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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**

**(DECEMBER 2007)**

Prepared by:

LAW, Sau Yee  
Senior Environmental Officer

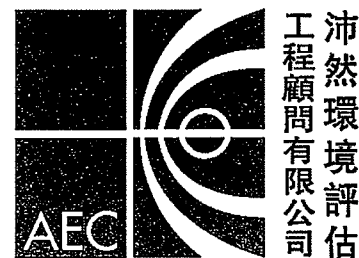
Checked and  
Approved by:

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: 840/08-0004

22<sup>nd</sup> January 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 (December 2007)**

---

I refer to the Environmental Permit (EP-157/2003) and the email from the environmental monitoring team, ETS-Testconsult Limited, dated 10 January 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.2) 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 December 2007.

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 9 designated boreholes.*

### **Groundwater Monitoring**

Groundwater monitoring was carried out on 18 December 2007. During this monitoring, ground water was found in WM3, WM3a, WM7a, WM10, WM11 and WM12, and the other sampling points were dry.

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 December 2007.

## 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/T/202, 23400/T/074, 23400/T/075 and 23400/T/076.

### 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
WM3	Keung Shan Road (L/P FA0445)
WM3a	Keung Shan Road (L/P FA0445)
WM6	Ngong Ping STP
WM7	Ngong Ping STP
WM7a	Ngong Ping STP
WM9	Ngong Ping STP
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	9
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 on 18 December 2007. During this monitoring, groundwater was found in Borehole No WM3, WM3a, WM7a, WM10, WM11 and WM12 and the other boreholes were dry. 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	---	---

#### 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 on 18 December 2007. During this monitoring, groundwater was found in WM3, WM3a, WM7a, WM10, WM11 and WM12, and the other sampling points were dry.

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

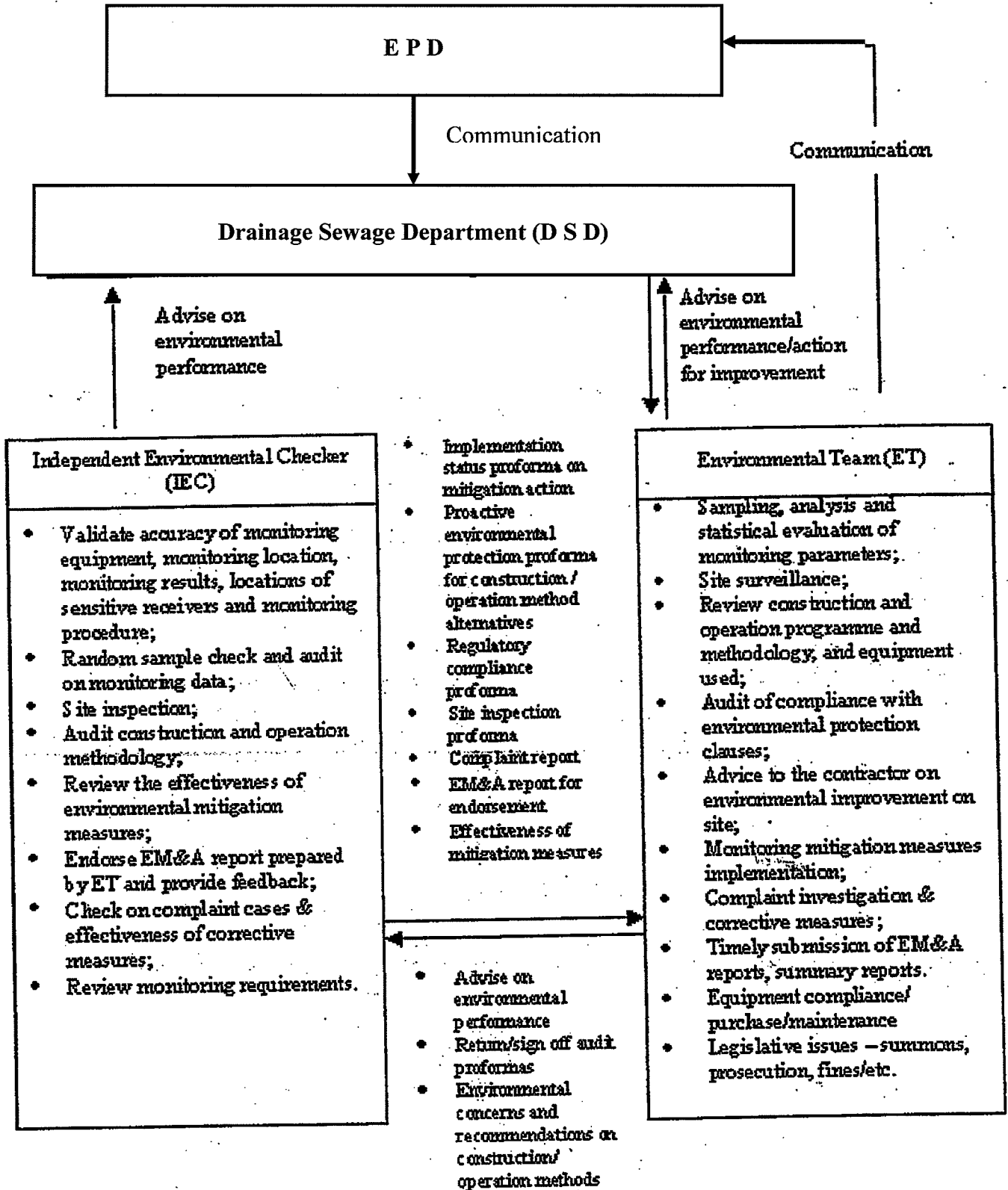
DSD will continue to carry out operation and maintenance works of NPSTW in the coming month. Future Key issues to be considered for the prevention of contamination of the water gathering ground are as follows:

- 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**



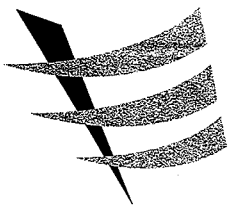


**Appendix B**

**Groundwater Monitoring Results**

**and**

**Photos of Groundwater Monitoring at Boleholes**



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**TEST REPORT**

**Environmental Testing of Water & Wastewater**

Report No. : ENA71241  
Date of issue : 31 December 2007  
Page No. : 1 of 6

**Information provided by client**

Client name : Welcome Construction Co Ltd  
Client 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 Png STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 18 December 2007  
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**

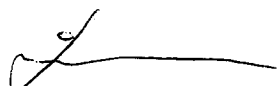
Date Received : 18 December 2007

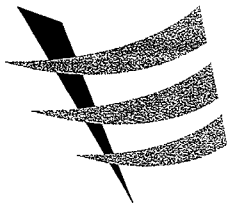
**Result**

Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM3	W22684 (01)	pH Value	In house method TPE/003/W	6.1 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	9.4 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	2.4 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (07)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.15 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	21 December 2007
	W22684 (13)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (25)	Total Phosphates	In house method TPE/019/W	<0.1 mg/L	19 December 2007
	W22684 (19)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
W22684 (31)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	18 to 20 December 2007	

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 only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

Checked by :   
LAW, Sau Yee  
Senior Chemist

Approved by :   
LAU, Chi Leung  
Chief Chemist



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Page No. : 2 of 6

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Sample Source : DC/2006/15 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2007-2009) - Groundwater Monitoring at Ngong Png STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 18 December 2007  
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 : 18 December 2007

**Result**

Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM3a	W22684 (02)	pH Value	In house method TPE/003/W	6.8 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	0.9 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	2.2 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (08)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.056 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	21 December 2007
	W22684 (14)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (26)	Total Phosphates	In house method TPE/019/W	<0.1 mg/L	19 December 2007
	W22684 (20)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
	W22684 (32)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	9 cfu/100ml	18 to 20 December 2007

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 only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

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**Laboratory information**

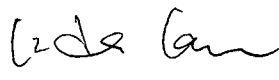
Date Received : 18 December 2007

**Result**

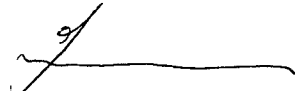
Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM7a	W22684 (03)	pH Value	In house method TPE/003/W	7.1 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	8.9 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	2.3 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (09)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	<0.04 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	0.21 mg/L	21 December 2007
	W22684 (15)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (27)	Total Phosphates	In house method TPE/019/W	2.6 mg/L	19 December 2007
	W22684 (21)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
W22684 (33)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	180 cfu/100ml	18 to 20 December 2007	

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 only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

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Sample Type : Groundwater  
Date of sampling : 18 December 2007  
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**

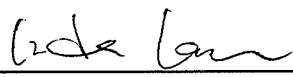
Date Received : 18 December 2007

**Result**


Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM10	W22684 (04)	pH Value	In house method TPE/003/W	11.2 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	23 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	3.4 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (10)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	<0.04 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	0.24 mg/L	21 December 2007
	W22684 (16)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (28)	Total Phosphates	In house method TPE/019/W	<0.1 mg/L	19 December 2007
	W22684 (22)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
	W22684 (34)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	18 to 20 December 2007

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 only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

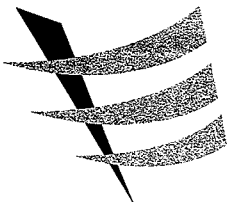
Checked by :

  
LAW, Sau Yee  
Senior Chemist

Approved by :

  
LAU, Chi Leung  
Chief Chemist





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

8/F, Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong  
Tel : 2695 8318 E-mail : etl@ets-testconsult.com  
Fax : 2695 3944 Web site : www.ets-testconsult.com

**TEST REPORT**

**Environmental Testing of Water & Wastewater**

Report No. : ENA71241  
Date of issue : 31 December 2007  
Page No. : 5 of 6

**Information provided by client**

Client name : Welcome Construction Co Ltd  
Client 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 Png STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 18 December 2007  
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 : 18 December 2007

**Result**


Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM11	W22684 (05)	pH Value	In house method TPE/003/W	5.3 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	27 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	3.2 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (11)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.72 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	21 December 2007
	W22684 (17)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (29)	Total Phosphates	In house method TPE/019/W	<0.1 mg/L	19 December 2007
	W22684 (23)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
	W22684 (35)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	18 to 20 December 2007

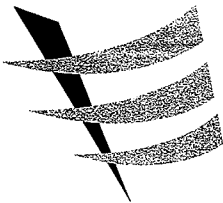
Remark (if any) : The tests marked with "\*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

Checked by :

  
LAW, Sau Yee  
Senior Chemist

Approved by :

  
LAU, Chi Leung  
Chief Chemist



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

8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong  
Tel : 2695 8318 E-mail : etl@ets-testconsult.com  
Fax : 2695 3944 Web site : www.ets-testconsult.com

**TEST REPORT**

**Environmental Testing of Water & Wastewater**

Report No. : ENA71241  
Date of issue : 31 December 2007  
Page No. : 6 of 6

**Information provided by client**

Client name : Welcome Construction Co Ltd  
Client 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 Png STW and Effluent Export Pipe  
Sample Type : Groundwater  
Date of sampling : 18 December 2007  
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 : 18 December 2007

**Result**


Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM12	W22684 (06)	pH Value	In house method TPE/003/W	5.7 (at 25°C)	18 December 2007
		Turbidity	In house method TPE/005/W	6.5 NTU	18 December 2007
		Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	2.1 mg/L	19 December 2007 (10:00) to 24 December 2007 (10:00)
	W22684 (12)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	1.4 mg/L	22 December 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	21 December 2007
	W22684 (18)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	19 December 2007
	W22684 (30)	Total Phosphates	In house method TPE/019/W	<0.1 mg/L	19 December 2007
	W22684 (24)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	19 December 2007
W22684 (36)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	<1 cfu/100ml	18 to 20 December 2007	

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 only carried out at WM3, WM3a, WM7a, WM10, WM11 and WM12 only since other sampling points were observed to be dry during the monitoring.

Checked by :

  
LAW, Sau Yee  
Senior Chemist

Approved by :

  
LAU, Chi Leung  
Chief Chemist



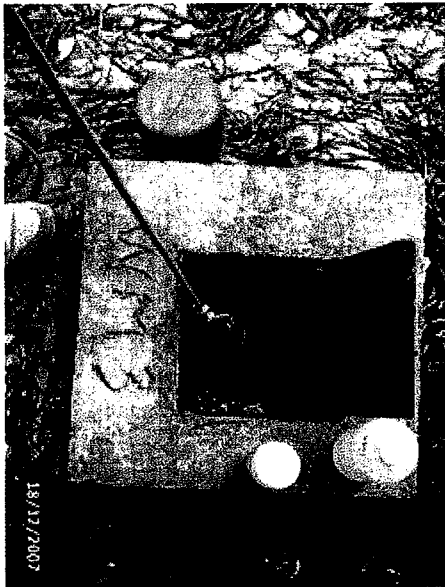
Project : DC/2006/15 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2007-2009)

Date of sampling and photo taking : 18 December 2007

Report No. : ENA71241

Date of issue : 31 December 2007

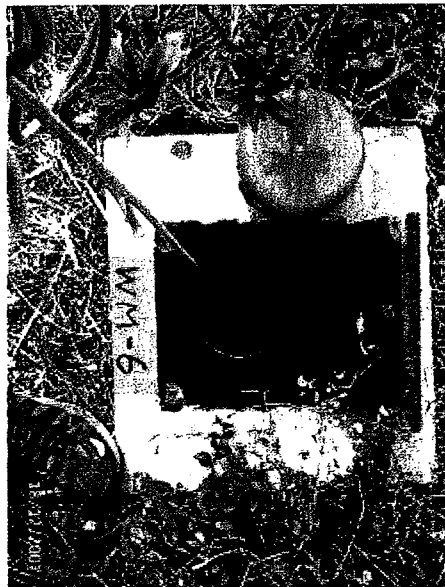
**WM3**



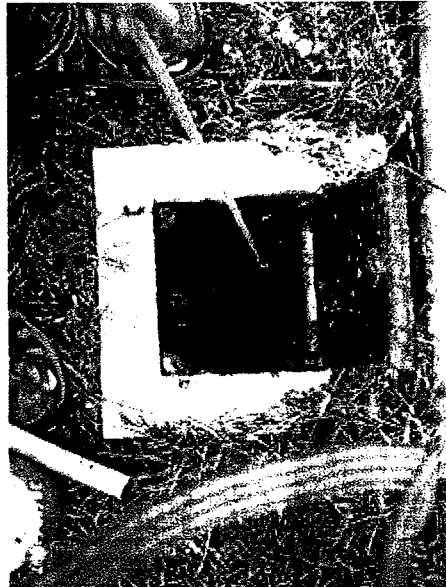
**WM3a**



**WM6**



**WM7**





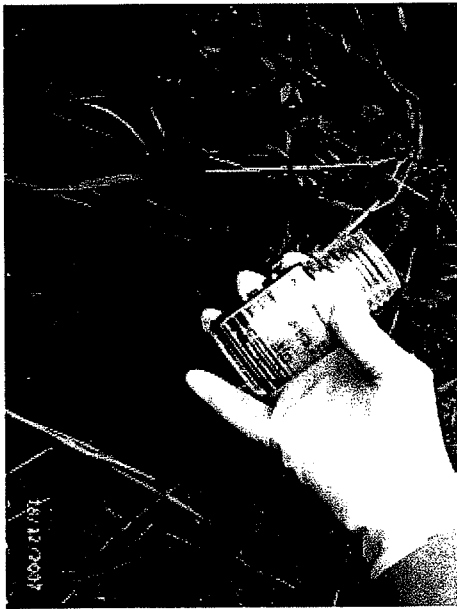
Project : DC/2006/15 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2007-2009)

Date of sampling and photo taking : 18 December 2007

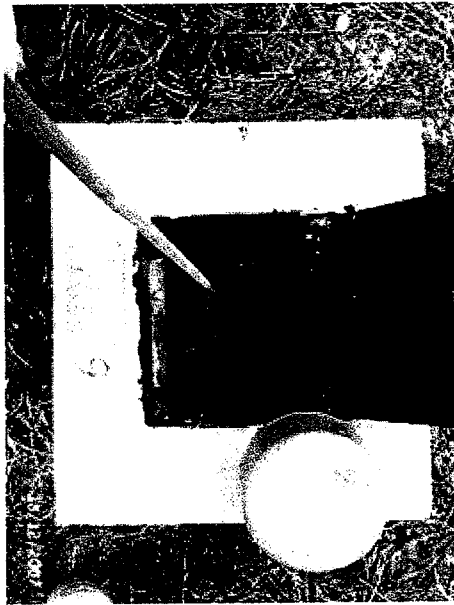
Report No. : ENA71241

Date of issue : 31 December 2007

**WM7a**



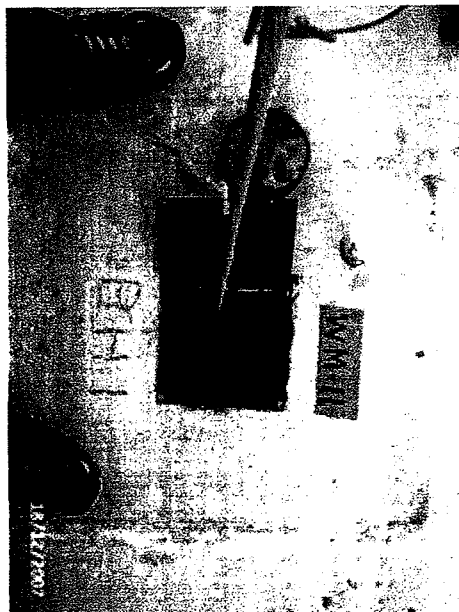
**WM9**



**WM10**



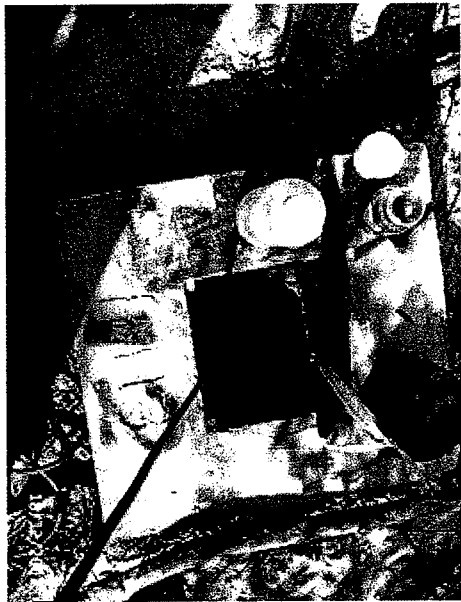
**WM11**





Project : DC/2006/15 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2007-2009)  
Date of sampling and photo taking : 18 December 2007  
Report No. : ENA71241  
Date of issue : 31 December 2007

**WM12**



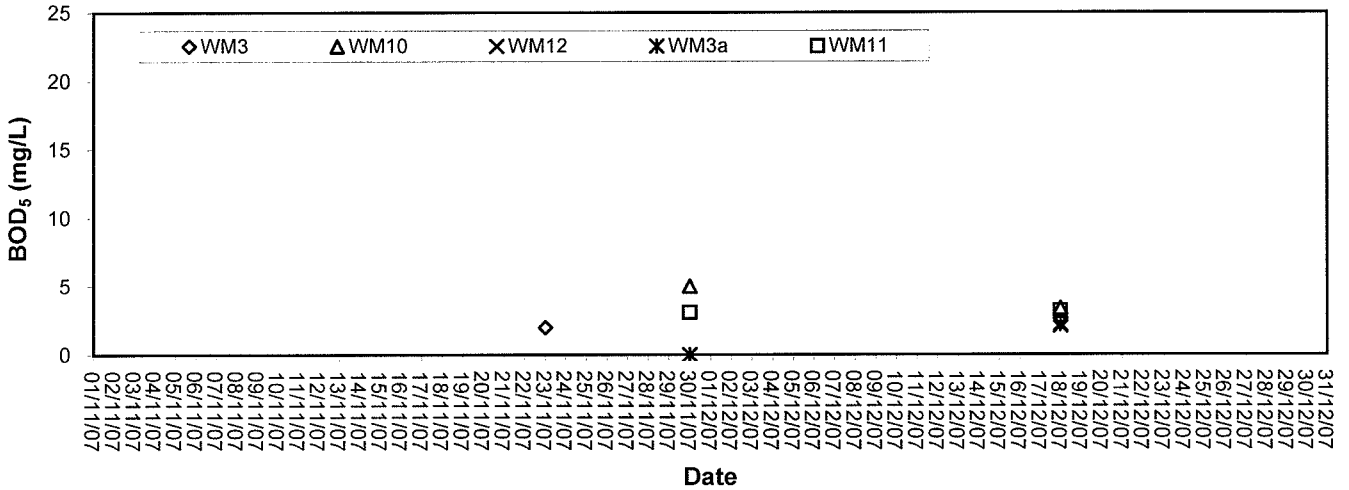


## **Appendix C**

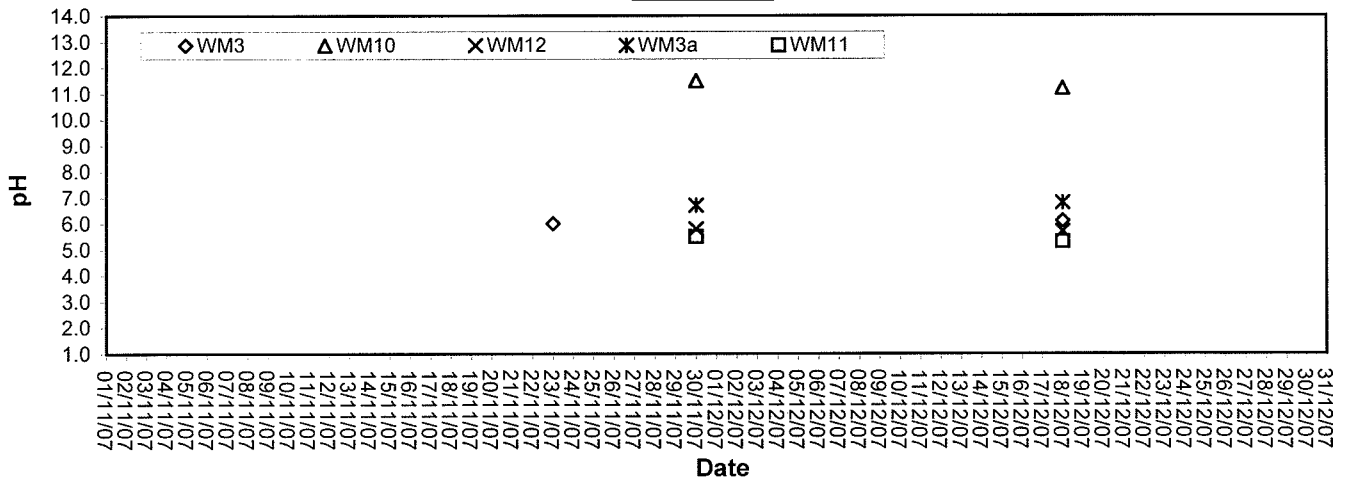
### **Graphical Plots of Groundwater Monitoring Data**



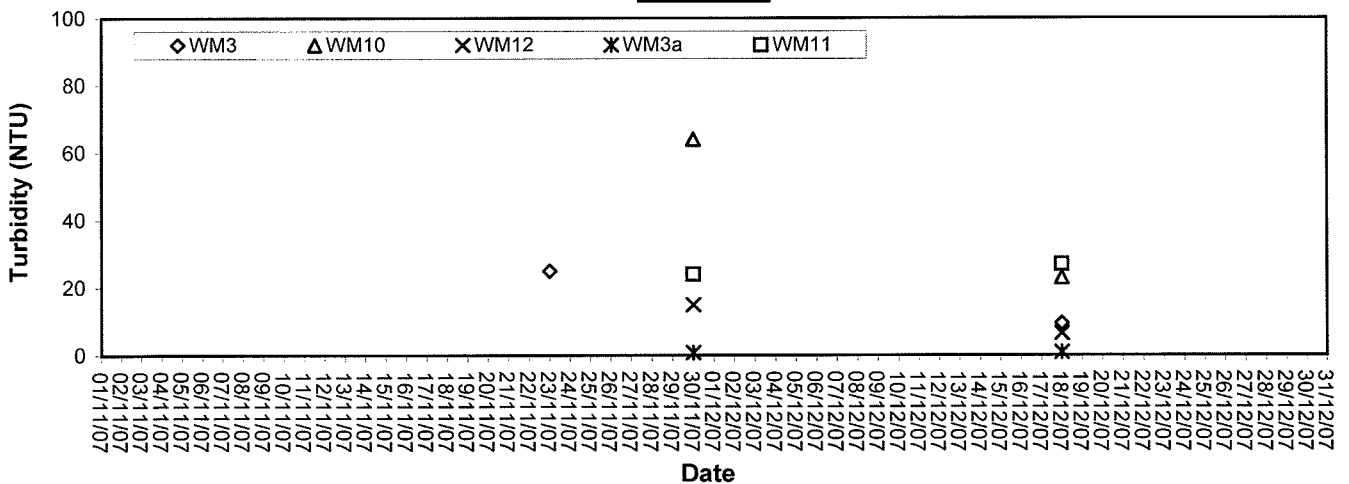
### 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>)



### pH Value

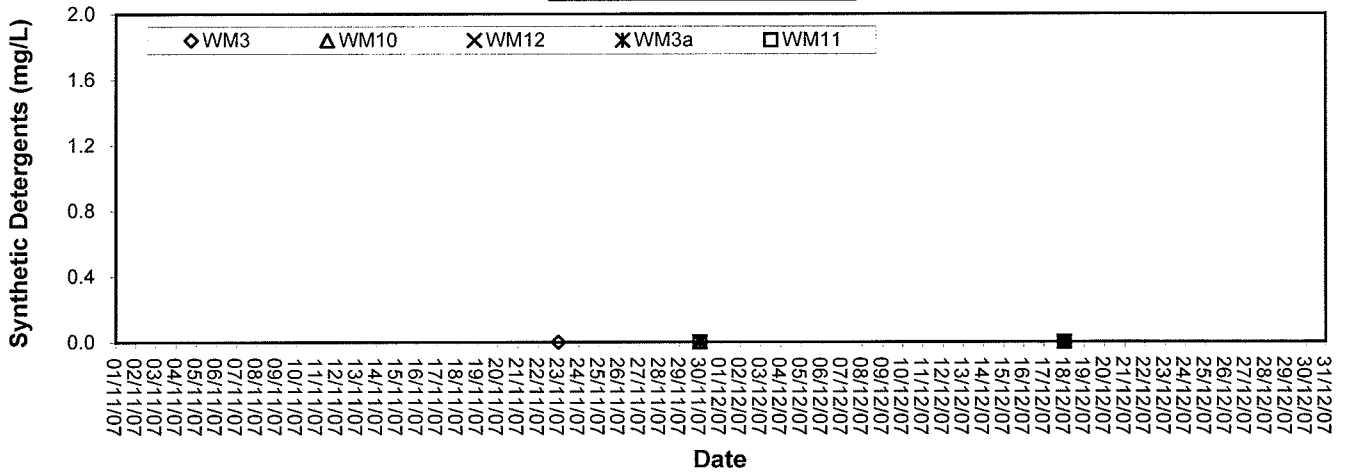


### Turbidity

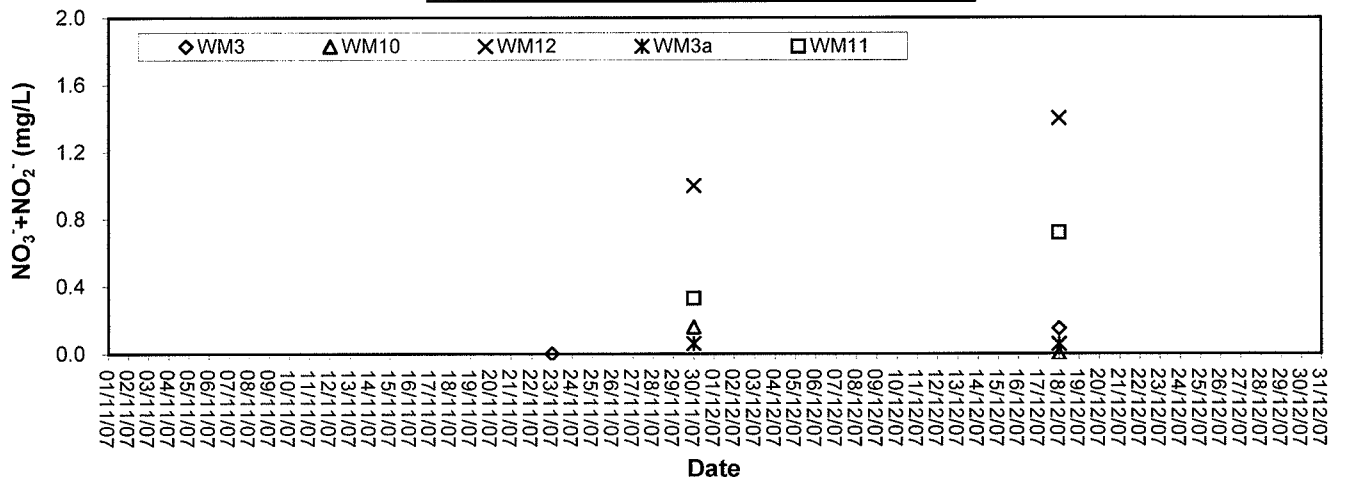




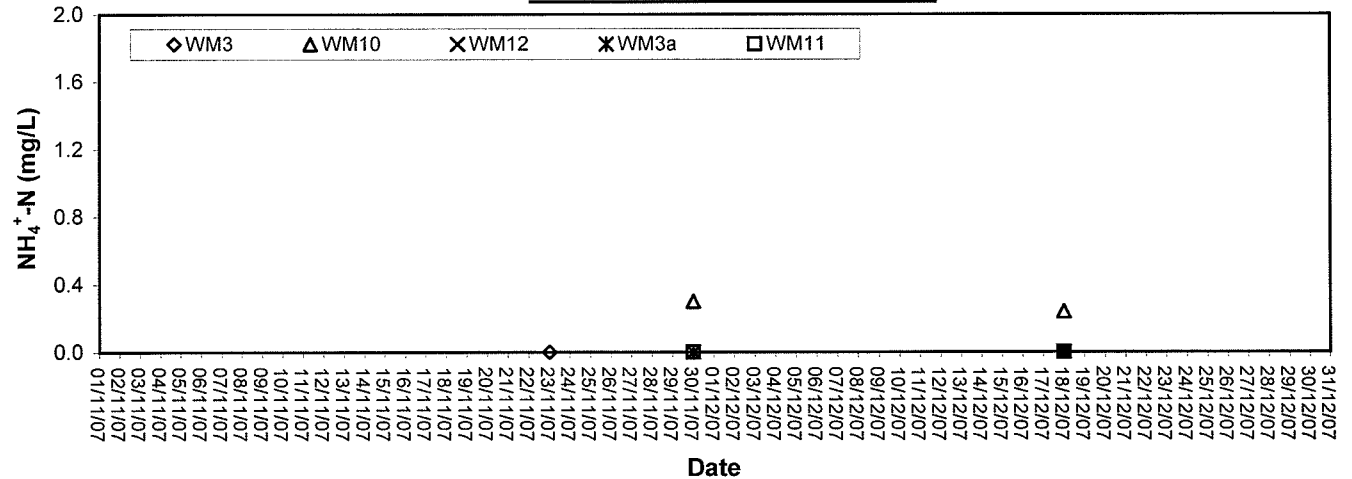
### Synthetic Detergents



### Nitrate & Nitrite Nitrogen (NO<sub>3</sub><sup>-</sup>+NO<sub>2</sub><sup>-</sup>)



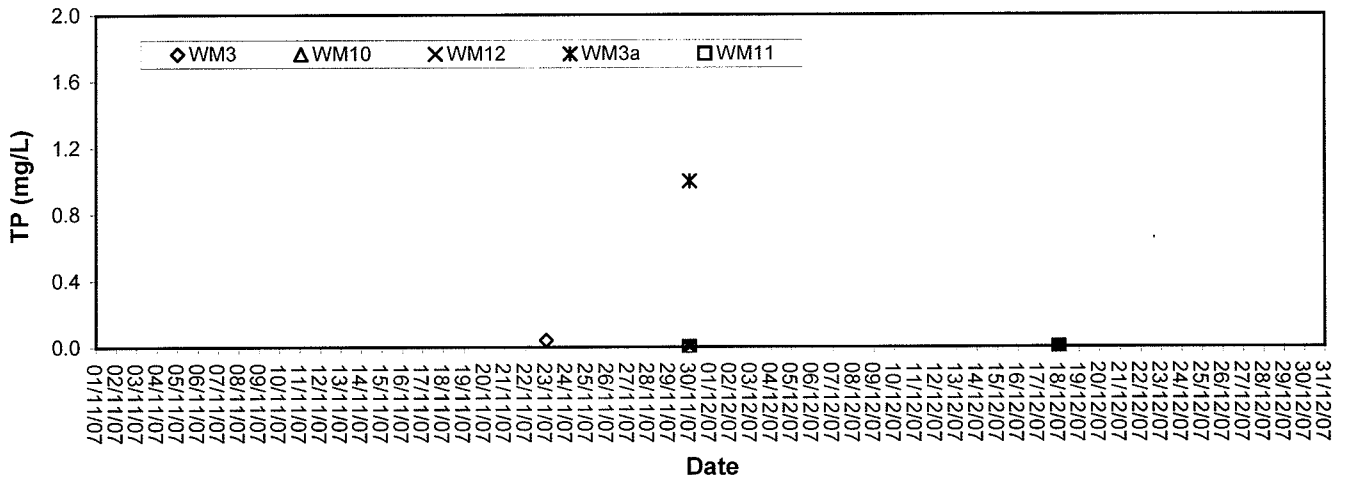
### Ammonia Nitrogen (NH<sub>4</sub><sup>+</sup>-N)



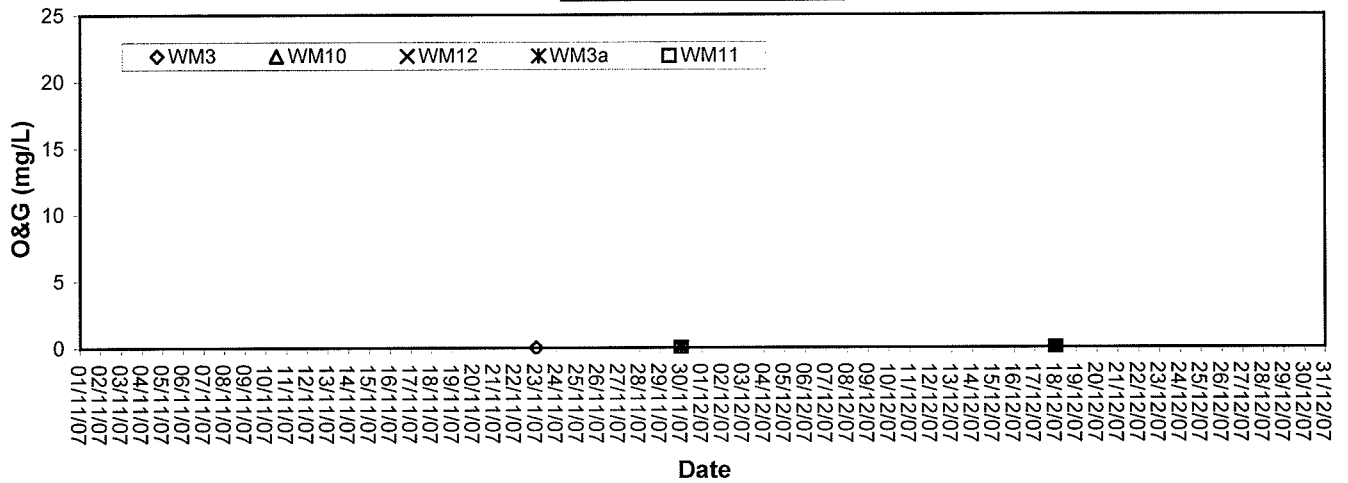




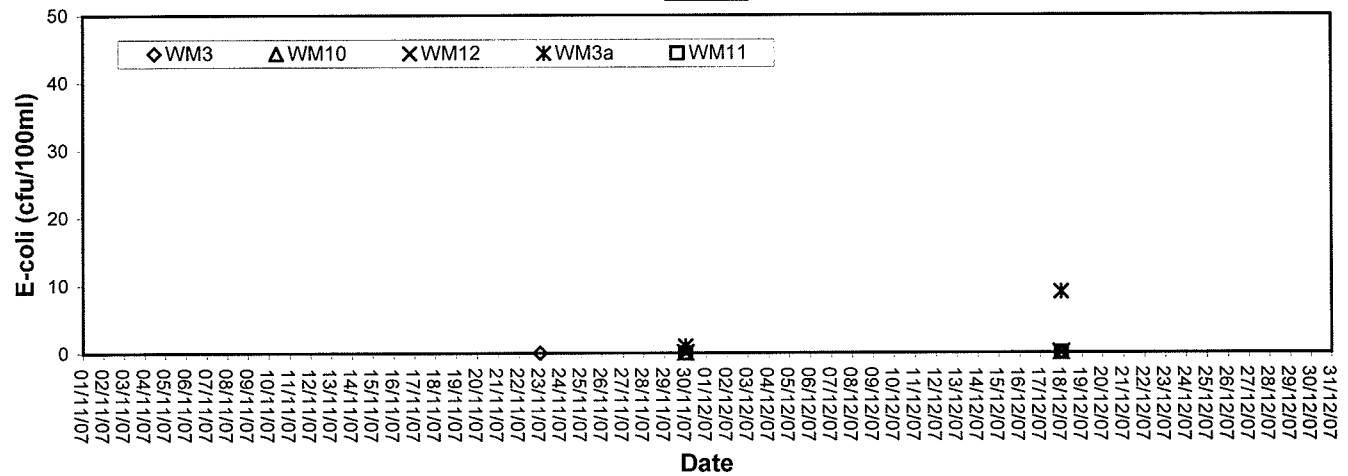
### Total Phosphates (TP)



### Oil & Grease (O&G)



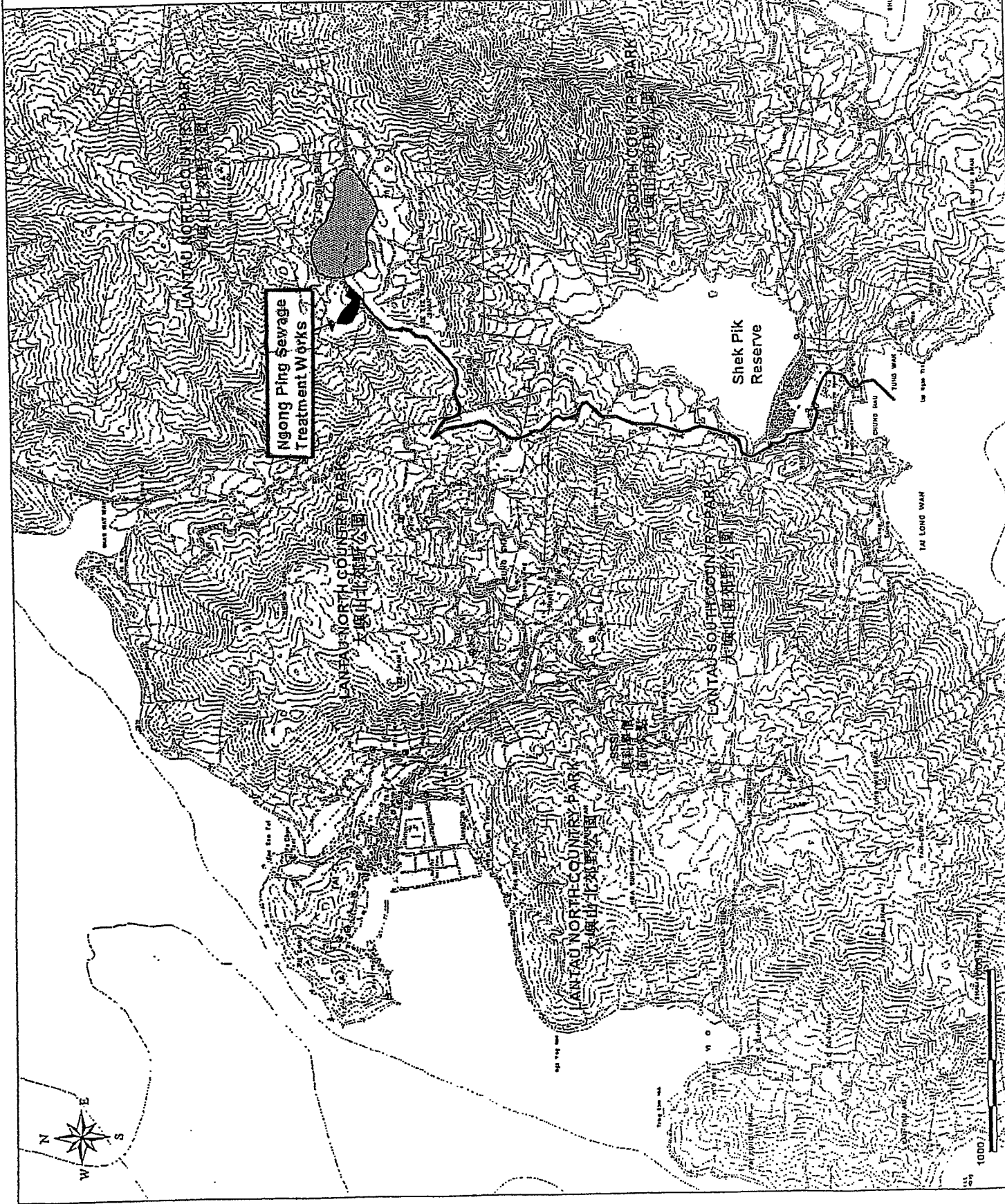
### E-coli





## **Appendix D**

### **General Layout Plan**



**Legend:**

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

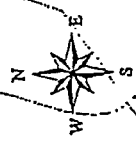
Scale	1:20000@A3	Project No.	23400/EN/098
Author	KC	Date	Feb 03
Checked	AC	Scale	AC
Approved		Stage	Preliminary

**ARUP** 香港城市規劃及建築師行

AGREEMENT NO CE 29/01  
 OUTLING ISLANDS STAGE 1 PHASE 1  
 NGONG PING SEWAGE TREATMENT  
 WORKS AND SEWERAGE

Ngong Ping Sewerage Project  
 Scheme - General Layout

香港特別行政區政府  
 環境衛生及食物局  
 排水及廢物管理處  
 特別行政區





## **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	WM3	0.63	---	---
Nitrate + Nitrite	111.7	WM3a	4.9	WM3a	113.0
Oil & Grease	100.8	---	---	---	---
Ammoniacal Nitrogen	104.8	---	---	---	---
Synthetic detergents	---	---	---	---	---
Biochemical Oxygen Demand (5-day)	97.5	WM3	3.84	---	---
Total Phosphates	103.2	WM3	N/A	---	---
Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	Difference between Duplicates +	Sample ID	% Recovery @
pH Value(at 25°C)	---	WM3	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.



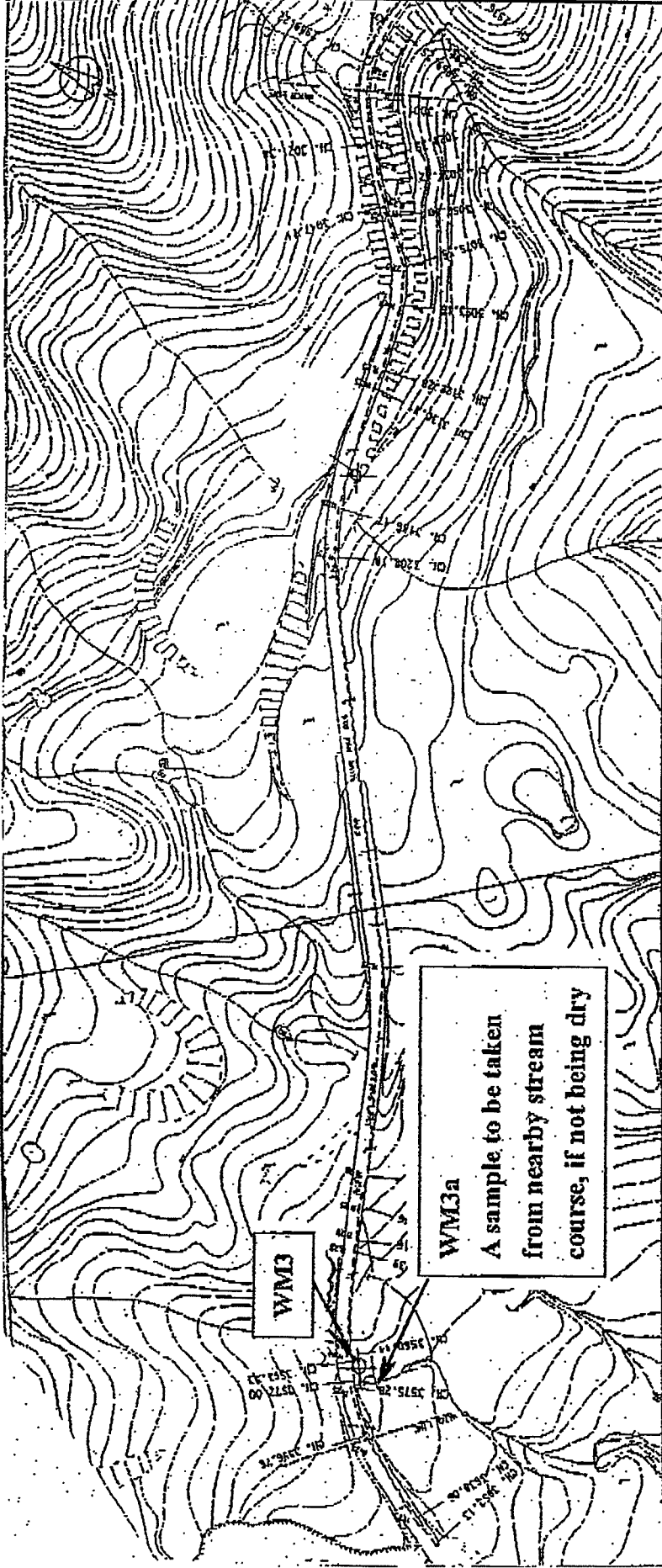
## Figures

LEGEND:

- EXISTING DRIVE
- EFFLUENT PIPELINE
- HANGDOWN CHAMBER
- GATE VALVES CHAMBER
- VENTILATION PIPE CHAMBER
- BENCH

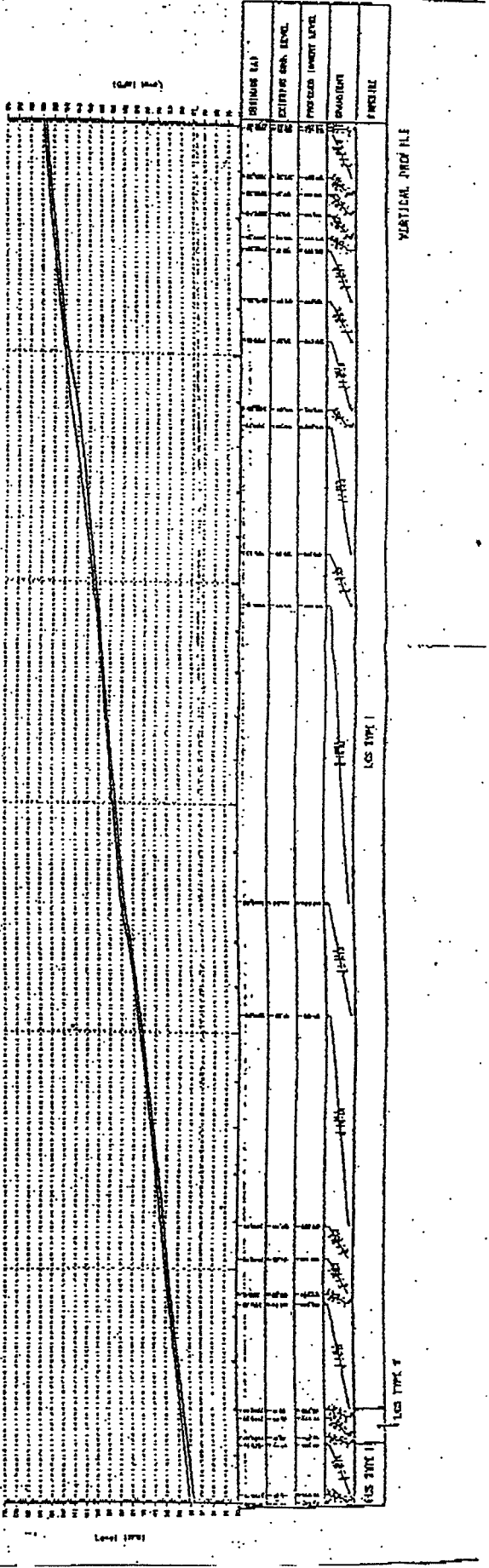
NOTES:

1. WORK IS TO BE DONE IN ACCORDANCE WITH THE GENERAL CONDITIONS OF CONTRACT AND THE SPECIFICATIONS FOR THE WORK.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.
3. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND UTILITIES AT ALL TIMES.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES AND STRUCTURES.
5. THE CONTRACTOR SHALL MAINTAIN THE PROPOSED ALIGNMENT AND PROFILE THROUGHOUT THE PROJECT.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND RESTORATION OF ALL VEGETATION AND EROSION CONTROL MEASURES.
7. THE CONTRACTOR SHALL MAINTAIN THE PROPOSED ALIGNMENT AND PROFILE THROUGHOUT THE PROJECT.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION AND RESTORATION OF ALL VEGETATION AND EROSION CONTROL MEASURES.



**WM3a**  
 A sample to be taken  
 from nearby stream  
 course, if not being dry

DATE FOR CONSTRUCTION	DATE DRAWN
APR 2000	APR 2000
PROJECT NO.	2340001016
<b>ARUP</b> Inc. One Bay Street, New York, NY 10007 CONTRACT NO. D00000001 HONG KONG SEWAGE TREATMENT PLANT, WAIKIKI BENTONS AND EFFLUENT EXPORT PIPELINE EFFLUENT EXPORT PIPELINE: ALIGNMENT AND PROFILE (SHEET 6 OF 10)	



SPW SITE

KEY PLAN

NOTES  
 1. COORDINATE SHOWN ON THE PLAN ARE MEASURED AT THE OUTSIDE EDGE OF WALL.  
 2. PLAN OF STRUCTURES ARE SHOWN AS EXISTING AND.

LEGEND  
 11% GRADE  
 SEE SLOPE  
 FULL SLOPE WITH FINISH

PERMITS: D-COMM-157  
 10/01/2015

ARUP  
 ARCHITECTURAL SERVICES

CHECKED BY: [Name]  
 MADE BY: [Name]  
 DRAWN BY: [Name]

1:1000  
 10/01/2015  
 10/01/2015



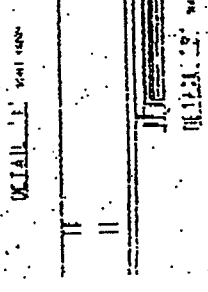
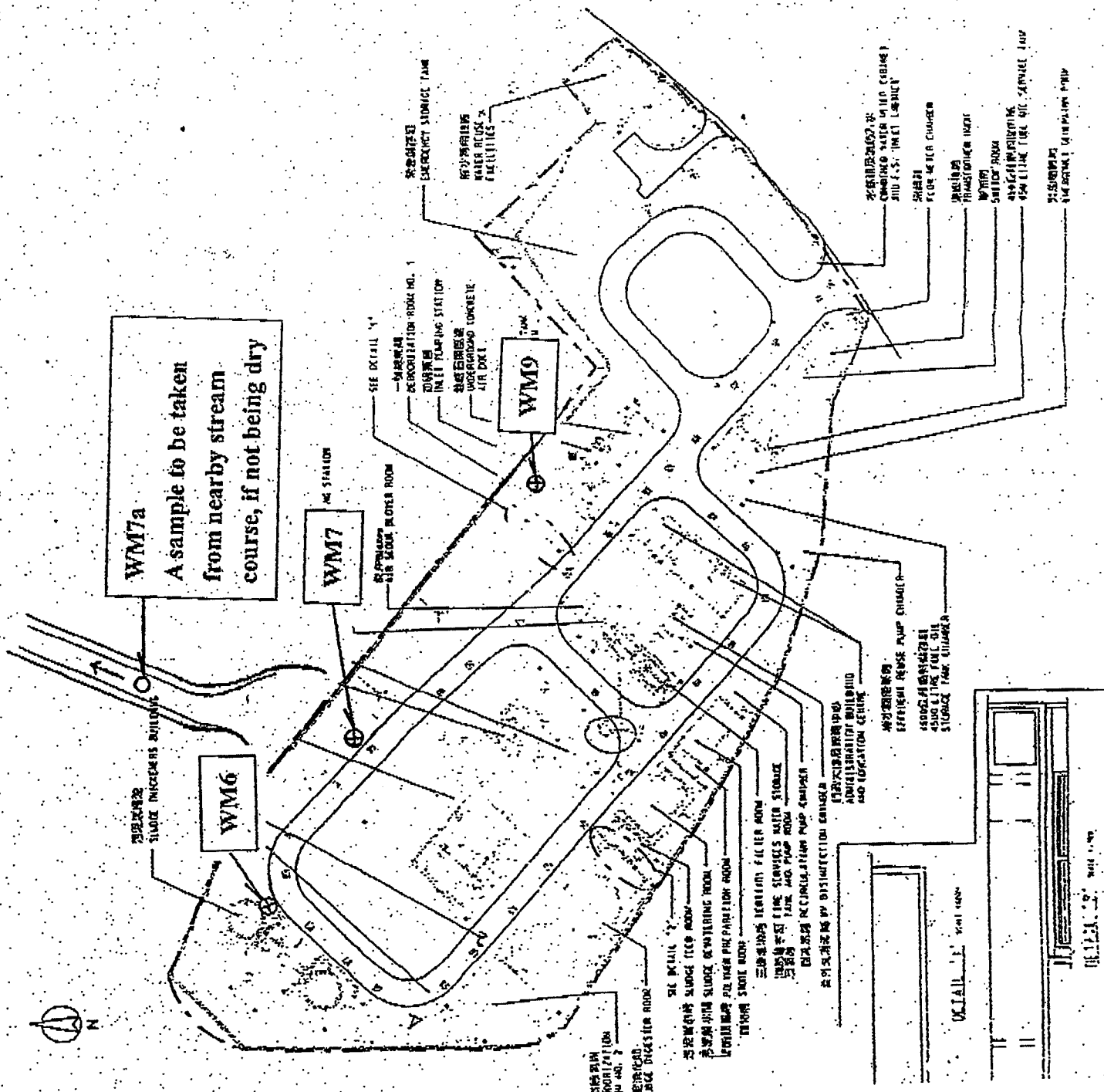
SETTING OUT TABLE

LOCATION	NORTHING	EASTING
1	10100.00	10100.00
2	10100.00	10100.00
3	10100.00	10100.00
4	10100.00	10100.00
5	10100.00	10100.00
6	10100.00	10100.00
7	10100.00	10100.00
8	10100.00	10100.00
9	10100.00	10100.00
10	10100.00	10100.00
11	10100.00	10100.00
12	10100.00	10100.00
13	10100.00	10100.00
14	10100.00	10100.00
15	10100.00	10100.00
16	10100.00	10100.00
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20	10100.00	10100.00
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43	10100.00	10100.00
44	10100.00	10100.00
45	10100.00	10100.00
46	10100.00	10100.00
47	10100.00	10100.00
48	10100.00	10100.00
49	10100.00	10100.00
50	10100.00	10100.00

**WM7a**  
 A sample to be taken from nearby stream course, if not being dry

**WM7**  
 AIR STATION

**WM9**  
 AIR DOCKET



SCALE: 1:1000



NOTE:

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

LEGEND:

- PROPOSED SEWER AND MANHOLE
- WATER MONITORING BOREHOLE

Rev	Description	By	Date
A	ISSUE	TMC	07/05

ARUP  
One Asia & Parkers Hong Kong Limited

Project No.

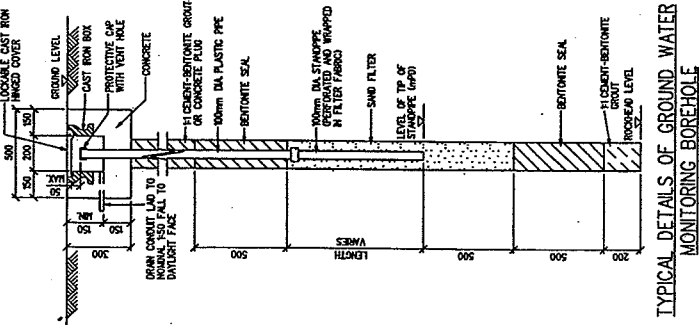
CONTRACT NO. DC2005/05  
NGONG PING VILLAGE SEWERAGE

Drawing title

LOCATION & TYPICAL DETAILS OF  
GROUND WATER MONITORING BOREHOLE

Working No.	23400/RWS/406	Rev.	A
Drawn	JMY	Checked	TMC
Scale	AS SHOWN	Scale	AS SHOWN
Author	JMY	Drawn	TMC
Project Manager	JMY	Checked	TMC
Project Engineer	JMY	Checked	TMC

香港特別行政區環境衛生署  
DRAINAGE SERVICES DEPARTMENT  
GOVERNMENT OF THE  
HONG KONG  
SPECIAL ADMINISTRATIVE REGION



TYPICAL DETAILS OF GROUND WATER MONITORING BOREHOLE  
K.T.S.

