



CONTRACT NO. DE/2005/04

**SUPPLY AND INSTALLATION OF ELECTRICAL AND MECHANICAL EQUIPMENT FOR
UPGRADING OF TING KOK ROAD PUMPING STATION NO. 5**

ENVIRONMENTAL MONITORING AND AUDIT

QUARTERLY EM&A SUMMARY REPORT NO. 3

FROM DECEMBER 2007 TO FEBRUARY 2008

for

Biwater Man Lee Limited

Submitted by

Kingsford Environmental (H.K.) Ltd.

CONTROLLED DOCUMENT

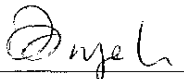
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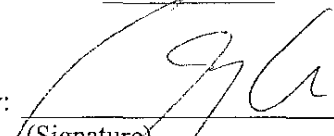
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PROJECT NAME: **Supply and Installation of Electrical and Mechanical Equipment for Upgrading of Ting Kok Road Pumping Station No. 5**

PROJECT NO.: 81901

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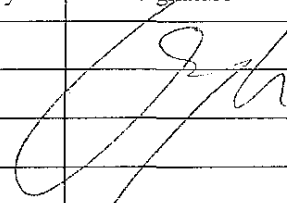
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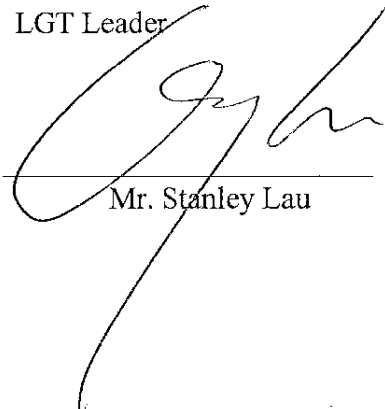
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Mr. Stanley Lau

Date: 6 March 2008

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Independent Checker (Landfill Gas) (CH2M HILL Hong Kong Limited)	Mr. K. S. Lee	1

EXECUTIVE SUMMARY

This is the third Quarterly Environmental Monitoring and Audit (EM&A) Summary Report for the Drainage Services Department Contract No. DE/2005/04 entitled “Supply and Installation of Electrical and Mechanical Equipment for Upgrading of Ting Kok Road Pumping Station No. 5”. Biwater Man Lee Limited has employed an independent Landfill Gas Team (LGT), Kingsford Environmental (H.K.) Limited, to monitor landfill gas parameter and audit the implementation of the landfill gas hazard mitigation measures, as required in the contract.

The LGT’s duties are to review/comment on the contractor’s method statements regarding actions, investigate complaints, provide monthly and quarterly reports on the environmental status, and certification of reports and all submissions under the EP in accordance with the requirement of the Report on Landfill Gas Hazard Assessment as per section 8 and the Environmental Permit. The Independent Checker (Landfill Gas) (IC(LG)) for the project is to review and verify the reports and all submissions under the EP in accordance with the requirement of the Report on Landfill Gas Hazard Assessment as per section 8.2.4.

For the landfill gas monitoring activities, Action and Limit (A/L) Levels are defined levels of impact recorded which represent levels at which a prescribed response is required. Action Limit Level is provided by the baseline monitoring results documented in the baseline monitoring report (Report No. EA01284R002) for the Project. The A/L Level for the methane are 0.5%/1.0%, the A/L Level for the carbon dioxide are 0.5%/1.5% and the A/L Level for the oxygen are 19.0%/18.0%.

In the third quarter (December 2007 – February 2008), the major site activities included the outstanding works, defect and functional test of E&M equipment at Pumping Station. In addition, operation and maintenance of E&M equipment at Pumping Station was conducted.

Note that no excavation work and construction work are carried out by Biwater Man Lee Limited from mid of January to mid of February 2008, which would not have any significant landfill gas impacts on site to the E&M contractor, Biwater Man Lee Limited.

In this quarter, weekly site inspection and landfill gas monitoring, as recommended in the Report on Landfill Gas Hazard Assessment as per section 8, were conducted.

No exceedance of monitoring parameters was found and no deficiency was found during the site inspections in this quarter. Thus, the work activities and mitigation measures were in compliance with the environmental protection regulations, contract requirements and the requirement of the environmental permit during this quarter.

Three monthly EM&A meetings were attended for the months of December 2007 to February 2008 with all of the parties (DSD, civil and E&M contractors, LGTs, and the IC(LG)) to review the environmental issues and communication between the parties.

There were no complaints received during the quarter.

There was no reporting change during the reporting quarter.

The planned activities for March 2008 as regards E&M equipment are mainly defect rectification, outstanding minor works and provision of emergency call services for the Pumping Station.

1 Introduction

This is the third Quarterly Environmental Monitoring and Audit (EM&A) Summary Report for the Drainage Services Department Contract No. DE/2005/04 entitled “Supply and Installation of Electrical and Mechanical Equipment for Ting Kok Road Pumping Station No.5”. The report was prepared by the Landfill Gas Team, Kingsford Environmental (H.K.) Limited, of the E&M Contractor, Biwater Man Lee Limited. This report is submitted to the Client, the Drainage Services Department, and Independent Checker, CH2M HILL Hong Kong Limited, for the project. In addition, this report is to be submitted to EPD in accordance with the requirement of the environmental permit (EP-212/2005) and Report on Landfill Gas Hazard Assessment as per section 8 (EM&A).

This report presents the summary results of the landfill gas monitoring and environmental auditing of the project activities regarding to the E&M equipment site work conducted during the months of December 2007 to February 2008. The various landfill gas parameters at the beginning of each half working day for E&M installation work (i.e. morning and afternoon) was monitored and auditing works including mainly regular site inspections for verification of the mitigation measures implementation as recommended in the Report on Landfill Gas Hazard Assessment was conducted by LGT.

The contact information for the key personnel is shown in Appendix 1.

2 Basic Project Information

The major parties involved in the project with respect to environmental protection are shown in Appendix 1 (Ref.: Report on Landfill Gas Hazard Assessment). These include the Biwater Man Lee Limited, the Landfill Gas Team, the DSD Client, and the Independent Checker (Landfill Gas), or IC(LG) and EPD. A chart showing the duties of the parties regarding inspections and follow-up is also shown.

The management of Biwater Man Lee Limited and project team is shown in Appendix 1. The LGT consists of an LGT Leader and 1-2 landfill gas technicians. The LGT will co-ordinated with the Site Agent of Biwater Man Lee Limited for site inspection.

The site works for the E&M equipment and for testing and commissioning of the various systems has commenced on 15 May 2007. The master construction program schedule is attached in Appendix 2. The major E&M work packages are listed below in Table 1.

Table 1: Master Construction Program for E&M Works

Section	Task Description	Date
I	- Submissions and approval of Major Equipment, Drawing and Design	16 Jan '06 – 15 May '06
II	- Equipment Manufacture and Delivery	15 May '07 – 15 Nov '07
	- Site installation, Public Utilities and T&C	21 Jun '07 – 5 Jan '08

EM&A contact information for the key personnel is shown in Table 2.

Table 2: EM&A Contact Information for Key Personnel

Name	Title	Telephone	Fax
Mr. Thomas Jim (BML)	Site Agent	2671-2350 / 9080-4998	2671-2351
Mr. Tommy Lo (BML)	Deputy Site Agent	2416-2828	2413-6278
Mr. Thomas Jim (BML)	Site Waste Manager / Co-ordinator	2671-2350 / 9080-4998	2671-2351
Mr. K. C. Lau (BML)	Site Supervisor	9056-7887	2413-6278
Mr. Stanley Lau (LEL)	LGT Leader	2612-2817	2614-7012
Ms. Angela Lau (KEL)	LGT Assistance	2612-2817	2614-7012
Mr. C. W. Tse (DSD)	Engineer's Representative	2594-7309	2827-8532
Mr. K. S. Lee (CH2M)	The Independent Checker (Landfill Gas)	2507-2203	2507-2293

3 Environmental Requirements

The works performed for this contract shall comply with the relevant Hong Kong government ordinances, regulations, guidelines, practice notes, etc. as regards environmental protection, as detailed in the Report on Landfill Gas Hazard Assessment, Section 8 (Environmental Monitoring and Audit) and Environmental Permit.

The Report on Landfill Gas Hazard Assessment, Section 8 (Environmental Monitoring and Audit) specifies environmental auditing to ensure that the mitigation measures recommended in the Report on Landfill Gas Hazard Assessment are effectively implemented. A summary of the required environmental protection and mitigation measures for the construction phase extracted from Appendix G of the Project Profile (“Implementation Schedule for Landfill Gas Hazard Mitigation Measures”) is attached in Appendix 3.

The environmental aspects for the construction phase include plant noise, dust, water quality, waste materials (including chemicals) and landfill gas hazard. Landfill gas monitoring is required at the beginning of each half working day for the E&M installation work (i.e. morning and afternoon). Since no excavation work is carried out by Biwater Man Lee Limited. Therefore, impact monitoring of landfill gas is to be carried out at selected location (i.e. Pumping Station). Landfill gas parameters to be monitored comprise methane, carbon dioxide and oxygen. In addition, temperature is also recorded. The portable gas analyzer equipment (Manufacture: Gas Data Model GFM410 Landfill and Serial No. 10239) was used for landfill gas monitoring and the calibration record for the equipment used for landfill gas monitoring is attached in Appendix 4.

For the landfill gas monitoring, Action and Limit (A/L) Levels are defined levels of impact recorded which represent levels at which a prescribed response is required. Action Limited Level is provided by the baseline monitoring results documented in the baseline monitoring report (Report No. EA01284R002) for Project. The Event and Action Plans (EAPs) is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident (either accidental or through inadequate implementation of mitigation measures) does occur, the cause will be quickly identified and remediated, and the risk of a similar event recurring is reduced. This also applies to the exceedances of A/L criteria identified in the Report on Landfill Gas Hazard Assessment. A summary of the event/action plan for the Project extracted from Report on Landfill Gas Hazard Assessment is attached in Appendix 3.

The Environmental Permit, i.e. section 6.21 of the Particular Specification, is shown in Appendix 5.

4 Implementation Status of Environmental Protection

Weekly site inspections were conducted during this quarter, as required. Frequency of the site inspections depends upon the work activities as regards environmental protection. The site inspections and audits conducted during this quarter are summarized in Table 3.

Table 3: Site Inspections/Audits for December 2007 to February 2008

Month	Date of Site Inspections/Audits	
	by ER/LGT/BML	by EPD
Dec 2007	7, 14, 21 and 28	n/a
Jan 2008	4 and 8	n/a
Feb 2008	21 and 26	n/a

The work activities and dates of occurrence of each activity in this quarter are summarized in Table 4.

In the third quarter (December 2007 – February 2008), the major site activities included the outstanding works, defect and functional test of E&M equipment at Pumping Station. In addition, operation and maintenance of E&M equipment at Pumping Station was conducted.

Note that no excavation work and construction work are carried out by Biwater Man Lee Limited from mid of January to mid of February 2008, which would not have any significant landfill gas impacts on site to the E&M contractor, Biwater Man Lee Limited.

Table 4: Work Activities from December 2007 to February 2008

<i>Pumping Station</i>	
Outstanding works and functional test of E&M equipment	1 Dec '07 – 31 Dec '07
Functional test of E&M equipment	1 Jan '08 – 11 Jan '08
Defect	1 Jan '08 – 29 Feb '08
Operation and Maintenance	28 Nov '07 – 29 Feb '08

* *Scheduled dates only for completion of the activities.*

Noise, air quality, water quality and waste/ chemicals Management

The job nature of the E&M contractor, Biwater Man Lee Limited, is mainly for installation of E&M equipment inside the Pumping Station, all hand-held's breakers, bulldozer, concrete lorry mixer, dump truck and hand-held's poker, vibratory would not be used so that the impact from noise and dust would be low. For water quality, appropriate mitigation measure e.g. regular removal of stagnant water and/or spraying larvicide will be implemented in place, if necessary.

The minor construction waste materials are preferred to be removed promptly from the site. No inert C&D materials will be generated from installation of E&M equipment whereas the minor non-inert C&D waste will be disposed to Tseung Kwan O landfill. Note that the C&D materials should be reduced, reused and recycled if possible, before disposal. Any substance identified as chemical waste would be disposed of properly by a licensed collector. A trip ticket system for the disposal of C&D waste should be conducted as required by the Particular Specification. Rubbish bins are provided on-site for collecting general refuses as necessary. The general refuse would be removed regularly and disposed to landfills by a licensed collector. A proper record of each waste disposal, including the new bar-coded disposal delivery form, would be kept to verify proper handling and disposal.

In this quarter, a refuse bins and waste storage/sorting area were provided for the collection of general refuse and sorting the C&D materials. In January and February 2008, packaging wastes and construction wastes mainly from Pumping Station was disposed to Tseung Kwan O landfill by the licensed waste collector this month.

The type and quantity of waste for final disposal during December 2007 – February 2008 is shown in Table 5. Note that the new bar-coded disposal delivery form for each disposal of C&D wastes continued to be kept.

**Table5: Type and Quantity of Waste Disposed of
from December 2007 to February 2008**

Types of Waste	Quantity
Inert C&D Material	Nil
Non-inert C&D Waste	4.67 tonnes (~ 52.5 m ³)
Chemical Waste	Nil

In November 2007, a deodourizer with a forced ventilation system was installed to remove odour during operation and maintenance of E&M equipment at Pumping Station. The exhaust air from pumping station was ventilated through a deodourizer capable of achieving at least 99% hydrogen sulphide gas removal, prior to discharge at a direction away from the sensitive receivers. The test report for deodourizer system is attached in Appendix 6.

Landfill Gas Hazard

The installation of E&M equipment is carried out inside the Pumping Station and no excavation work will be carried out by Biwater Man Lee Limited.

Appropriate mitigation measure will be implemented in place e.g. smoking and naked flames are not allowed within the working area and worker is not allowed to work alone at any time in the confined area. In addition, Safety Officer, trained to familiar with gas detection equipment and landfill gas-related hazards, is appointed on site. Also, safe portable instruments, appropriately calibrated and capable of measuring the methane (0-100% LEL and 0-100% by volume), carbon dioxide (0-100%) and oxygen (0-21%) is provided.

For the confined space, welding, flame-cutting or other hot works are only allowed to be carried out in accordance with the requirement of the Report on Landfill Gas Hazard Assessment as per section 6 and mitigation measures for the construction phase extracted from Appendix G of the Project Profile (“Implementation Schedule for Landfill Gas Hazard Mitigation Measures”).

The temporary site offices or buildings that have enclosed spaces with the capacity to accumulate landfill gas, then they are located on an area which has been proven to be free of landfill gas and monitoring 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. Also, adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus (BA) sets will be made available on site. Lastly, periodic environmental monitoring report with LFG control measures evaluation during construction phase should be provided by contractor.

In this quarter, daily field measurement recording sheet was checked and no exceedances for Action or Limit Level at any locations were recorded during the reporting period. In addition, adequate fire extinguishing equipments were made available on site.

5 Landfill Gas Monitoring Results

The landfill gas monitoring by Landfill Gas Team was carried out in December 2007 - February 2008 to monitor the landfill gas parameters comprising methane, carbon dioxide and oxygen. Note that temperature is also recorded. The site works of the E&M contractor, Biwater Man Lee Limited, is mainly for installation of E&M equipment inside the Pumping Station and no excavation work is carried out by Biwater Man Lee Limited. Therefore, monitoring locations were selected at Pumping Station.

M3 (existing manholes) monitored by civil contractor (Maeda) was dismantled in December 2007. A manhole MH3 (approximately 4m depth and 3m next to M3) of the new system was constructed and monitored by civil contractor to serve the same purpose of M3. A manhole MH3 was recorded monthly for the analysis of potential risk of hazardous gases and hence; identify any adverse impacts arising from the boreholes in order to protect the workers from potential hazards. Note that M1 (new deep borehole) monitored by civil contractor was dismantled in September 2007, which would not have any significant impacts on site to the E&M contractor, Biwater Man Lee Limited. For the site work of Biwater Man Lee Limited, no excavation work is carried out. In addition, before carrying out any E&M installations, landfill gas monitoring would be performed at the designated working area each day; i.e. morning and afternoon, to ensure the safety at work.

The results are summarized below in Table 6 and the site layout of work areas and the monitoring location code is shown in Appendix 7.

Table 6: Monitoring results by civil contractor (Maeda) at fixed location for December 2007 - February 2008

Fixed Monitoring Station	Date of measurement	Flammable gas Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Temp. (°C)	Remarks
MH3	21-Dec -2007	0.0	0.0	20.9	20	1m depth
MH3	21-Dec-2007	0.0	0.0	20.9	20	3m depth
MH3	29-Jan -2008	0.0	0.0	20.9	10	1m depth
MH3	29-Jan-2008	0.0	0.0	20.9	10	3m depth
MH3	28-Feb -2008	0.0	0.0	20.6	11	1m depth
MH3	28-Feb-2008	0.0	0.0	20.6	11.5	3m depth

The landfill gas monitoring was carried out according to the working area of E&M installation (inside Pumping Station) at the beginning of each half working day for the E&M installation works (i.e. morning and afternoon).

In December 2007, January 2008 and February 2008, the number of readings monitored at pumping Station were 48, 18 and 4, respectively. Thus, a total 70 numbers of readings at Pumping Station were monitored in this quarter. Note that on-line automatic gas detection system was installed to monitor landfill gas at Pumping Station in this quarter. The calibration record for on-line automatic gas detection system used for landfill gas monitoring is attached in Appendix 4.

No exceedances for Action or Limit Level at any locations were recorded during the reporting period. Refer to field measurement recording sheet and monitoring location in Appendix 7.

6 Summary of Deficiencies and Remedial Actions

There were no deficiencies noted from the site inspections in this quarter (December 2007 – February 2008).

7 Summary of Complaints and Remedial Actions

No complaints were received during this quarter (December 2007 – February 2008). In the event of complaints, the procedure for handling of the complaints is detailed in the Report on Landfill Gas Hazard Assessment.

8 Comments, Conclusions and Recommendations

The landfill gas monitoring for the coming month (March 2008) will be continued. In addition, the planned activities for the coming month (March 2008) as regards E&M equipment consists of defect rectification, outstanding minor works and provision of emergency call services for the Pumping Station, as listed below:-

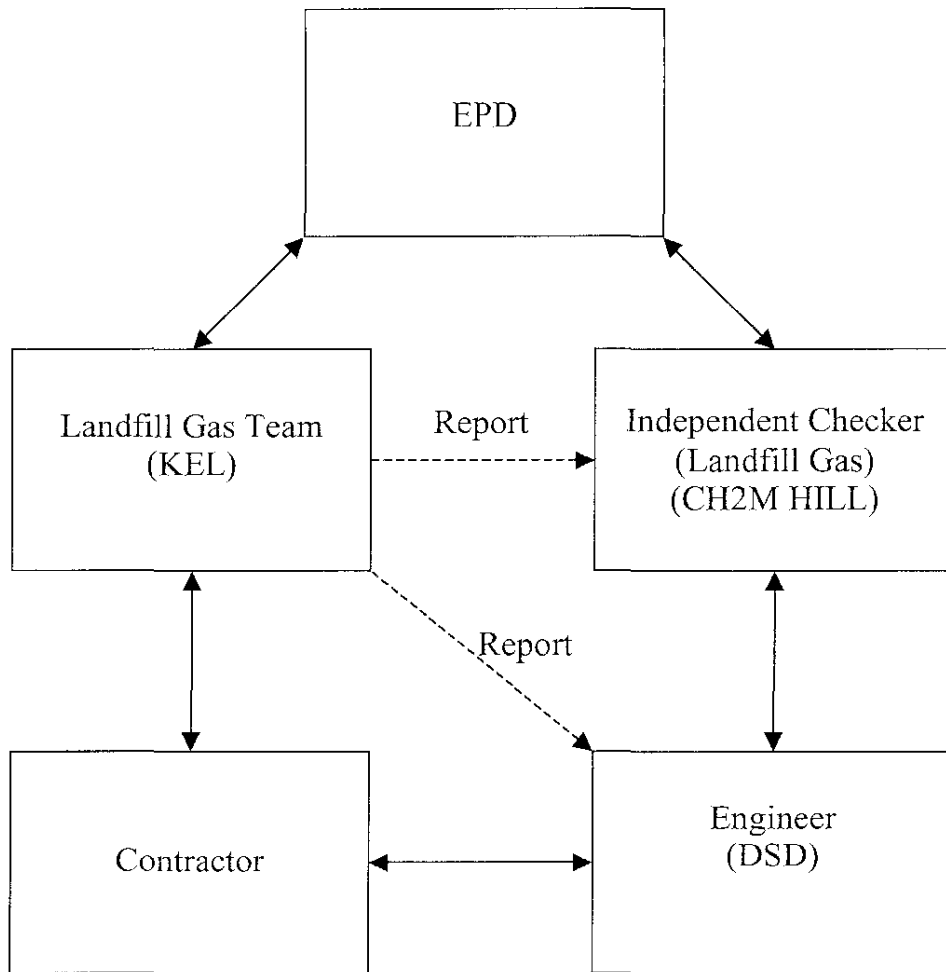
- Pumping Station

The anticipated landfill gas issues for March 2008 will be as follows:-

- Pumping Station
 - No significant landfill gas issue.

Appendix 1

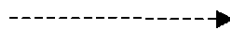
Reporting Structure and Contractor Project Management Structure



Communication Line



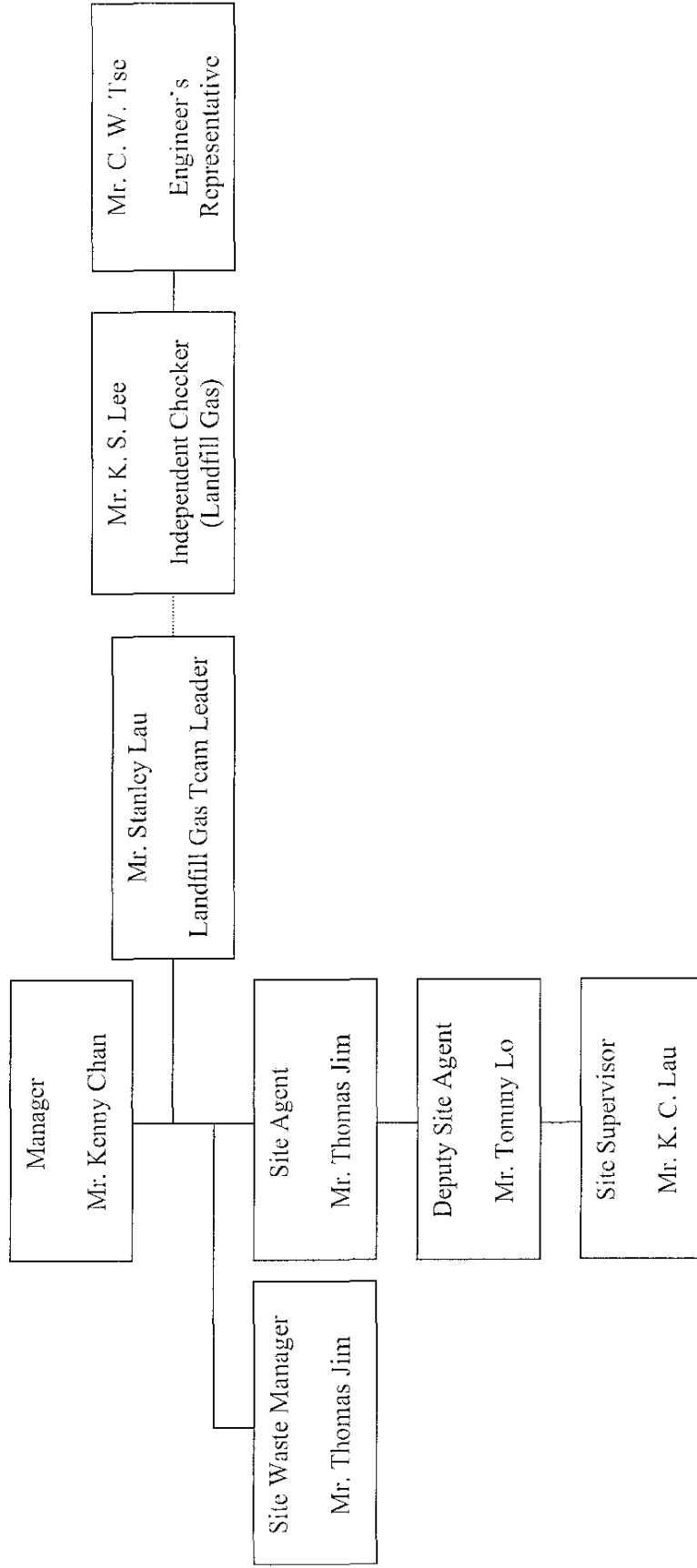
Reporting Line



Upgrading of Ting Kok Road Pumping Station No. 5
Project Organization

CONTRACT NO. DE/2005/04
SUPPLY AND INSTALLATION OF ELECTRICAL AND MECHANICAL EQUIPMENT FOR
UPGRADING OF TING KOK ROAD PUMPING STATION No. 5

Project Team Organization Chart relevant to EM&A



EM&A Contact Information for Key Personnel

Name	Title	Telephone	Fax
Mr. Thomas Jim (BML)	Site Agent	26712350 / 90804998	26712351
Mr. Tommy Lo (BML)	Deputy Site Agent	24162828	24136278
Mr. Thomas Jim (BML)	Site Waste Manager / Co-ordinator	26712350 / 90804998	26712351
Mr. K. C. Lau (BML)	Site Supervisor	97569316	24136278
Mr. Stanley Lau (KEL)	LGT Leader	2612-2817	2614-7012
Ms. Angela Lau (KEL)	LGT Assistance	2612-2817	2614-7012
Mr. C. W. Tse (DSD)	Engineer's Representative	25947309	28278532
Mr. K. S. Lee (CH2M)	The Independent Checker (Landfill Gas)	2507-2203	2507-2293

Appendix 2

Master Construction Work Program

Appendix 3

EM&A Key Requirements List and Complaint Procedure

charge of the Site.

- 6.21.8 The Contractor shall display a copy of these Environmental Permits (including the most updated Environmental Permit) on the Site at all vehicular site entrances/exits or at convenient location or as directed by the Engineer for public information at all times. The Contractor shall ensure that most updated information about the Environmental Permit, including any amended Permits, are displayed at such locations.
- 6.21.9 In accordance with the Permits as shown in Appendix VII, the Contractor shall establish an Landfill Gas Team (hereinafter referred to in this Clause as the "LGT") after handover of the Site from the Civil Contractor to undertake monitoring, analysis and reporting of landfill gas and other relevant works required by the Permits.
- 6.21.10 The Contractor shall provide assistance to LGT to undertake the landfill gas monitoring and audit and accompany joint site inspection undertaken by the LGT.
- 6.21.11 The LGT should report to the Contractor and be led and managed by the LGT Leader. The LGT Leader and the LGT should be employed to conduct the E&MA programme and ensure the Contractor's compliance with the project's landfill gas requirements during construction. The LGT Leader should be an independent party from the Contractor and has relevant professional qualifications, or have sufficient relevant experience in landfill gas hazards subject to approval of the ER and the EPD.
- 6.21.12 The duties and responsibilities of the LGT are defined in Appendix E Clause 8.2.2 of Project Profile (as mentioned in the EP) of Upgrading of Ting Kok Road Pumping Station No.5 which include the followings:
- (a) to monitor various landfill gas parameters as required;
 - (b) to analyse the landfill gas monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and to identify any adverse impacts arising;
 - (c) to carry out regular site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to landfill gas hazard, and effect proactive action to pre-empt problems;
 - (d) to carry out monthly EM&A report, quarterly E&MA summary report and final E&MA review report;
 - (d) to audit and prepare audit reports on the landfill gas monitoring data and its conditions;
 - (e) to report on the landfill gas monitoring and audit results to the relevant parties, the Engineer and EPD or its delegated representative;
 - (f) to recommend suitable mitigation measures to the Contractor in accordance with the Event and Action Plan; and
 - (g) to adhere to the procedures for carrying out complaint investigation.

Event and Action Plan (EAP) for Landfill Gas

The Event and Action Plan for landfill gas detected in utilities and any on-site areas following construction are shown in the table below.

Event and Action Plan for Landfill Gas

Parameter	Level	Action
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)	- Post "No Smoking" signs - 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 oxygen to <10% LEL
Carbon Dioxide	>0.5%	- Ventilate to restore carbon dioxide to <0.5%
	>1.5%	- Post "No Smoking" signs - Prohibit hot works - Increase ventilate to restore carbon dioxide to <0.5%

Appendix G
Implementation Schedule for LFG Hazard Mitigation Measures

Section	Environmental Protection Measures	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%				<i>Code of Practice on Safety and Health at Work in Confined Space.</i>
6.2	No smoking and naked flames should be allowed.	Within the work site	Contractor	Construction	<i>Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)</i>
6.2	No worker should work alone at any time in the confined area or any excavation trenches.				
6.2	Construction equipment should be equipped with a vertical exhaust at least 0.6m above ground level and/or with spark arrestors.				
6.2	Electrical motors and electrical extension cords should be explosion-proof or intrinsically safe.				
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.				
6.2	Forced ventilation should be required for workers, if in a trench deeper than 1m.				<i>Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)</i>

Appendix G
Implementation Schedule for LFG Hazard Mitigation Measures

Section	Environmental Protection Measures	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.2	During piping assembly or conduiting 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.				
6.2	The Safety Officer should set down the monitoring frequency and areas prior to commencement of construction works.				
6.2	Daily and routine monitoring should be carried out in all excavations.				
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.				
6.2	For excavations deeper than 1m, measurements should be carried out: <ul style="list-style-type: none"> • 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 workers are in the excavation. 	Within the work site	Contractor	Construction	<i>Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)</i>
6.2	For excavations between 300mm and 1m deep, measurements should be carried out: <ul style="list-style-type: none"> • directly after the excavation has been completed; and • periodically whilst the excavation remains open. 				

*Appendix G
Implementation Schedule for LFG Hazard Mitigation Measures*

Section	Environmental Protection Measures	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
6.2	The landfill gas precautionary measures involved with excavation and piping works should be included in the Safety Plan.				
6.3	The cracks on the ground level at the working area should be monitored during ground-works construction				
6.4	<p>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:</p> <ul style="list-style-type: none"> • Be located on an area which has been proven 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. 	Within the work site	Contractor	Construction	<i>Landfill Gas Hazard Assessment Guidance Note (EPD/TR8/97)</i>
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.				
6.6	Adequate fire extinguishing equipment, fire-resistant clothing and breathing apparatus (BA) sets should be made available on site.				
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.				

Appendix G
Implementation Schedule for LFG Hazard Mitigation Measures

Section	Environmental Protection Measures	Location	Implementation Agent	Implementation Stage	Relevant Legislation & Guidelines
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	Manhole/ chamber			
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 (of longer than 8 hours).	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) is detected.		DSD	Operation	<i>Code of Practice on Safety and Health at Work in Confined Spaces</i>
7.4	No person should enter or remain in any confined spaces or trenches where the carbon dioxide concentration exceeds 1.5 % (by volume).	Manhole/ chamber/			
7.5	Oxygen concentration should be monitored and no person should enter or remain in any confined spaces or trenches where the oxygen content of air has fallen below 18 % by volume.	Pumping station			
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.				

Landfill Gas Complaint

Landfill gas complaint should be referred to the LGT Leader for action. The LGT Leader should undertake the following procedures upon receipt of any complaint:


- log complaint and date of receipt onto the complaint database and inform the IC(LG) and the ER immediately;
- investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
- identify mitigation measures in consultation with the IC(LG) if a complaint is valid and due to works;
- advise the Contractor if mitigation measures are required;
- review the Contractor's response to identified mitigation measures, and the updated situation;
- if the complaint is transferred from the EPD, submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
- undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- report investigation results and subsequent actions to complainant (if the source of complaint is EPD, the results should be reported within the timeframe assigned by the EPD); and
- record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

Appendix 4

Calibration records for equipment used for landfill gas monitoring

- **The Portable gas analyzer equipment
(Manufacture: Gas Data Model GFM410 Landfill)**
- **The on-line automatic gas detection system
(Model: Crowcon Gasmonitor System)**

TEST DATE AND CONDITIONS	
Date	27/07/2007
Atmospheric Pressure	996 mB
Ambient Temp	19 °C
Enviroics Serial No.	3268

GAS DATA LTD Pegasus House Seven Stars Estate Wheler Rd Coventry CV3 4LB Tel 02476303311 Fax 02476307711	
---	---

GFM410 FINAL INSPECTION & CALIBRATION CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
10239	science international corporation


INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	400 cc/min
Display Contrast	✓	Pump Flow @ -200mB	300 cc/min
Clock Set / Running	✓	S/W Version	G410.0022/0004
Labels Fitted	✓	Recalibration Date	27/7/2008

GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+0.1
CH4	5%	5.1	+/-0.3	0.0	0.0	0.0	+0.1
	60%	59.2	+/-3.0	0.0	0.0	0.0	+0.1
CO2	5%	0.0	0.0	4.9	+/-0.3	0.0	+0.1
	40%	0.0	0.0	39.4	+/-3.0	0.0	+0.1
AIR (20.9% O2, 400ppm CO2)	100%	0.0	0.0	0.0	+0.1	20.9	+/-0.5
[Hatched Area]							
[Hatched Area]							

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)	Static [Sp] (mB)	tol. (mB)		
All ports	current atmospheric	996	+/-2.0	0	0.0		
Ap port (internal)	+800mB(a)	800	+/-5.0	0	0.0		
	+1200mB(a)	1200	+/-5.0	0	0.0		
Gas IN port	+400mB(g)	996	n/a	400	+/-2.0		
	-400mB(g)	996	n/a	-399	+/-2.0		
[Hatched Area]							
[Hatched Area]							

TEST DATE AND CONDITIONS	
Date	27/07/2007
Atmospheric Pressure	996 mB
Ambient Temp	19°C
Enviroics Serial No.	3268

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711



GFM410 FINAL INSPECTION & CALIBRATION CERTIFICATE

FLOW CHECKS

OPTIONAL GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	Label Range					tol. (% vol.)
N2	100%						0.0
							+/- 5.0
							+/- 5.0
							+/- 5.0
							+/- 5.0
							+/- 5.0

OPTIONAL TEMPERATURE CHECK

PACKING						
Instrument	✓	AC Powered Battery Charger	<u>UK</u>	EUR	US	
Gas Sample Pipe	✓	Manual	✓	Carry Case		✓
Spares Pot	✓	Allen Key	✓			
USB Lead		PC Software				
Vane Anemometer		Extra Items				

TESTED ps sarkaria APPROVED [Signature]



Calibration Certificate

Number: CCS/57011

Customer: Biwater Man Lee Limited
 Location: DSD Ting Kok Road Sewage Screening Plant
 Contact Person: Mr. Jim
 Model: Crowcon Gasmonitor System
 Auxiliary System: NA

Channel Number	Sensor Type	Measuring Range	Alarm 1	Alarm 2	Alarm 3	Calibration Gas	Result
Rack 1							
1	CH4	0-100%LEL	20	40	100	50%LEL	Passed
2	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
3	O2	0-25%v/v	19	18	17	17%v/v	Passed
4	CH4	0-100%LEL	20	40	100	50%LEL	Passed
5	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
6	O2	0-25%v/v	19	18	17	17%v/v	Passed
7	CH4	0-100%LEL	20	40	100	50%LEL	Passed
8	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
9	O2	0-25%v/v	19	18	17	17%v/v	Passed
Rack 2							
1	CH4	0-100%LEL	20	40	100	50%LEL	Passed
2	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
3	O2	0-25%v/v	19	18	17	17%v/v	Passed
4	CH4	0-100%LEL	20	40	100	50%LEL	Passed
5	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
6	O2	0-25%v/v	19	18	17	17%v/v	Passed
7	CH4	0-100%LEL	20	40	100	50%LEL	Passed
8	CO2	0-2%v/v	0.5	1.5	2	1.5%v/v	Passed
9	O2	0-25%v/v	19	18	17	17%v/v	Passed

Remarks: Instrument PASSED – fit for service.

Authorized Signature

Technical Department

Date: 10th Jan 2008



FireMark Hong Kong Limited
 Unit 901, 9/F., Lai Sun Commercial Center, 6&0 Cheung Sha Wan Road, Kowloon,
 Hong Kong
 Tel : (852) 2751 8871 Fax : (852) 2751 8806

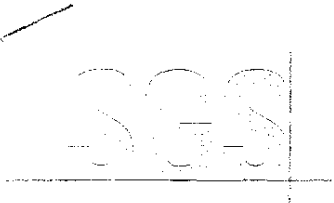
Appendix 5

Permits

Same as in June 2007 Report

Appendix 6

Test Report for Deodourizer System



Test Report

No. 2002355/IEQ

Date : Feb 18 2008

Page 1 of 2

AROMATRIX TECHNOLOGIES (HONG KONG) LTD
UNIT 403, YEE KUK INDUSTRIAL CENTRE,
555 YEE KUK ST., CHEUNG SHA WAN, KLN.

SGS Job No. : 2612856

1. Sampling and Analytical Methodologies

Report on the performance test of Deodourising System installed at Tai Po Industrial Estate. The performance of the units is expressed as the hydrogen sulphide removal efficiency. The sampling of hydrogen sulphide was conducted on 11 Januray 2008.

2. Sample Identification

SGS Sample ID	Sample Labelling	Date of Sampling	Parameter
A0801033	Inlet	11 January 2008	H ₂ S
A0801034	Outlet	11 January 2008	H ₂ S

3. Sampling and Analytical Methodologies

The sampling and analytical methodologies were based on ISC 3rd ed. 701 "Determination of Hydrogen Sulphide Content of the Atmosphere" in Methods of Air Sampling and Analysis.

The hydrogen sulphide gas was injected. Hydrogen sulphide gas was collected simultaneously at the designated inlet and outlet of the Deodouring Unit. A sampling train consisted of a sampling probe, a midget impinger containing cadmium hydroxide (STRactan 10 was added to the cadmium hydroxide slurry prior to sampling to minimize the photo-decomposition of cadmium sulphide precipitate) and a calibrated SKC air sampler was employed for air sampling. A measured volume of air was aspirated through the cadmium hydroxide solution in the midget impinger at a flow rate of about 1.0 LPM.

3. Sampling and Analytical Methodologies (Continue) / 4. Result

Please refer to the following page(s).

Singed for and on behalf of
SGS Hong Kong Ltd.


BROOK WANG
TECHNOLOGIST

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Test Report

No. 2002355/IEQ

Date : Feb 18 2008

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3. Sampling and Analytical Methodologies (Continue)

Samples were stored in an ice box (i.e. about 4 °C) and sent to laboratory immediately. The analysis of Hydrogen sulphide (H₂S) was conducted by outside laboratory as competent

The removal efficiency of hydrogen sulphide (H₂S) of the Deodouring Unit was calculated according to the following equation.

$$\text{Removal efficiency \%} = \left\{ 1 - \frac{H_2S \text{ concentration at outlet, ppb}}{H_2S \text{ concentration at inlet, ppb}} \right\} \times 100\%$$

4. Test Result

SGS Sample ID	Description	Hydrogen Sulphide (ppb)	Average Efficiency (%)
A0801033	Inlet	110000	>99.93%
A0801034	Outlet	<75	

*** End of Report ***

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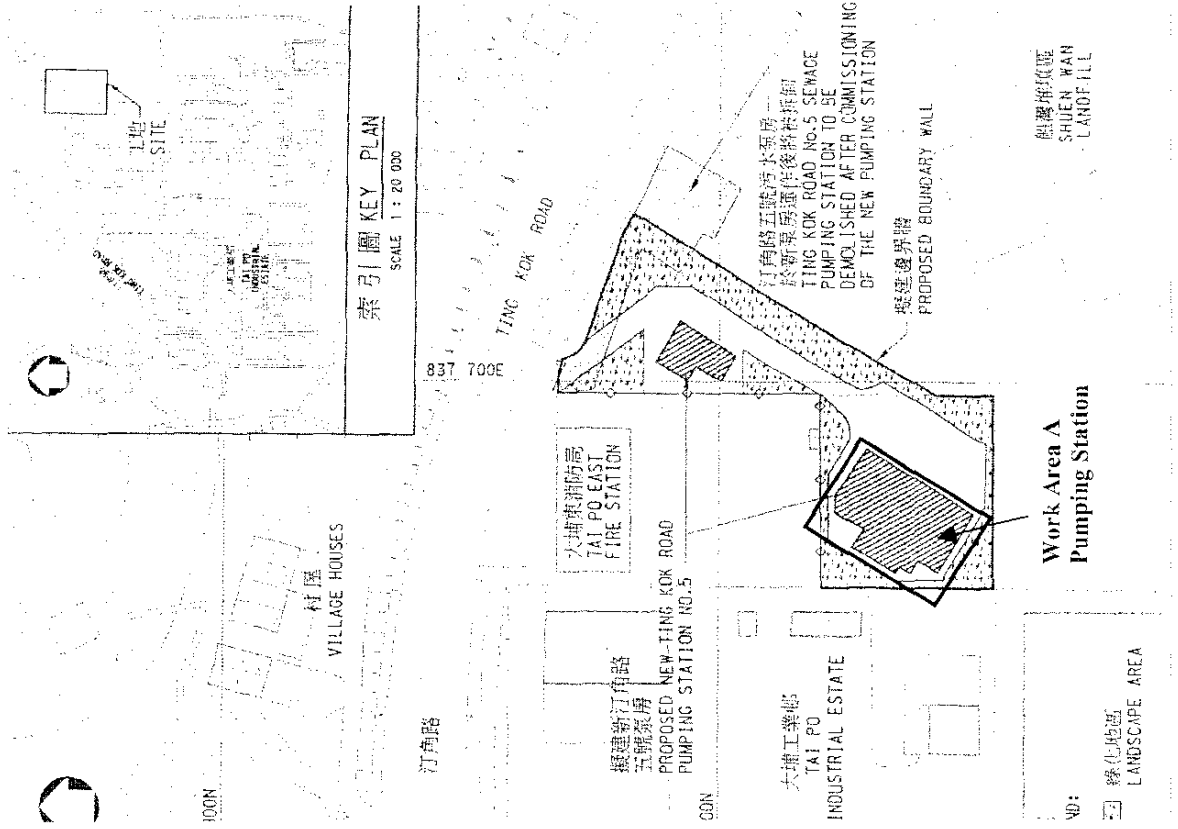
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Appendix 7

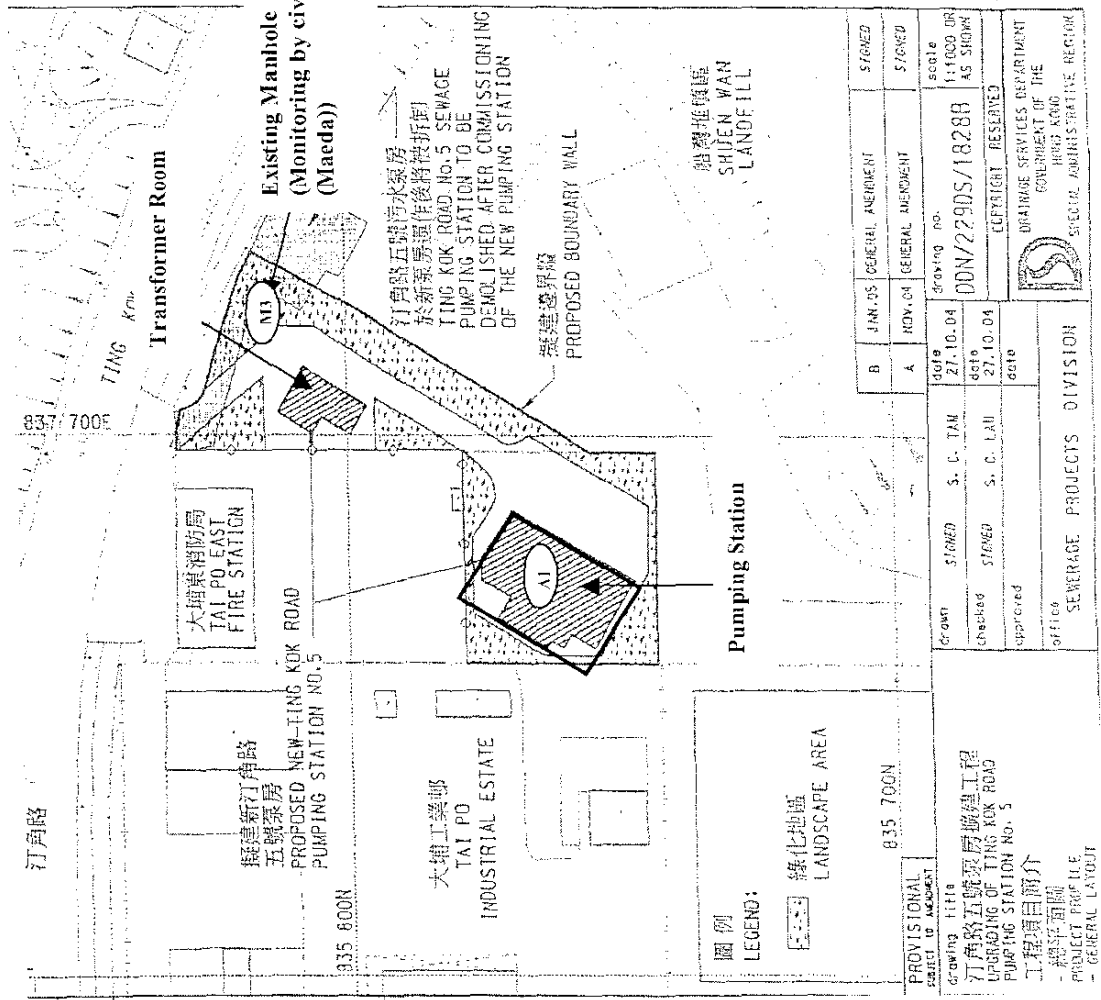
Site Layout of Work Areas and Landfill Gas Monitoring Results

Upgrading Ting Kok Road Pumping Station No. 5 – E&M Works EM&A Site Inspection – December 2007 – February 2008

Site Layout



**Upgrading Ting Kok Road Pumping Station No. 5 – E&M Works
Landfill Gas Monitoring – December 2007 - February 2008
Site Layout**



Appendix 8

Deficiency Investigation Reports

(Not Applicable)

Appendix 9

Complaint Reports

(Not Applicable)