



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**

**DRAINAGE SEWAGE DEPARTMENT**

**NGONG PING SEWAGE TREATMENT PLANT,  
TRUNK SEWERS AND EFFLUENT EXPORT  
PIPELINE  
OPERATION PHASE**

**MONTHLY EM&A REPORT  
FOR  
GROUND WATER MONITORING  
(APRIL 2007)**

Prepared by:

LAW, Sau Yee  
Senior Environmental Officer

Checked and  
Approved by:

LAU, Chi Leung  
Environmental Team Leader

Issued Date: 03 May 2007

Report No.: ENA70243

**CH2MHILL**

西園香港有限公司  
CH2M HILL Hong Kong Limited  
Suite 1801, Harcourt House  
59 Gloucester Road  
Wanchai, Hong Kong  
Tel (852) 2507-2203  
Fax (852) 2507-2293

Our Ref.: DSDSTPOPEM0\_0\_0067

Date: 08 May 2007

Consultants Management Division  
Drainage Services Department  
42/F., Revenue Tower,  
5 Gloucester Road, Wan Chai,  
Hong Kong

By mail and by Fax (2827 8526)

Attention : Mr. Mok Wing Cheong, Ringo

Dear Mr. Mok,

**Re: Environmental Permit 157/2003/A**  
**Contract No: DC/2003/01 Ngong Ping Sewage Treatment Plant, Truck Sewers and**  
**Effluent Export Pipeline**  
**Monthly EM&A Report of Ground Water Monitoring for Apr 2007**

Reference is made to the monthly EM&A Report prepared by ETS for the captioned project (report no. ENA70243). We are pleased to verify that the captioned report complied with the conditions 5.4 and 6.1 of the Environmental Permit.

Thank you very much for your attention and please feel free to contact the undersigned or our Eva Ho if you have any queries.

Yours sincerely,

Billy Yu  
Independent Environmental Checker

c.c. Mr. Edwin Lam CE/HKI, DSD  
Mr. C L Lau ETS

By Fax: 2827 6657  
By Fax: 2695 3944



<b>TABLE OF CONTENTS</b>		Page
<b>EXECUTIVE SUMMARY</b>		
<b>1.0</b>	<b>INTRODUCTION</b>	1
<b>2.0</b>	<b>PROJECT INFORMATION</b>	
	2.1 Background	1
	2.2 Site Description	2
	2.3 Milestones of Environmental Protection / Mitigation activities annotated	2
<b>3.0</b>	<b>GROUNDWATER QUALITY MONITORING</b>	
	3.1 Monitoring Locations	2
	3.2 Monitoring Parameters	2
	3.3 Monitoring Frequency	2 – 3
	3.4 Monitoring Methodology and Equipment Used	3
	3.5 Groundwater Monitoring Results	4
<b>4.0</b>	<b>ENVIRONMENTAL NON-CONFORMANCE</b>	
	4.1 Summary of air quality, noise and water quality monitoring	4
	4.2 Summary of Environmental Complaints	4
	4.3 Summary of Notification of Summons and Prosecution	4
<b>5.0</b>	<b>IMPLEMENTATION STATUS</b>	
	5.1 Implementation Status of Environmental Mitigation Measures	4
	5.2 Implementation Status of Environmental Complaint Handling	4
<b>6.0</b>	<b>CONCLUSION</b>	5
<b>7.0</b>	<b>FUTURE KEY ISSUES</b>	5

## **APPENDIX**

A	Lines of Communication of Project Organization
B	Groundwater Monitoring Results and Photos of Groundwater Monitoring at Boleholes
C	Graphical Plots of Groundwater Monitoring Data
D	General Layout Plan
E	QA/QC Results

## **FIGURES**

Drawing No. 23400/T/202	Ngong Ping Sewage Treatment Plant Setting out Plan for Structures
Drawing No. 23400/T/074	Effluent Export Pipeline Alignment and Profile (Sheet 5 of 10)
Drawing No. 23400/T/075	Effluent Export Pipeline Alignment and Profile (Sheet 6 of 10)
Drawing No. 23400/R/076	Effluent Export Pipeline Alignment and Profile (Sheet 7 of 10)

## **TABLES**

2.1	Contact Details of Key Personnel
3.1	Location of Groundwater Quality Monitoring
3.3	The Frequency of the Groundwater Monitoring
3.4	Summary of testing procedures
5.1	Statistical Summary of Environmental Complaints



### **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 the operation phase of "Ngong Ping Sewage Treatment Plant, Trunk Sewers and Effluent Export Pipeline" (the Project) during the reporting period from 01 to 30 April 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.

#### **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 12 April 2007. During this monitoring, ground water was found in Borehole WM3 and the other boreholes were dry. According to the results of all testing parameters, it was found that no contamination of groundwater due to the leakage from the NPSTP and Effluent Export Pipeline was detected.

#### **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 April 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.
Hong Kong & Islands Division, DSD	Contractor (responsible for Groundwater Monitoring)	Mr. Edwin Lam	2594 7208	2827 6657
Sewage Treatment Division 2, DSD	Contractor (responsible for Odour Control and Water Quality Control except Groundwater Monitoring)	Mr. Zenith Chan	2195 3458	2991 4233
CH2M HILL	Independent Environmental Checker	Mr. Billy Yu	2507 2203	2507 2293
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 boreholes shown in Table 3.1.

Table 3.1 Locations of Groundwater Quality Monitoring

Borehole No.	Depth from Ground Level to end of standpipe (m)	Location
WM1	3.58	Keung Shan Road (L/P FA0463)
WM2	4.24	Keung Shan Road (L/P FA0458)
WM3	3.57	Keung Shan Road (L/P FA0445)
WM4	2.77	Keung Shan Road (L/P FA0437)
WM5	4.63	Keung Shan Road (L/P FA0428)
WM6	10.46	STP (Ngong Ping)
WM7	96.8	STP (Ngong Ping)
WM8	9.99	STP (Ngong Ping)
WM9	10.69	STP (Ngong Ping)

#### 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 12 April 2007. During this monitoring, groundwater was found in Borehole No WM3 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.

According to the results of all testing parameters, it was found that no contamination of groundwater due to the leakage from the NPSTP and Effluent Export Pipeline was detected.

### 4.0 ENVIRONMENTAL NON-CONFORMANCE

#### 4.1 Summary of Groundwater Quality Monitoring

According to the results of all testing parameters, it was found that no contamination of groundwater due to the leakage from the NPSTP and Effluent Export Pipeline was detected.

#### 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
April 06	0	0	---	---
May 06	0	0	---	---
June 06	0	0	---	---
July 06	0	0	---	---
Aug 06	0	0	---	---
Sept 06	0	0	---	---
Oct 06	0	0	---	---
Nov 06	0	0	---	---
Dec 06	0	0	---	---
Jan 07	0	0	---	---
Feb 07	0	0	---	---
Mar 07	0	0	---	---
April 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 12 April 2007. During this monitoring, ground water was found in Borehole WM3 and the other boreholes were dry.

According to the results of all testing parameters, it was found that no contamination of groundwater due to the leakage from the NPSTP and Effluent Export Pipeline was detected.

### **7.0 FUTURE KEY ISSUES**

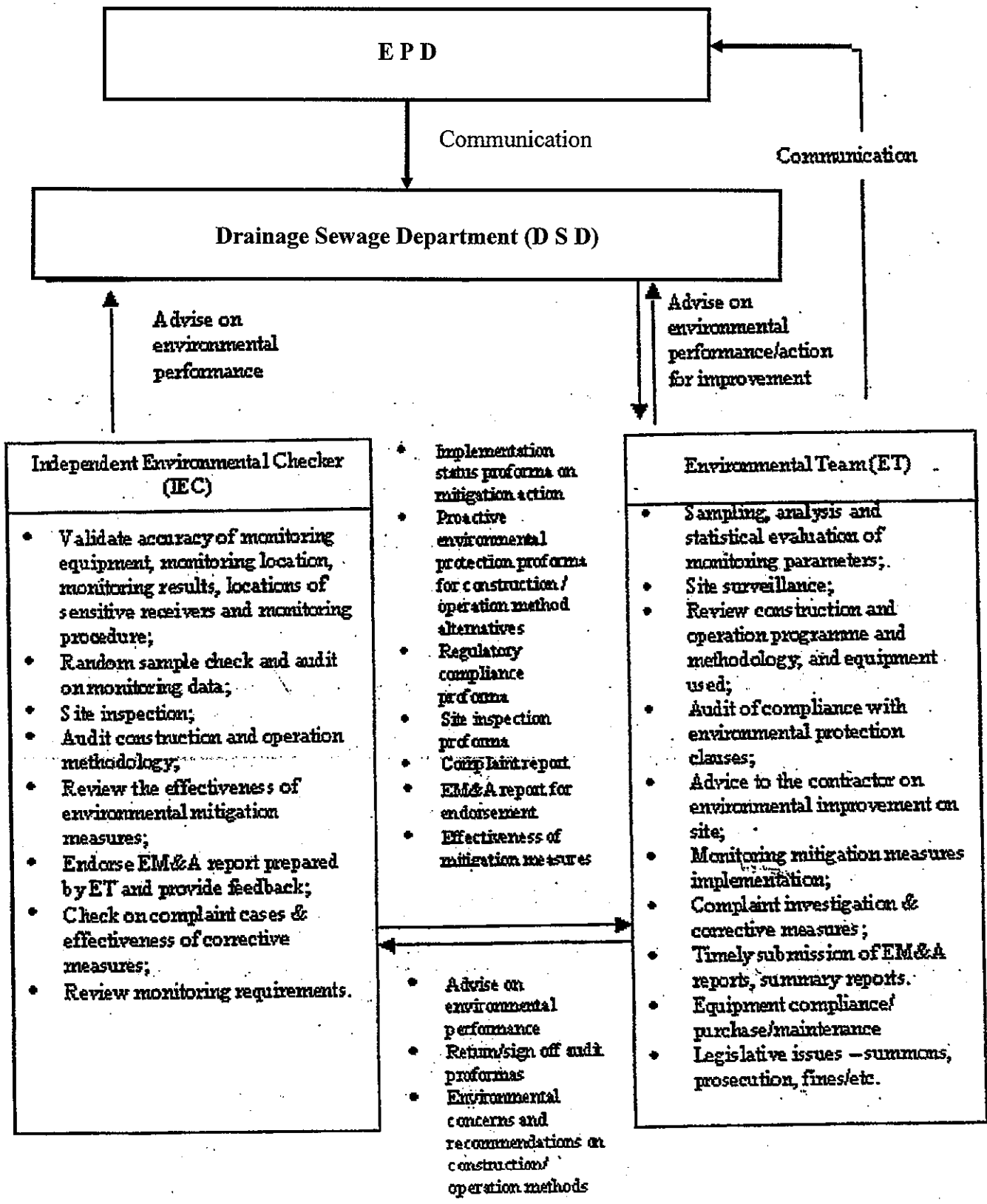
DSD will continue to carry out operation and maintenance works of NPSTW in the coming month. Future Key issues to be considered for the prevention of contamination of the water gathering ground are as follows:

- 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**



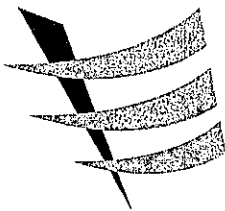


**Appendix B**

**Groundwater Monitoring Results**

**and**

**Photos of Groundwater Monitoring at Boleholes**



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. : ENA 70244  
Date of issue : 19 April 2007  
Page No. : 1 of 1

**Information provided by client**

Client name : Paul Y Construction Co. Ltd  
Client address : 31/F Paul Y Centre 51 Hung To Road Kwun Tong Kowloon HK  
Sample Source : DC/2004/09 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2005-2007)  
Sample Type : Groundwater  
Date of sampling : 12 April 2007  
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<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**

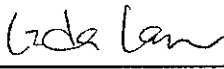
Date Received : 12 April 2007

**Result**

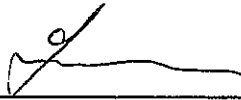
Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM3	W21561 (01)	Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	8.2 mg/L	12 April 2007 (18:00) to 17 April 2007 (18:00)
		pH Value	In house method TPE/003/W	6.2 (at 25°C)	12 April 2007
		Turbidity	In house method TPE/005/W	13 NTU	12 April 2007
	W21561 (05)	Synthetic Detergents	In house method based on APHA 19th ed 5540 C & D	<0.1 mg/L	13 April 2007
	W21561 (02)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	0.41 mg/L	13 April 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	13 April 2007
	W21561 (03)	Total Phosphates	In house method TPE/019/W	< 0.1 mg/L	13 April 2007
	W21561 (04)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	13 April 2007
	W21561 (06)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	7 cfu/100ml	12 to 14 April 2007

Remark (if any) : The tests marked with "\*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Water monitoring was only carried out at Borehole WM3 only since other boreholes were observed to be dry during water monitoring.

Checked by :

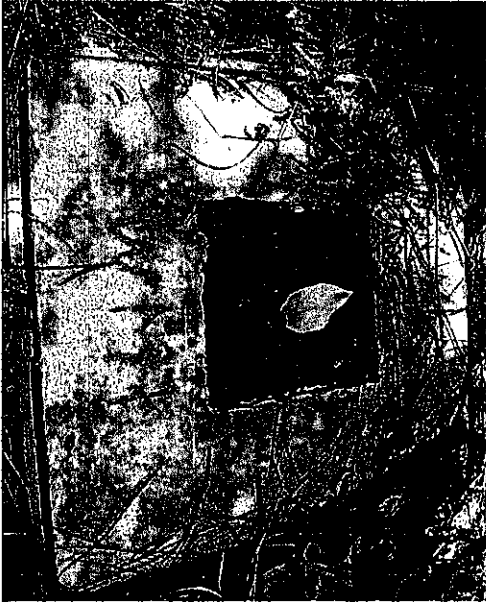
  
LAW, Sau Yee  
Senior Chemist

Approved by :

  
LAU, Chi Leung  
Chief Chemist

Project : DC/2004/09 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2005-2007)  
Date of sampling and photo taking : 12 April 2007  
Report No. : ENA 70244  
Date of issue : 19 April 2007

WM1



WM2



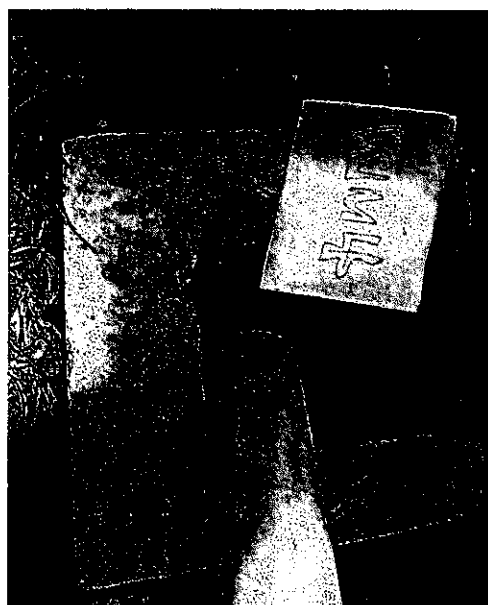
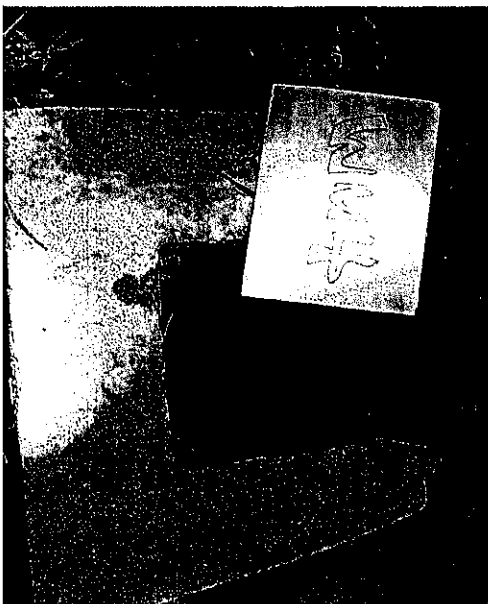


Project : DC/2004/09 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2005-2007)  
Date of sampling and photo taking : 12 April 2007  
Report No. : ENA 70244  
Date of issue : 19 April 2007

WM3



WM4





Project : DC/2004/09 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2005-2007)  
Date of sampling and photo taking : 12 April 2007  
Report No. : ENA 70244  
Date of issue : 19 April 2007

WM5



WM6

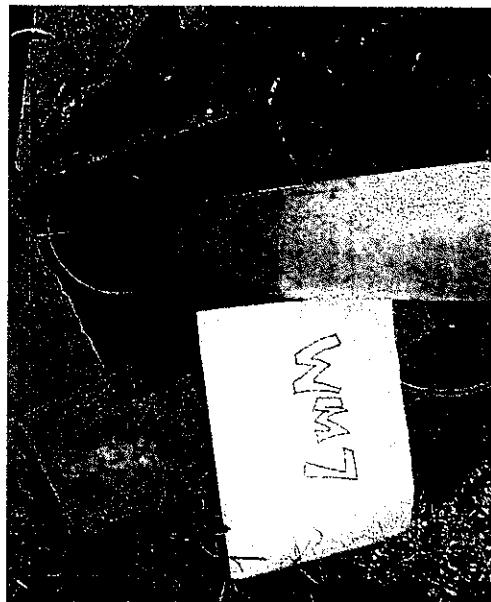
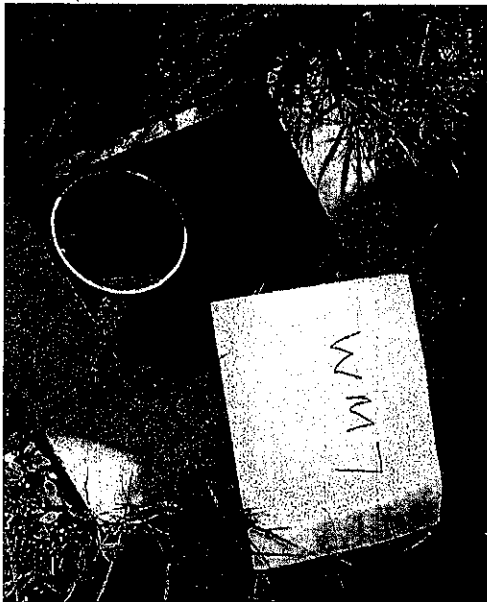




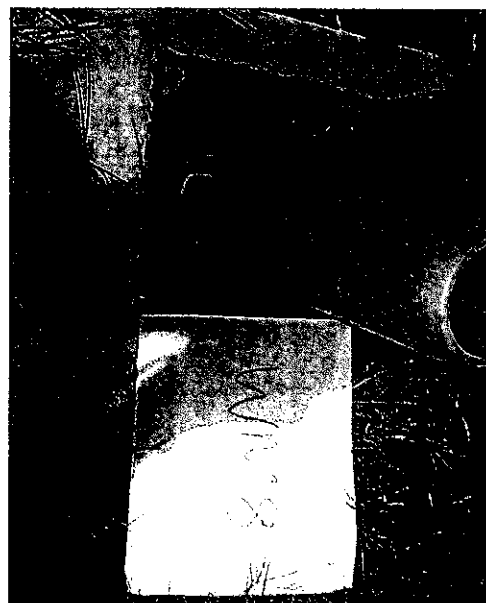
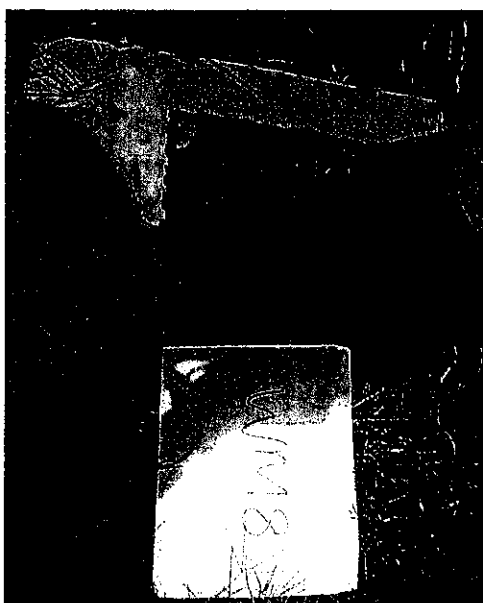


Project : DC/2004/09 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2005-2007)  
Date of sampling and photo taking : 12 April 2007  
Report No. : ENA 70244  
Date of issue : 19 April 2007

WM7



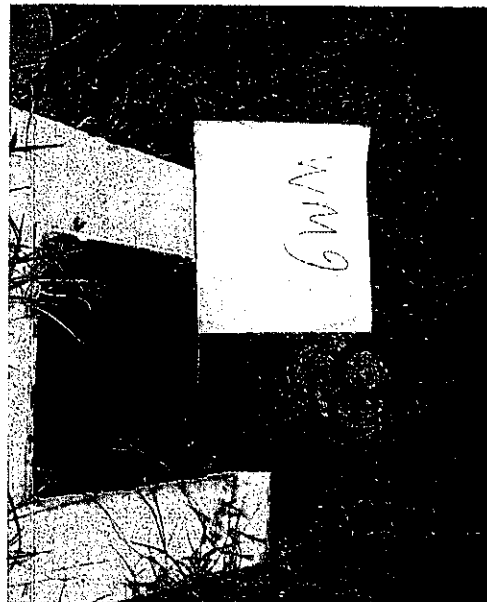
WM8





Project : DC/2004/09 - Building and Civil Maintenance and  
Minor Works to DSD Plants and Facilities (2005-2007)  
Date of sampling and photo taking : 12 April 2007  
Report No. : ENA 70244  
Date of issue : 19 April 2007

WM9



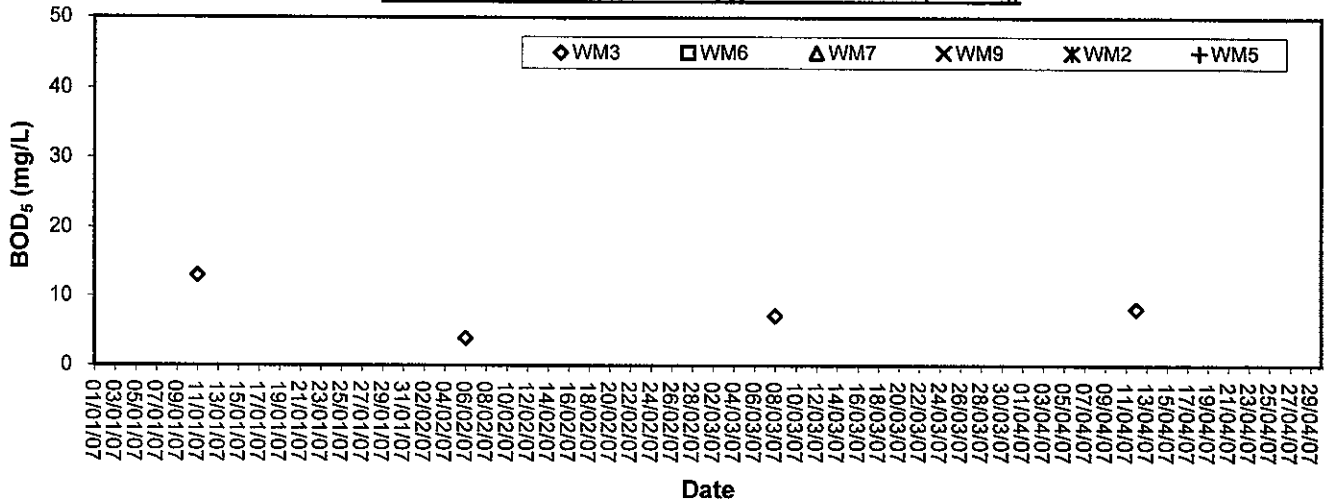


## **Appendix C**

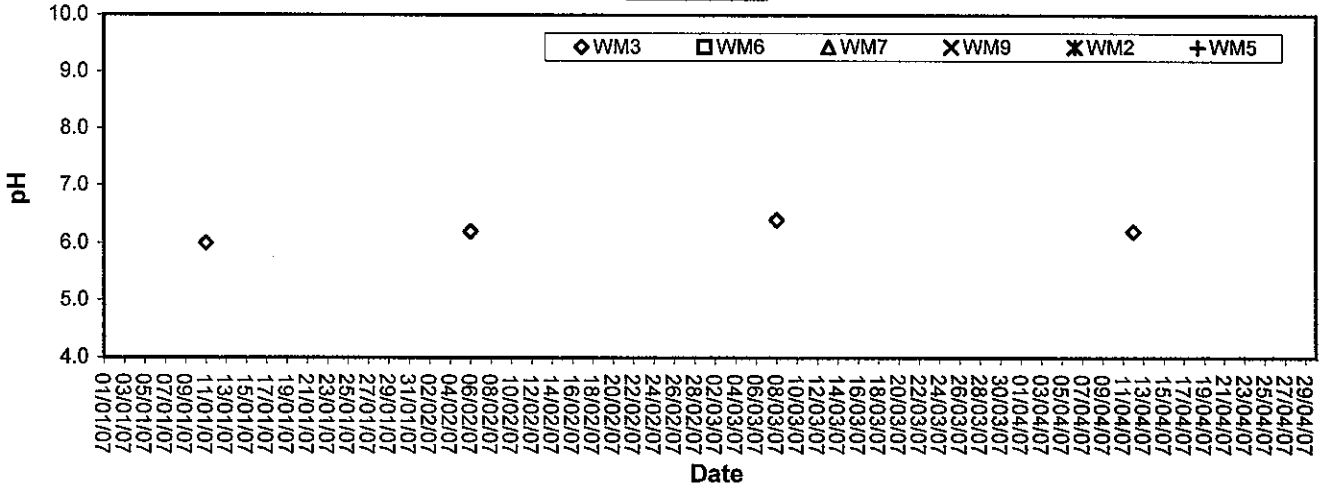
### **Graphical Plots of Groundwater Monitoring Data**



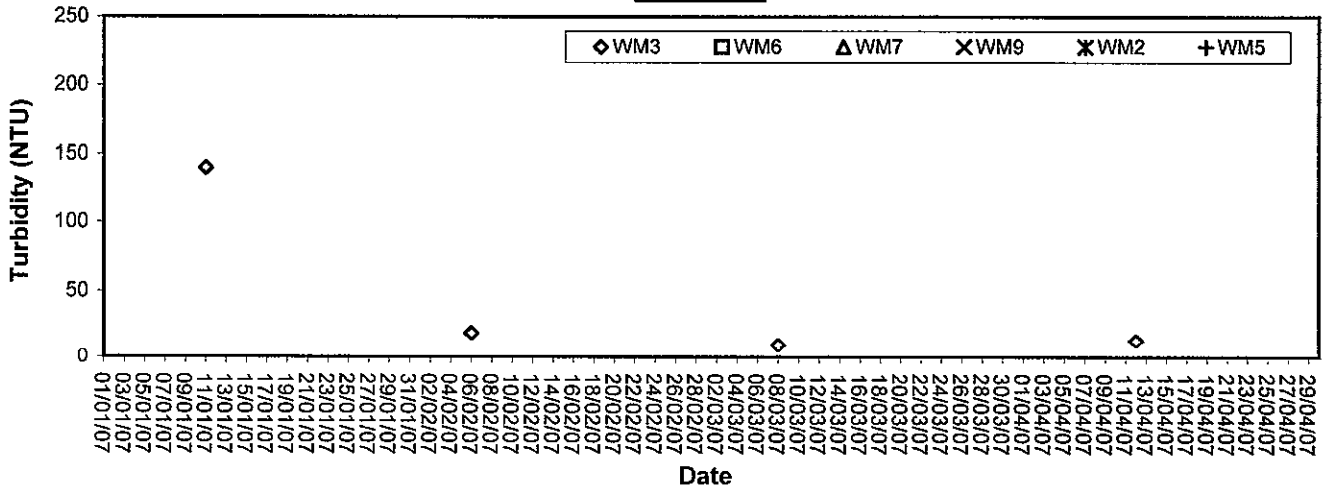
### 5-day Biochemical Oxygen Demand (BOD<sub>5</sub>)



### pH Value



### Turbidity



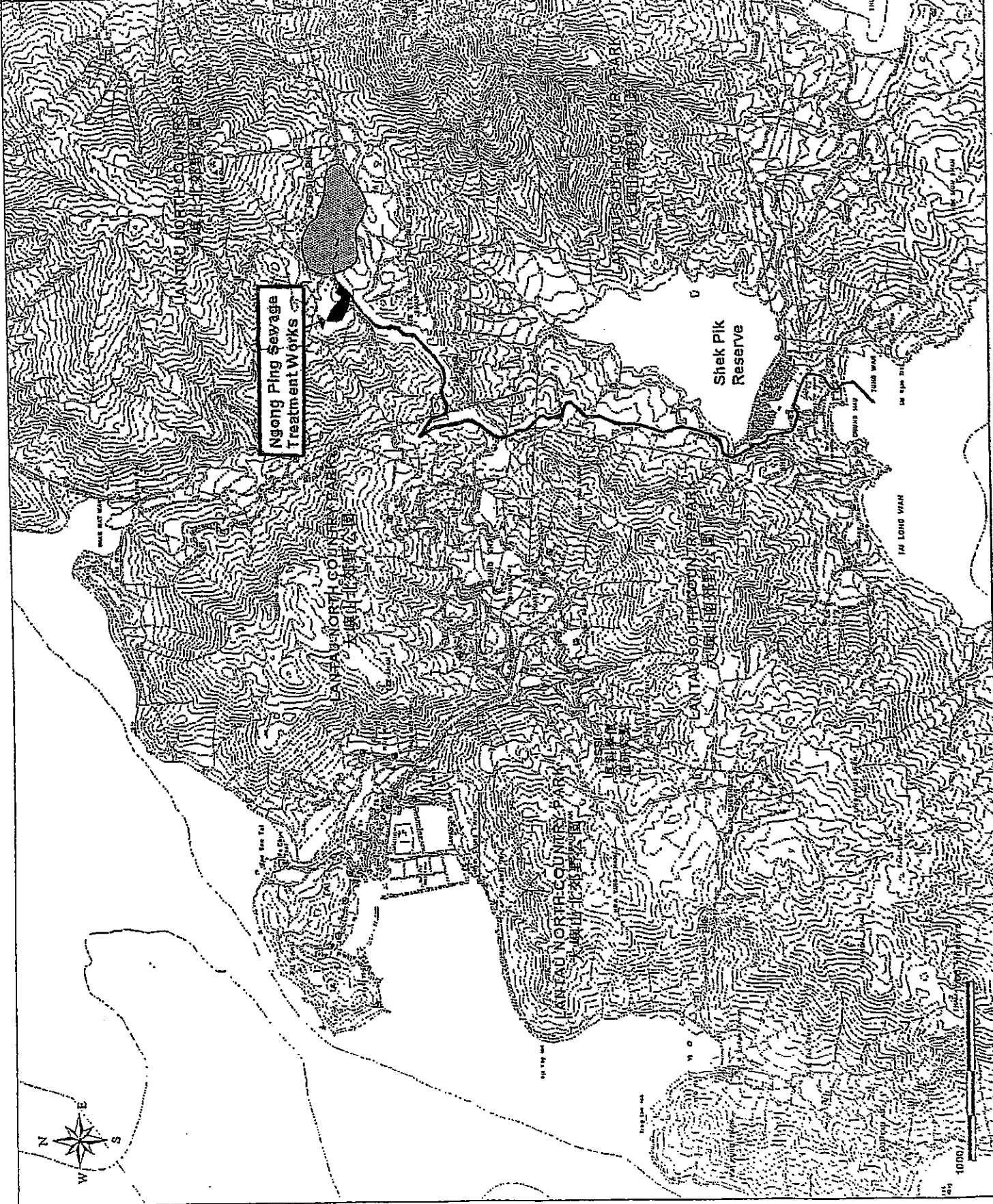






## **Appendix D**

### **General Layout Plan**



**Legend:**

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

Project No.	
Scale	
Date	
Sheet No.	
Sheet	

**ARUP**

ARUP CONSULTANTS LIMITED

AGREEMENT NO CE 2001  
 ACTING CHIEF EXECUTIVE OFFICER  
 NGONG PING SEWERAGE TREATMENT  
 WORKS AND SEWERAGE

Ngong Ping Sewerage Project  
 Scheme - General Layout

Project No.	23400/EN/0088
Scale	AC
Date	Feb 03
Sheet	AC
Sheet	AC
Scale	1:20000@A3
Sheet	Preliminary

香港特別行政區環境保護署  
 ENVIRONMENTAL PROTECTION  
 DEPARTMENT OF THE  
 HONG KONG  
 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	100.1	WM3	2.3	---	---
Nitrate + Nitrite	95	---	---	---	---
Oil & Grease	97	---	---	---	---
Ammoniacal Nitrogen	103	---	---	---	---
Synthetic detergents	---	---	---	---	---
Biochemical Oxygen Demand (5-day)	98	WM3	1.2	---	---
Total Phosphates	107	---	---	---	---
Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	Difference between Duplicates +	Sample ID	% Recovery @
pH Value(at 25°C)	---	WM3	0.02 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.



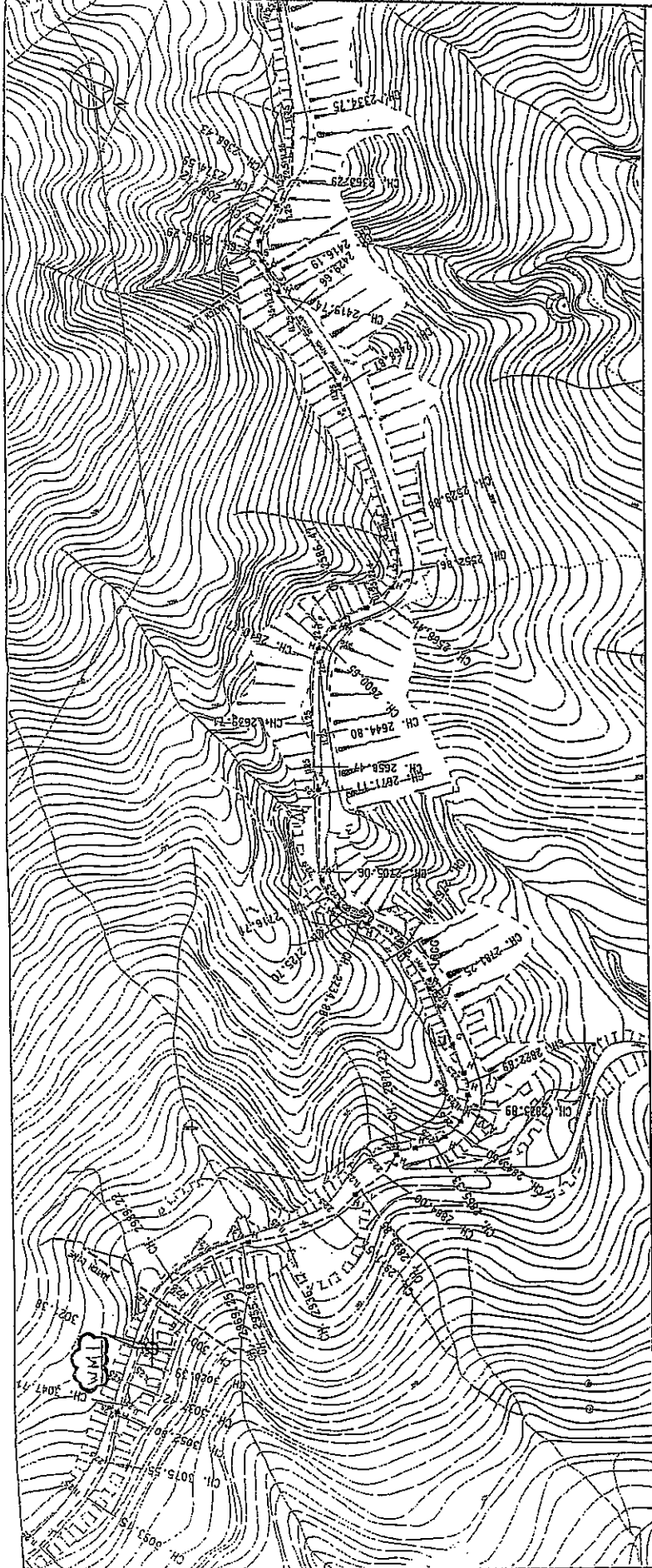
## Figures

LEGENDS :

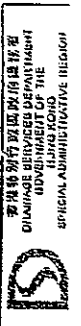
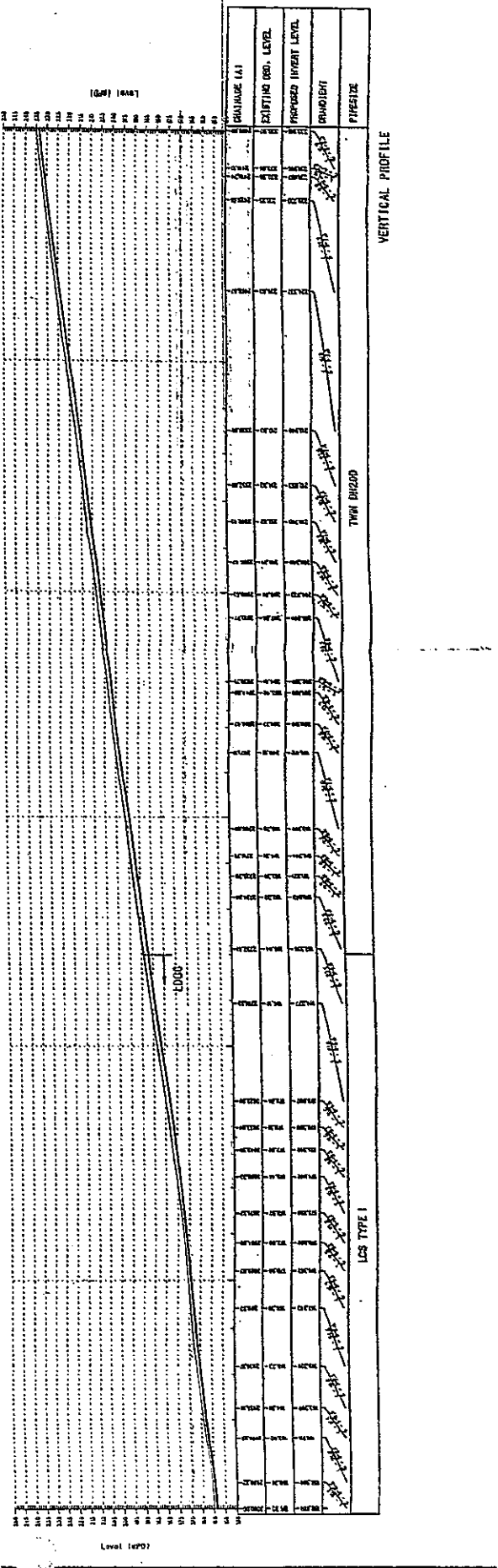
- EFFLUENT PIPELINE ALIGNMENT
- EXISTING GROUND LEVEL
- EFFLUENT PIPELINE PROFILE
- HATCHBOX CHAMBER
- GATE VALVES CHAMBER
- VENTILATION PIPE CHAMBER
- BENDS

NOTE:

1. REFER TO DRAWING FOR DIMENSIONS AND DETAILS.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.
6. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.
7. ALL WORK SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND STANDARDS OF THE DEPARTMENT OF WATER SUPPLY AND SEWERAGE.



<p><b>ARUP</b> One Avenue Road, Hong Kong Limited</p> <p>Project No. 23400T0074</p> <p>Contract No. DC000301</p> <p><b>RIGID PING SEWAGE TREATMENT PLANT, TRUK BEVERES AND EFFLUENT EXPORT PIPELINE</b></p> <p>Effluent Export Pipeline Alignment and Profile (Sheet 5 of 10)</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">ISSUE FOR CONSTRUCTION</td> <td style="width: 50%;">DATE</td> </tr> <tr> <td>DESCRIPTION</td> <td>BY</td> </tr> <tr> <td>DATE</td> <td>BY</td> </tr> </table> <p style="text-align: center;">             香港特別行政區政府              環境及自然護理署              DEPARTMENT OF ENVIRONMENT AND NATURE              香港特別行政區政府              環境及自然護理署              DEPARTMENT OF ENVIRONMENT AND NATURE         </p>	ISSUE FOR CONSTRUCTION	DATE	DESCRIPTION	BY	DATE	BY
ISSUE FOR CONSTRUCTION	DATE						
DESCRIPTION	BY						
DATE	BY						

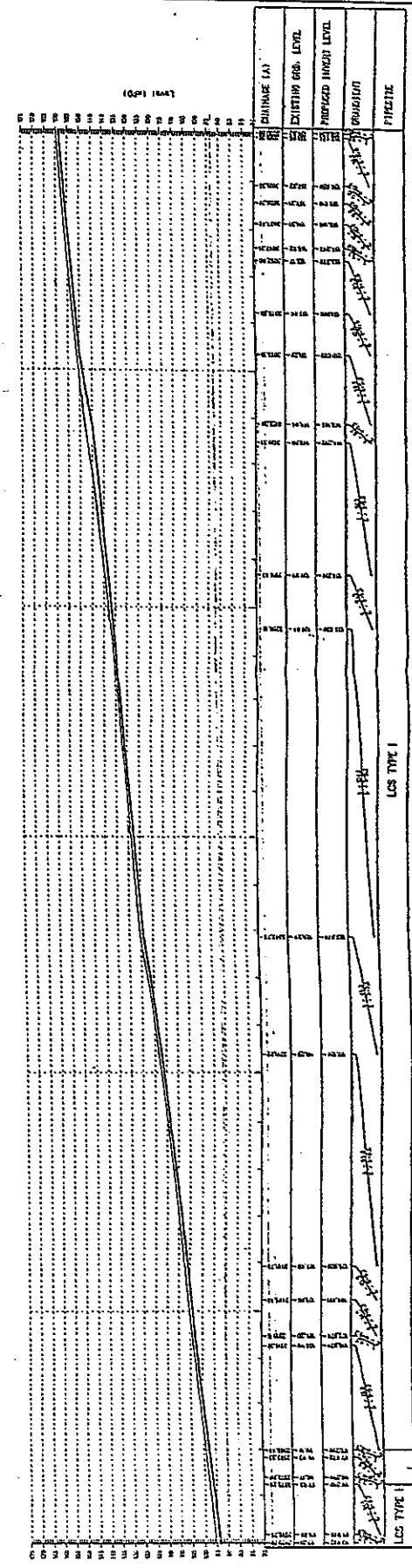
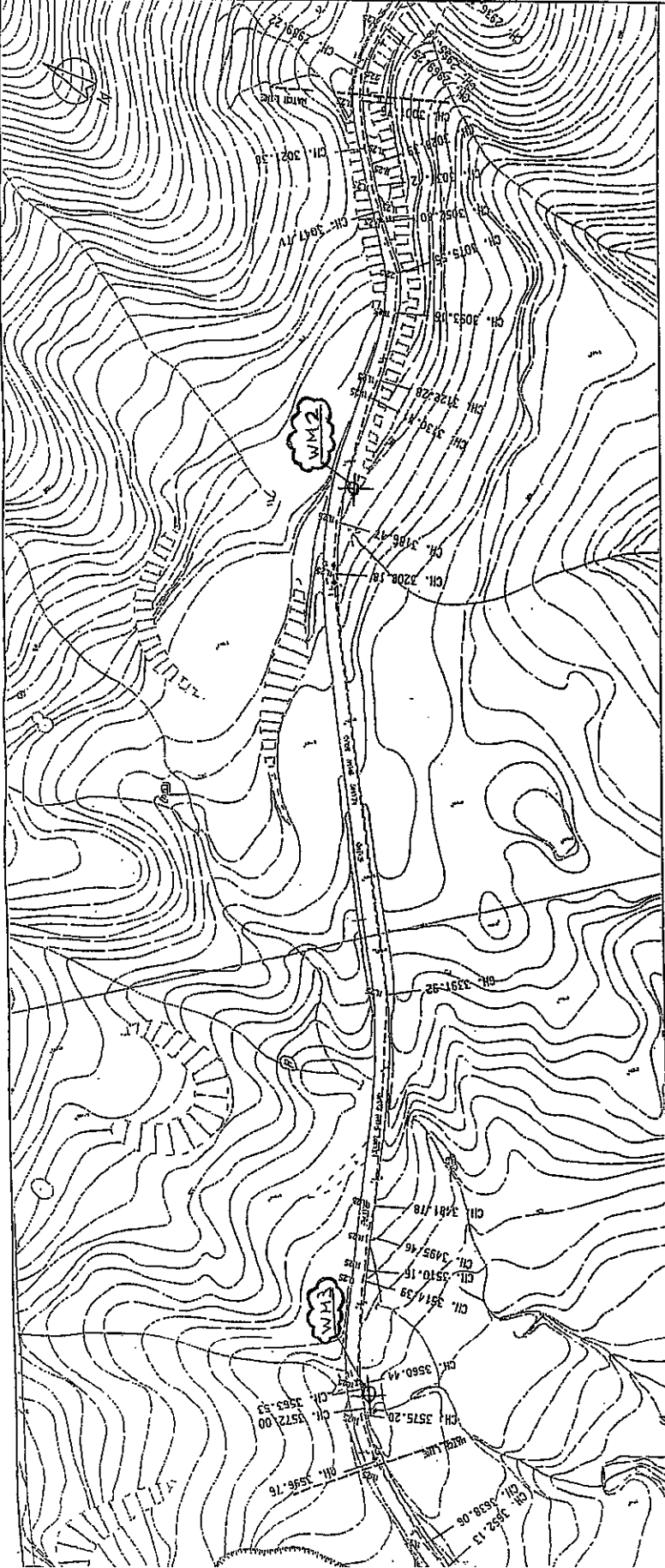


LEGENDS :

- EFFLUENT PIPELINE ALIGNMENT
- EXISTING GROUND LEVEL
- EFFLUENT PIPELINE PROFILE
- H HATCHBOX CHAMBER
- o o GATE VALVES CHAMBER
- ▲ V VENTILATION PIPE CHAMBER
- L-25 BENDS

NOTE:

1. REFER TO DRAWING NO. 21100/010/01 FOR DETAILS.
2. USE 1:20 SCALE FOR ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED.
3. ALL DIMENSIONS ARE TO THE CENTERLINE OF THE PIPE UNLESS OTHERWISE SPECIFIED.
4. ALL DIMENSIONS ARE TO THE CENTERLINE OF THE PIPE UNLESS OTHERWISE SPECIFIED.
5. THE LOCATION OF EACH AND EVERY PIPE TO BE EXTENDED IN THE FUTURE IS INDICATED BY A DOTTED LINE.
6. THE LOCATION OF EACH AND EVERY PIPE TO BE EXTENDED IN THE FUTURE IS INDICATED BY A DOTTED LINE.
7. THE LOCATION OF EACH AND EVERY PIPE TO BE EXTENDED IN THE FUTURE IS INDICATED BY A DOTTED LINE.
8. THE LOCATION OF EACH AND EVERY PIPE TO BE EXTENDED IN THE FUTURE IS INDICATED BY A DOTTED LINE.



ISSUE FOR CONSTRUCTION	DATE
Rev	Date
Description	
By	
Date	
Checked	
Date	

**ARUP** On Joint Venture (Hong Kong Limited)

Project No. **234001076**

Contract No. **DC200304**  
**HONG KONG SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE**

Drawing No. **EFFLUENT EXPORT PIPELINE - ALIGNMENT AND PROFILE (SHEET 5 OF 10)**

Scale: 1:1000

Drawn: **Y. Y. Y.**  
 Checked: **Y. Y. Y.**  
 Approved: **Y. Y. Y.**

DATE: **10/10/03**

DEPARTMENT: **SEWERAGE**

PROJECT: **SEWERAGE**

REVISIONS:

NO. 1: **ISSUE FOR CONSTRUCTION**

NO. 2: **ISSUE FOR CONSTRUCTION**

NO. 3: **ISSUE FOR CONSTRUCTION**

NO. 4: **ISSUE FOR CONSTRUCTION**

NO. 5: **ISSUE FOR CONSTRUCTION**

NO. 6: **ISSUE FOR CONSTRUCTION**

NO. 7: **ISSUE FOR CONSTRUCTION**

NO. 8: **ISSUE FOR CONSTRUCTION**

NO. 9: **ISSUE FOR CONSTRUCTION**

NO. 10: **ISSUE FOR CONSTRUCTION**

NO. 11: **ISSUE FOR CONSTRUCTION**

NO. 12: **ISSUE FOR CONSTRUCTION**

NO. 13: **ISSUE FOR CONSTRUCTION**

NO. 14: **ISSUE FOR CONSTRUCTION**

NO. 15: **ISSUE FOR CONSTRUCTION**

NO. 16: **ISSUE FOR CONSTRUCTION**

NO. 17: **ISSUE FOR CONSTRUCTION**

NO. 18: **ISSUE FOR CONSTRUCTION**

NO. 19: **ISSUE FOR CONSTRUCTION**

NO. 20: **ISSUE FOR CONSTRUCTION**

NO. 21: **ISSUE FOR CONSTRUCTION**

NO. 22: **ISSUE FOR CONSTRUCTION**

NO. 23: **ISSUE FOR CONSTRUCTION**

NO. 24: **ISSUE FOR CONSTRUCTION**

NO. 25: **ISSUE FOR CONSTRUCTION**

NO. 26: **ISSUE FOR CONSTRUCTION**

NO. 27: **ISSUE FOR CONSTRUCTION**

NO. 28: **ISSUE FOR CONSTRUCTION**

NO. 29: **ISSUE FOR CONSTRUCTION**

NO. 30: **ISSUE FOR CONSTRUCTION**

NO. 31: **ISSUE FOR CONSTRUCTION**

NO. 32: **ISSUE FOR CONSTRUCTION**

NO. 33: **ISSUE FOR CONSTRUCTION**

NO. 34: **ISSUE FOR CONSTRUCTION**

NO. 35: **ISSUE FOR CONSTRUCTION**

NO. 36: **ISSUE FOR CONSTRUCTION**

NO. 37: **ISSUE FOR CONSTRUCTION**

NO. 38: **ISSUE FOR CONSTRUCTION**

NO. 39: **ISSUE FOR CONSTRUCTION**

NO. 40: **ISSUE FOR CONSTRUCTION**

NO. 41: **ISSUE FOR CONSTRUCTION**

NO. 42: **ISSUE FOR CONSTRUCTION**

NO. 43: **ISSUE FOR CONSTRUCTION**

NO. 44: **ISSUE FOR CONSTRUCTION**

NO. 45: **ISSUE FOR CONSTRUCTION**

NO. 46: **ISSUE FOR CONSTRUCTION**

NO. 47: **ISSUE FOR CONSTRUCTION**

NO. 48: **ISSUE FOR CONSTRUCTION**

NO. 49: **ISSUE FOR CONSTRUCTION**

NO. 50: **ISSUE FOR CONSTRUCTION**

NO. 51: **ISSUE FOR CONSTRUCTION**

NO. 52: **ISSUE FOR CONSTRUCTION**

NO. 53: **ISSUE FOR CONSTRUCTION**

NO. 54: **ISSUE FOR CONSTRUCTION**

NO. 55: **ISSUE FOR CONSTRUCTION**

NO. 56: **ISSUE FOR CONSTRUCTION**

NO. 57: **ISSUE FOR CONSTRUCTION**

NO. 58: **ISSUE FOR CONSTRUCTION**

NO. 59: **ISSUE FOR CONSTRUCTION**

NO. 60: **ISSUE FOR CONSTRUCTION**

NO. 61: **ISSUE FOR CONSTRUCTION**

NO. 62: **ISSUE FOR CONSTRUCTION**

NO. 63: **ISSUE FOR CONSTRUCTION**

NO. 64: **ISSUE FOR CONSTRUCTION**

NO. 65: **ISSUE FOR CONSTRUCTION**

NO. 66: **ISSUE FOR CONSTRUCTION**

NO. 67: **ISSUE FOR CONSTRUCTION**

NO. 68: **ISSUE FOR CONSTRUCTION**

NO. 69: **ISSUE FOR CONSTRUCTION**

NO. 70: **ISSUE FOR CONSTRUCTION**

NO. 71: **ISSUE FOR CONSTRUCTION**

NO. 72: **ISSUE FOR CONSTRUCTION**

NO. 73: **ISSUE FOR CONSTRUCTION**

NO. 74: **ISSUE FOR CONSTRUCTION**

NO. 75: **ISSUE FOR CONSTRUCTION**

NO. 76: **ISSUE FOR CONSTRUCTION**

NO. 77: **ISSUE FOR CONSTRUCTION**

NO. 78: **ISSUE FOR CONSTRUCTION**

NO. 79: **ISSUE FOR CONSTRUCTION**

NO. 80: **ISSUE FOR CONSTRUCTION**

NO. 81: **ISSUE FOR CONSTRUCTION**

NO. 82: **ISSUE FOR CONSTRUCTION**

NO. 83: **ISSUE FOR CONSTRUCTION**

NO. 84: **ISSUE FOR CONSTRUCTION**

NO. 85: **ISSUE FOR CONSTRUCTION**

NO. 86: **ISSUE FOR CONSTRUCTION**

NO. 87: **ISSUE FOR CONSTRUCTION**

NO. 88: **ISSUE FOR CONSTRUCTION**

NO. 89: **ISSUE FOR CONSTRUCTION**

NO. 90: **ISSUE FOR CONSTRUCTION**

NO. 91: **ISSUE FOR CONSTRUCTION**

NO. 92: **ISSUE FOR CONSTRUCTION**

NO. 93: **ISSUE FOR CONSTRUCTION**

NO. 94: **ISSUE FOR CONSTRUCTION**

NO. 95: **ISSUE FOR CONSTRUCTION**

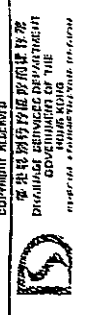
NO. 96: **ISSUE FOR CONSTRUCTION**

NO. 97: **ISSUE FOR CONSTRUCTION**

NO. 98: **ISSUE FOR CONSTRUCTION**

NO. 99: **ISSUE FOR CONSTRUCTION**

NO. 100: **ISSUE FOR CONSTRUCTION**

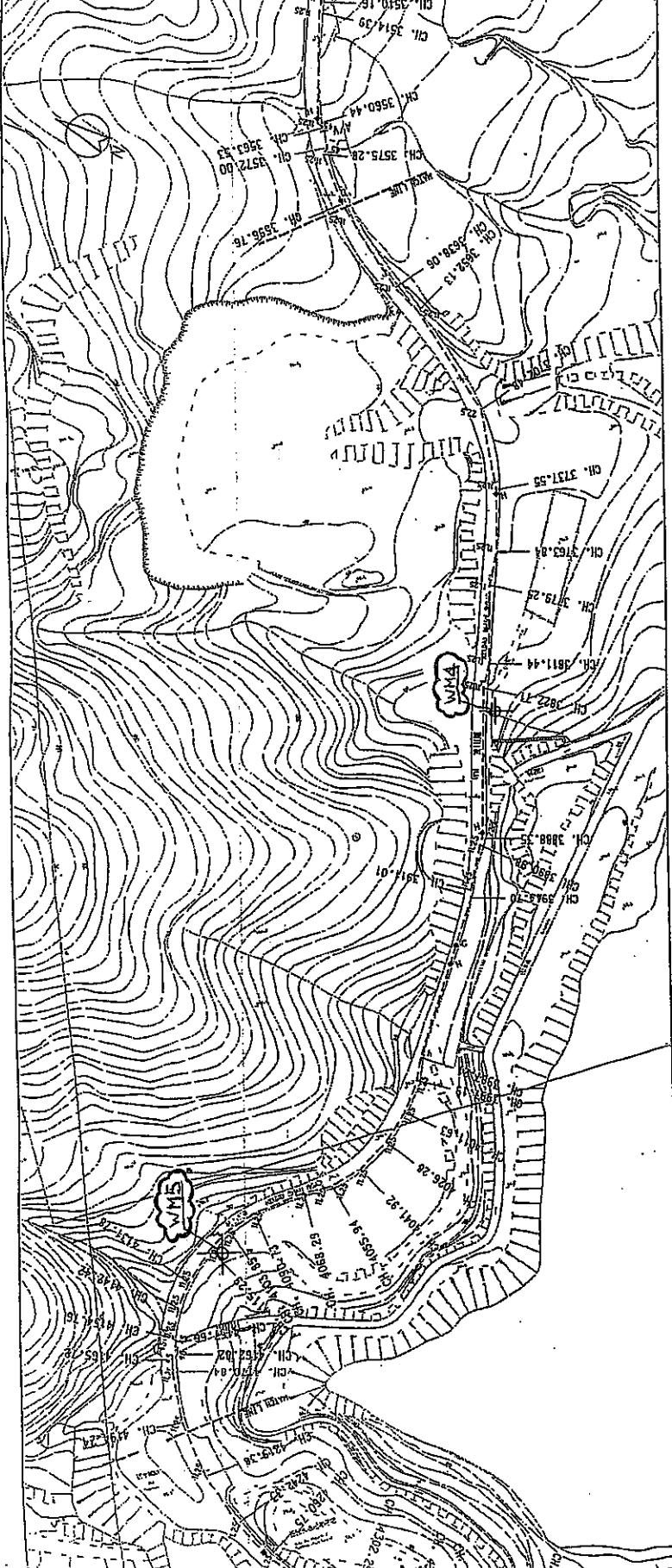


LEGENDS :

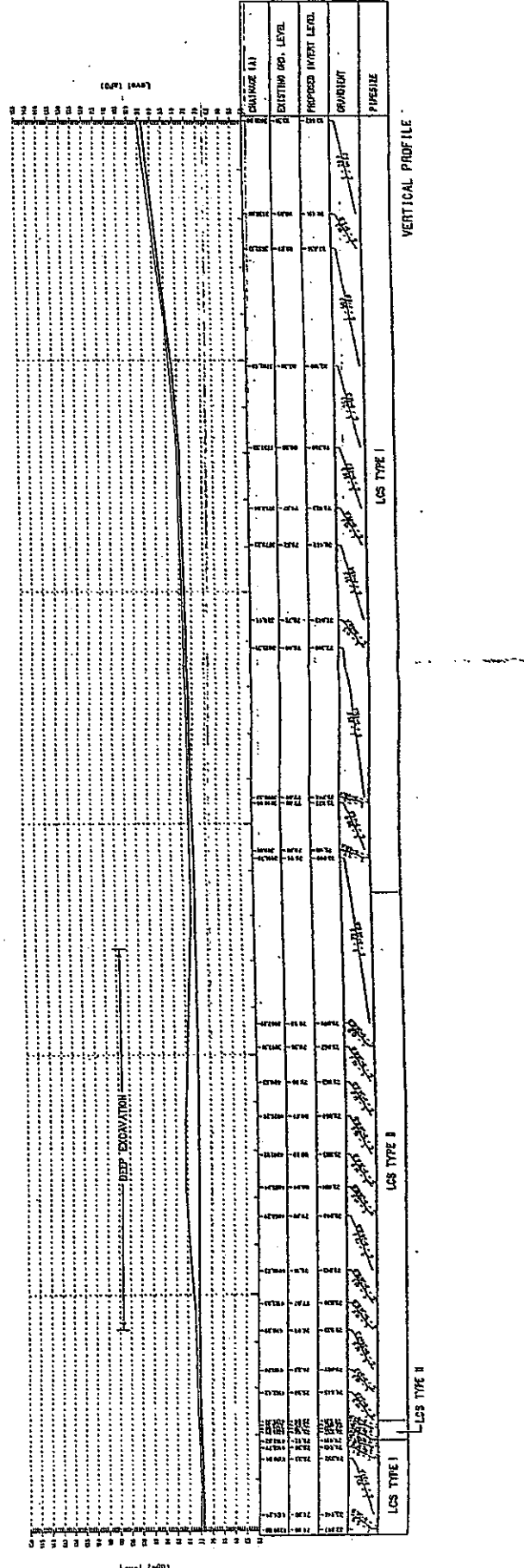
- EFFLUENT PIPELINE ALIGNMENT
- EXISTING GROUND LEVEL
- EFFLUENT PIPELINE PROFILE
- HATCHBOX CHAMBER
- GATE VALVES CHAMBER
- △ VENTILATION PIPE CHAMBER
- 11.25 BENDS

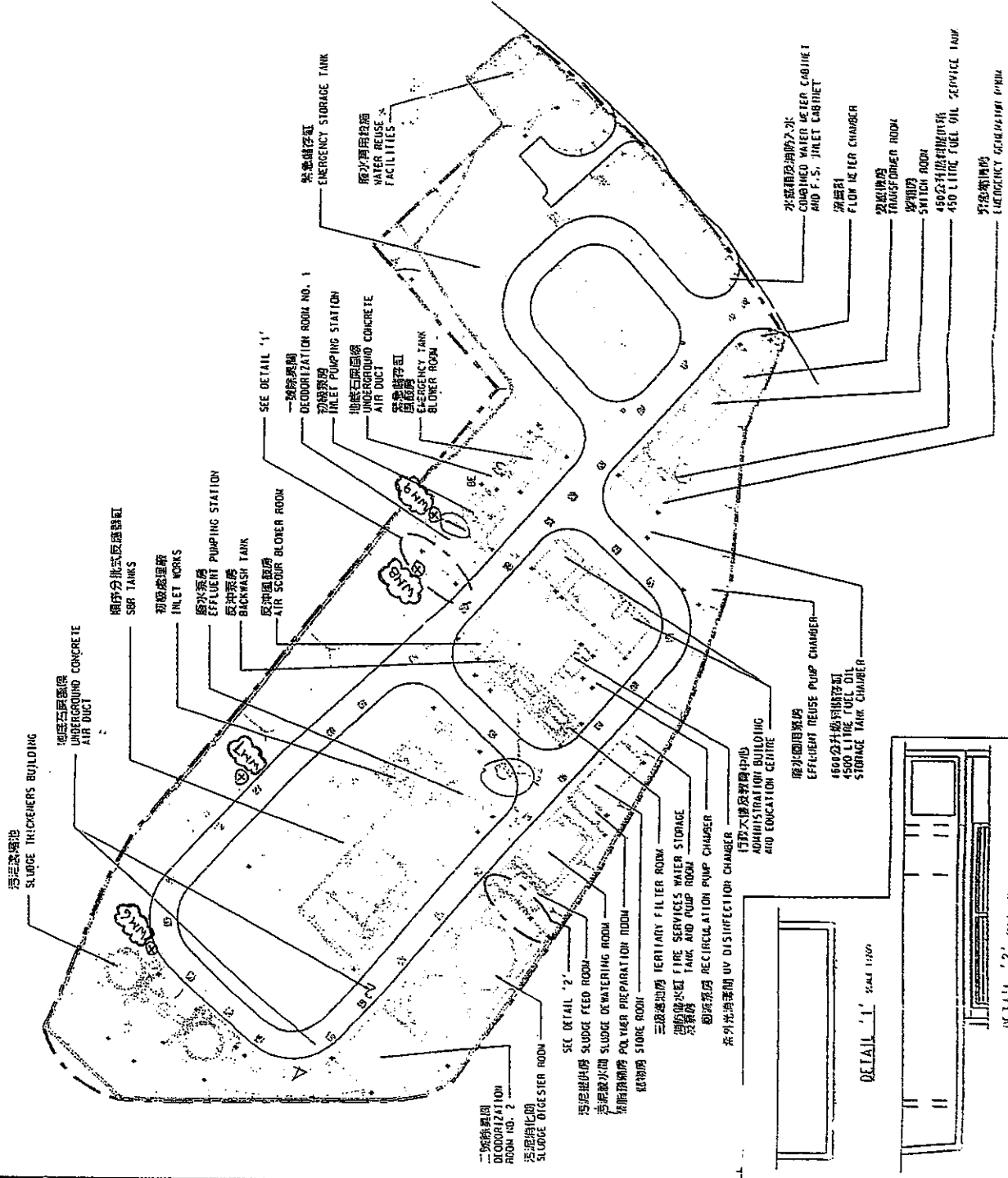
NOTE:

1. REFER TO DRAWING NO. 114/02/74/1/1/1 FOR GENERAL NOTES
2. ALL CHAMBER CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
3. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
4. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
5. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
6. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
7. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
8. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
9. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT
10. ALL CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE SPECIFICATIONS OF THE HONG KONG WATER SUPPLY DEPARTMENT



ISSUE FOR CONSTRUCTION	DATE	BY
Rev	Description	Date
<p>ARUP One App &amp; Palace Hong Kong Limited</p>		
<p>CONTRACT NO. DC/20/001 NGONG PING SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE</p>		
<p>EFFLUENT EXPORT PIPELINE: ALIGNMENT AND PROFILE (SHEET 7 OF 10)</p>		
Drawing No.	234007076	Scale
Project No.	DC/20/001	Sheet No.
Client	HONG KONG WATER SUPPLY DEPARTMENT	Author
Check	W. L. CHAN	Drawn
Approved	W. L. CHAN	Reviewed
<p>ALL RIGHTS RESERVED COPYRIGHT RESERVED</p>		
<p>香港供水部 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION</p>		





SETTLING OUT TABLE

LOCATION	NORTHING	EASTING
1	11744.382	80746.822
2	11732.401	80735.428
3	11732.401	80735.428
4	11732.401	80735.428
5	11732.401	80735.428
6	11732.401	80735.428
7	11732.401	80735.428
8	11732.401	80735.428
9	11732.401	80735.428
10	11732.401	80735.428
11	11732.401	80735.428
12	11732.401	80735.428
13	11732.401	80735.428
14	11732.401	80735.428
15	11732.401	80735.428
16	11732.401	80735.428
17	11732.401	80735.428
18	11732.401	80735.428
19	11732.401	80735.428
20	11732.401	80735.428
21	11732.401	80735.428
22	11732.401	80735.428
23	11732.401	80735.428
24	11732.401	80735.428
25	11732.401	80735.428
26	11732.401	80735.428
27	11732.401	80735.428
28	11732.401	80735.428
29	11732.401	80735.428
30	11732.401	80735.428
31	11732.401	80735.428
32	11732.401	80735.428
33	11732.401	80735.428
34	11732.401	80735.428
35	11732.401	80735.428
36	11732.401	80735.428
37	11732.401	80735.428
38	11732.401	80735.428
39	11732.401	80735.428
40	11732.401	80735.428
41	11732.401	80735.428
42	11732.401	80735.428
43	11732.401	80735.428
44	11732.401	80735.428
45	11732.401	80735.428
46	11732.401	80735.428
47	11732.401	80735.428
48	11732.401	80735.428
49	11732.401	80735.428
50	11732.401	80735.428
51	11732.401	80735.428
52	11732.401	80735.428
53	11732.401	80735.428
54	11732.401	80735.428
55	11732.401	80735.428
56	11732.401	80735.428
57	11732.401	80735.428
58	11732.401	80735.428
59	11732.401	80735.428
60	11732.401	80735.428
61	11732.401	80735.428
62	11732.401	80735.428
63	11732.401	80735.428
64	11732.401	80735.428
65	11732.401	80735.428
66	11732.401	80735.428
67	11732.401	80735.428
68	11732.401	80735.428
69	11732.401	80735.428
70	11732.401	80735.428
71	11732.401	80735.428
72	11732.401	80735.428
73	11732.401	80735.428
74	11732.401	80735.428
75	11732.401	80735.428
76	11732.401	80735.428
77	11732.401	80735.428
78	11732.401	80735.428
79	11732.401	80735.428
80	11732.401	80735.428
81	11732.401	80735.428
82	11732.401	80735.428
83	11732.401	80735.428
84	11732.401	80735.428
85	11732.401	80735.428
86	11732.401	80735.428
87	11732.401	80735.428
88	11732.401	80735.428
89	11732.401	80735.428
90	11732.401	80735.428
91	11732.401	80735.428
92	11732.401	80735.428
93	11732.401	80735.428
94	11732.401	80735.428
95	11732.401	80735.428
96	11732.401	80735.428
97	11732.401	80735.428
98	11732.401	80735.428
99	11732.401	80735.428
100	11732.401	80735.428

KEY PLAN

NOTE:  
 1. COORDINATES SHOWN ON THE TABLE ARE MEASURED AT THE OUTSIDE WALL AT GPD.  
 2. PLAN OF STRUCTURES ARE SHOWN AT 1:44:1.00 GPD.



ARUP  
 No. 101, Prince of Wales Drive  
 Project No. 24007700  
 CONTRACT NO. 10200001  
 WONG PING SANG TREATMENT PLANT, TANK SIZES AND EFFLUENT REUSE PIPELINE  
 Drawing No. 24007700-01  
 SHEET NO. 2  
 DATE: 11/11/09  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 APPROVED BY: [Name]  
 CONSULTANT: [Name]  
 CONTRACTOR: [Name]  
 DESIGNER: [Name]  
 ARCHITECT: [Name]  
 CIVIL ENGINEER: [Name]  
 ELECTRICAL ENGINEER: [Name]  
 MECHANICAL ENGINEER: [Name]  
 STRUCTURAL ENGINEER: [Name]  
 ENVIRONMENTAL ENGINEER: [Name]  
 GEOTECHNICAL ENGINEER: [Name]  
 LANDSCAPE ARCHITECT: [Name]  
 TRAFFIC ENGINEER: [Name]  
 WATER ENGINEER: [Name]  
 WASTE ENGINEER: [Name]  
 AIR POLLUTION ENGINEER: [Name]  
 SOIL CONTACTION ENGINEER: [Name]  
 VEGETATION ENGINEER: [Name]  
 HISTORICAL ENGINEER: [Name]  
 ARCHITECTURAL ENGINEER: [Name]  
 INTERIOR DESIGNER: [Name]  
 FURNITURE DESIGNER: [Name]  
 LIGHTING DESIGNER: [Name]  
 SOUND DESIGNER: [Name]  
 SECURITY DESIGNER: [Name]  
 SIGNAGE DESIGNER: [Name]  
 AV DESIGNER: [Name]  
 BROADCASTING ENGINEER: [Name]  
 TELECOMMUNICATIONS ENGINEER: [Name]  
 ENERGY ENGINEER: [Name]  
 ENVIRONMENTAL IMPACT ASSESSMENT ENGINEER: [Name]  
 SOCIAL INVESTIGATOR: [Name]