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 SERVICES DEPARTMENT

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

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

Prepared by: _____
LAW, Sau Yee
Senior Environmental Officer

Checked and Approved by: _____
LAU, Chi Leung
Environmental Team Leader

Issued Date: 03 July 2007 *Report No.: ENA70630*

Ngong Ping - OP (83)

西圖香港有限公司
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39 Gloucester Road
Wanchai, Hong Kong
Tel (852) 2507-2203
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CH2MHILL

FAXED

Our Ref.: DSDSTPOPEM0_0_0083

Date: 13 July 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 Jun 2007

Reference is made to the monthly EM&A Report prepared by ETS for the captioned project (report no. ENA70630). 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.

File to: (1)
(2)
Circulate to:

Yours sincerely,

Billy Yu
Independent Environmental Checker

c.c. Mr. Edwin Lam CE/HKI, DSD By Fax: 2827 6657
Mr. C L Lau ETS By Fax: 2695 3944

G:\PROJECTS\DSD_NGONG PING STP OPERATION PHASE\CORR\EM&A REPORT\GROUND WATER\DSDSTPOPEM0_0_0083L.07

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EXECUTIVE SUMMARY

This monthly EM&A report (No.15) 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 June 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 20 June 2007. During this monitoring, ground water was found in Borehole WM3 and the other boreholes 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 30 June 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	*9.68*	*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_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*	*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_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 on 20 June 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.

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*
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*	---	---
May 07	*0*	*0*	---	---
June 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 20 June 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, 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.

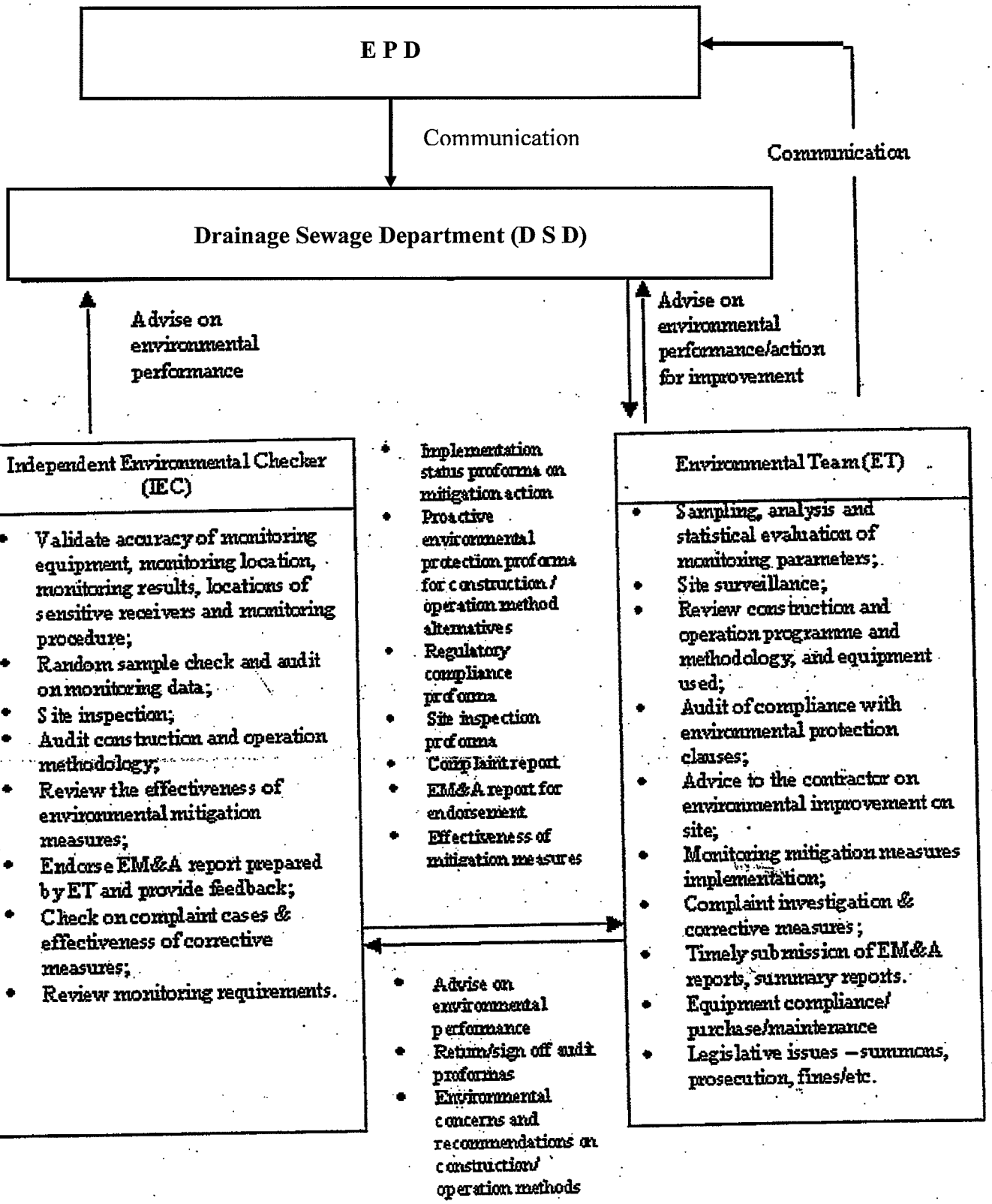
7.0 FUTURE KEY ISSUES

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

東業德勤測試顧問有限公司
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8/F., Block B, Veristrong Industrial Centre, 34-36 Au Pui Wan Street, Fotan, Hong Kong
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Fax : 2695 3944 Web site : www.ets-testconsult.com

TEST REPORT

Environmental Testing of Water & Wastewater

Report No. : ENA70629
Date of issue : 29 June 2007

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 : 20 June 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_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 : 20 June 2007

Result

Client Sample ID	Lab Ref No	Test	Method Used	Result	Date Tested
WM3	W21867 (01)	pH Value	In house method TPE/003/W	5.8 (at 25°C)	20 June 2007
		Turbidity	In house method TPE/005/W	29 NTU	20 June 2007
	W21867 (02)	Biochemical Oxygen Demand (5-day)	In house method TPE/001/W	7.8 mg/L	20 June 2007 (18:00) to 25 June 2007 (18:00)
	W21867 (04)	Nitrate & Nitrite Nitrogen	In house method TPE/023/W	<0.1 mg/L	26 June 2007
		Ammonia	In house method TPE/016/W	<0.025 mg/L	26 June 2007
	W21867 (06)	Total Phosphates	In house method TPE/019/W	<0.05 mg/L	22 June 2007
	W21867 (05)	Oil & Grease	APHA 19ed 5520B	<5.0 mg/L	22 June 2007
	W21867 (03)	Synthetic Detergents	In house method refer to APHA 19th ed 5540 C & D	<0.1 mg/L	21 June 2007
	W21867 (07)	E-coli *	DoE (1983), section 7.8 & 7.9 plus in-situ urease test	6 cfu/100ml	20 to 21 June 2007

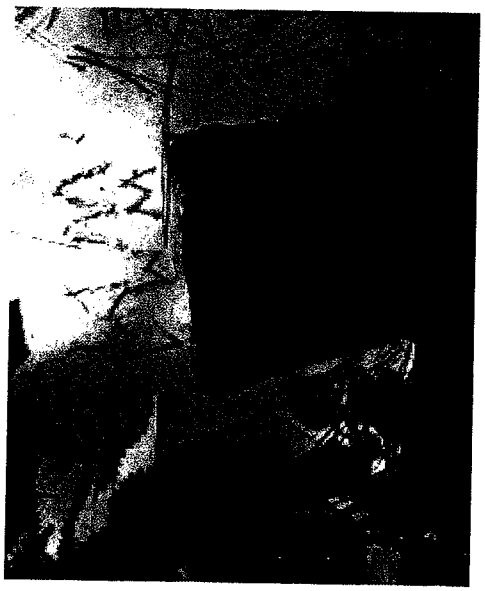
Remark (if any) : The tests marked with "*" indicated the tests were sub-contract to ALS Technichem (HK) Pty Ltd and HOKLAS accredited. Ground water monitoring was only carried out at Borehole WM3 only since other boreholes were observed to be dry during the monitoring.

Checked by : LAW, Sau Yee
Senior Chemist

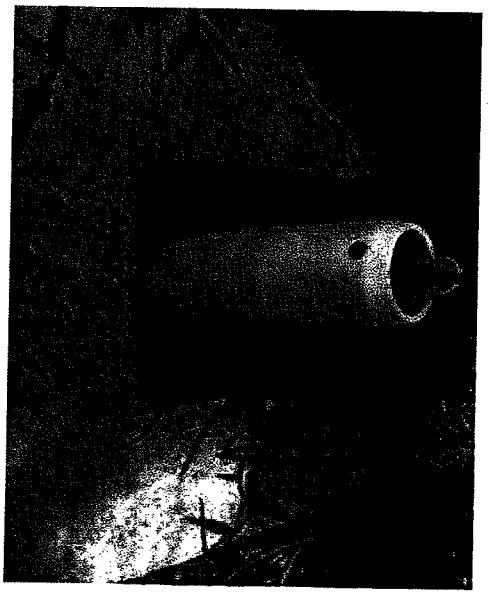
Approved by : LAU, Chi Leung
Chief Chemist

Project	:	DC/2004/09 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2005-2007)
Date of sampling and photo taking	:	20 June 2007
Report No.	:	ENA70629
Date of issue	:	29 June 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	:	20 June 2007
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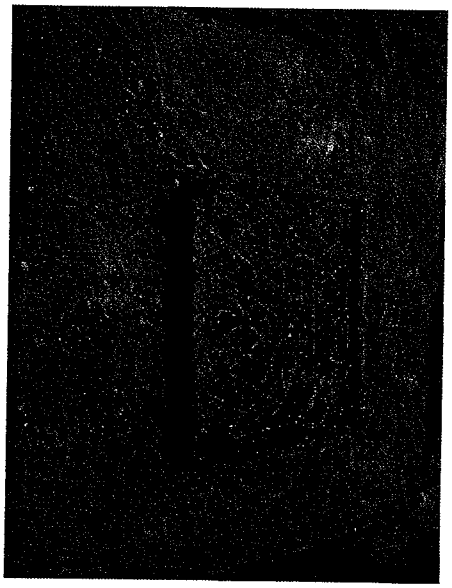
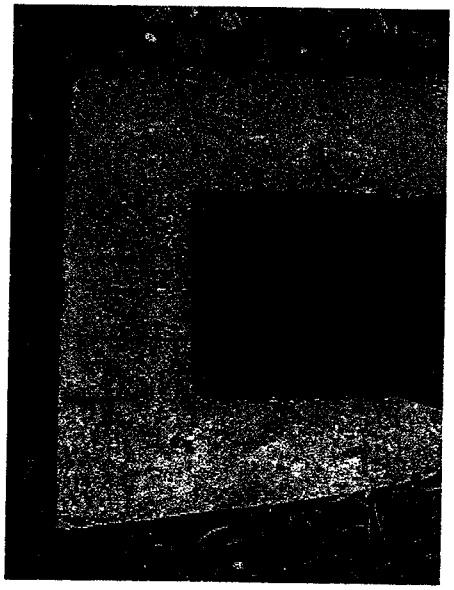
WM3



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	:	20 June 2007
Report No.	:	ENA70629
Date of issue	:	29 June 2007

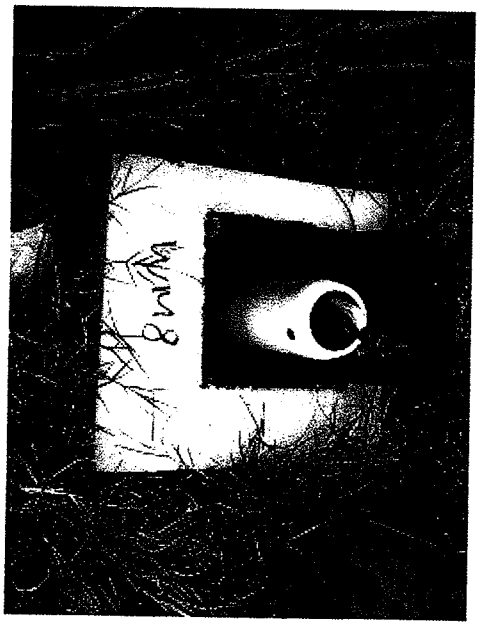
WM5

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	:	20 June 2007
Report No.	:	ENA70629
Date of issue	:	29 June 2007

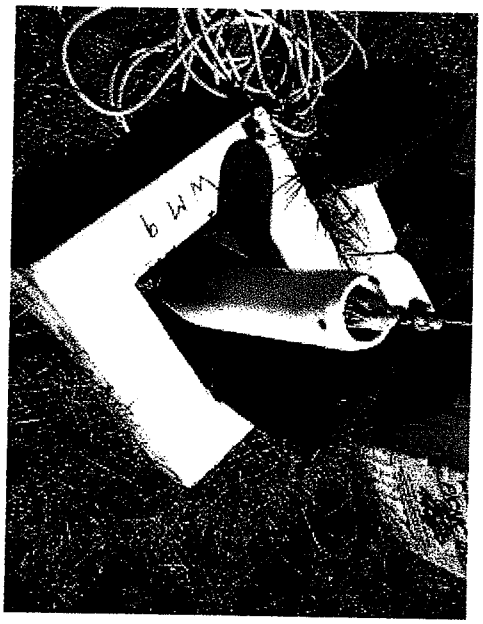
WM7

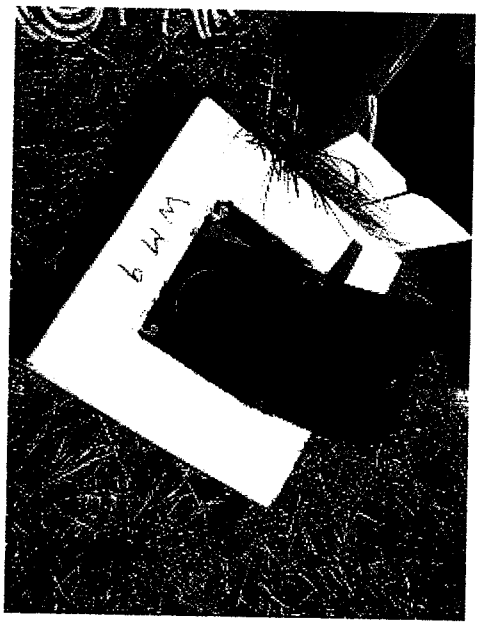
WM8



Project	:	DC/2004/09 - Building and Civil Maintenance and Minor Works to DSD Plants and Facilities (2005-2007)
Date of sampling and photo taking	:	20 June 2007
Report No.	:	ENA70629
Date of issue	:	29 June 2007

WM9

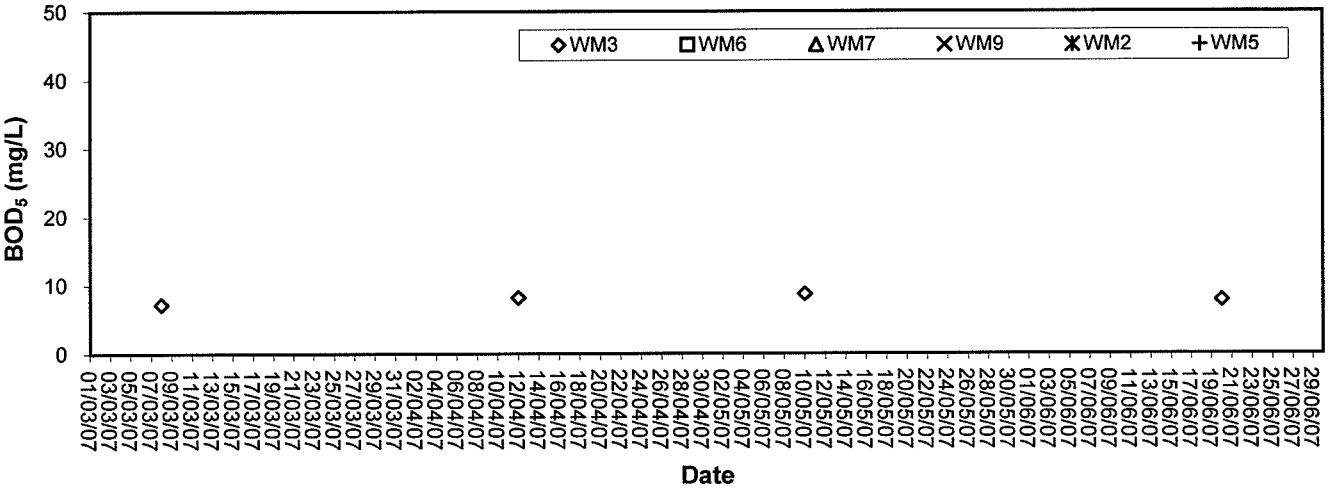




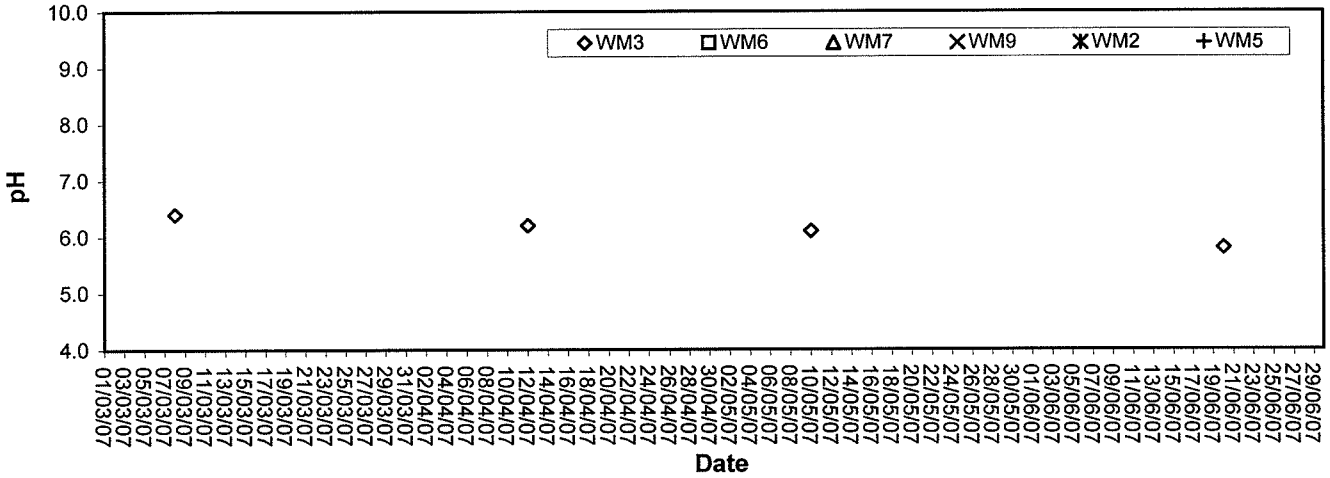
Appendix C

Graphical Plots of Groundwater Monitoring Data

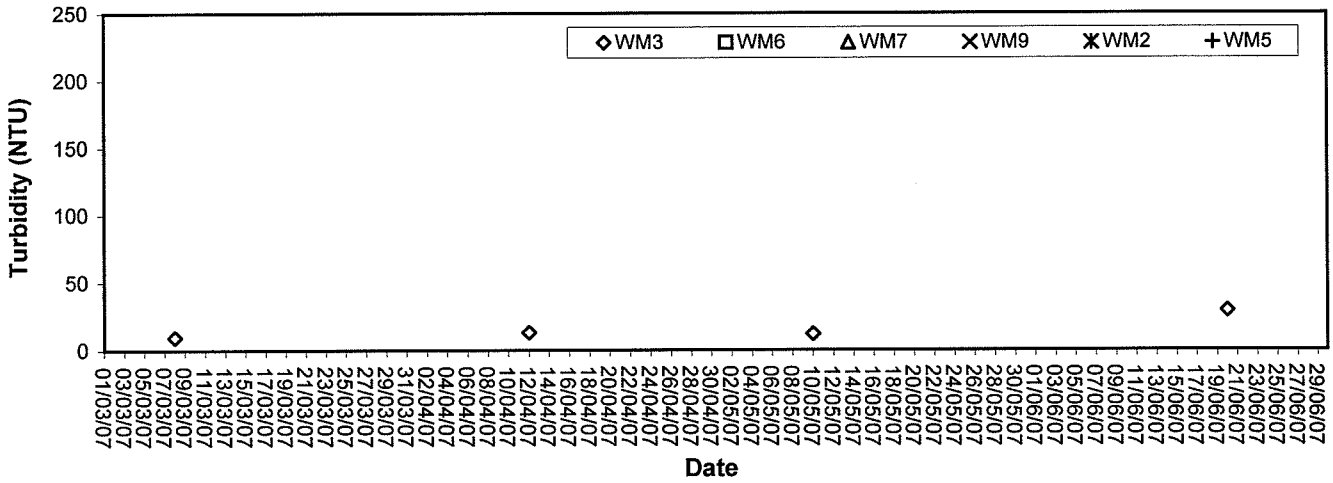
5-day Biochemical Oxygen Demand (BOD_5)



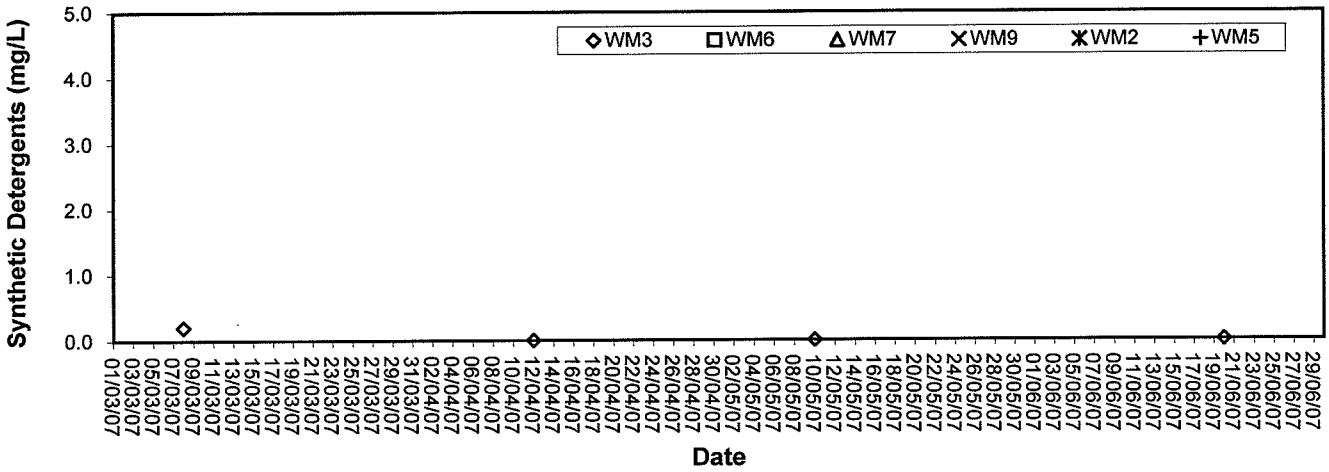
pH Value



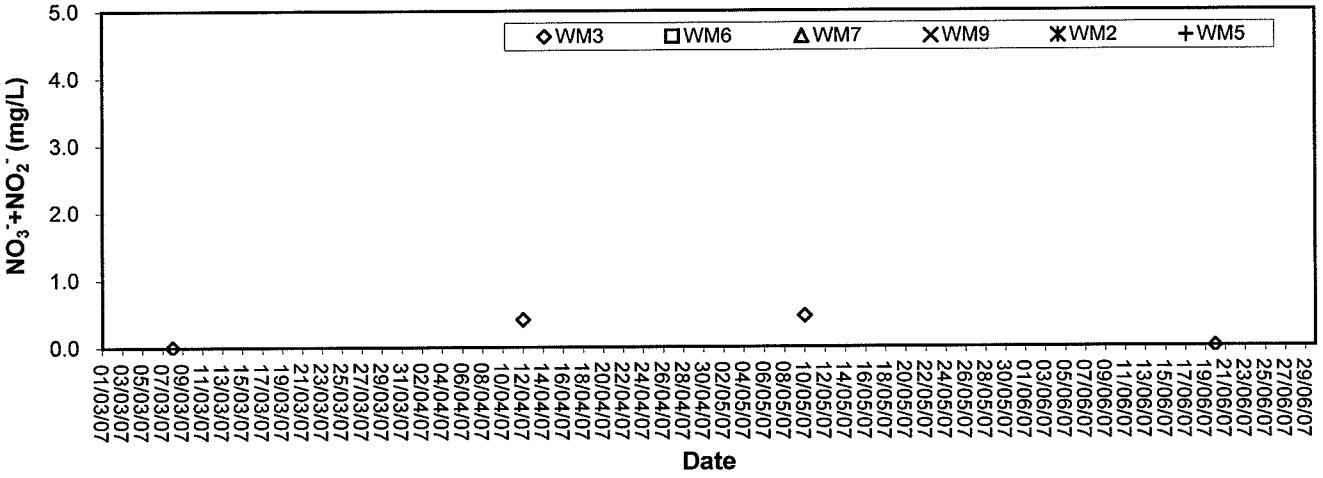
Turbidity



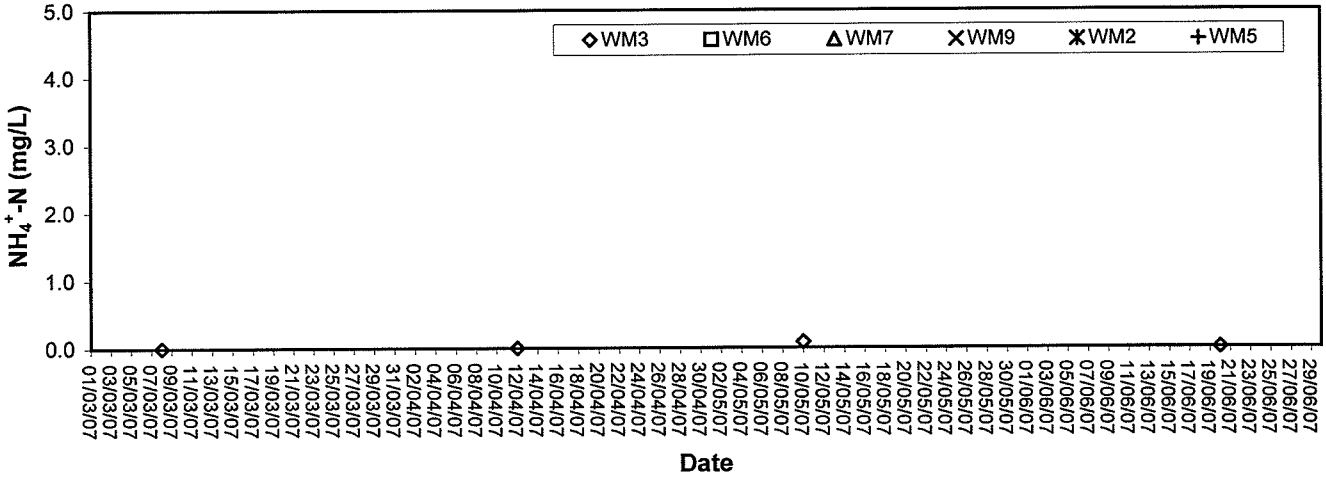
Synthetic Detergents



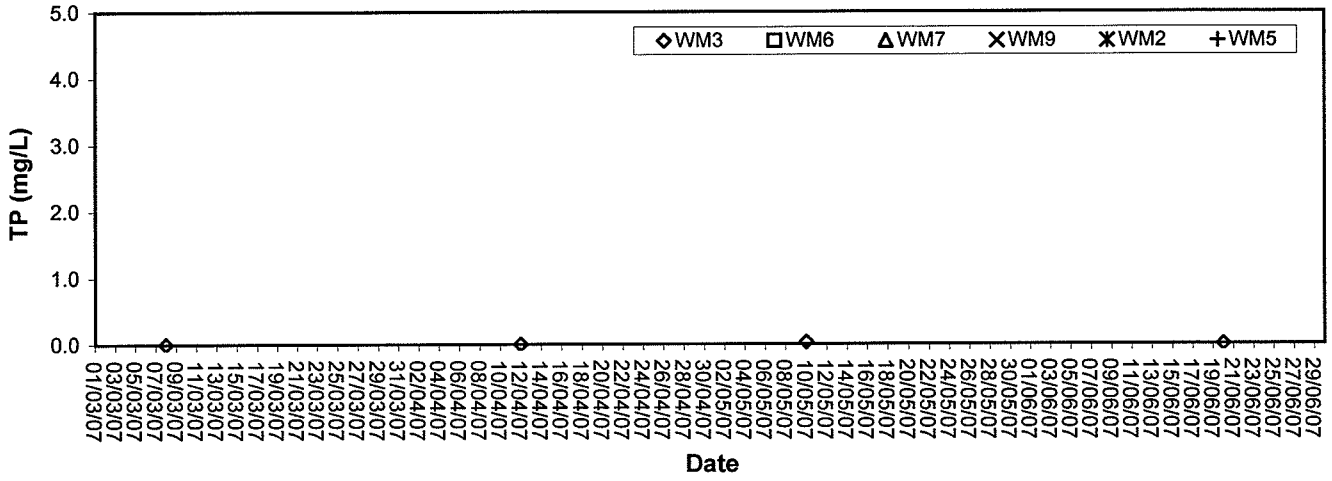
Nitrate & Nitrite Nitrogen (NO_3^-+NO_2^-)



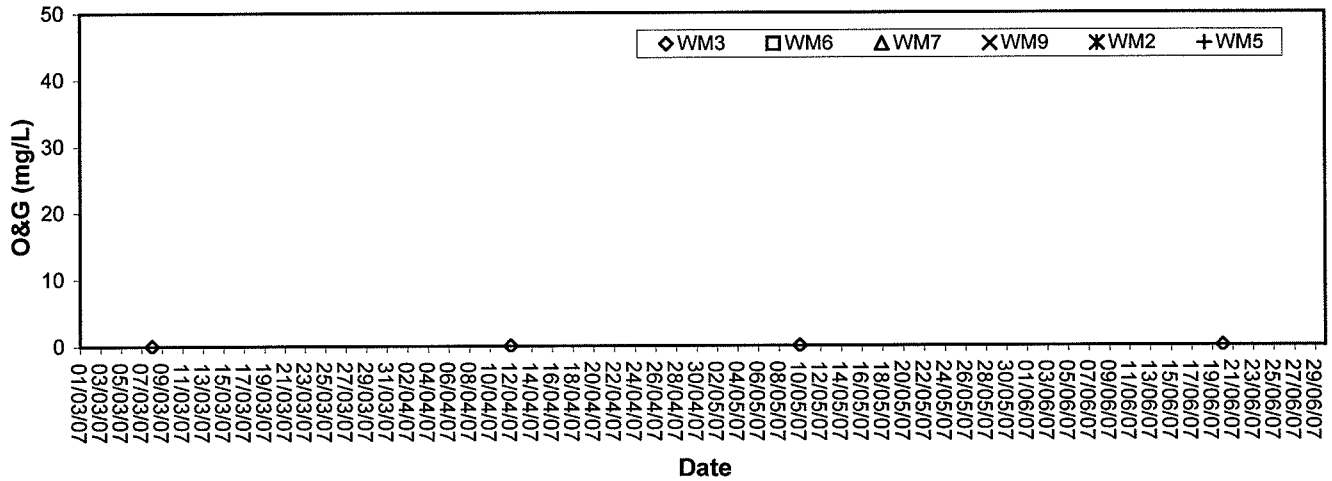
Ammonia Nitrogen (NH_4^+-N)



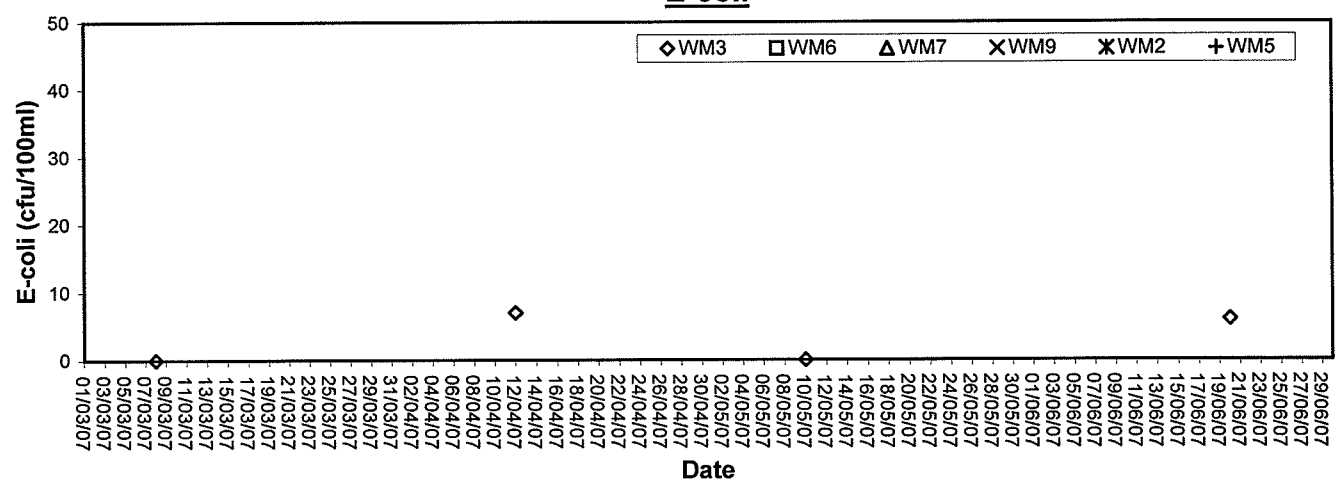
Total Phosphates (TP)



Oil & Grease (O&G)

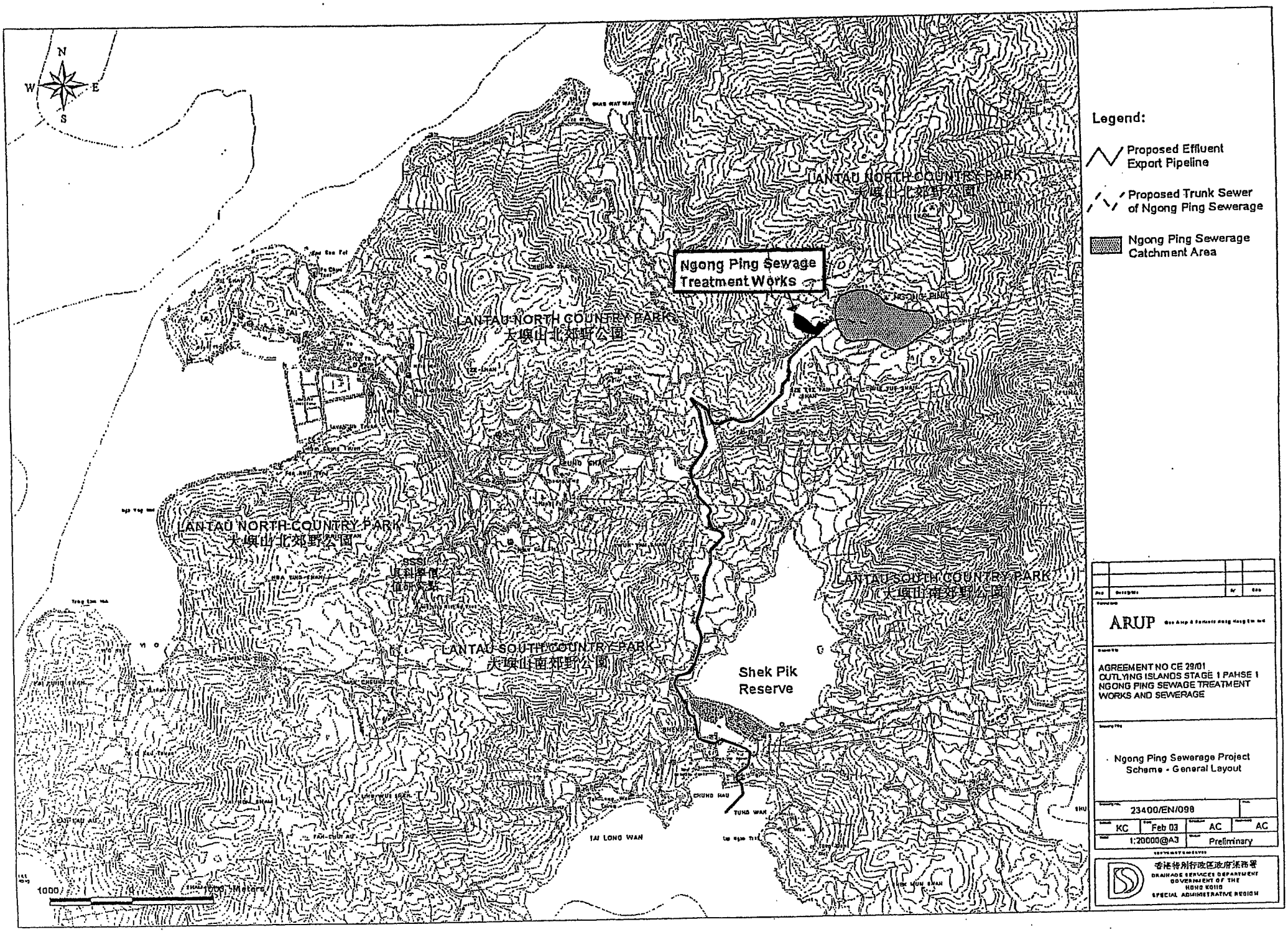


E-coli



Appendix D

General Layout Plan


N
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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
1000 Meters
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

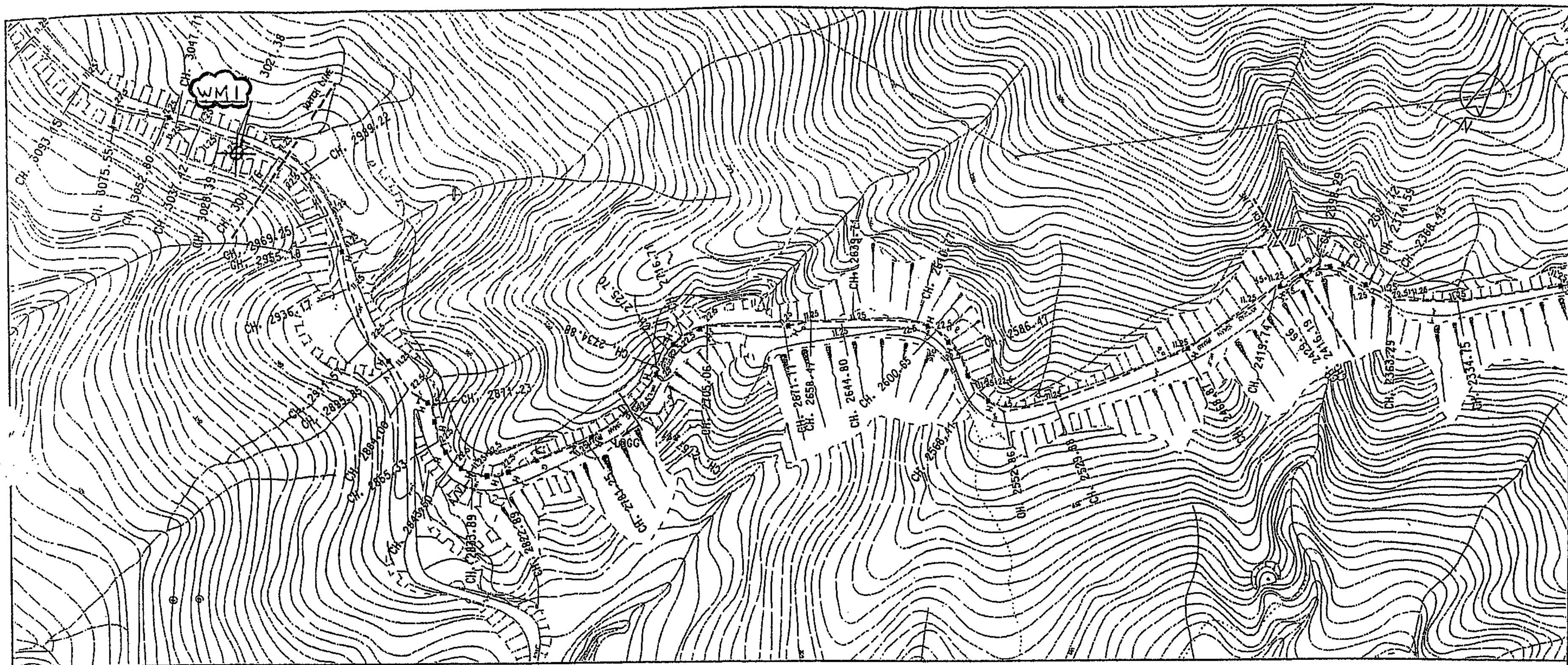
QA/QC Results of Laboratory Analysis of Testing Parameters

Testing Parameter	QC Sample Analysis	Sample Duplicate		Sample Spike	
	% Recovery *	Sample ID	% Error #	Sample ID	% Recovery @
Turbidity	100.8	WM3	2.1	---	---
Nitrate + Nitrite	98.3	---	---	---	---
Oil & Grease	102.0	---	---	---	---
Ammoniacal Nitrogen	102.6	---	---	---	---
Synthetic detergents	---	---	---	---	---
Biochemical Oxygen Demand (5-day)	96.5	WM3	2.6	---	---
Total Phosphates	104.8	---	---	---	---

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

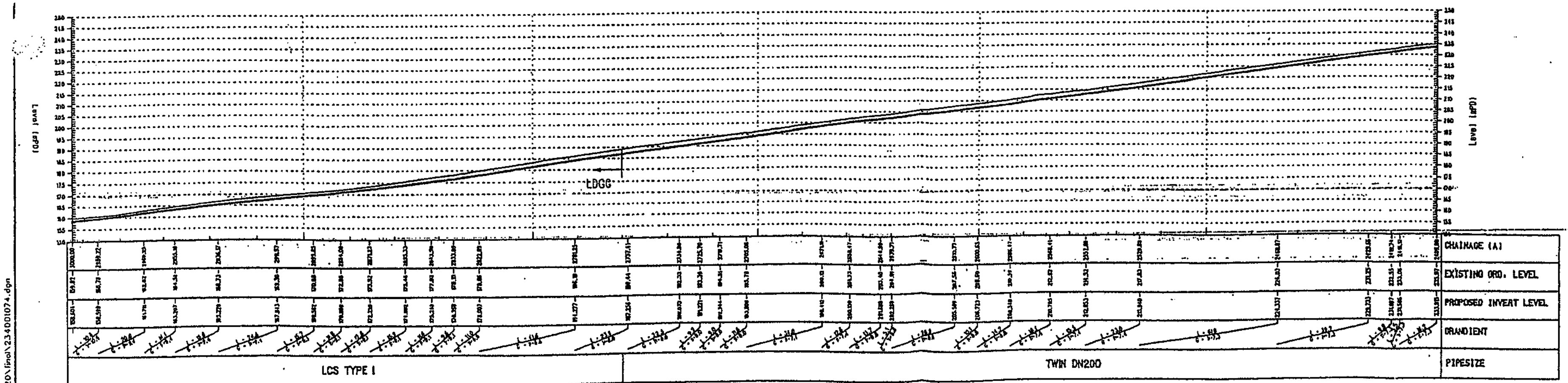


LEGENDS :

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

NOTE:

1. REFER TO DRAWING NO. 23400/T/081 FOR GENERAL NOTES
2. LCS - LEAKAGE COLLECTION SYSTEM, LDGG - LOWER DIRECT GATHERING GROUND
3. REFER DRAWING NOS 23400/T/093 TO 098 FOR DETAILS OF HATCHBOX CHAMBER. SPACING NOT TO EXCEED 200m
4. REFER DRAWING NOS 23400/T/109 AND 110 FOR DETAILS OF GATE VALVE CHAMBER
5. VENTILATION PIPE CHAMBER TO FOLLOW DETAILS OF DRAWING NO. 23400/T/093 TO 098 EXCEPT HATCHBOX TO BE REPLACED BY TEE PIECE AND OVERFLOW PIPE (REFER DRAWING NO. 23400/T/090)
6. EXACT LOCATION OF BENDS AND CHAMBERS TO BE DETERMINED ON SITE
7. DETACHABLE COUPLING OR OTHER SIMILAR FLEXIBLE COUPLINGS SHALL BE PROVIDED EVERY 500m. EXACT LOCATION TO BE AGREED WITH ENGINEER



VERTICAL PROFILE

Rev	Description	By	Date
-	ISSUE FOR CONSTRUCTION	BRC	08/03

Consultants

ARUP Ove Arup & Partners Hong Kong Limited

Project title

CONTRACT NO. DC/2003/01
NGONG PING SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE

Drawing title

EFFLUENT EXPORT PIPELINE: ALIGNMENT AND PROFILE (SHEET 5 OF 10)

Drawing no. 23400/T/074 Rev. -

Drawn	Date	Checked	Approved
TSN	NOV02	DKW	YWT

Scale HORIZ. 1:1000 VERT. 1:500 AT A1; HORIZ. 1:2000 VERT. 1:1000 AT A3 Status WORKING

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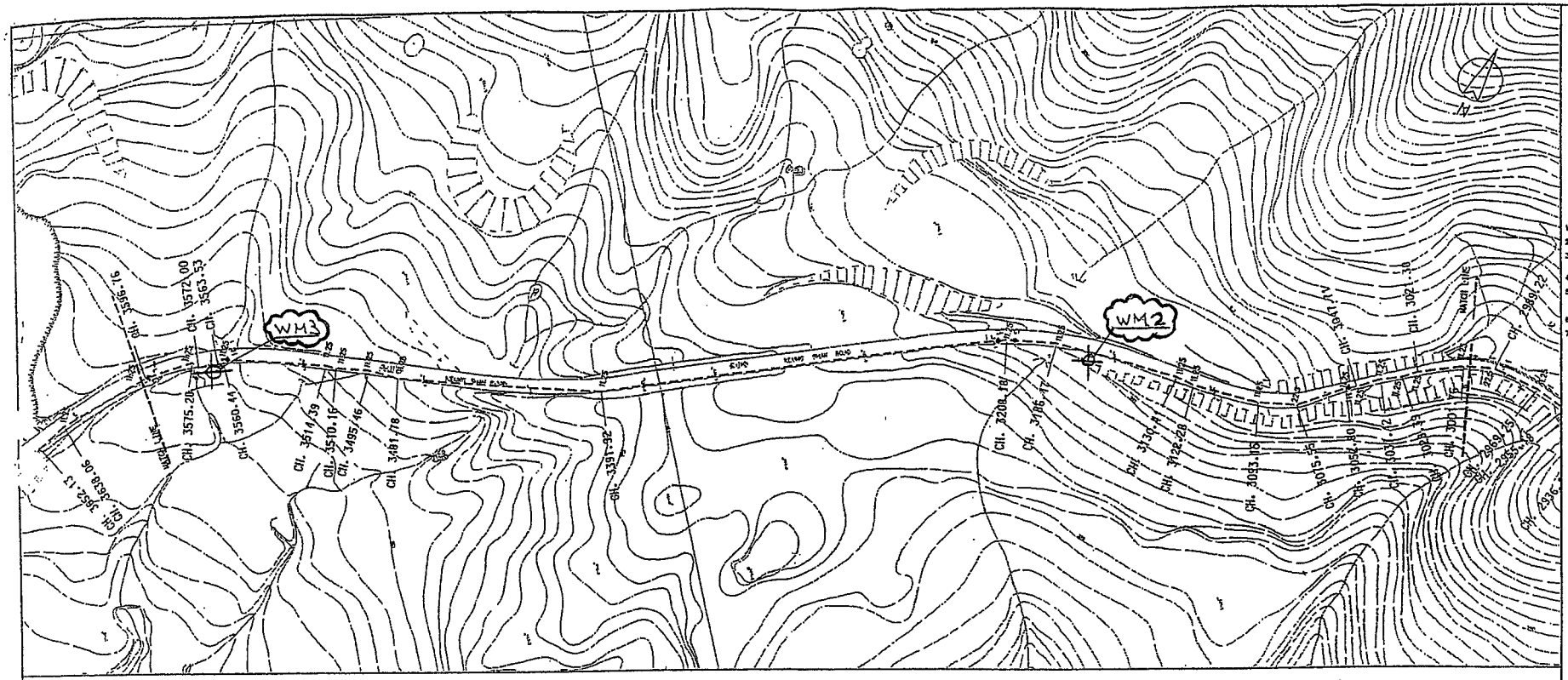
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

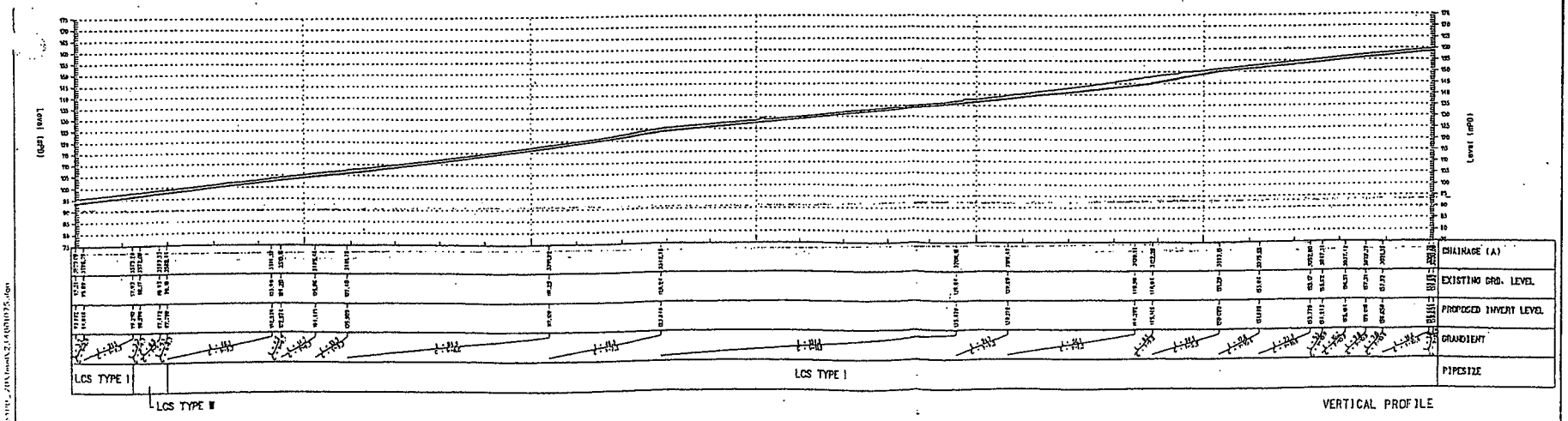


LEGENDS :

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

NOTE:

1. REFER TO DRAWING NO. 23400/T/001FOR GENERAL NOTES
2. LCS = LEAKAGE COLLECTION SYSTEM, LDS = LOWER DRIFT GATHERING GROUND
3. REFER DRAWING NOS 23405/T/002 TO 005 FOR DETAILS OF HATCHBOX CHAMBER. SPACING NOT TO EXCEED 250m
4. REFER DRAWING NOS 23405/T/006 AND 007 FOR DETAILS OF GATE VALVE CHAMBER
5. VENTILATION PIPE CHAMBER TO FOLLOW DETAILS OF DRAWING NO. 23400/T/073 TO 076 EXCEPT HATCHBOX TO BE REPLACED BY TEE PIECE AND OVERFLOW PIPE UNDER DRAWING NO. 23400/T/080
6. EXACT LOCATION OF BENDS AND CHAMBER TO BE DETERMINED ON SITE
7. DETACHABLE COUPLING OR OTHER SIMILAR FLEXIBLE COUPLINGS SHALL BE PROVIDED EVERY 500m. EXACT LOCATION TO BE AGREED WITH ENGINEER



Rev	Description	By	Date
-	ISSUE FOR CONSTRUCTION	DKC	08/03

Consultants

ARUP Ove Arup & Partners Hong Kong Limited

Project title

CONTRACT NO. DC/2003/01
NGONG PING SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE

Drawing title

EFFLUENT EXPORT PIPELINE: ALIGNMENT AND PROFILE (SHEET 6 OF 10)

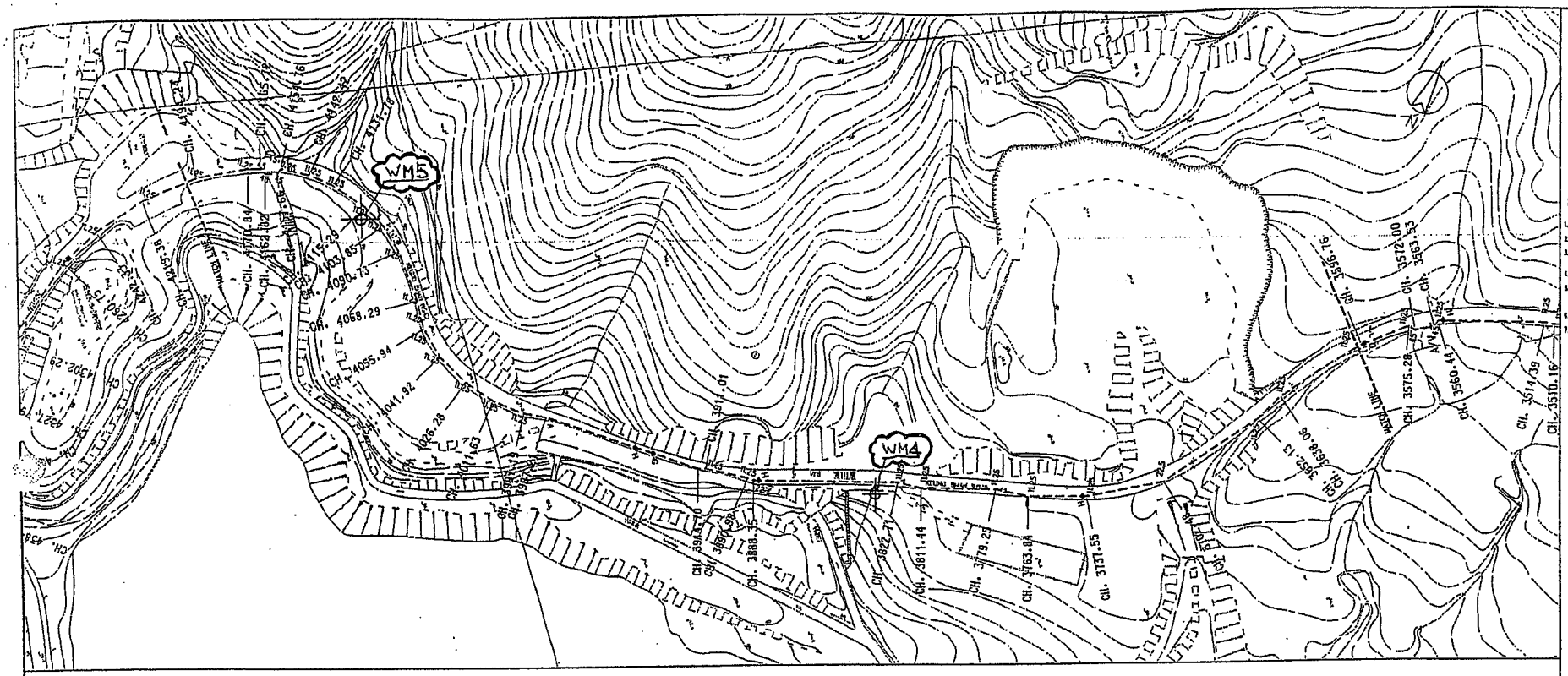
Drawing no. 23400/T/075 Rev. -

Drawn TSM | Date NOV03 | Checked DKC | Approved YWY

Scale HORIZ. 1:1000 VERT. 1:200 A1 A1
HORIZ 1:2000 VERT. 1:1000 A1 A3

Status WORKING

DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

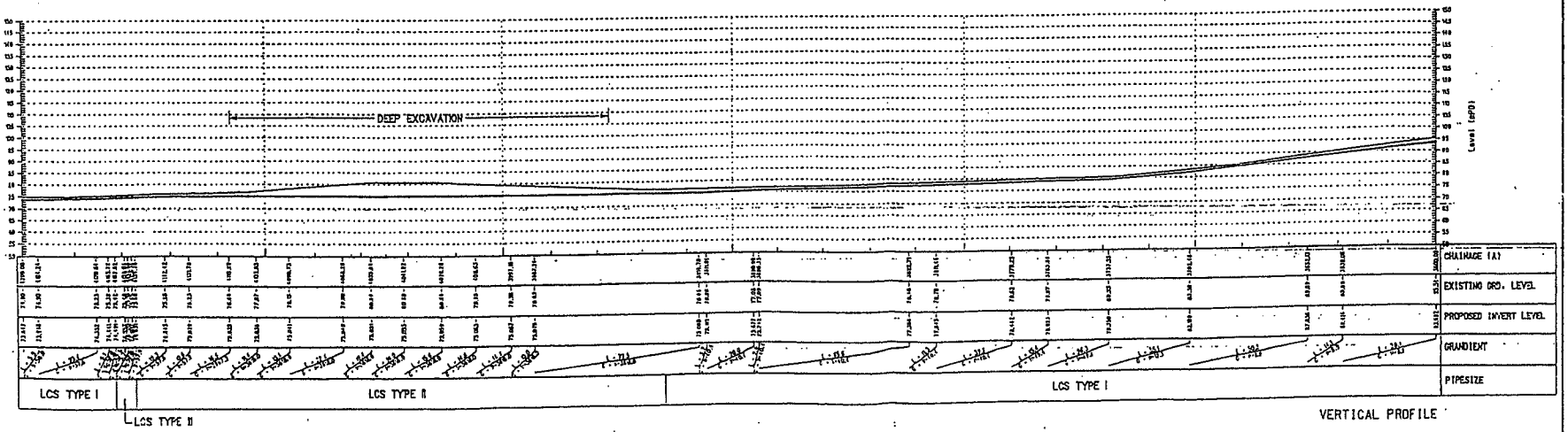


LEGENDS :

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

NOTE:

1. REFER TO DRAWING NO. 23400/T/081 FOR GENERAL NOTES
2. "LCS" - LEAKAGE COLLECTION SYSTEM, LOCS - LOWER GREAT GATHERING GROUND
3. REFER DRAWING NOS 23400/T/082 TO 085 FOR DETAILS OF HATCHBOX CHAMBER. SPACING NOT TO EXCEED 250m
4. REFER DRAWING NOS 23400/T/109 AND 110 FOR DETAILS OF GATE VALVE CHAMBER
5. VENTILATION GATE CHAMBER TO FOLLOW DETAILS OF DRAWING NO. 23400/T/083 TO 086 EXCEPT HATCHBOX TO BE REPLACED BY TEE PIECE AND OVERFLOW PIPE (REFER DRAWING NO. 23400/T/090)
6. EXACT LOCATION OF BENDS AND CHAMBERS TO BE DETERMINED ON SITE
7. DETACHABLE COUPLING OR OTHER SIMILAR FLEXIBLE COUPLINGS SHALL BE PROVIDED EVERY 500m. EXACT LOCATION TO BE AGREED WITH ENGINEER



VERTICAL PROFILE

Rev	Description	By	Date
-	ISSUE FOR CONSTRUCTION	DWL	08/03

Consultants

ARUP Ove Arup & Partners Hong Kong Limited

Project title

CONTRACT NO. DC/2003/01
NGONG PING SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE

Drawing title

EFFLUENT EXPORT PIPELINE: ALIGNMENT AND PROFILE (SHEET 7 OF 10)

Drawing no. 23400/T/076 Rev. -

Drawn YSH Date NOV 02 Checked CDC Approved YWY

Scale HORIZ. 1:1000 VERT. 1:500 AT A1 HORIZ. 1:2000 VERT. 1:1000 AT A3 Status WORKING

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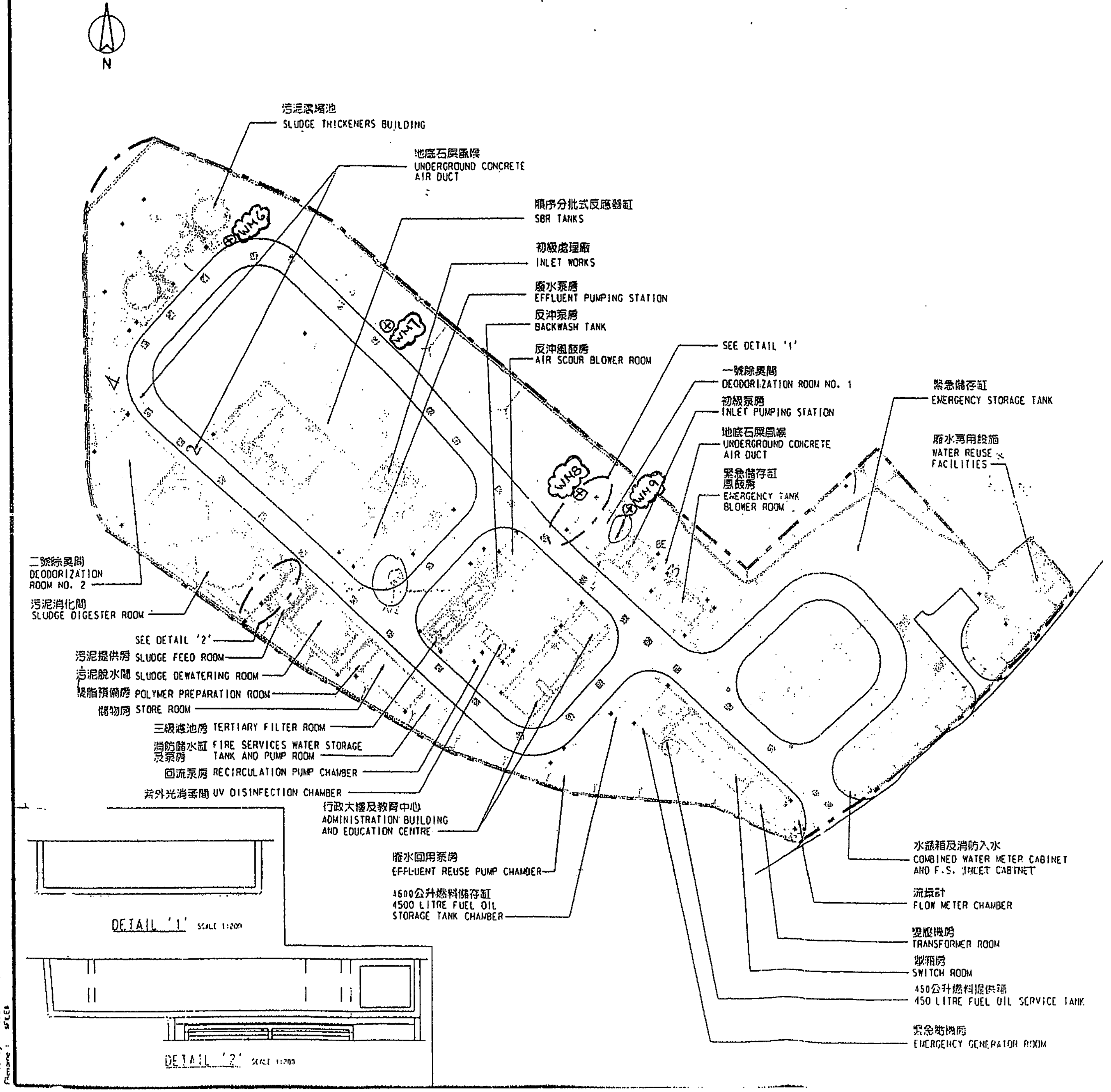
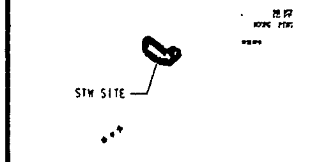
DRAINAGE SERVICES DEPARTMENT
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

Printer by : USERS SOATES
Filename : SFLE8



SETTING OUT TABLE

LOCATION	COORDINATES	
	NORTHING	EASTING
A	812946.992	807866.022
B	812955.201	807875.492
C	812995.446	807800.346
D	812970.442	807777.602
E	812941.129	807808.794
F	812937.697	807812.561
G	812940.968	807827.574
H	812952.064	807837.667
I	813021.979	807735.043
J	813027.917	807760.553
K	813005.361	807750.606
L	813015.038	807759.584
M	812966.287	807747.556
N	812975.607	807756.035
O	812947.769	807754.536
P	812924.012	807785.107
Q	812910.870	807808.469
R	812910.532	807813.299
S	812902.051	807825.590
T	812921.868	807829.106
U	812917.005	807834.348
V	812914.252	807849.666
W	812917.257	807852.454
X	812936.687	807841.745
Y	812942.352	807845.145
Z	812941.624	807848.834
AA	812946.462	807853.323
AB	812906.901	807849.276
AC	812921.819	807863.110
AD	812923.265	807864.478
AE	812929.003	807869.783
AF	812931.687	807887.157
AG	812936.325	807891.195
AJ	812901.788	807876.926
AK	812899.445	807882.770
AL	812908.766	807891.249
AM	812880.334	807922.502
AN	812921.024	807895.429
AP	812958.540	807937.004
AQ	812931.860	807970.610
AR	812924.440	807977.310
AS	812928.433	807789.163
AT	812911.993	807814.660
AU	812902.090	807836.880
AV	812873.244	807923.952
AX	812873.374	807926.349
AY	812914.530	807842.558
AZ	812916.729	807844.598
BA	812889.640	807861.751
BB	812893.235	807865.080
BC	812927.924	807903.076
BD	812929.920	807901.275
BE	812941.185	807888.895
BF	812937.483	807887.689
BG	812979.192	807783.287
BH	812969.617	807774.588
BI	812965.664	807771.357
BJ	812981.961	807767.980
BK	813016.290	807776.025
BL	813007.420	807767.795
BM	812997.948	807758.597
BN	812995.936	807756.730
BO	812977.575	807758.366
BP	812975.356	807756.347



KEY PLAN

NOTE:

1. COORDINATES SHOWN ON THE TABLE ARE MEASURED AT THE OUTSIDE WALL AT mPD.
2. PLAN OF STRUCTURES ARE SHOWN AT +441.00 mPD.

LEGEND:-

SITE BOUNDARY

CUT SLOPE

FILL SLOPE WITH FILTER

PERIMETER U-CHANNELS / CATCH PITS

Rev	Description	By	Date
2	AS-CONSTRUCTED DRAWING	RL	04/05

Consultants
ARUP Ove Arup & Partners Hong Kong Limited

Project title
CONTRACT NO. DC/2003/01
NGONG PING SEWAGE TREATMENT PLANT, TRUNK SEWERS AND EFFLUENT EXPORT PIPELINE

Drawing title
昂平污水處理廠結構座標圖
NGONG PING SEWAGE TREATMENT PLANT
SETTING OUT PLAN FOR STRUCTURES

Drawing no. 23400/T/202 Rev. 2

Scale 1:500 AT A1 / 1:1000 AT A3

Status AS-CONSTRUCTED

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