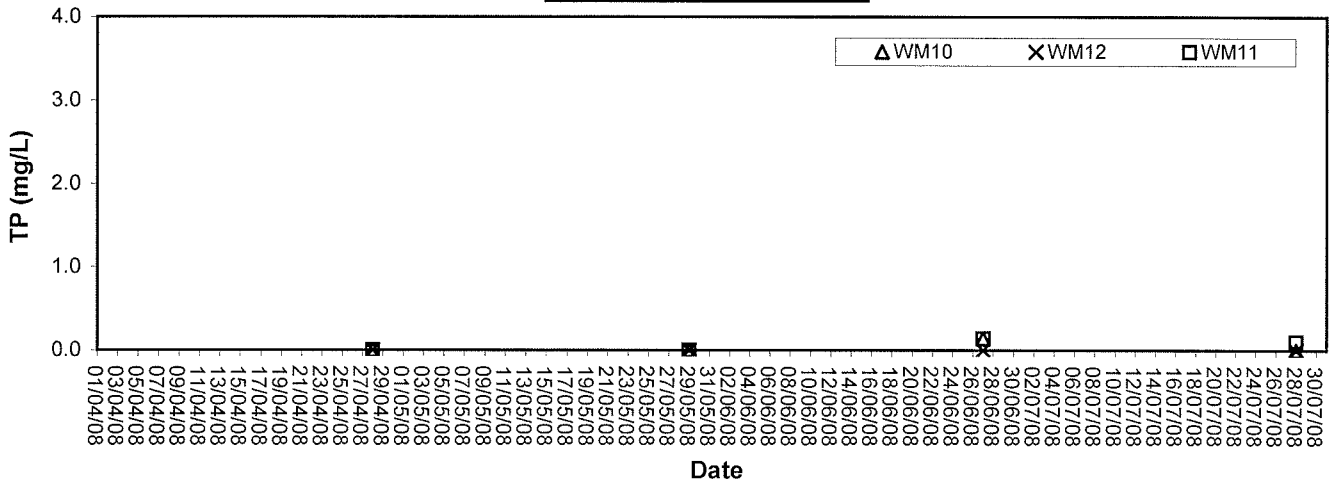


Turbidity

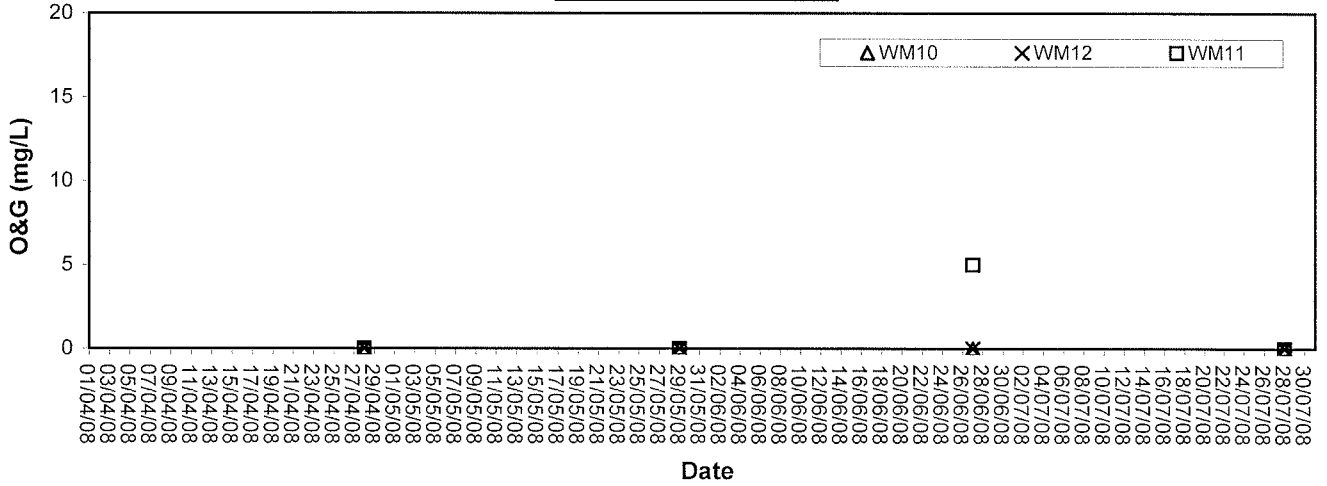




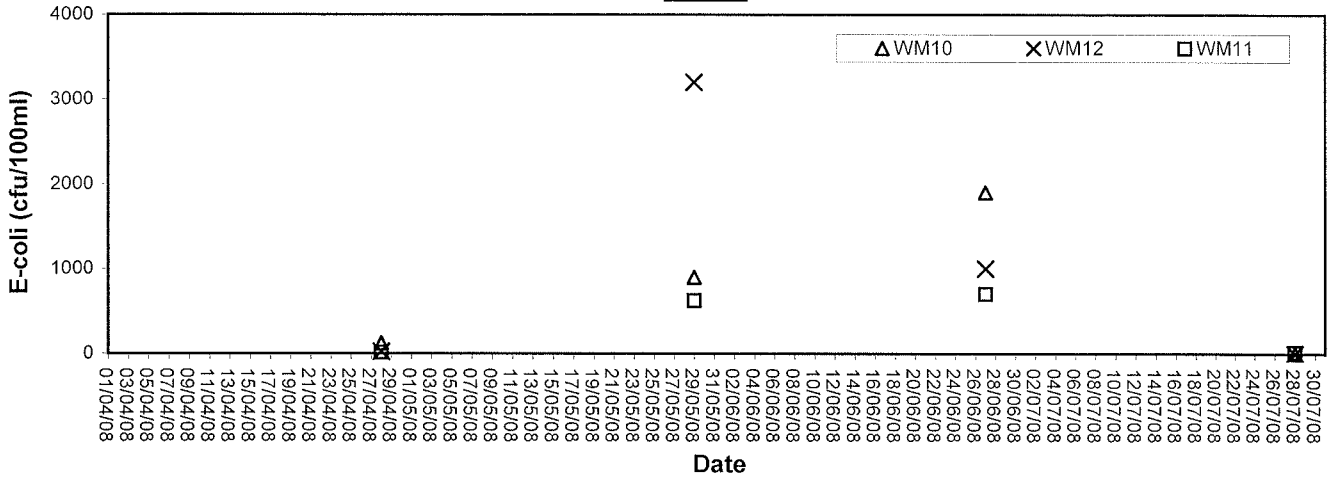
Total Phosphates (TP)



Oil & Grease (O&G)



E-coli








東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

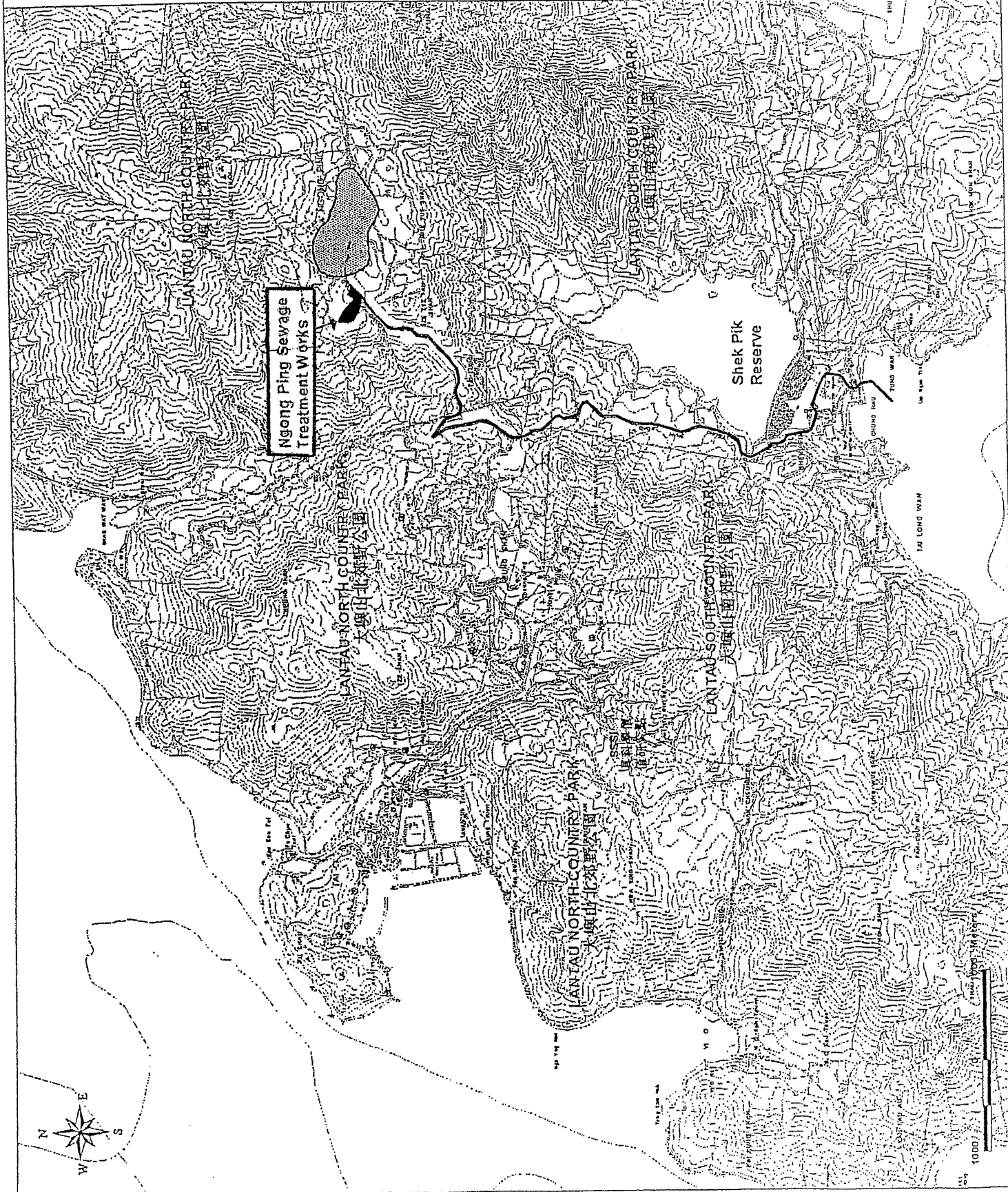
Appendix D

General Layout Plan

Legend:

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

Project Name		ARUP	
Project No.		23400/EN/098	
Date		Feb 03	
Scale		1:20000@A3	
Drawing No.		AC	
Drawing Date		AC	
Drawing Status		Preliminary	
AGREEMENT NO CE 29/01 OUTLYING ISLANDS STAGE 1 PHASE 1 NGONG PING SEWAGE TREATMENT WORKS AND SEWERAGE			
Ngong Ping Sewerage Project Scheme - General Layout			
23400/EN/098 KC 1:20000@A3 Feb 03 AC AC Preliminary			
香港特別行政區環境保護署 ENVIRONMENTAL SERVICES DEPARTMENT 001 HONG KONG 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	2.1	---	---
Nitrate + Nitrite	103.3	---	---	---	---
Oil & Grease	94.1	---	---	---	---
Ammoniacal Nitrogen	103.2	WM10	---	WM10	---
Synthetic detergents	---	---	---	---	---
Biochemical Oxygen Demand (5-day)	99.5	---	---	---	---
Total Phosphates	103.8	WM10	---	WM10	108.5
Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	Difference between Duplicates +	Sample ID	% Recovery @
pH Value(at 25°C)	---	WM10	0.01 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.

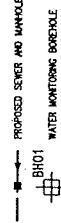


Figures

NOTE:

1. EXACT LOCATIONS OF GROUND WATER MONITORING BOREHOLES ARE SUBJECT TO CONFIRMATION ON SITE.

LEGEND:



Rev	Description	By	Date
A	TENDER ISSUE	TNC	07/05

ARUP

One Apg & Partners Hong Kong Limited

Project Site

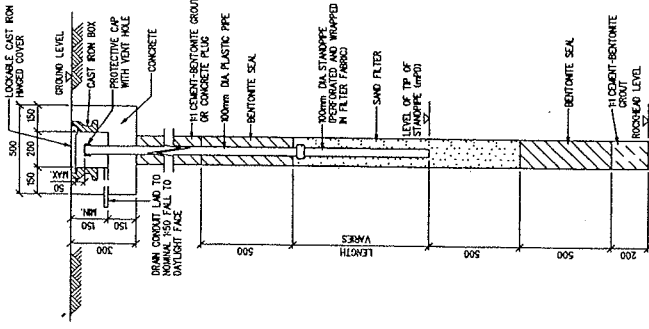
CONTRACT NO. DC/2005/015
NGONG PING VILLAGE SEWERAGE

Drawing Title

LOCATION & TYPICAL DETAILS OF
GROUND WATER MONITORING BOREHOLE

Drawing No. 23400/RVS/406

Scale	Sheet No.	Rev.
1:500	1	A
Drawn By	Checked By	Approved By
JAN 05	TNC	JAN 05
Issue Date	Issue Date	Issue Date
15/04/05	15/04/05	15/04/05



TYPICAL DETAILS OF GROUND WATER MONITORING BOREHOLE

