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)

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

## MONTHLY EM&A REPORT

## (NOVEMBER 2008)

*Prepared by:*

*LAW, Sau Yee*
*Senior Environmental Officer*

*Checked and Approved by:*

*LAU, Chi Leung*
*Environmental Team Leader*

*Issued Date: 03 December 2008* *Report No.: ENA81214*

Allied Environmental Consultants Limited
Acousticians & Environmental Engineers

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Tel: (852) 2815 7028 Fax: (852) 2815 5399 Email: info@aechk.com

沛然環境評估工程顧問有限公司

Our Ref: 840/08-0032

3 December 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 (November 2008)**

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I refer to the Environmental Permit (EP-157/2003) and the email from the environmental monitoring team, ETS-Testconsult Limited with the report on 3 December 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 – Ms Ada Pang (By Email)
ETS-Testconsult – Ms Linda Law (By Email and Fax: 2695 3944)

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## TABLE OF CONTENTS

## *EXECUTIVE SUMMARY*

This monthly EM&A report (No.13) has been prepared by the Environmental Team (ET) of ETS-Testconsult Ltd for groundwater monitoring under "Contract No. DC/2006/15 Building and Cilvil 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 November 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 24 November 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 30 November 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 ($BOD_5$), mg/L;
- Ammonia Nitrogen ($NH_4^+$-N), mg/L;
- Nitrate + Nitrite Nitrogen ($NO_2^-$+$NO_3^-$), 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-$NH_3$ F & G* | *0.13 mg/L* |
| *Nitrate + Nitrite* | *In house method TPE/023/W, refer to APHA 19ed 4500-$NO_3$ B* | *0.004 mg/L* |
| *pH (at 25°C)* | *In house method TPE/003/W, refer to APHA 19ed APHA 4500-$H^+$ 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 m/L* |
| *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 24 November 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* | --- | --- |
| *October 08* | *0* | *0* | --- | --- |
| *November 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 24 November 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.

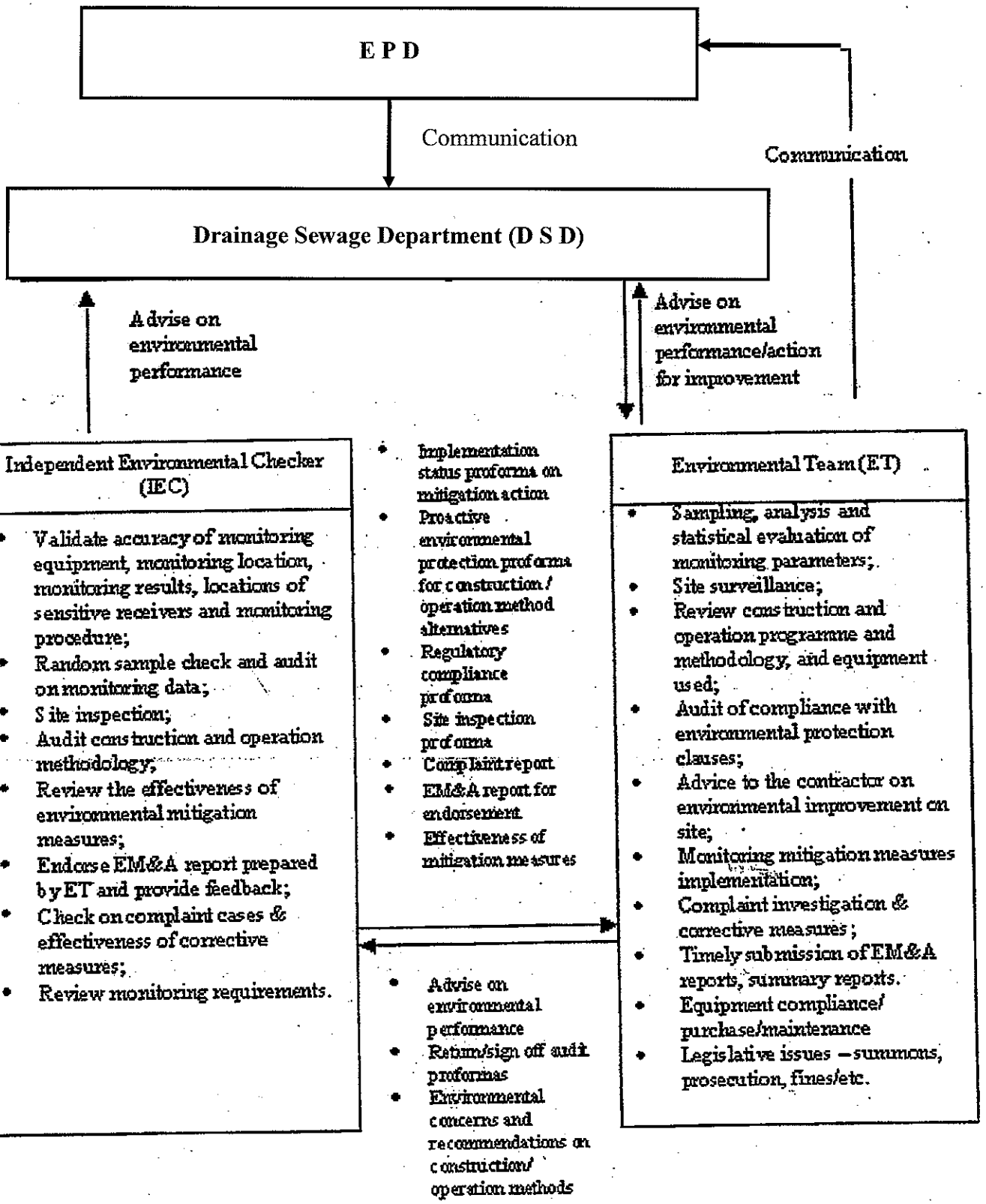
## 7.0 FUTURE KEY ISSUES

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


EPD
Communication
Communication
Drainage Sewage Department (D S D)
Advise on environmental performance
Advise on environmental performance/action for improvement
Independent Environmental Checker (IEC)
• Validate accuracy of monitoring equipment, monitoring location, monitoring results, locations of sensitive receivers and monitoring procedure;
• Random sample check and audit on monitoring data;
• Site inspection;
• Audit construction and operation methodology;
• Review the effectiveness of environmental mitigation measures;
• Endorse EM&A report prepared by ET and provide feedback;
• Check on complaint cases & effectiveness of corrective measures;
• Review monitoring requirements.
• Implementation status proforma on mitigation action
• Proactive environmental protection proforma for construction / operation method alternatives
• Regulatory compliance proforma
• Site inspection proforma
• Complaint report
• EM&A report for endorsement
• Effectiveness of mitigation measures
• Advise on environmental performance
• Return/sign off audit proformas
• Environmental concerns and recommendations on construction/ operation methods
Environmental Team (ET)
• Sampling, analysis and statistical evaluation of monitoring parameters;
• Site surveillance;
• Review construction and operation programme and methodology, and equipment used;
• Audit of compliance with environmental protection clauses;
• Advice to the contractor on environmental improvement on site;
• Monitoring mitigation measures implementation;
• Complaint investigation & corrective measures;
• Timely submission of EM&A reports, summary reports.
• Equipment compliance/ purchase/maintenance
• Legislative issues – summons, prosecution, fines/etc.

# Appendix B

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

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ETS-TESTCONSULT LIMITED
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**TEST REPORT**

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

# Environmental Testing of Water & Wastewater

Report No. : ENA81213
Date of issue : 02 December 2008


## *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 : 24 November 2008
Sample Description : The sample was collected in 100ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 100ml 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. $H_2SO_4$ 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 : 24 November 2008

## *Result*

| Customer Sample ID | Lab Ref No | Test | Method Used | Result | Date Tested |
|---|---|---|---|---|---|
| WM10 | W24005 (01) | pH Value | In house method TPE/003/W | 5.4 (at 25°C) | 24 November 2008 |
| | | Turbidity | In house method TPE/005/W | 6.8 NTU | 24 November 2008 |
| | | Biochemical Oxygen Demand (5-day) | In house method TPE/001/W | <2.0 mg/L | 24 November 2008 (17:00) to 29 November 2008 (17:00) |
| | W24005 (04) | Nitrate & Nitrite Nitrogen | In house method TPE/023/W | 0.22 mg/L | 26 November 2008 |
| | | Ammonia | In house method TPE/016/W | <0.25 mg/L | 25 November 2008 |
| | W24005 (07) | Synthetic Detergents | In house method refer to APHA 19th ed 5540 C & D | <0.1 mg/L | 25 November 2008 |
| | W24005 (10) | Total Phosphates | In house method TPE/019/W | 0.20 mg/L | 25 November 2008 |
| | W24005 (13) | Oil & Grease | APHA 19ed 5520B | <5.0 mg/L | 25 November 2008 |
| | W24005 (16) | E-coli * | DoE (1983), section 7.8 & 7.9 plus in-situ urease test | 13 cfu/100ml | 24 to 26 November 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 Phoshphates and Ammonia were <0.10mg/L and <0.25mg/L instand 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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**TEST REPORT**

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

## Environmental Testing of Water & Wastewater



### *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 | : | 24 November 2008 |
| Sample Description | : | The sample was collected in 100ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 100ml 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. $H_2SO_4$ 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 : 24 November 2008

### *Result*

| Customer Sample ID | Lab Ref No | Test | Method Used | Result | Date Tested |
|---|---|---|---|---|---|
| WM11 | W24005 (02) | pH Value | In house method TPE/003/W | 5.0 (at 25°C) | 24 November 2008 |
| | | Turbidity | In house method TPE/005/W | 8.6 NTU | 24 November 2008 |
| | | Biochemical Oxygen Demand (5-day) | In house method TPE/001/W | 2.6 mg/L | 24 November 2008 (17:00) to 29 November 2008 (17:00) |
| | W24005 (05) | Nitrate & Nitrite Nitrogen | In house method TPE/023/W | 0.57 mg/L | 26 November 2008 |
| | | Ammonia | In house method TPE/016/W | <0.25 mg/L | 25 November 2008 |
| | W24005 (08) | Synthetic Detergents | In house method refer to APHA 19th ed 5540 C & D | 0.1 mg/L | 25 November 2008 |
| | W24005 (11) | Total Phosphates | In house method TPE/019/W | 0.28 mg/L | 25 November 2008 |
| | W24005 (14) | Oil & Grease | APHA 19ed 5520B | <5.0 mg/L | 25 November 2008 |
| | W24005 (17) | E-coli * | DoE (1983), section 7.8 & 7.9 plus in-situ urease test | 3 cfu/100ml | 24 to 26 November 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 Phoshphates and Ammonia were <0.10mg/L and <0.25mg/L instand 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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**TEST REPORT**

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

## Environmental Testing of Water & Wastewater

Report No. : ENA81213
Date of issue : 02 December 2008


***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 : 24 November 2008
Sample Description : The sample was collected in 100ml glass bottle (for Total Phosphates only), 500ml glass bottle (for Oil & Grease only), 100ml 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. $H_2SO_4$ 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 : 24 November 2008

***Result***

| Customer Sample ID | Lab Ref No | Test | Method Used | Result | Date Tested |
|---|---|---|---|---|---|
| WM12 | W24005 (03) | pH Value | In house method TPE/003/W | 5.4 (at 25°C) | 24 November 2008 |
| | | Turbidity | In house method TPE/005/W | 10 NTU | 24 November 2008 |
| | | Biochemical Oxygen Demand (5-day) | In house method TPE/001/W | 2.1 mg/L | 24 November 2008 (17:00) to 29 November 2008 (17:00) |
| | W24005 (06) | Nitrate & Nitrite Nitrogen | In house method TPE/023/W | 1.5 mg/L | 26 November 2008 |
| | | Ammonia | In house method TPE/016/W | <0.25 mg/L | 25 November 2008 |
| | W24005 (09) | Synthetic Detergents | In house method refer to APHA 19th ed 5540 C & D | 0.2 mg/L | 25 November 2008 |
| | W24005 (12) | Total Phosphates | In house method TPE/019/W | 0.20 mg/L | 25 November 2008 |
| | W24005 (15) | Oil & Grease | APHA 19ed 5520B | <5.0 mg/L | 25 November 2008 |
| | W24005 (18) | E-coli * | DoE (1983), section 7.8 & 7.9 plus in-situ urease test | 10 cfu/100ml | 24 to 26 November 2008 |

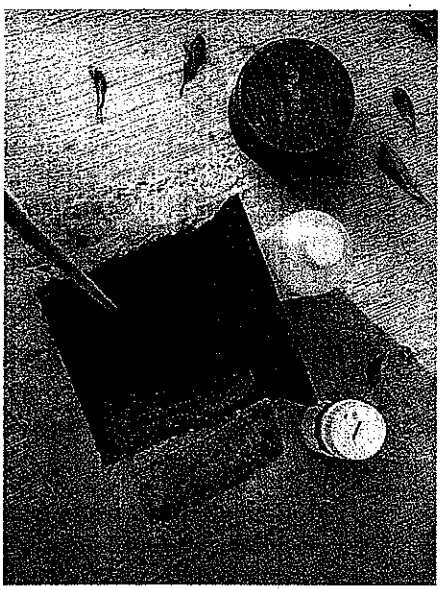
Remark (if any) : The tests marked with "*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was carried out at WM10, WM11 and WM12.
The reporting limit of Total Phoshphates and Ammonia were <0.10mg/L and <0.25mg/L instand of <0.010mg/l 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

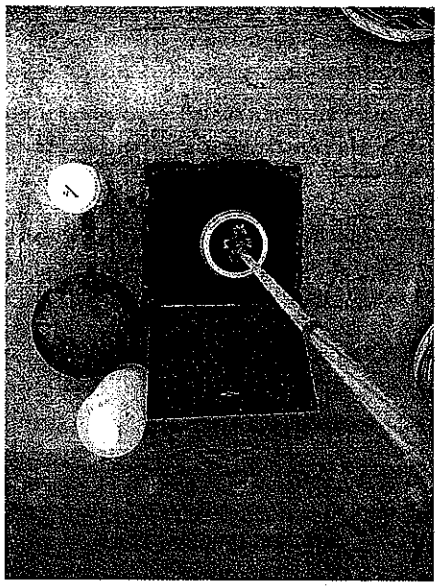
Approved by : LAU, Chi Leung
Chief Chemist

| | | |
|---|---|---|
| Project | : | DC/2006/15 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2007-2009) |
| Date of sampling and photo taking | : | 24 November 2008 |
| Report No. | : | ENA81213 |
| Date of issue | : | 02 December 2008 |

**WM10**



**WM11**

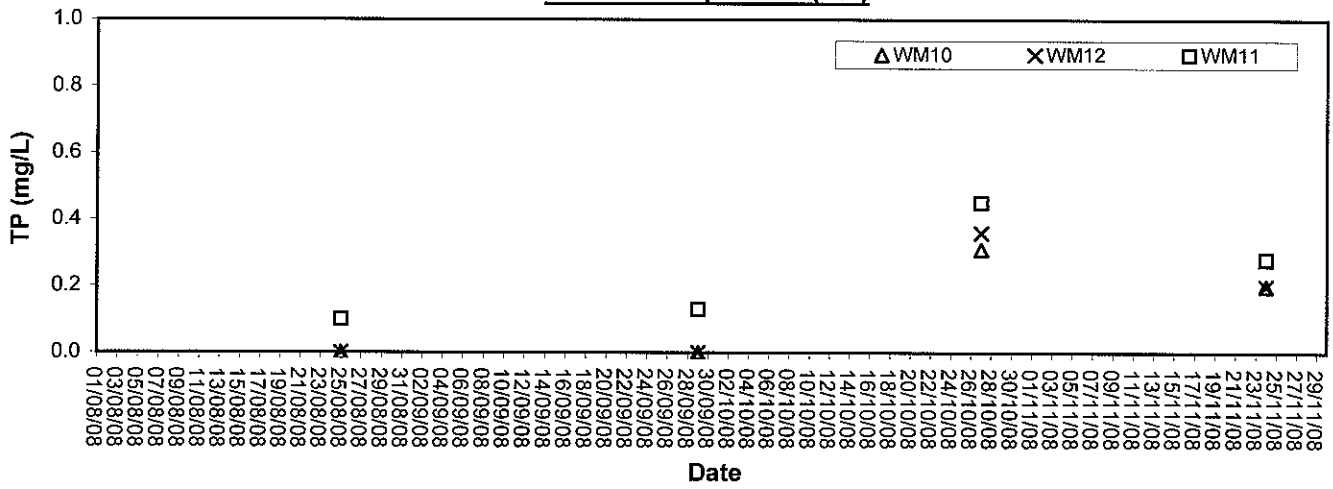


**WM12**

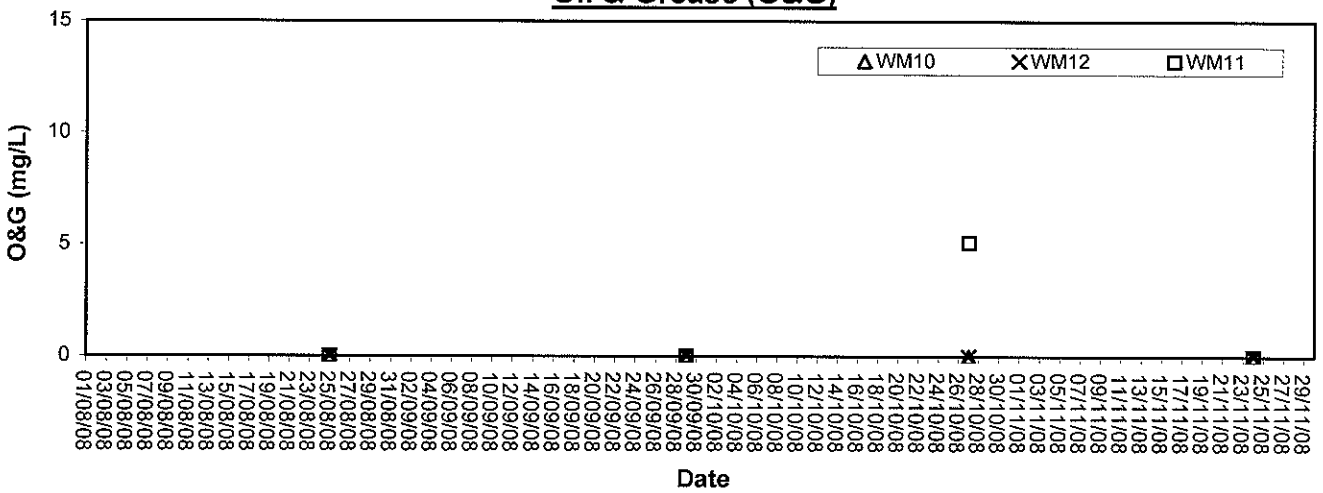
# Appendix C

# Graphical Plots of Groundwater Monitoring Data

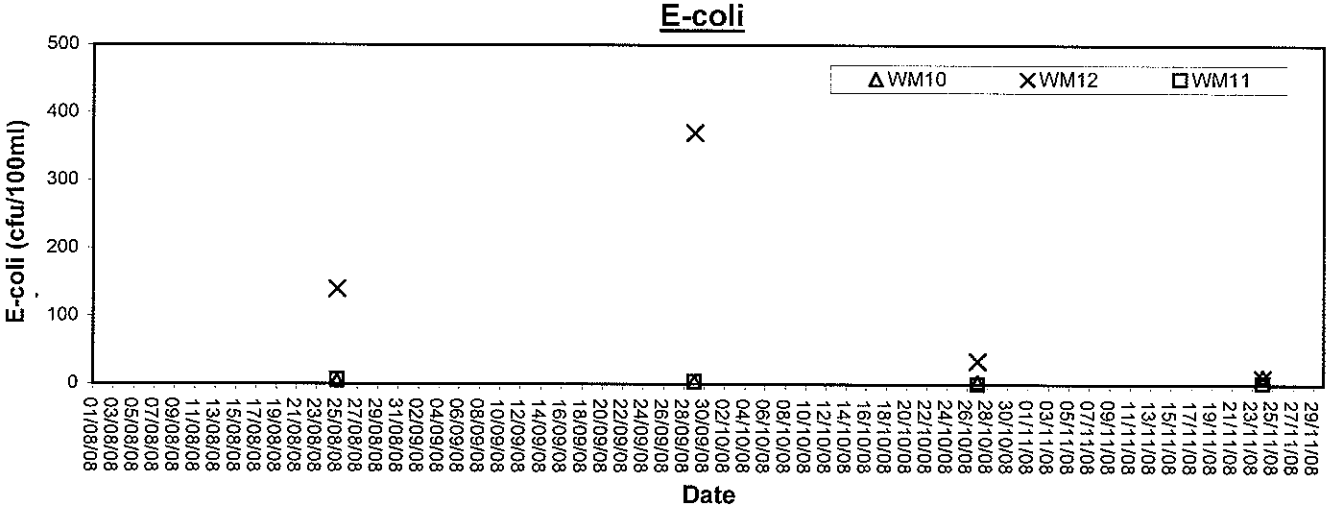
## Total Phosphates (TP)



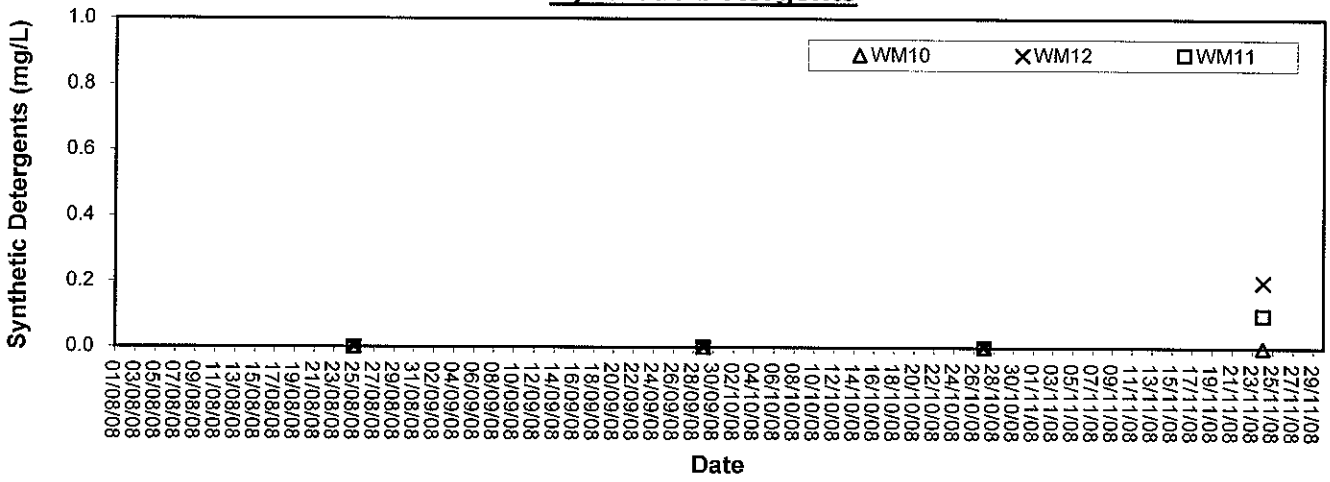

## Oil & Grease (O&G)



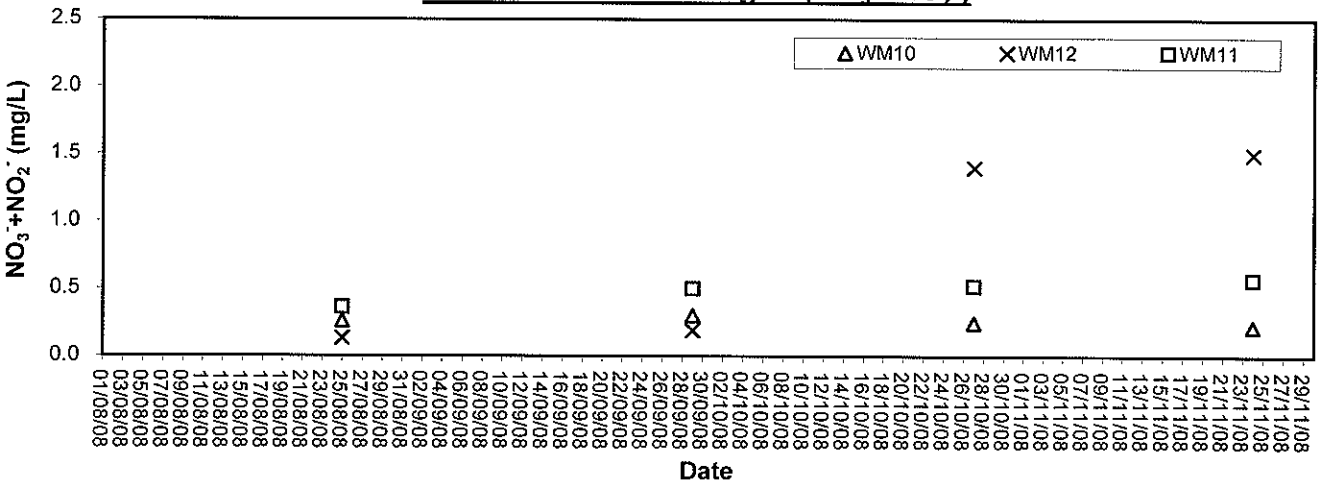

## E-coli



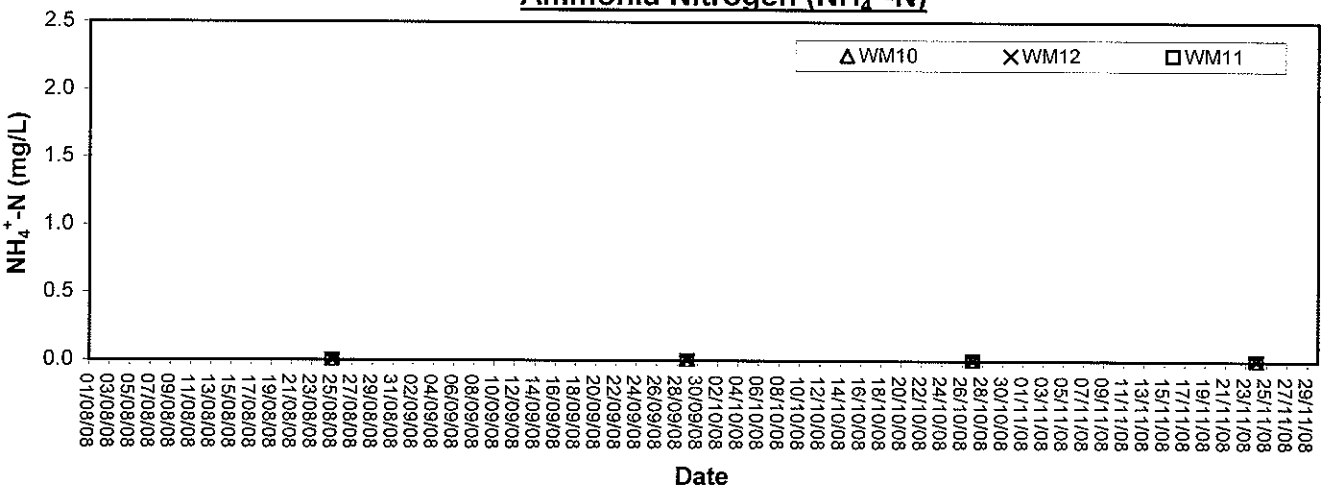
## Synthetic Detergents



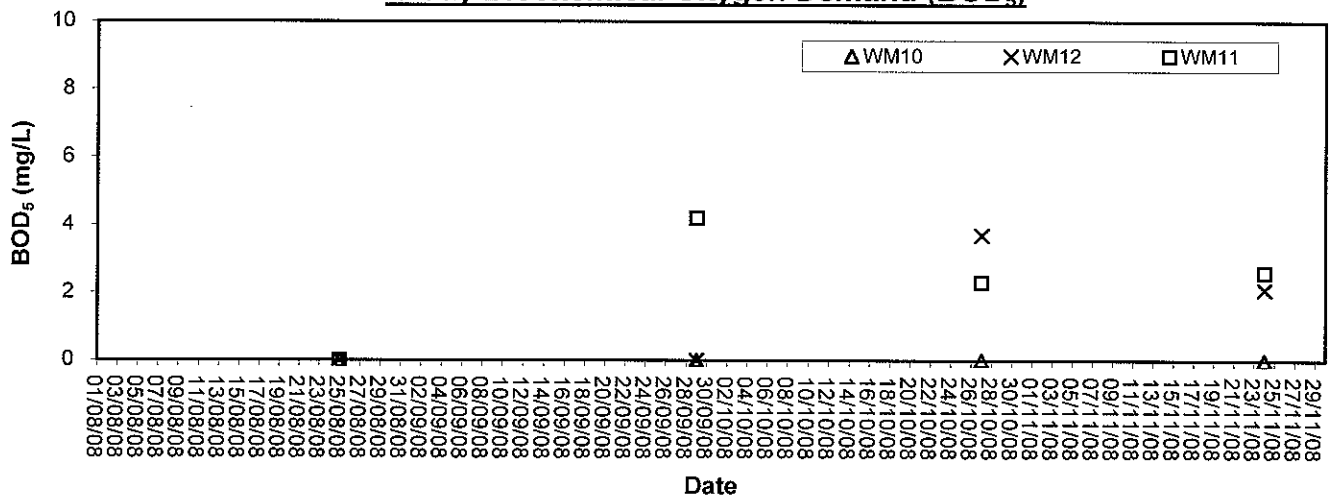

## Nitrate & Nitrite Nitrogen ($NO_3^-$+$NO_2^-$)



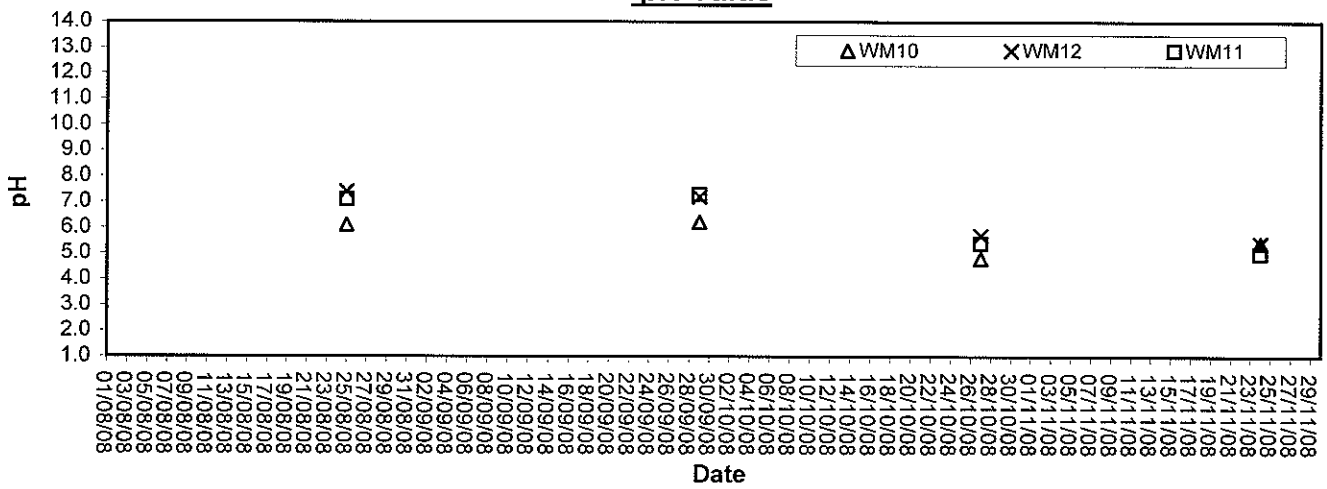

## Ammonia Nitrogen ($NH_4^+$-N)



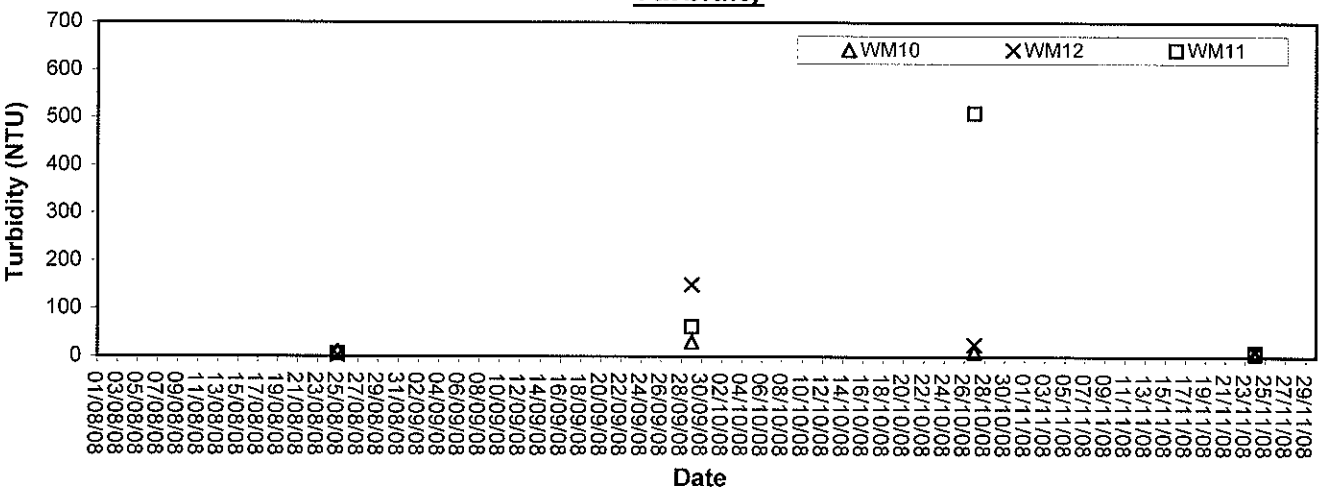
## 5-day Biochemical Oxygen Demand ($BOD_5$)




## pH Value

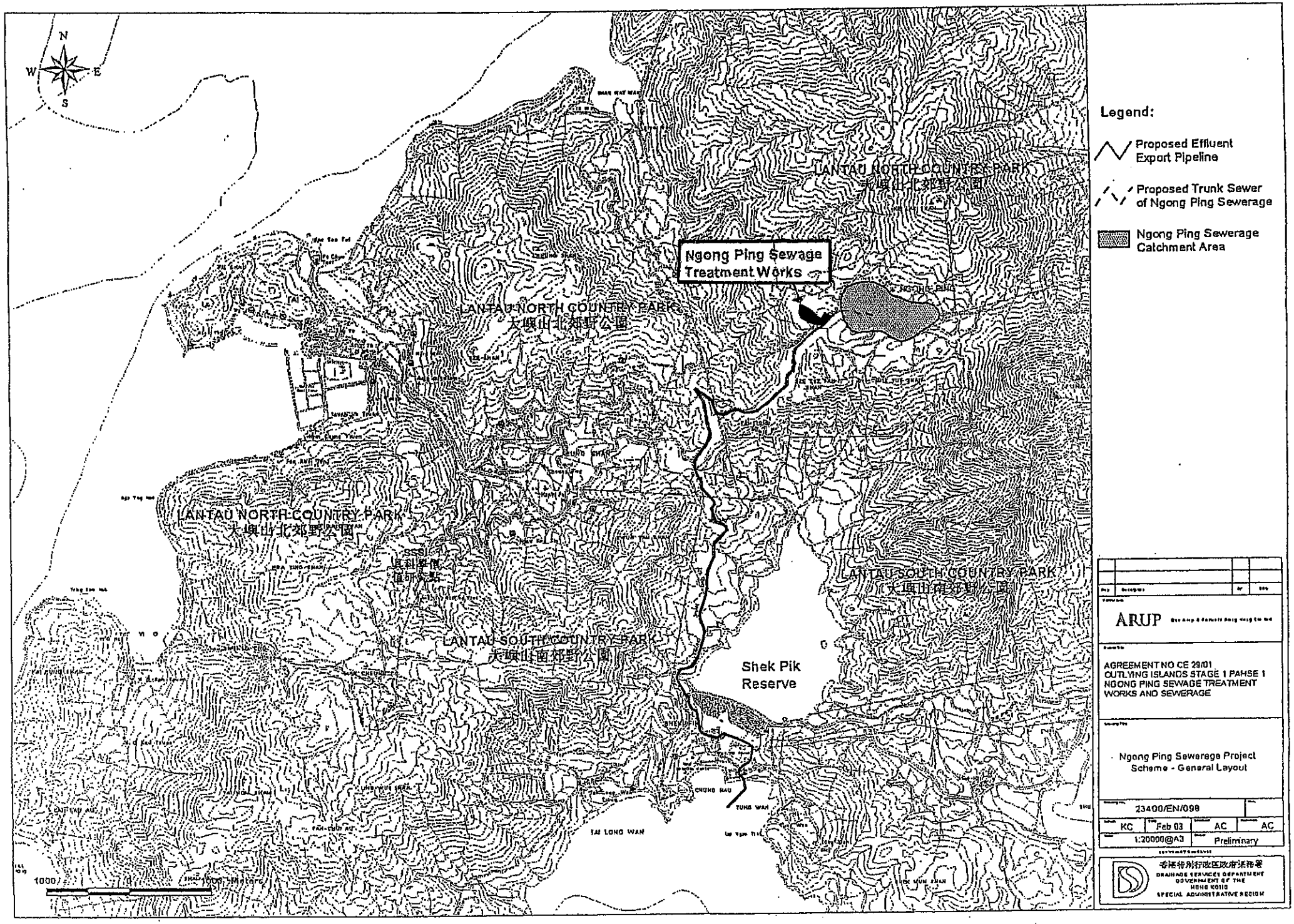



## Turbidity



# Appendix D

# General Layout Plan


N
W
E
S
Legend:
Proposed Effluent Export Pipeline
Proposed Trunk Sewer of Ngong Ping Sewerage
Ngong Ping Sewerage Catchment Area
Ngong Ping Sewage Treatment Works
LANTAU NORTH COUNTRY PARK
大嶼山北郊野公園
LANTAU SOUTH COUNTRY PARK
大嶼山南郊野公園
Shek Pik Reserve
SSSI
TUNG WAN
CHUNG HAU
TAI LONG WAN
1000
1000 Metres
ARUP
AGREEMENT NO CE 29/01
OUTLYING ISLANDS STAGE 1 PAHSE 1
NGONG PING SEWAGE TREATMENT WORKS AND SEWERAGE
Ngong Ping Sewerage Project
Scheme - General Layout
23400/EN/098
KC
Feb 03
AC
AC
1:20000@A3
Preliminary
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION

# Appendix E

# QA/QC Results

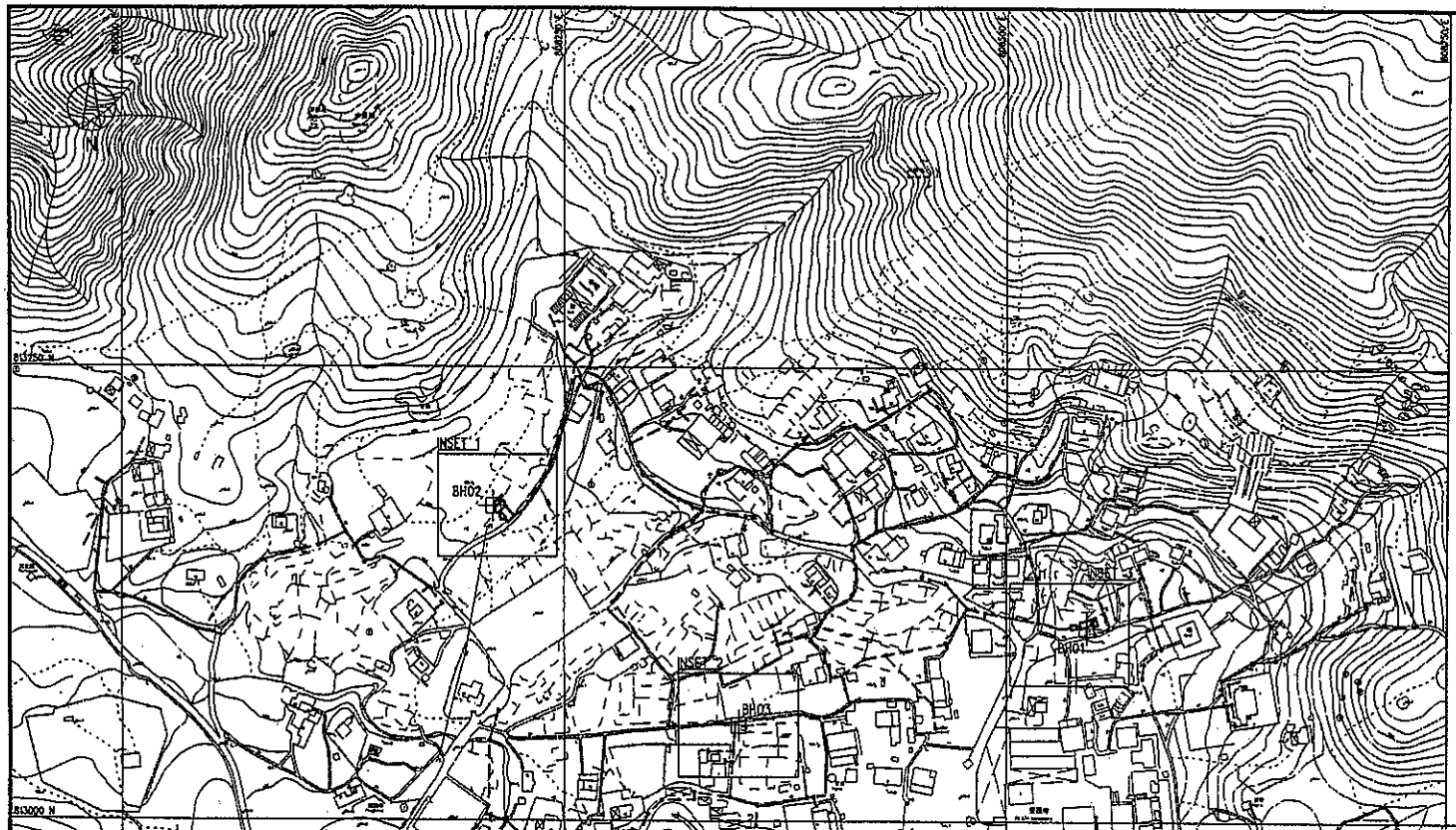
# QA/QC Results of Laboratory Analysis of Testing Parameters

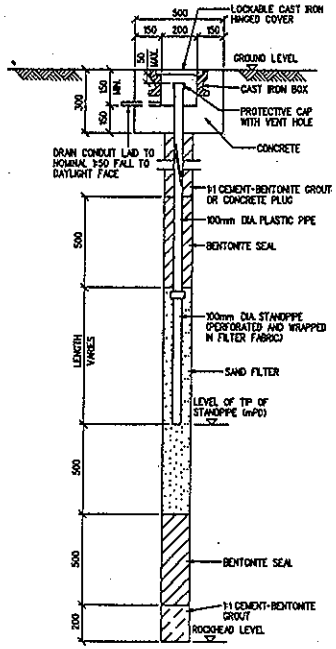
| Testing Parameter | QC Sample Analysis | Sample Duplicate | | Sample Spike | |
|---|---|---|---|---|---|
| | % Recovery * | Sample ID | % Error # | Sample ID | % Recovery @ |
| Turbidity | 98.8 | WM10 | 0.4 | --- | --- |
| Nitrate + Nitrite | 101.7 | --- | --- | --- | --- |
| Oil & Grease | 94.9 | --- | --- | --- | --- |
| Ammoniacal Nitrogen | 103.2 | --- | --- | --- | --- |
| Synthetic detergents | --- | --- | --- | --- | --- |
| Biochemical Oxygen Demand (5-day) | 96.5 | WM10 | 3.1 | --- | --- |
| Total Phosphates | 101.4 | WM10 | 2.5 | WM10 | 95.3 |

| Testing Parameter | QC Sample Analysis | Sample Duplicate | | Sample Spike | |
|---|---|---|---|---|---|
| | % Recovery * | Sample ID | Difference between Duplicates + | Sample ID | % Recovery @ |
| pH Value(at 25°C) | --- | WM10 | 0.04 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




TYPICAL DETAILS OF GROUND WATER MONITORING BOREHOLE

N.T.S.

NOTE:

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

LEGEND:

PROPOSED SEWER AND MANHOLE

8H01 WATER MONITORING BOREHOLE

| Rev | Description | By | Date |
|---|---|---|---|
| A | TENDER ISSUE | TNC | 07/05 |

Consultants

ARUP Ove Arup & Partners Hong Kong Limited

Project title

CONTRACT NO.DC/2005/05
NGONG PING VILLAGE SEWERAGE

Drawing title

LOCATION & TYPICAL DETAILS OF GROUND WATER MONITORING BOREHOLE

| Drawing no. | | Rev. |
|---|---|---|
| 23400/R/VS/406 | | A |
| Drawn: TY | Date: JAN 05 | Checked: TNC |
| Approved: YWY | | |
| Scale: 1:1000 AT A1, 1:2000 AT A3 | Status: TENDER | |



香港特別行政區政府渠務署
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION