Maeda Corporation

Upgrading of Ting Kok Road Pumping Station No. 5

First Quarterly EM&A Report

(January – March 2006)

April 2006

Report no: 01284R0102

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Hyder Consulting

Maeda Corporation

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First Quarterly EM&A Report (January – March 2006)

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Report no: EA01284R0102 **Date:** April 2006

Hyder Consulting

Certified by Landfill Gas Team Leader
Alexi Bhanja

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1 Executive Summary

Drainage Services Department awarded the contract for the Upgrading of Ting Kok Road Pumping Station No. 5 to Maeda Corporation in September 2005. Maeda appointed Hyder Consulting Limited as the Contractor's Landfill Gas (LFG) Team during the construction period. The construction contract commenced in September 2005 and the total construction period is approximately 28 months.

This report recorded the results and findings of the required EM&A works undertaken during the period from January to March 2006. All relevant mitigation measures and requirements were implemented. There have been no exceedances in A/L Levels at either fixed or variable monitoring locations except for a carbon dioxide level of 1% at Manhole M1 in February 2006 and a carbon dioxide level of 0.9% at Manhole M1 in March 2006. However, these levels are within expected norms and are not of concern. As this is a fixed location, not part of the excavation works, there are no safety-related issues. Location M1 is not affected by any ongoing Works and so these exceedances are not considered to be due to the construction activities, nor they are considered to be non-compliances in terms of the EM&A programme and implementation of the Action/Event Plan.

Event and Action Levels

The baseline monitoring results documented in the baseline monitoring report for the Project (our report ref.: EA01284R0022) provided the Action and Limit (A/L) Levels for LFG impact monitoring and also the Action Plan. For methane, A/L Levels are 0.5%/1.0%; for carbon dioxide, A/L Levels are 0.5%/1.5%; and for oxygen, A/L Levels are 19.0%/18.0%.

Complaint Log

There were no non-compliances during the reporting period and no complaints regarding LFG were received.

Reporting Changes

There have been no reporting changes during the reporting period.

Future Key Issues

Based on anticipated construction activities for the next quarter, on the construction programme and on the review of relevant Contractor's method statements by the LGT, no significant future key issues in terms of LFG have been identified at this time.

2 Introduction

2.1 Basic Project Information

Upgrading of Ting Kok Road Pumping Station No. 5 (TKRPS) under North District and Tolo Harbour Sewerage, Sewage Treatment and Disposal – High Priority Works is implemented based on the findings of the Study *Review of North District and Tolo Harbour Sewerage Master Plan*.

The purpose of the Project is to upgrade the existing TKRPS to cope with the sewerage needs of both existing and future developments along Ting Kok Road up to Tai Mei Tuk. The design pumping capacity of TKRPS has to be increased from 2,888m^3/day to 11,520m^3/day in order to serve the increasing sewage flow along Ting Kok Road. The Project is of high priority and needs to commence as soon as possible because full commissioning of the upstream sewerage facilities along Ting Kok Road is dependent on the completion of this Project.

The proposed scope of works includes construction of a new pumping station, laying of about 350m long twin 450mm diameter rising mains and 250m long 600mm diameter gravity sewer, and demolition of the existing pump pit. The main pumping station, transformer room, gravity sewers, manholes and boundary wall (except the twin rising mains) will be located outside the existing passive vent trench of Shuen Wan Landfill and the three existing Landfill Gas (LFG) monitoring probes within the Project site will not be affected by the works.

There are six village houses located about 60m away from the boundary of the proposed pumping station. The proposed pumping station upgrading works therefore constitutes a Designated Project under type F.3(b)(i) in Schedule 2 of the Environmental Impact Assessment Ordinance. A Project Profile (PP) for direct application of the Environmental Permit (EP) (Application No.DIR-115/2005) was approved by the Environmental Protection Department (EPD) in March 2005 and an EP (EP-212/2005) was granted in April 2005, prior to the commencement of the upgrading works.

Drainage Services Department awarded the contract for the upgrading of TKRPS to Maeda Corporation in September 2005. Maeda appointed Hyder Consulting Limited as the Contractor's Landfill Gas Team (LGT) during the construction period. CH2M HILL Hong Kong Limited (formerly known as CH2M-IDC Hong Kong Limited) is the Independent Checker (Landfill Gas) (IC(LG)) of the project. The construction contract commenced in September 2005 and the total construction period is approximately 28 months.

Close proximity of the Project to Shuen Wan Landfill (within the 250m Consultation Zone of Shuen Wan Landfill) may also suggest the possibility of landfill gas being released during excavation works for substructure of pumping station, transformer room and associated rising mains and gravity sewers. As such, a *Report on Landfill Gas Hazard Assessment* has been prepared previously (as Appendix E to the PP) in accordance with EPD's *Landfill Gas Hazard Assessment Guidance Note* and the

Practice Note for Professional Persons – Landfill Gas Hazard Assessment for Development Adjacent to Landfills.

2.2 Management Structure and Project Organisation

The Engineer (DSD) is responsible for overseeing the construction works and ensuring that they are undertaken by the Contractor (Maeda) in accordance with the specification and contractual requirements. The Contractor shall report to the Engineer. The LGT is employed by the Contractor and responsible for conducting the EM&A programme. The IC(LG) shall advise the Engineer on LFG issues related to the Project.

The key personnel contact names and telephone number are summarised in Table 2-1. The project organisation is shown in Appendix 1.

Party	Position	Name:	Tel. No.:
Project Proponent – DSD	Project Manager	Raymond LEE	2594 7457
	Engineer's Representative	Tim TSOI	2594 7460
Contractor – Maeda	Site Agent	George CHEUNG	9268 1918
LGT – Hyder Consulting	LGT Leader	Alexi BHANJA	2911 2916
IC(LG) – CH2M HILL	IC(LG)	Aldex LEE	2507 2203

Table 2-1 Contact Details for Key Project Personnel

2.3 Construction Programme

Construction programme of the Project is attached in Appendix 2. As can be seen, all works carried out during the reporting period have been carried out with the required LFG control measures in place (e.g. LFG monitoring for "hot works").

2.4 Works Undertaken during the Quarter

Works undertaken during the reporting period included:

- Construction of mini-pile
- Driving of sheet pile
- Excavation for trial pit
- Construction of permanent piles
- Loading test
- Sheet piling work and temporary work for trenchless method

3 Environmental Status

3.1 Works Undertaken during the Quarter with Illustrations

Works undertaken during the reporting period are identified in Section 2.4. Illustrations of these works, such as location of works, are provided in Appendix 3.

3.2 Project Area and Monitoring Locations

The site is located at Ting Kok Road in Tai Po, and the major items to be constructed are located outside the existing passive vent trench of the adjacent Shuen Wan Landfill.

The impact monitoring locations specified in the *Report on Landfill Gas Hazard Assessment* comprise "utilities' manholes and chambers" (i.e. fixed locations for purposes of environmental protection) and at excavations of 1m depth or more (i.e. variable locations for purposes of worker safety), which vary from month to month.

In terms of fixed monitoring locations, the Baseline Report identified two existing manholes. A third location – a deep borehole – was installed by the Contractor to provide further coverage.

The fixed monitoring locations are summarised in Table 3-2:

Monitoring Station ID	Description
M1	New Deep Borehole (11m deep)
M2	Existing Manhole (2m deep)
M3	Existing Manhole (2m deep)

Table 3-2 Monitoring Locations for LFG EM&A

Project area is shown in Appendix 3 and the fixed monitoring locations are shown in Appendix 4.

4 Brief Summary of EM&A Requirements

4.1 Monitoring Parameters

During the construction phase, impact monitoring of LFG is to be carried out in accordance with the *Report on Landfill Gas Hazard Assessment* at the selected locations. LFG parameters to be monitored comprise oxygen, methane and carbon dioxide. Temperature is also recorded but this is not a LFG parameter.

4.2 Monitoring Equipment

Table 4-3 shows the equipment list for LFG monitoring.

Equipment	Manufacturer / Serial Nos.
Gas Analyser GA 2000	Geotechnical Instruments / GA 08277

Table 4-3 Equipment List for LFG Monitoring

4.3 Event and Action Levels/Plans

The baseline monitoring results documented in the baseline monitoring report for the Project (our report ref.: EA01284R0022) provided the Action and Limit (A/L) Levels for LFG impact monitoring and also the Action Plan. As per the *Report on Landfill Gas Hazard Assessment*, and in keeping with the standard presentation of LFG EM&A in other projects, both the A/L Levels and Action Plan are shown in the same table.

Table 4-4 shows the combined A/L Level and Action Plan for the Project, to be triggered if the LFG criteria are exceeded:

Parameter	A/L Level	Action Plan
Oxygen	<19%	– Ventilate to restore oxygen to > 19%
	<18%	– Stop works – Evacuate personnel/prohibit entry – Increase ventilation to restore oxygen to >19%
Methane	>10% LEL (i.e. > 0.5 % by volume)	– Prohibit hot works – Ventilate to restore methane to < 10% LEL
	> 20% LEL (i.e. > 1% by volume)	– Stop works – Evacuate personnel/prohibit entry – Increase ventilation to restore methane to < 10% LEL
Carbon Dioxide	>0.5%	– Ventilate to restore carbon dioxide to <0.5%
	>1.5%	– Stop works – Evacuate personnel/prohibit entry – Increase ventilation to restore carbon dioxide to >0.5%

Table 4-4 Action and Limit Levels and Action Plan for Landfill Gas

4.4 Mitigation Measures and Requirements in Contract Documents

Measures for mitigating LFG hazards during the construction works have been stated clearly in the *Report on Landfill Gas Hazard Assessment*, which forms part of the contract documents Specification. Relevant excerpts could be referred to the Project Profile for Upgrading of Ting Kok Road Pumping Station No. 5.

Section 5 and Appendix 5 summarise the mitigation measures and requirements as well as the implementation status.

5 Implementation Status of Landfill Gas Hazard Control Measures

The status of the mitigation measures implemented by the Contractor is listed in Appendix 5. All LFG hazard control measures have been implemented as stipulated in the contract documents and in the *Report on Landfill Gas Hazard Assessment.*

6 Monitoring Results

Calibration records for the equipment used for LFG monitoring are provided in Appendix 6. *Original Field Measurement Recording Sheets* for both fixed locations and variable locations are provided in Appendix 7.

During the reporting period, LFG was monitored at the three fixed locations for purposes of environmental protection). These are shown in Table 6-5, below (**bold** indicates an exceedance of Action Level and **bold** indicates an exceedance of Limit Level):

Fixed Monitoring Station ID	Date	Gas Concentration (%)			Temperature (°C)	Remarks
		Methane	Carbon Dioxide	Oxygen		
M1	4 Jan 06	0.0	0.3	20.3	24.6	Nil
M2	4 Jan 06	0.0	0.0	20.3	23.5	
M3	4 Jan 06	0.0	0.1	20.3	23.8	
M1	3 Feb 06	0.0	**1.0**	20.3	19.0	Nil
M2	3 Feb 06	0.0	0.0	20.6	18.8	
M3	3 Feb 06	0.0	0.0	20.7	18.8	
M1	1 Mar 06	0.0	**0.9**	20.2	9.4	Nil
M2	1 Mar 06	0.0	0.1	20.5	10.9	
M3	1 Mar 06	0.1	0.1	20.5	11.3	

Table 6-5 Monitoring Results at Fixed Locations

Appendix 4 shows the position of each fixed monitoring station. There have been no exceedances in A/L Levels at either fixed or variable monitoring locations except for a carbon dioxide level of 1% in February 2006 and 0.9% in March 2006 both at Manhole M1. However, these levels are within expected norms and are not of concern. As this is a fixed location, not part of the excavation works, there are no safety-related issues. Location M1 is not affected by any ongoing Works and so these exceedances are not considered to be due to the construction activities, nor they are considered to be non-compliances in terms of the EM&A programme and implementation of the Action/Event Plan.

During January 2006, LFG was monitored at ten variable locations (for purposes of worker safety). These comprised Portions 4, 5 and 7, MP6, 21, 22, 29, 30, 44 and at

the pumping station, as shown in Appendix 3. A total of 68 readings at the ten variable locations were taken for safety-related reasons, including hot work, sheet piling and excavation. There were no exceedances for Action or Limit Level at any variable locations during January 2006. The LFG monitoring results for variable locations are provided on the *Field Measurement Recording Sheets* in Appendix 7.

During February 2006, LFG was monitored at variable locations (for purposes of worker safety). These comprised Portions 4, 5 and 7, as shown in Appendix 3. A total of 89 readings at variable locations were taken for safety-related reasons, including hot work, sheet piling and excavation. There were no exceedances for Action or Limit Level at any variable locations during February 2006. The LFG monitoring results for variable locations are provided on the *Field Measurement Recording Sheets* in Appendix 7.

During March 2006, LFG was monitored at variable locations (for purposes of worker safety). These comprised Portions 4 and 5 as shown in Appendix 3. A total of 98 readings, each including carbon dioxide, methane and oxygen, at variable locations were taken for safety-related reasons, including hot work and excavation. There were no exceedances for Action or Limit Level at any variable locations during March 2006. The LFG monitoring results for variable locations are provided on the *Field Measurement Recording Sheets* in Appendix 7.

7 Report on Non-Compliance and Complaints

Environmental Protection Department has conducted 1 inspection at the site during the reporting period. The site inspection was conducted on 10 Feb 2006. This was a general inspection on site condition and for inspecting the effluent discharge license. The situation and the requirements in the Project Profile were made known to EPD and EPD had no adverse comment on the site condition and the recharge of muddy water.

No non-compliances or complaint regarding the LFG was received during the reporting period.

8 Others

8.1 Future Key Issues

Construction activities for next quarter are anticipated to include:

- permanent piles at pumping station and transformer house
- sheet piling work and temporary work for trenchless method
- trench excavation
- construction of gravity sewer

Based on the above, on the construction programme (shown in Appendix 2) and on the review of relevant Contractor's method statements by the LGT, no significant future key issues in terms of LFG have been identified at this time.

LFG monitoring will be continued and the monitoring schedule for the next three months is shown below:

- 1 April 2006
- 2 May 2006
- 1 June 2006

8.2 Comments, Recommendations and Conclusions

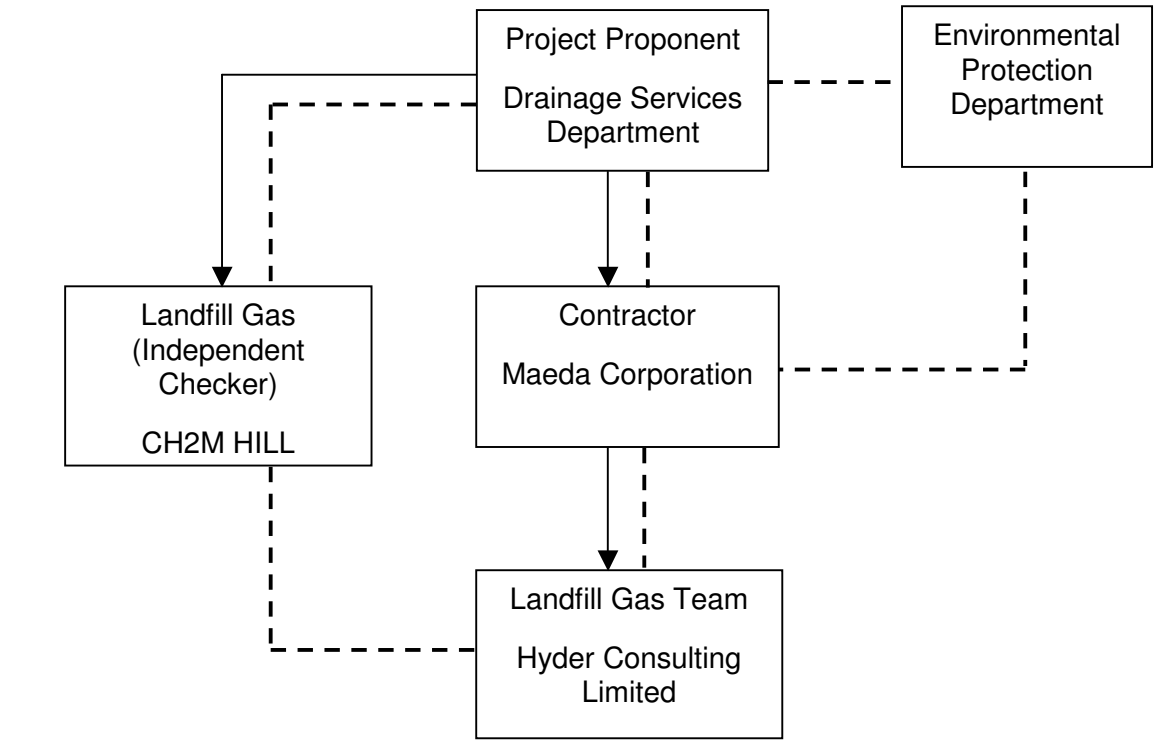
The LFG mitigation measures adopted by the Contractor during the reporting period are considered to have been implemented in a satisfactory manner and there have been no exceedances in A/L Levels at either fixed or variable monitoring locations.

The EM&A programme is considered to performed acceptably and there are no recommendations for improvements or modifications at this time.

In conclusion, there have been no significant issues relating to LFG hazard during the reporting period.

Appendix 1

Project Organisation



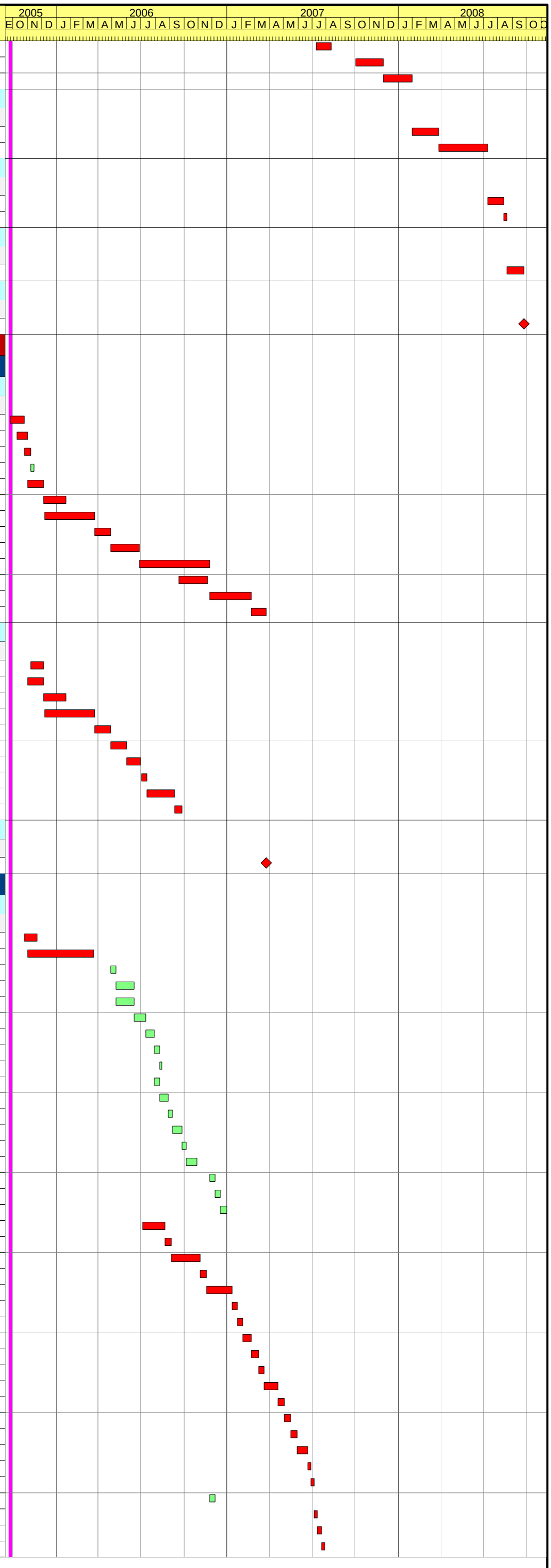
Line of communication

Line of Authority

Appendix 2

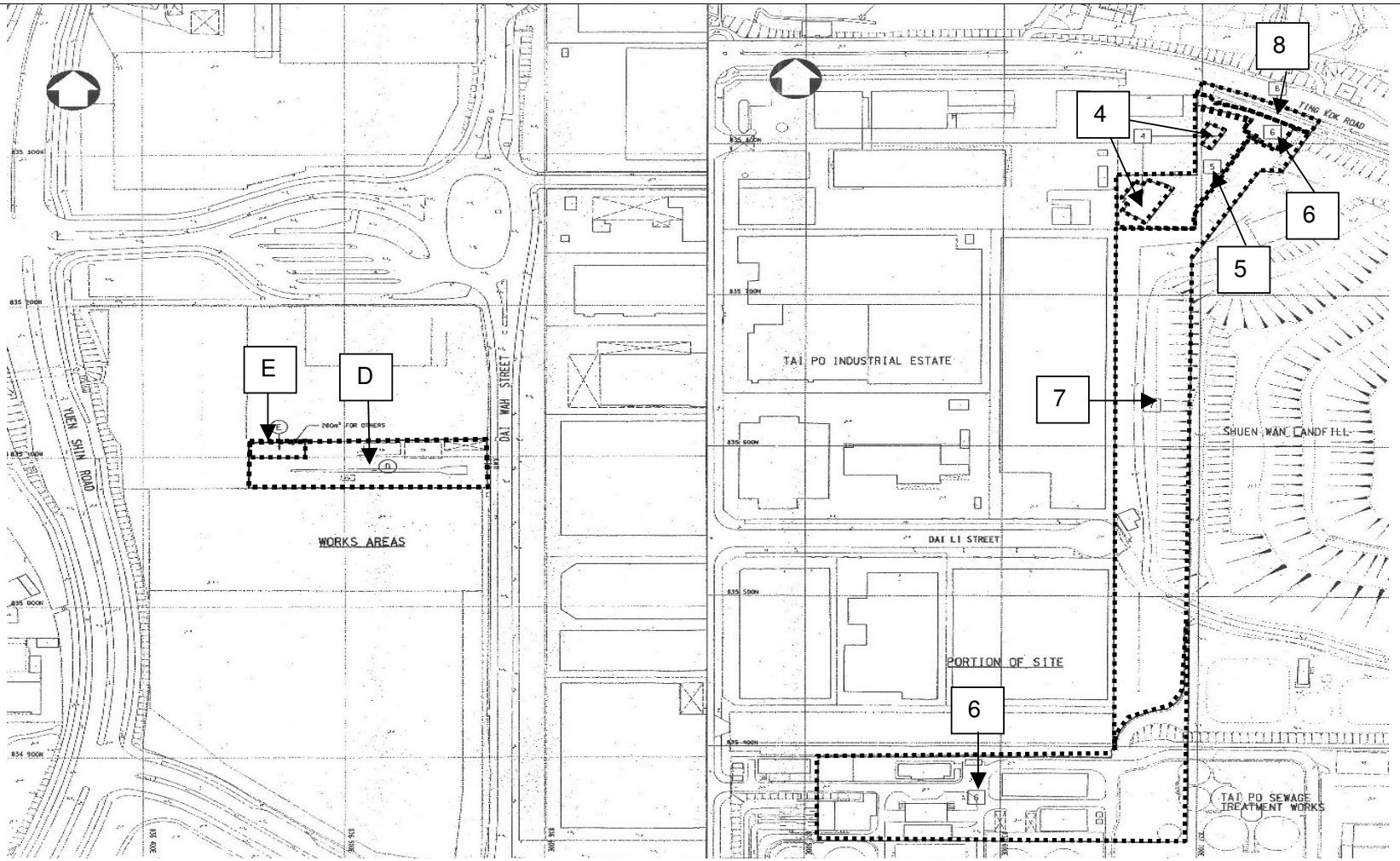
Construction Programme

Activity ID	Activity Description	Orig Dur	Early Start	Early Finish	Predecessors
DC0758	Cover for Grit channels	28	11/07/07	11/08/07	DC0754*
DC0760	Cover for Sedimentation tank No. 1-8	50	02/10/07	29/11/07	DC0752*
DC0762	Cover for Sludge Hoarding Tank No. 1-4	50	01/12/07	30/01/08	DC0760*
Roadworks					
DC0764	Portion 1	50	31/01/08	28/03/08	DC0762*
DC0766	Portion 2&3	86	29/03/08	10/07/08	DC0764*
Soft Landscaping Works					
DC0770	Planting works (Portion 2)	28	11/07/08	12/08/08	DC0766*
DC0772	Hydroseeding	6	13/08/08	19/08/08	DC0770*
Establishment Works					
DC079200	General establishment works	30	20/08/08	24/09/08	DC0772*
Key Date					
DC07K5	Completion of the Section 5	0		24/09/08	D004*, DC0772,
Upgrading of Ting Kok Road Pumping Station No.5					
BN08: Section 6 of Works					
Pumping Station					
DC0806	Initial Survey	22	27/09/05	24/10/05	D004*
DC0808	Site Clearance + Tree Felling	18	11/10/05	31/10/05	DC0806*
DC0810	Hoarding Erection	12	25/10/05	07/11/05	DC0808*
DC0812	Demolition of Existing Boundary Wall (partial)	7	08/11/05	15/11/05	DC0810*
DC0814	G.I./Pre-drilling	30	01/11/05	05/12/05	DC0808*
DC0818	Prelim Pile (1no) (Pile Installation+Setting up)	40	06/12/05	21/01/06	DC0814*
DC0820	Mini Piling (66 nos.)	90	08/12/05	23/03/06	DC0818*
DC0822	Pile Load Test (1 nos) (Selection of Piles)	30	24/03/06	28/04/06	DC0820*
DC0830	Sheetpiling + Wailing + Excavation (ELS)	50	29/04/06	28/06/06	DC0822*
DC0840	Substructure	125	29/06/06	24/11/06	DC0830*
DC0842	Backfilling	51	21/09/06	20/11/06	DC0840*
DC0844	Superstructure (incl. roof)	75	25/11/06	22/02/07	DC0840*, DC0842
DC0848	Internal Finishes (Plumbing, Cat ladder, etc)	26	23/02/07	24/03/07	DC0844*
Transformer House					
DC0852	Site Clearance+Tree Felling+Tree Transplanting	24	08/11/05	05/12/05	DC0810*
DC0854	G.I./Pre-drilling	30	01/11/05	05/12/05	DC0808*
DC0856	Prelim Pile (1no) (Pile Installation+Setting up)	40	06/12/05	21/01/06	DC0852*, DC0854*
DC0858	Mini Piling (10 nos.)	90	08/12/05	23/03/06	DC0856*
DC0860	Pile Load Test (1 nos) (Selection of Piles)	30	24/03/06	28/04/06	DC0858*
DC0862	Excavation (Open excavation) (2.05m depth)	26	29/04/06	30/05/06	DC0860*
DC0864	Substructure	26	31/05/06	30/06/06	DC0862*
DC0866	Backfilling	11	03/07/06	14/07/06	DC0864*
DC0868	Superstructure (incl. roof)	50	15/07/06	11/09/06	DC0866*
DC0870	Internal Finishes	12	12/09/06	26/09/06	DC0868*
Key Date					
DC08K6	Completion of the Section 6	0		24/03/07	D004*, DC0848*, DC0870
BN09: Section 7 of Works					
Sewers, Rising Mains (by Open Excavation)					
DC0922	Initial Survey	24	25/10/05	21/11/05	DC0806*
DC0924	Documents Submission (eg. Pipeline Schedule)	120	02/11/05	22/03/06	DC0922*
DC0926	Laying Sewer MH6 - MH5 (7m)	10	28/04/06	09/05/06	DC0906*, DC0924
DC0928	Construct MH5	30	10/05/06	15/06/06	DC0926*
DC0930	Construct MH6	30	10/05/06	15/06/06	DC0926*
DC0932	Laying Sewer MH5 - MH4 (32m)	20	16/06/06	10/07/06	DC0928*
DC0936	Construct MH4	17	11/07/06	29/07/06	DC0932*
DC0938	Laying Sewer MH4 - MH2 (8m)	9	31/07/06	09/08/06	DC0936*
DC0940	Modify F2	5	10/08/06	15/08/06	DC0938*
DC0942	Laying Sewer MH4 - MH3 (8m)	9	31/07/06	09/08/06	DC0936*
DC0944	Construct MH3	16	10/08/06	28/08/06	DC0942*
DC0946	Laying Sewer MH3 - MH2 (13m)	8	29/08/06	06/09/06	DC0944*
DC0948	Construct MH2	17	07/09/06	27/09/06	DC0946*
DC0950	Laying Sewer MH2 - MH1 (8m)	7	28/09/06	05/10/06	DC0948*
DC0958	Construct MH1	18	07/10/06	27/10/06	DC0950*
DC0960	Laying Sewer P/S - MH6 (5m)	10	25/11/06	06/12/06	DC0840*, DC0958
DC0962	Pressure Testing (section 1)	10	07/12/06	18/12/06	DC0960*
DC0964	CCTV Inspection (section 1)	10	19/12/06	30/12/06	DC0962*
DC0966	Laying Rising Mains CH.0+00-CH.1+00 (100m)	42	05/07/06	22/08/06	DC0912*
DC0968	Construct VIC (CH.1+00)	11	23/08/06	04/09/06	DC0966*
DC0970	Laying Rising Mains CH.1+00-CH.2+25 (125m)	50	05/09/06	03/11/06	DC0968*
DC0972	Construct WOIC (CH.2+25)	12	04/11/06	17/11/06	DC0970*
DC0974	Laying Rising Mains CH.2+25 - CH.3+32(107m)	44	18/11/06	10/01/07	DC0972*
DC0976	Pressure Testing (section 2)	10	11/01/07	22/01/07	DC0974*
DC0978	CCTV Inspection (section 2)	10	23/01/07	02/02/07	DC0976*
DC0980	Construct MH7	15	03/02/07	20/02/07	DC0978*
DC0982	Laying Sewer MH7 - MH8 (33m)	14	21/02/07	08/03/07	DC0980*
DC0984	Construct MH8	10	09/03/07	20/03/07	DC0982*
DC0986	Laying Sewer MH8 - MH9 (62m)	25	21/03/07	19/04/07	DC0984*
DC0988	Construct MH9	12	20/04/07	03/05/07	DC0986*
DC0990	Laying Sewer MH9 - MH10 (26m)	11	04/05/07	17/05/07	DC0988*
DC0992	Construct MH10	11	18/05/07	30/05/07	DC0990*
DC0994	Laying Sewer MH10 - STW (45m)	19	31/05/07	22/06/07	DC0992*
DC0996	Pressure Testing (section 3)	6	23/06/07	29/06/07	DC0994*
DC0998	CCTV Inspection (section 3)	6	30/06/07	06/07/07	DC0996*
DC1000	Laying Sewer P/S - existing box culvert (5m)	10	25/11/06	06/12/06	DC0840*
DC1002	Modify STW	6	07/07/07	13/07/07	DC0998*
DC1004	Collection to existing STW	6	14/07/07	20/07/07	DC1002*
DC1006	Collection to existing Box Culvert	6	21/07/07	27/07/07	DC1004*



Appendix 3

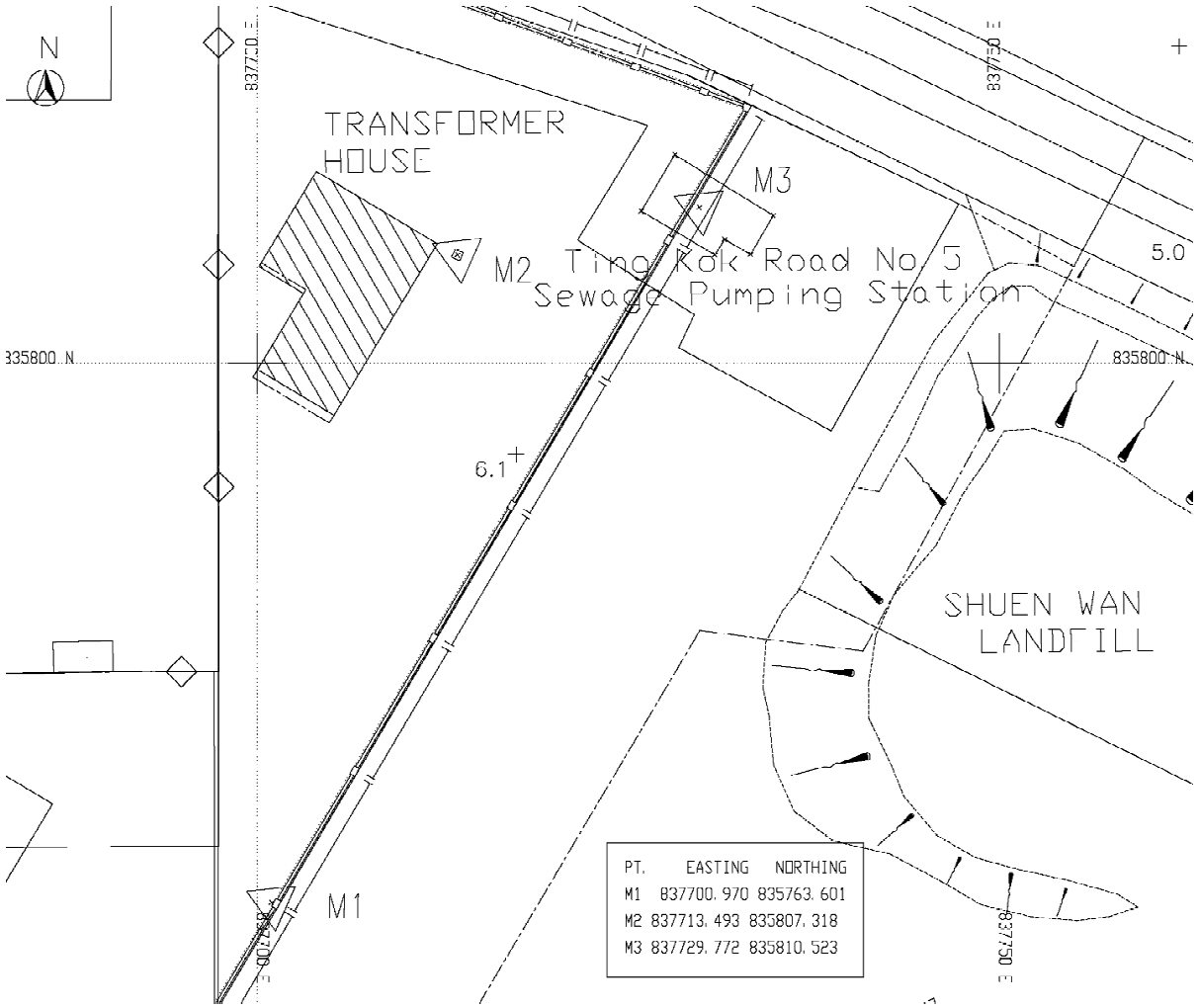
Location of Works and Project Area



Hyder Consulting	MAEDA	Title: Upgrading of Ting Kok Road Pumping Station No. 5 – Portion of Site and Works Area	Date: Dec 2005 Figure: N.A. Scale: NTS

Appendix 4

Fixed Monitoring Locations



Hyder Consulting	MAEDA	Title: Upgrading of Ting Kok Road Pumping Station No. 5 – LFG Monitoring Station	Date: Dec 2005 Figure: N.A. Scale: NTS

Appendix 5

Updated Implementation Schedule

Hyder Consulting Ltd
Incorporated in Hong Kong with
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126012

April 2006

Section	Environmental Protection Measure	Status	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.1	Safety officer, trained in the use of gas detection equipment and landfill gas-related hazards should be appointed on site throughout the ground works phase. The Safety Officer should be provided with intrinsically safe portable instruments, appropriately calibrated and capable of measuring the following gases in the ranges indicated: methane 0-100% LEL and 0-100% by volume; carbon dioxide 0-100%;and oxygen 0-21%	Y	Within the work site	Contractor	Construction	Code of practice on Safety and Health at Work in Confined Space. Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)
6.2	No smoking and naked flames should be allowed.	Y				Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)
6.2	No worker should work alone at any time in the confined area or any excavation trenches.	Y				
6.2	Construction equipment should be equipped with a vertical exhaust at least 0.6m above ground level and/or with spark arrestors	Y				
6.2	Electrical motors and electrical extension cords should be explosion-proof or intrinsically safe.	N/A				
6.2	Welding, flame-cutting or other hot works should only be carried out in trenches or confined spaces when controlled by a 'permit to work' procedure, properly authorized by the Safety Officer.	N/A				
6.2	Forced ventilation should be required for workers, if in a trench deeper than 1m.	N/A				

Section	Environmental Protection Measure	Status	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.2	During piping assembly or conducting construction, all valves/seals should be closed as installed to prevent the migration of gases through the pipeline/conduit. Forced ventilation and gas monitoring should be performed before staff entering and working in large diameter pipe.	N/A	Within the work site	Contractor	Construction	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)
6.2	The Safety Officer should set down the monitoring frequency and areas prior to commencement of construction works.	Y				
6.2	Daily and routine monitoring should be carried out in all excavations.	Y				
6.2	All measurements in excavations should be made with the extended monitoring tube located not more than 10mm from the exposed ground surface. Monitoring should be performed properly to make sure that the area is free of landfill gas before any man enters the area.	Y				
6.2	For excavations deeper than 1m, measurement should be carried out: ▪ at the ground surface before excavation commences; ▪ immediately before any worker enters the excavation; ▪ at the beginning of each half working day (i.e morning and afternoon) for the entire period the excavation remains open; and ▪ periodically through the working day whilst works are in the excavation.	N/A				

Section	Environmental Protection Measure	Status	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.2	For excavations between 300mm and 1m deep, measurements should be carried out: ▪ Directly after the excavation has been completed; and ▪ Periodically whilst the excavation remains open.	Y				
6.2	The landfill gas precautionary measures involved with excavation and piping works should be included in the Safety Plan.	Y	Within the work site	Contractor	Construction	Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)
6.3	The cracks on the ground level at the working area should be monitored during ground-works construction	N/A				
6.4	Where there are any temporary site offices, or any other buildings that have enclosed spaces with the capacity to accumulate landfill gas, then they should either: ▪ Be located on an area which has been proved to be free of landfill gas and monitored manually by the Safety officer or an approved and appropriately qualified person to ensure that hazardous concentration of landfill gas does not occur; or ▪ Be raised clear of the ground. If buildings are raised clear of the ground, a minimum, clear separation distance should be 500mm.	Y				
6.5	Such offices or buildings should be provided with some kinds of control of gas by mechanical means e.g. forced ventilation using fans or blowers.	Y				
6.6	Adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus (BA) sets should be made available on site.	Y				

Section	Environmental Protection Measure	Status	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.7	Periodic environmental monitoring report with LFG control measures evaluation during construction phase should be provided by contractor and submitted to SP/DSD and EPD.	Y				
7.1	When service voids, manholes or inspection chambers within the proposed site are entered for maintenance, monitoring and a checklist system of safety requirements should be performed before entry.	N/A	Manhole/ chamber	DSD	Operation	Code of Practice on Safety and health at Work in Confined Spaces
7.2	A procedure should be developed as part of the station operation to respond to gas detector alarms. The detection system should be maintained and calibrated regularly in accordance with the manufacturer's recommendations. In the event of a power failure, the detectors should have an 8-hour battery back-up system, and the procedures should indicate for manual monitoring in the station in the event of prolonged power failure (or longer than 8 hours).	N/A	Pumping station			
7.3	Forced ventilation should be used if methane of more than 0.5% (by volume) in the internal atmosphere (e.g. in service voids, manholes, inspection chambers or rooms as mentioned above) in detected.	N/A	Manhole/ chamber/ pumping station			
7.4	No person should enter or remain in a confined spaces or trenches where the carbon dioxide concentration exceed 1.5% (by volume).	N/A				
7.5	Oxygen concentration should be monitored and no person should enter or remain in any confined spaced or trenches where the oxygen content of air has fallen below 18% by volume.	N/A				

Section	Environmental Protection Measure	Status	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
7.6	All the access to these confined spaces would be restricted only to authorize personnel who should be aware of the LFG hazard. No member of general public should be permitted or allowed to access these confined spaces, manholes or inspection chambers.	N/A				

Note:

Y – Implemented

N – Not Implemented

N/A – Not Applicable

Appendix 6

Calibration Records

Geotechnical Instruments
Landfill and Environmental Equipment - Worldwide

Verification Checklist

Product Type: **Gas Analyser** GA 2000 Serial Number: GA 08277

Checks and processes to be carried out		(✓) or (n/a)
Documents	All paperwork has been completed and signed	✓
	Solenoid by-pass - signed as reconnected (GEM-500 only)	N/A
Functions, options & settings	Anemometer set (refer Precal Sheet)	✓
	H2 warning level set (compensated CO only, refer Project 1 or Precal Sheet)	N/A
	Baud rate set to 19200+HS (2K ONLY)	✓
	Barometer set (± 5mbar of actual)	✓
	Internal Gas sensors fitted Cell 1	N/A
	Cell 2	N/A
	Cell 3	N/A
	Oxy cell	✓
	Current software version correct (write current version)	V 2.35
	Current time correct	✓
	Date format correct	(UK) / ~~USA~~
	Company logo correct	✓
	Instrument type correct (refer to opening title screen)	✓
	Lifetime guarantee	~~on~~ / (off)
	Service due date set (current date + 6 months)	✓
	Last gas check date set (refer outward gas check)	✓
Sample flow	Vacuum tested at inlet port	✓
	Flow correct	✓
	Flow fail operates correctly	✓
Ancillary readings	Temperature probe registers correct temperature	✓
	Analyser recognises gas pod correctly	✓
	Analyser recognises flow pod correctly	✓
Pressure transducer	Check 5psi relative pressure transducer set using DPI	✓
	Check 1psi differential pressure transducer set using DPI (GEM ONLY)	N/A
Labels	All relevant product labels are fitted correctly	✓
	'Ex' screen printing/label is clear/correct for product	✓
	Battery cover sealing tape fitted (Hyperbaric units only)	N/A
Accessories	All relevant accessories included correct	✓
Memory & battery	Update EPROM database (2K only)	✓
	Update GA Production database	✓
	Memory clear (unless client requests otherwise)	✓
	New batteries fitted as standard (NMRI Hyperbaric units only)	N/A
	Battery life tested by logging (If new 2k battery fitted only)	14 Hrs
Comments		

Verified By: L. Gibbs (Signed) L. GIBBS (Printed) (ref. FI0002) **Date:** 08.11.05.

Geotechnical Instruments
Landfill and Environmental Equipment - Worldwide

CERTIFICATE OF CALIBRATION

Certificate number: GA08277L0041105
Date of Calibration: 04/11/05
Product: GA 2000
Serial number: GA08277

CALIBRATION CHECK RESULTS

Primary Gas Channels

Methane		Carbon Dioxide	
Certified Gas %	Reading %	Certified Gas %	Reading %
0.0	0.0	0.0	0.0
0.5	0.4	0.5	0.4
5.0	5.0	5.0	4.5
14.8	14.7	14.8	14.2
59.5	59.9	40.5	37.8
50.1	50.9	49.9	47.5
100.0	99.0	0.0	0.0

Oxygen Channel

Certified Gas	0% O_2	4.95 % O_2	Air (20.9% nominal)
Reading	0.0 %	4.8 %	20.9 %

Approved by: L. Gibbs (Name)

L. Gibbs ..... (Signature)

All gases are certified to traceable National Standards.

This unit must be serviced at regular 6 monthly intervals by a Geotechnical Instruments Ltd approved service facility.

Sovereign House, Queensway, Leamington Spa, Warwickshire, CV31 3JR, England
Tel: +44 (0)1926 338111, Fax: +44 (0)1926 338110, e-mail: service@geotech.co.uk, www.bacharach-europe.com

Appendix 7

Field Measurement Recording Sheets

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: DC/2005/01 Ting Kok Road Pumping

Date of measurement: 4/1/06

Sampling equipment used:	Dates calibrated
GA 2000	04/11/05
Serial no. GA 08277	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
M01	4/1/06	13:50	Sunny	79.2	0.0	0.3	20.3	24.6	
M02	4/1/06	13:53	Sunny	79.6	0.0	0.0	20.5	23.5	
M03	4/1/06	14:50	Sunny	79.4	0.0	0.1	20.3	23.8	

Field Technician: _____

Checked by: _____

Annex A

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: DC/2005/01 Tung Tak Road Pumping Station
Date of measurement: See Below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08779	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes							
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	25/1/2006	08:05	Cloudy	79.2	0	0	20.1	13.4	Hot work
Man-hole	"	08:06	"	79.1	0	0	20.7	13.4	
Portion 7	25/1/2006	08:08	Cloudy	79.1	0	0	20.7	13.4	Sheet piling & Excavation
"	"	08:09	"	79.1	0	0	20.7	13.4	
Portion 4	25/1/2006	12:56	Fine	79.2	0	0	20.6	17.6	Hot work
Man-hole	"	12:57	"	79.2	0	0	20.7	17.6	
Portion 7	25/1/2006	13:00	Fine	79.2	0	0	20.7	17.6	Sheet piling & Excavation
"	"	13:01	"	79.1	0	0	20.7	17.6	
Portion 4	26/1/06	8:00	Fine	79.2	0	0	20.6	12.8	Hot work
Man-hole	"	8:02	"	79.2	0	0	20.6	12.8	
Portion 4	26/1/06	13:09	Fine	79.1	0	0	20.7	18.5	Hot work.
Man-hole		13:11	"	79.1	0	0	20.7	18.5	

Field Technician: Jaycee Ng

Checked by:

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: D/C2005/01 Tin Kok Road Pumping Station
Date of measurement: See below

Sampling equipment used:	Dates calibrated
Geotechnical	
Serial no. GA of 37	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes							
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	23-1-06	13:15	Fine	79.1	0	0	20.7	15.3	Hot work.
MP43	"	13:16	Fine	79.2	0	0	20.6	15.6	Hotwork
Portion 7	23-1-06	13:19	"	79.2	0	0	20.6	15:6	Shut piling.
	"	13:21	"	79.2	0	0	20.5	15.5	Excavation.
Portion 4	24-1-06	8:34	Fine	79.4	0	0.1	20.4	11.8	Hot
MP43	"	8:35	"	79.4	0	0.1	20.4	11.8	work.
Portion 7	24-1-06	8:37	Fine	79.3	0	0.1	20.5	11.6	Shut piling
"	"	8:38	"	79.2	0	0.1	20.6	11.7	excavation
Portion 4	24-1-06	13:16	Fine	79.1	0	0	20.7	17.6	Hot
MP42	"	13:17	"	79.1	0	0	20.8	16.8	work.
Portion 7	24-1-06	13:20	"	79.2	0	0	20.6	16.6	Shut piling
"	"	13:20	"	79.1	0	0	20.7	16.6	Excavation.

Field Technician: Tam Kwong

Checked by:

Landfill Gas Monitoring – Field Measurement Recording Sheet

Name of site: DC/2005/01 Ting Kok Road Pumping Station

Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	21/1/06	13:00	Cloudy	79.1	0	0	20.7	16.6	Hot
MP29	21/1/06	13:01	"	79.1	0	0	20.7	16.6	Work
Portion 7	"	13:03	"	79.2	0	0	20.6	16.6	Sheet pile
"	"	13:05	"	79.2	0	0	20.6	16.7	Excavation
Portion 4	23/1/06	8:30	Cloudy	79.2	0	0	20.6	10.3	Hot
MP29	"	8:31	"	79.1	0	0	20.7	10.3	Work
Portion 7	23/1/06	8:33	Cloudy	79.2	0	0	20.6	10.1	Sheet pile
"	"	8:34	"	79.2	0	0	20.6	10.1	Excavation

Field Technician: [signature]

Checked by: [signature]

Landfill Gas Monitoring – Field Measurement Recording Sheet

Name of site: TKR
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	9/11/05
Serial no. GA 05777	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	20/1/06	08:00	Rain	79.2	0	0	20.6	19.2	Hot work
MP22.44	"	08:03	"	79.2	0	0	20.7	19.2	
Portion 7	20/1/06	08:02	Rain	79.2	0	0	20.6	19.1	Sheet pile, Excavation
"	"	08:04	"	79.1	0	0	20.7	19.1	
Portion 4	20/1/06	12:54	Rain	79.2	0	0	20.6	17.6	Hot work
MP30.44	"	12:58	"	79.1	0	0	20.7	17.6	
Portion 7	20/1/06	12:55	Rain	79.1	0	0	20.7	17.5	Sheet pile, Excavation
"	"	12:57	"	79.1	0	0	20.7	17.4	
Portion 4	21/1/06	8:32	Rain	79.1	0	0	20.8	13.8	Hot work. Sheet pile. Excavation
MP22.44	"	8:34	"	79.1	0	0	20.8	13.7	
Portion 7	"	8:35	Rain	79.2	0	0	20.7	13.7	
"	"	8:36	"	79.2	0	0	20.7	13.8	

Field Technician: _____

Checked by: _____

Landfill Gas Monitoring – Field Measurement Recording Sheet

Name of site: Tung Lok Road Pumping Station No. 5
Date of measurement: see below

Sampling equipment used:	Dates calibrated
GA 2000	04/11/05
serial no. GA 08277	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	18/1/06	12:55	Cloudy	79.3	0	0	20.7	21.0	Hot Work
MP21	"	13:05	"	79.2	0	0	20.7	21.0	
Portions 5, 7	18/1/06	12:56	Cloudy	79.2	0	0	20.7	20.9	Excavation/
"	"	13:07	"	79.2	0	0	20.6	21.0	sheetpile
Portion 4	19/1/06	8:00	Rain	79.1	0	0	20.7	19.7	Hot work
MP22, 44	"	8:05	"	79.2	0	0	20.7	19.7	
Portion 5, 7	19/1/06	8:02	Rain	79.2	0	0	20.6	19.6	Excavation &
"	19/1/06	8:06	"	79.2	0	0	20.6	19.6	sheetpile
Portion 4	19/1/06	12:52	Rain	79.1	0	0	20.6	19.1	Hot work
MP22, MP44	19/1/06	12:54	" "	79.1	0	0	20.7	19.1	
Portion 7	19/1/06	12:55	Rain	79.2	0	0	20.7	19.1	Sheetpile
"	"	12:57	"	79.1	0	0	20.7	19.2	Excavation

Field Technician: [signature]

Checked by: [signature]

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping station No.5

Date of measurement: see below

Sampling equipment used:	Dates calibrated
GA 2000	04/11/05
Serial no. GA 08297	

Sample location	Date of measurement	Sampling time	Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
			Perimeter on-site and/or off-site monitoring holes						
Portion 4	17/1/06	08:10	Rain	79.1	0	0	20.8	18.3	Hot work
MP21	"	08:11	"	79.1	0	0	20.7	18.1	&
Portion 5	17/1/06	08:13	Rain	79.1	0	0	20.7	18.1	Excavation/
"	"	08:14	"	79.1	0	0	20.7	18.1	Sheet pile
Portion 4	17/1/06	12:55	Cloudy	79.2	0	0	20.7	19.3	Hot work
MP21	"	12:58	"	79.2	0	0	20.7	19.3	&
Portion 5,7	17/1/06	12:56	Cloudy	79.1	0	0	20.8	19.4	Excavation/
	"	13:00	"	79.2	0	0	20.7	19.4	sheet pile
Portion 4	18/1/06	8:05	Rain	79.2	0	0	~~19.5~~ 20.8	19.5	Hot work
MP21	"	8:30	"	79.1	0	0	20.8	20.0	"
Portion 5,7	18/1/06	8:06	Rain	79.1	0	0	20.7	19.6	Excavation &
"	"	8:31	"	79.1	0	0	20.8	20.0	Sheet pile

Field Technician: [signature]

Checked by: [signature]

ANNEX A
Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tuen Kok Road pumping station No.5.
Date of measurement: 13 Jan 06 to 16 Jan 06

Sampling equipment used:	Dates calibrated
GA 2000	04/11/05
Serial no. GA 08277	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 5	13-1-06	13:45	Fine	79.3	0	0	20.6	29.1	Hot work
MP6	"	13:47	"	79.4	0	0	20.4	28.1	"
Portion 7	"	14:05	Fine	79.3	0	0	20.6	27.0	Excavation
Existing Pumping Station	"	14:07	"	79.3	0	0	20.5	26.8	"
Portion 5	14-1-06	08:32	Fine	79.1	0	0	20.8	19.8	Hot work
MP6	"	08:34	Fine	79.2	0	0	20.7	19.7	"
Portion 5	16-1-06	08:37	Fine	79.1	0	0	20.8	20.2	Hot work
	"	08:39	"	79.2	0	0	20.7	20	Hot work
✓ Portion 4	16/1/06	12:55	Fine	79.2	0	0	20.6	27.7	Hot-Work
Pumping station	"	13:35	"	79.2	0	0	20.6	28.1	"
Portion 5	16/1/06	12:57	Fine	79.1	0	0	20.8	27.4	Excavation/ sheet pile
"	"	13:35	Fine	79.2	0	0	20.7	28.2	"
Portion 7	16/1/06	12:58	Fine	79.2	0	0	20.6	28.3	Excavation/ sheet pile
"	"	13:37	"	79.2	0	0	20.5	28.3	"

Field Technician: _____

Checked by: _____

Annex A

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tuen Kok road Pumping station No 5.

Date of measurement: 10-1-2006 / 11-JAN-06 / 12 Jan 06

13 Jan 06

Sampling equipment used:	Dates calibrated
GA 2000	06/11/05
Serial no. GA 08277	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	10-1-06	11:25	Fine	79.1	0	0	20.9	20.8	Hot work
MP6	"	11:28	Fine	79.1	0	0	20.7	20.6	Hot work
Portion 4	11-1-06	8:39	Fine	79.1	0	0	20.8	17.7	Hot work.
MP6.	"	8:41	Fine	79.2	0	0	20.7	17.8	Hot work
Portion 4	12-1-06	8:20	Fine	79.1	0	0	20.8	18.6	Hot-Work
MP6	"	8:31	"	79.1	0	0	20.8	18.4	Hot work
Portion 4	12-1-06	12:55	Fine	79.3	0	0	20.6	26.2	Hot-work
MP6	"	13:15	"	79.2	0	0	20.7	26.5	Hot work
Portion 4	13-1-06	8:35	Fine	79.2	0	0	20.7	18.6	Hot work
MP6	"	8:38	"	79.3	0	0	20.7	18.7	Hot Work

Field Technician: _____

Checked by: _____

Annex A

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement: 3 Feb 2006

Sampling equipment used:	Dates calibrated
GA 2000	04/11/05
Serial no. GA 08277	

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
No1	3 Feb 06	8:39am	Fine	78.7	0	1.0	20.3	19.0	CO_2 > 0.5%
No2	3 Feb 06	8:41am	Fine	79.4	0	0	20.6	18.8	
No3	3 Feb 06	8:36am	Fine	79.3	0	0	20.7	18.8	

Field Technician: Jerquelin Yip

Checked by: (SO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement:

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08377	04/11/05

Sample location	Date of measurement	Sampling time	Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
			Perimeter on-site and/or off-site monitoring holes						
Portion 4	4 Feb 06	9:30	Cloudy	79.1	0	0	20.8	16.1	Bar sun
Portion 4	4 Feb 06	13:02	Fine	79.2	0	0	20.7	18.6	Hot work
"	"	13:04	Fine	79.2	0	0	20.7	18.6	
Portion 4	6 Feb 06	8:15	Fine	79.1	0	0	20.8	15.9	Hot
"	"	8:16	Fine	79.1	0	0	20.7	15.8	work.
Portion 7	6 Feb 06	8:19	Fine	79.2	0	0	20.6	16.0	Sheet
Portion 1	"	8:20	"	79.1	0	0	20.7	16.0	piling.
Portion 4	6 Feb 06	1:12	Fine	79.1	0	0	20.8	23.2	Hot
"	"	1:14	"	79.1	0	0	20.8	23.1	work
Portion 7	"	1:15	"	79.2	0	0	20.7	23.1	sheet
"	"	1:16	"	79.1	0	0	20.8	23.0	piling.

Field Technician: Lam Kwong (TA)

Checked by: [signature] (SO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station N.T.
Date of measurement:

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. - GA 08277	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	7 Feb 06	8:36	Fine	79.1	0	0	20.8	18.6	Hot
"	"	8:37	"	79.2	0	0	20.7	18.7	Work.
Portion 7	"	8:39	"	79.2	0	0	20.7	18.7	Shaft
"	"	8:40	"	79.1	0	0	20.8	18.7	piling
Portion 4	7 Feb 06	13:32	Fine	79.2	0	0	20.6	27.4	Hot
"	"	13:33	"	79.3	0	0	20.8	27.2	Work
Portion 7	"	13:35	"	79.1	0	0	20.8	27.0	Shaft
"	"	13:36	"	79.2	0	0	20.7	27.2	piling.

Field Technician: [signature] (TA)

Checked by: [signature] (SO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no GA 08277	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
~~8/2/06~~	8/2/06	8:24	Fine	79.1	0	0	20.7	16.8	Hot work
Portion 4	8/2/06	8:26	"	79.1	0	0	20.7	16.8	
Portion 7	8/2/06	8:31	Fine	79.2	0	0	20.6	17.1	Sheet piling
"	8/2/06	8:32	"	79.2	0	0	20.6	17.1	
Portion 4	8/2/06	13:40	Fine	79.3	0	0	20.1	24.0	Hot work.
"	"	13:41	"	79.2	0	0	20.6	23.9	
Portion 5	8/2/06	13:42	Fine	79.0	0	0	20.8	24.0	trial pit Excavation
"	"	13:42	"	79.1	0	0	20.8	24.0	
Portion 4	9/2/06	8:12	Fine	79.1	0	0	20.7	15.9	Hot work
"	"	8:13	"	79.1	0	0	20.7	15.9	
Portion 4	9/2/06	13:02	Fine "	79.2	0	0	20.6	19.4	Hot work
"	"	13:04	"	79.2	0	0	20.6	19.4	

Field Technician: Jacqueline Yip (Sub-Agent) Checked by: [signature] (SO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tung Kok Road Pumping Station No.5

Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	04/11/08

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	10/2/06	8:06	Fine	79.2	0	0	20.6	14.4	Hot work
"	"	8:08	"	79.2	0	0	20.6	14.4	
Portion 4	10/2/06	13:28	Fine	79.3	0	0	20.6	25.0	Hot work.
"	"	13:29	"	79.2	0	0	20.6	25.0	
Portion 4	11/2/06	8:11	Fine	79.2	0	0	20.6	15.8	Hot work.
	11/2/06	8:12	Fine	79.2	0	0	20.7	15.7	
Portion 4	11/2/06	13:14	Fine	79.2	0	0	20.6	24.3	Hot work.
"	11/2/06	13:15	"	79.3	0	0	20.6	24.2	
Portion 4	13/2/06	8:17	Fine	79.0	0	0	20.8	17.7	Hot work.
"	13/2/06	8:18	"	79.1	0	0	20.8	17.7	
Portion 4	13/2/06	13:16	Fine	79.1	0	0	20.8	21.8	Hot work.
"	13/2/06	13:17	"	79.0	0	0	20.8	22.0	

Field Technician: Dora Kwong (TA)

Checked by: (Safety Officer)

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ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tong Kok Road pumping station No.5
Date of measurement:

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08377	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	14 Feb 06	8:20	Rain	79.0	0	0	20.8	18.6	Hot
"	"	8:21	Rain	79.1	0	0	20.7	18.6	Work
Portion 4	14 Feb 06	13:22	Cloudy	79.2	0	0	20.6	19.9	Hot
"	"	13:23	Cloudy	79.2	0	0	20.7	19.9	Work.
Portion 4	15 Feb 06	8:19	Cloudy	79.1	0	0	20.8	19.9	Hot
"	"	8:20	"	79.0	0	0	20.8	19.8	Work.
Portion 4	15 Feb 06	13:22	Fine	79.3	0	0	20.6	26.7	Hot
"	"	13:23	Fine	79.3	0	0	20.6	26.8	Work.
Portion 4	16/2/06	8:06	Cloudy	79.2	0	0	20.6	21.2	Hot work
"	"	8:08	"	79.2	0	0	20.6	21.2	"
Portion 4	16/2/06	13:31	Fine	79.1	0	0	20.7	25.7	Hot work
"	"	13:33	"	79.1	0	0	20.7	25.7	"

Field Technician: Lam Kwong (TA)

Checked by: (Safety Officer)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tung Kok road pumping station No.5.
Date of measurement:

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 0f0ff	02/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Perimeter 4	17 Feb 06	8:17	Fine	79.0	0	0	20.4	17.5	Hot
"	"	8:18	"	79.0	0	0	20.8	17.5	Work.
Perimeter 4	17 Feb 06	13:11	Fine	79.1	0	0	20.8	21.3	Hot
Perimeter 5	17 Feb 06	13:14	Fine	79.2	0	0	20.6	21.3	Work
Perimeter 4	18/2/06	8:02	Rain	79.1	0	0	20.8	14.1	Hot Work
"	"	8:05	"	79.1	0	0	20.8	14.1	"
Perimeter 4	18/2/06	13:14	Cloudy	79.2	0	0	20.6	14.9	Hot
"	"	13:15	Cloudy	79.3	0	0	20.6	15.0	Work
Perimeter 4	20/2/06	8:08	Fine	79.1	0	0	20.7	14.7	Hot Work
"	"	8:09	"	79.1	0	0	20.7	14.7	"
Perimeter 4	20/2/06	13:10	Fine	79.2	0	0	20.6	20.8	Hot Work
"	"	13:12	"	79.2	0	0	20.6	20.8	"

Field Technician: [signature] (Sub-agent)

Checked by: [signature] (Safety Officer)

ANNEX A
Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tng Kok Road Pumping Station No. 5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no.: GA 08277	04/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes							
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	21 Feb 06	08:06	Fine	79.1	0	0	20.7	18.1	Hot work
"	"	08:07	"	79.1	0	0	20.7	18.1	"
Portion 4	21 Feb 06	13:02	Fine	79.2	0	0	20.6	22.4	Hot work
"	"	13:04	"	79.2	0	0	20.6	22.4	"
Portion 4	22 Feb 06	8:11	Fine	79.0	0	0	20.9	20.4	Hot
"	"	8:12	"	79.1	0	0	20.8	20.4	work.
Portion 4	22 Feb 06	13:15	Fine	79.2	0	0	20.6	27.8	Hot
"	"	13:16	"	79.2	0	0	20.6	27.8	work.
Portion 4	23 Feb 06	08:10	Cloudy	79.0	0	0	20.8	18.0	Hot work
"	"	08:11	"	79.0	0	0	20.8	18.0	"
Portion 4	23 Feb 06	13:10	Cloudy	79.1	0	0	20.7	21.7	Hot work
"	"	13:12	"	79.1	0	0	20.7	21.7	"

Field Technician: _____ (Sub-agent)

Checked by: _____ (Safety Officer)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tung Tau Road Pumping Station No.5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	02/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	24 Feb 06	08:09	Cloudy	79.1	0	0	20.7	17.8	Hot weather
"	"	08:11	"	79.1	0	0	20.7	17.8	"
Portion 4	24 Feb 06	13:10	Cloudy	79.1	0	0	20.7	18.3	Hot weather
"	"	13:11	"	79.1	0	0	20.7	18.3	"
Portion 4	25/2/06	08:15	Cloudy	79.1	0	0	20.8	17.0	Hot weather
"	"	08:17	"	79.1	0	0	20.8	17.0	"
Portion 4	27/2/06	8:09	Cloudy	79.1	0	0	20.7	16.1	Hot weather
"	"	"	"	79.1	0	0	20.8	16.1	"
Portion 4	27/2/06	13:05	cloudy	79.1	0	0	20.7	17.1	Hot weather
"	"	13:07	"	79.1	0	0	20.7	17.1	"

Field Technician: _____ (Sub-agent)

Checked by: _____ (Safety Officer)

To: Sharifah / Claudine
From: Edith
Total 9 pages

FAX
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ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement: 1 Mar 2006

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
M000001	1/3/06	08:33	Fine	78.9	0	0.9	20.2	9.4	
M000002	1/3/06	08:35	Fine	79.2	0	0.1	20.5	10.9	
M000003	1/3/06	08:37	Fine	79.2	0.1	0.1	20.5	11.3	

Field Technician: Jacqueline Yip (Sub-Agent)

Checked by: [signature] (RSO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	1/3/06	8:10	Fine	79.3	0	0	20.5	9.4	Hot work
"	"	8:12	"	79.3	0	0	20.5	9.4	"
Portion 4	1/3/06	13:01	Fine	79.0	0	0	20.8	11.9	Hot work
"	"	13:02	"	79.0	0	0	20.8	11.9	"
Portion 5	1/3/06	13:04	Fine	79.0	0	0	20.8	11.9	} Excavation
"	1/3/06	13:05	"	79.0	0	0	20.8	11.9	
Portion 4	2/3/06	08:15	Fine	79.3	0	0.1	20.5	9.8	} Hot work
"	"	08:16	"	79.3	0	0.1	20.5	9.8	"
Portion 4	2/3/06	13:06	Fine	79.2	0	0	20.6	16.4	} Hot work
"	"	13:07	"	79.2	0	0	20.6	16.4	"
Portion 4	3/3/06	08:10	Fine	79.2	0	0.1	20.5	12.8	} Hot work
"	"	08:12	"	79.2	0	0.1	20.5	12.8	"
Portion 4	3/3/06	13:06	Fine	79.2	0	0	20.6	22.8	} Hot work
"	"	13:08	"	79.2	0	0	20.6	22.8	

Field Technician: [signature] (Sub-Agent)

Checked by: [signature] (RSO)

ANNEX A
Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tseung Kwan O Road Pumping station No.5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA-2000	
Serial no. GA08277	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	4/3/06	08:06	Fine	79.3	0	0.1	20.5	15.0	Hot work
"	"	08:07	"	79.3	0	0.1	20.5	15.0	
Portion 4	4/3/06	12:56	Cloudy	79.1	0	0	20.7	17.1	Hot work
"	"	12:58	"	79.1	0	0	20.7	17.1	
Portion 4	6/3/06	08:11	Rain	79.1	0	0.1	20.6	19.1	Hot work
"	"	08:13	"	79.2	0	0	20.7	19.1	
Portion 4	6/3/06	13:10	Cloudy	79.2	0	0	20.6	21.2	Hot work
"	"	13:11	"	79.2	0	0	20.7	21.2	
Portion 4	7/3/06	08:05	Cloudy	79.2	0	0	20.6	21.1	Hot work
"	"	08:06	"	79.2	0	0	20.6	21.1	
Portion 4	7/3/06	13:03	Cloudy	79.2	0	0	20.7	23.3	Hot work
"	"	13:05	"	79.2	0	0	20.7	23.3	

Field Technician: Jacquelyn Ng

Checked by: (RSO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tong Fok Road Pumping Station No 5

Date of measurement: See ~~the~~ below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	8/3/06	08:10	Fine	79.1	0	0	20.8	19.9	Hot work
"	"	08:11	"	79.1	0	0	20.8	19.9	
Portion 4	8/3/06	13:06	Fine	79.2	0	0	20.7	25.1	Hot work
"	"	13:08	"	79.2	0	0	20.7	25.1	
Portion 4	9/3/06	08:15	Cloudy	79.1	0	0	20.7	18.4	Hot work
"	"	08:17	"	79.1	0	0	20.7	18.5	
Portion 4	9/3/06	13:06	Fine	79.1	0	0	~~20.8~~ 20.8	24.8	Hot work
"	"	13:07	"	79.1	0	0	20.8 ~~24.8~~	24.8	
Portion 4	10/3/06	08:15	Fine	79.2	0	0	20.7	22.9	Hot Work
"	"	08:17	"	79.2	0	0	20.7	22.9	
Portion 4	10/3/06	13:01	Fine	79.3	0	0	20.6	25.1	Hot work
"	"	13:03	"	79.3	0	0	20.6	25.1	

Field Technician: Jacqueline Yap

Checked by: (RSO)

Annex A

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tung Fok Road Pumping Station No.5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA2000	
Serial no. GA08223	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes: Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	11/3/06	08:15	Fine	79.2	0	0	20.7	22.4	Hot work.
"	"	08:17	"	79.2	0	0	20.7	22.4	
Portion 4	11/3/06	13:01	Fine	79.2	0	0	20.7	23.6	Hot work
"	"	13:03	Fine	79.2	0	0	20.7	23.6	
Portion 4	13/3/06	08:06	Rain	79.0	0	0	20.8	12.0	Hot work
"	"	08:08	Rain	79.0	0	0	20.8	12.0	
Portion 4	13/3/06	13:06	Cloudy	79.0	0	0	20.8	11.8	Hot work
"	"	13:07	Cloudy	79.0	0	0	20.8	11.8	
Portion 4	14/3/06	08:11	Fine	79.0	0	0.1	20.7	10.1	Hot work
"	"	08:13	"	79.0	0	0.1	20.7	10.1	
Portion 4	14/3/06	13:13	Cloudy	79.1	0	0	20.6	16.2	Hot work
"	"	13:14	"	79.1	0	0	20.6	16.2	

Field Technician: Cannon Tsui

Checked by: [signature] (RSO)

ANNEX A
Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5.
Date of measurement: See below.

Sampling equipment used:	Dates calibrated
GA 200	
Serial No.: GA 08277	04/11/05.

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	15/03/06	08:15	Cloudy.	79.1	0	0	20.6	16.0	Hot Work.
"	"	08:17	"	79.2	0	0	20.6	16.0	
Portion 4	15/03/06	13:15	Sunny	79.1	0	0	20.6	21.9	Hot Work
"	"	13:17	"	79.1	0	0	20.6	21.9	
Portion 4	16/03/06	08:10	Cloudy	79.1	0	0	20.6	19.4	Hot Work
"	16/03/06	08:12	"	79.1	0	0	20.6	19.4	
Portion 4	16/03/06	13:05	Sunny	79.3	0	0	20.6	26.3	Hot Work
"	"	13:07	"	79.3	0	0	20.6	26.3	
Portion 4	17/03/06	08:10	Rainy	79.2	0	0	20.6	20.6	Hot Work
"	"	08:12	"	79.2	0	0	20.6	20.6	
Portion 4	17/03/06	13:05	Cloudy	79.1	0	0	20.7	21.7	Hot Work
"	"	13:07	"	79.1	0	0	20.7	21.7	

Field Technician: Carman Fu.

Checked by: (ESO)

ANNEX A
Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No. 5
Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA08279	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	18/3/06	08:05	Cloudy	79.2	0	0	20.6	21.1	Hot works
"	"	08:07	"	79.2	0	0	20.6	21.1	
Portion 4	18/03/06	13:18	Fine	79.3	0	0	20.6	30	Hot Works
"	"	13:17	"	79.3	0	0	20.6	30	
Portion 4	20/3/06	08:03	Fine	79.0	0	0	20.8	18.6	Hot works
"	"	08:05	Fine	79.0	0	0	20.8	18.6	
Portion 4	20/3/06	13:02	Fine	79.1	0	0	20.7	20.1	Hot works
"	"	13:03	Fine	79.1	0	0	20.7	20.1	
Portion 4	21/3/06	08:02	Fine	79.0	0	0	20.8	18.4	Hot works
"	"	08:03	Fine	79.0	0	0	20.8	18.4	
Portion 4	21/3/06	13:10	Fine	79.2	0	0	20.6	22.0	Hot works
"	"	13:11	"	79.2	0	0	20.6	22.0	

Field Technician: Jacqueline Yip

Checked by: (signature) (RSO)

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Tung Kok Road Pumping Station No.5

Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 82277	4/11/05

Sample location	Date of measurement	Sampling time	Perimeter on-site and/or off-site monitoring holes						
			Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
Portion 4	22/3/06	08:01	Cloudy/Rain	79.1	0	0	20.7	21.6	Hot work
"	"	08:03	"	79.1	0	0	20.7	21.6	"
Portion 4	22/3/06	13:16	Cloudy	79.2	0	0	20.6	22.5	Hot work
"	"	13:18	"	79.2	0	0	20.6	22.5	"
Portion 4	23/3/06	08:10	Rain	79.2	0	0	20.6	23.2	Hot work
"	"	08:11	"	79.2	0	0	20.6	23.2	"
Portion 4	23/3/06	13:03	Rain	79.3	0	0	20.6	23.9	Hot work
"	"	13:04	Rain	79.3	0	0	20.6	23.9	"
Portion 4	24/3/06	08:06	Rain	79.0	0	0	20.8	17.6	Hot work
"	"	08:08	Rain	79.1	0	0	20.7	17.6	"
Portion 4	24/3/06	13:06	Rain	79.1	0	0	20.7	16.9	Hot work
"	"	13:08	Rain	79.1	0	0	20.7	16.9	"

Field Technician: J Jacquelyn Yip

Checked by: (ESO)

DC/2005/01

Annex A

ANNEX A

Landfill Gas Monitoring – Field Measurement Recording Sheet (Sample)

Name of site: Ting Kok Road Pumping Station No.5

Date of measurement: See below

Sampling equipment used:	Dates calibrated
GA 2000	
Serial no. GA 08277	4/11/05

Sample location	Date of measurement	Sampling time	Weather condition	Balance gas (%)	Flammable gas (methane %)	Carbon dioxide (%)	Oxygen (%)	Temp (°C)	Remark
			Perimeter on-site and/or off-site monitoring holes						
Portion 4	25/3/06	08:07	Rain	79.1	0	0	20.6	17.8	} Hot work
	"	08:08	Rain	79.1	0	0	20.6	17.8	
Portion 4	25/3/06	13:10	Cloudy	79.2	0	0	20.6	18.6	} Hot work
"	"	13:12	"	79.2	0	0	20.6	18.6	
Portion 4	27/3/06	08:14	Rain	79.1	0	0	20.7	17.7	} Hot work
"	"	08:15	"	79.1	0	0	20.7	17.7	
Portion 4	27/3/06	13:08	Rain	79.2	0	0	20.6	18.1	} Hot work
"	"	13:10	"	79.2	0	0	20.6	18.1	
Portion 4	28/3/06	08:17	Fine	79.1	0	0	20.7	17.5	} Hot work
"	"	08:19	Fine	79.1	0	0	20.7	17.5	
Portion 4	28/3/06	13:05	Fine	79.2	0	0	20.6 ~~24.3~~	24.3	} Hot work
"	"	13:06	"	79.2	0	0	20.6 ~~24.3~~	24.3	

Field Technician: J. Jacqueline Yip

Checked by: [signature] (RSO)

Particular Specification