

Maeda Corporation



# Upgrading of Ting Kok Road Pumping Station No. 5

---

Second Quarterly EM&A Report  
(April – June 2006)

July 2006

Report no: 01284R0201

**Hyder Consulting Ltd**

Incorporated in Hong Kong with limited liability—COI Number 126012  
47th Floor, Hopewell Centre, 183 Queens Road East, Wanchai, Hong Kong

Tel: +852 2911 2233 Fax: +852 2805 5028

[www.hyderconsulting.com](http://www.hyderconsulting.com)



Maeda Corporation



# Upgrading of Ting Kok Road Pumping Station No. 5

---

## Second Quarterly EM&A Report (April – June 2006)

**Author:** Alexi Bhanja

---

**Checker:** Sharifah Or

---

**Approver:** Guiyi Li

---

**Report no:** EA01284R0201

**Date:**

July 2006

This report has been prepared for in accordance with the terms and conditions of Maeda Corporation appointment for the Upgrading of Ting Kok Road Pumping Station No. 5 in October 2005. Hyder Consulting Ltd (Incorporated in Hong Kong with limited liability – COI Number 126012) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.



---

**Certified by Landfill Gas Team Leader  
Alexi Bhanja**

**Consulting**

# Contents

|          |  |          |
|----------|--|----------|
| <b>1</b> | <b>Executive Summary .....</b>                                 | <b>1</b> |
| <b>2</b> | <b>Introduction.....</b>                                       | <b>2</b> |
| 2.1      | Basic Project Information.....                                 | 2        |
| 2.2      | Management Structure and Project Organisation .....            | 3        |
| 2.3      | Construction Programme.....                                    | 3        |
| 2.4      | Works Undertaken during the Quarter.....                       | 3        |
| <b>3</b> | <b>Environmental Status.....</b>                               | <b>3</b> |
| 3.1      | Works Undertaken during the Quarter with Illustrations .....   | 3        |
| 3.2      | Project Area and Monitoring Locations.....                     | 4        |
| <b>4</b> | <b>Brief Summary of EM&amp;A Requirements .....</b>            | <b>4</b> |
| 4.1      | Monitoring Parameters .....                                    | 4        |
| 4.2      | Monitoring Equipment.....                                      | 4        |
| 4.3      | Event and Action Levels/Plans .....                            | 5        |
| 4.4      | Mitigation Measures & Requirements in Contract Documents ..... | 5        |
| <b>5</b> | <b>Implementation Status of LFG Control Measures .....</b>     | <b>5</b> |
| <b>6</b> | <b>Monitoring Results .....</b>                                | <b>6</b> |
| 6.1      | Early-warning Location M1 .....                                | 6        |
| 6.2      | Fixed Locations M2 and M3 .....                                | 6        |
| 6.3      | Variable Locations .....                                       | 7        |
| <b>7</b> | <b>Report on Non-Compliance and Complaints .....</b>           | <b>7</b> |
| <b>8</b> | <b>Others.....</b>   | <b>7</b> |
| 8.1      | Future Key Issues.....   | 7        |
| 8.2      | Comments, Recommendations and Conclusions.....                 | 8        |

## List of Tables

|           |  |   |
|-----------|--|---|
| Table 2-1 | Contact Details for Key Project Personnel                | 3 |
| Table 3-2 | Fixed Monitoring Locations for LFG EM&A                  | 4 |
| Table 4-3 | Equipment List for LFG Monitoring                        | 4 |
| Table 4-4 | Action and Limit Levels and Action Plan for Landfill Gas | 5 |
| Table 6-5 | Monitoring Results at M1                                 | 6 |
| Table 6-6 | Monitoring Results at M2 and M3                          | 6 |

# List of Appendices

- [Appendix 1 Project Organisation](#)
- [Appendix 2 Construction Programme](#)
- [Appendix 3 Location of Works and Project Area](#)
- [Appendix 4 Fixed Monitoring Locations](#)
- [Appendix 5 Updated Implementation Schedule](#)
- [Appendix 6 Calibration Records](#)
- [Appendix 7 Field Measurement Recording Sheets](#)

# 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 April to June 2006. All relevant mitigation measures and requirements were implemented. There have been no exceedances in Action/Limit (A/L) Levels at of the locations monitored under the EM&A programme.

An 11m-deep borehole, designated "M1", was installed by the Contractor to provide an "early warning" of potential LFG problems that could affect surface trenches, but does not form part of the EM&A programme. The Contractor has noted the monitoring results from M1 and will take them into consideration when planning surface trench works in the vicinity.

Environmental Protection Department (EPD) conducted one site visit during the reporting period.

## 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<sup>3</sup>/day to 11,520m<sup>3</sup>/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. 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-IDC       | 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 (e.g. LFG monitoring for “hot works”).

## 2.4 Works Undertaken during the Quarter

Works undertaken during the reporting period included:

- Construction of permanent piles
- Post-drilling
- Loading test
- Sheet piling work and temporary work for trenchless method
- Working pit construction for rising mains
- Construction of gravity sewer
- Excavation

## 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, etc., 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, which has been restored and is currently being monitored.

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).

An 11m-deep borehole, designated “M1”, was installed by the Contractor (in addition to contract requirements) to provide an “early warning” of potential LFG problems that could affect surface trenches. It is not intended that M1 forms part of the EM&A programme, since conditions deep below the surface do not fall within the scope of the EM&A programme (i.e. manholes and excavations >1m).

In terms of fixed monitoring locations, the Baseline Report identified two existing manholes (M2 and M3). In terms of variable monitoring locations, these vary from month to month, depending on site activities. The fixed monitoring locations are summarised in Table 3-2:

| Monitoring Station ID | Description                | Purpose        |
|-----------------------|----------------------------|----------------|
| M2                    | Existing Manhole (2m deep) | EM&A programme |
| M3                    | Existing Manhole (2m deep) | EM&A programme |

**Table 3-2 Fixed 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 at fixed locations M2 or M3, or at any of the variable locations:

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

### 6.1 Early-warning Location M1

During the reporting period, LFG was monitored at M1 to give an “early warning” of potential LFG problems. M1 is an 11m-deep borehole and the carbon dioxide and methane concentrations may reflect possible influence of LFG at depth below the site. Monitoring results are shown in Table 6-5, below. Location M1 is not subject to EM&A and so A/L Levels are not applicable.

| Monitoring Station ID | Date      | Gas Concentration (%) |                |        | Temperature (°C) |
|-----------------------|-----------|-----------------------|----------------|--------|------------------|
|                       |           | Methane               | Carbon Dioxide | Oxygen |                  |
| M1                    | 3 Apr 06  | 0.3                   | 1.0            | 19.5   | 27.5             |
|                       | 10 May 06 | 0                     | 1.7            | 19.4   | 33.0             |
|                       | 3 June 06 | 0.1                   | 0.6            | 19.9   | 27.0             |

**Table 6-5 Monitoring Results at M1**

Considering the location of M1 adjacent to a restored landfill, the recorded levels are within expected norms and are not cause for concern. Notwithstanding, the Contractor has noted these concentrations and will take them into consideration when planning surface trench works in the vicinity.

### 6.2 Fixed Locations M2 and M3

During the reporting period, LFG was monitored at two fixed locations for purposes of environmental protection. These are shown in Table 6-6, below:

| Monitoring Station ID | Date      | Gas Concentration (%) |                |        | Temperature (°C) |
|-----------------------|-----------|-----------------------|----------------|--------|------------------|
|                       |           | Methane               | Carbon Dioxide | Oxygen |                  |
| M2                    | 3 Apr 06  | 0.1                   | 0.1            | 20.3   | 27.5             |
| M3                    |           | 0.2                   | 0.3            | 19.9   | 27.5             |
| M2                    | 10 May 06 | 0                     | 0              | 20.4   | 37.6             |
| M3                    |           | 0.1                   | 0.3            | 20.0   | 41.7             |
| M2                    | 3 June 06 | 0.0                   | 0.0            | 20.3   | 27.3             |
| M3                    |           | 0.1                   | 0.2            | 19.8   | 27.0             |

Note : **bold** indicates an exceedance of Action Level and **bold** indicates exceedance of Limit Level

**Table 6-6 Monitoring Results at M2 and M3**

Appendix 4 shows the position of each fixed monitoring station. There were no exceedances of A/L Levels at the two fixed locations during the reporting period.

## 6.3 Variable Locations

During the reporting period, LFG was monitored at variable locations (for purposes of worker safety) within Portions 4 to 7, as shown in Appendix 3. Readings were taken for safety-related reasons, including piling works, trench excavation, hot works, post-drilling work and the construction of the temporary drainage system.

A total of 70 no. readings were taken in April 2006, 224 no. readings in May 2006 and 340 no. readings in June 2006, giving a total of 634 for the reporting period. There were no exceedances of A/L Levels at any variable locations during the reporting period. The LFG monitoring results are provided on the *Field Measurement Recording Sheets* in Appendix 7.

## 7 Report on Non-Compliance and Complaints

---

EPD conducted one inspection of the site during the reporting period, on 13 April 2006. The wastewater discharge and chemical storage areas were inspected. According to the Contractor, no adverse comment given by EPD.

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

## 8 Others

---

### 8.1 Future Key Issues

Construction activities for next quarter are anticipated to include:

- Sheet piling work
- Excavation
- Diversion of existing sewer
- Construction of gravity sewer and rising main
- Installation of pile head steel plate
- Construction of sub-structure

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:

- 3 July 2006
- 1 August 2006
- 1 September 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 exceedance of A/L Levels.

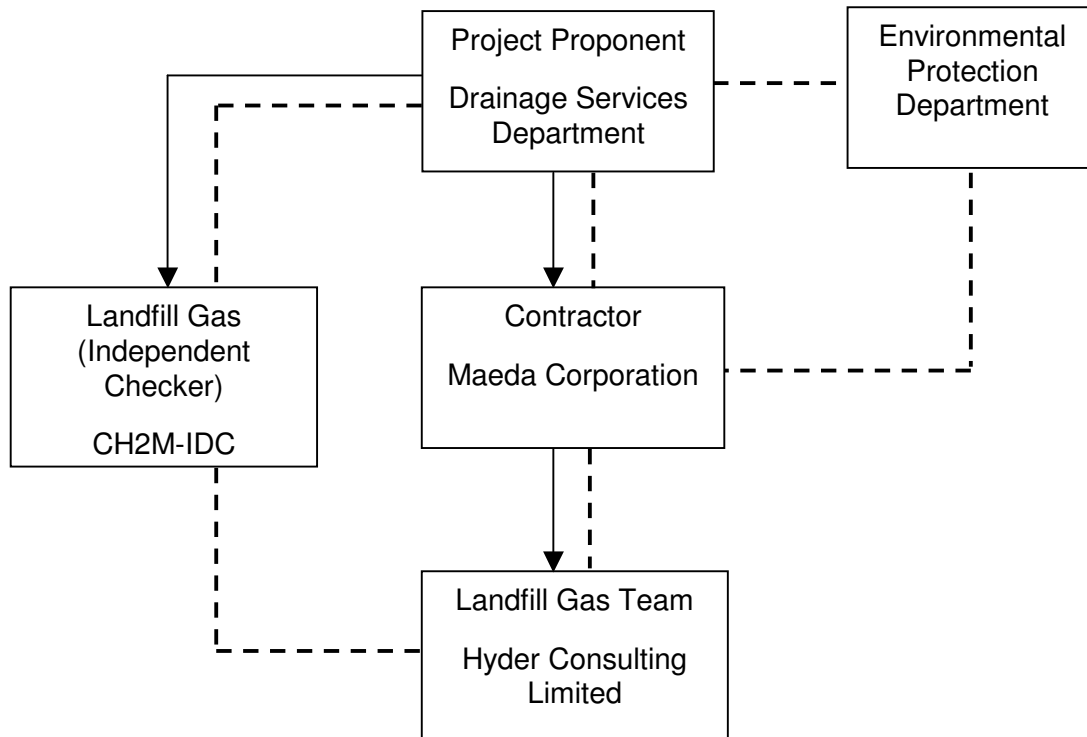
The EM&A programme is considered to have performed acceptably and there are no recommendations for improvements or modifications at this time.

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

# Appendix 3

---

## Location of Works and Project Area



# Appendix 4

---

## Fixed Monitoring Locations

# Appendix 5

---

## Updated Implementation Schedule

# Appendix 6

---

## Calibration Records

# Appendix 7

---

## Field Measurement Recording Sheets