



Castle Peak Power Company Limited

# Landfill Gas Power Generation Project at the West New Territories (WENT) Landfill

Monthly Environmental Audit Report No.1

14 December 2018

Project No.: 0477661

<b>Document details</b>	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.
Document title	Landfill Gas Power Generation Project at the West New Territories (WENT) Landfill
Document subtitle	Monthly Environmental Audit Report No.1
Project No.	0477661
Date	14 December 2018
Version	1.0
Author	Joey Ho
Client Name	CLP

**Document history**

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	01	Joey Ho	Mandy To	Frank Wan	14/12/2018	N/A

---

## Signature Page

14 December 2018

# Landfill Gas Power Generation Project at the West New Territories (WENT) Landfill

## Monthly Environmental Audit Report No.1

---

### Approved by



Frank Wan  
Partner

### Certified by



Mandy To  
Independent Environmental Checker

ERM Hong Kong  
2507, 25/F One Harbourfront  
18 Tak Fung Street,  
Hung Hom,  
Kowloon  
Hong Kong

© Copyright 2018 by ERM Worldwide Group Ltd and / or its affiliates ("ERM").  
All rights reserved. No part of this work may be reproduced or transmitted in any form,  
or by any means, without the prior written permission of ERM

## CONTENTS

<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 Purpose of the Report.....	1
1.2 Structure of the Report.....	1
<b>2. PROJECT INFORMATION</b> .....	<b>2</b>
2.1 Background.....	2
2.2 General Site Description .....	2
2.3 Construction Programme and Activities .....	2
2.4 Status of Environmental Licences, Notification and Permits.....	2
<b>3. ENVIRONMENTAL SITE INSPECTION &amp; IMPLEMENTATIONS STATUS OF THE ENVIRONMENTAL PROTECTION REQUIREMENTS</b> .....	<b>4</b>
3.1 ENVIRONMENTAL SITE INSPECTION .....	4
3.2 IMPLEMENTATIONS STATUS OF THE ENVIRONMENTAL PROTECTION REQUIREMENTS...	4
<b>4. CONCLUSIONS</b> .....	<b>5</b>

<b>APPENDIX A</b>	<b>INDICATIVE LOCATION PLAN OF KEY PROJECT COMPONENTS FOR THE PROJECT</b>
<b>APPENDIX B</b>	<b>CONSTRUCTION PROGRAMME FOR THE REPORTING MONTH AND COMING MONTHS</b>
<b>APPENDIX C</b>	<b>SUMMARY OF IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION</b>

### List of Tables

Table 2.1: Summary of the Construction Activities Undertaken during the Reporting Month.....	2
Table 2.2: Summary of the Construction Activities Undertaken during the Reporting Month.....	2

### List of Figures

No table of figures entries found.

## 1. INTRODUCTION

The Castle Peak Power Company Limited (CAPCO) is a joint venture between CLP Power Hong Kong Limited (CLP) and China Southern Power Grid Company Limited with CLP as the operator. ERM-Hong Kong, Limited (ERM) was appointed by CAPCO as the Independent Environmental Checker (IEC) (Ms Mandy To of ERM) to undertake environmental audit works for the **Landfill Gas Power Generation Units (LFGPGUs)** (“the Project”) at the West New Territories (WENT) Landfill. The Contractor, Zhen Hua Engineering Company Limited, is responsible for civil works construction.

### 1.1 Purpose of the Report

This is the 1<sup>st</sup> Monthly Environmental Audit Report which summarises the environmental audit findings during the reporting period from 8 to 30 November 2018.

### 1.2 Structure of the Report

Section 1 : **Introduction**

It details the purpose and structure of the report.

Section 2 : **Project Information**

It summarises the background and scope of the project, site description, construction programme, construction works undertaken and status of the Environmental Permits/Licenses during the reporting period.

Section 3 : **Environmental Site Inspection & Implementation Status of the Environmental Mitigation Measures**

It summarises the audit findings of the bi-weekly site inspections undertaken and implementation of environmental protection measures within the reporting period.

Section 4 : **Conclusions**

## 2. PROJECT INFORMATION

### 2.1 Background

The scope of the Project involves the phased construction, operation and maintenance of up to seven LFGPGUs at the WENT Landfill. Each LFGPGUs will have a generation capacity of 2MW and provide electricity output connected into CLP Power Hong Kong Limited's (CLP) existing power grid. It is a Designated Project under the *Environmental Impact Assessment Ordinance* (Cap. 499) (EIAO). The Phase 1 Programme only includes five LFGPGUs.

A Project Profile of the Project was prepared in accordance with the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)* and submitted under the EIAO for Applications for Permission to Apply Directly for an Environmental Permit in February 2017. Subsequent to the approval of the Project Profile (*PP-546/2017*), approval from the Director of Environmental Protection (DEP) on permission to apply directly for permit (No. DIR-251/2017) and an Environmental Permit (EP) (EP-536/2017) for the Project was granted by the Director of Environmental Protection (DEP) on 6 April 2017 and 27 April 2017 respectively.

### 2.2 General Site Description

The proposed location for the Project is located in the north-western part of the existing WENT Landfill adjacent to the coastline. Two underground pipelines will run from the existing LFG-related facilities within the WENT Landfill to the proposed plant area for provision of LFG. Another underground cable will run from the proposed plant area along Nim Wan Road to the existing power grid near the WENT Landfill entrance/exit gate.

The location plan of key Project components is shown in **Annex A**.

### 2.3 Construction Programme and Activities

A summary of the major construction activities undertaken in this reporting period is shown in **Table 2.1**. The construction programme is presented in **Annex B**.

**Table 2.1: Summary of the Construction Activities Undertaken during the Reporting Month**

Construction Activities undertaken	
■	Pre-boring and sheetpiling work at West site;
■	Pre-fabrication of sheetpile and steel casing; and
■	Trial pit / trenching for the existing drainage pipe.

### 2.4 Status of Environmental Licences, Notification and Permits

A summary of the valid permits, licences, and/or notifications on environmental protection for this Project is presented in **Table 2.2**.

**Table 2.2: Summary of the Construction Activities Undertaken during the Reporting Month**

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Environmental Permit	EP-536/2017	Throughout the Contract	Permit granted on 27 Apr 2017

Permit/ Licences/ Notification	Reference	Validity Period	Remarks
Notification Pursuant to Section 3(1) of the <i>Air Pollution Control (Construction Dust) Regulation</i>	Ref. Number : 438937	Throughout the Contract	Notification received on 02 Nov 2018
Chemical Waste Producer Registration	Application reference No: 439396	-	Application was made on 15 Nov 2018 and is pending for EPD's approval

### 3. ENVIRONMENTAL SITE INSPECTION & IMPLEMENTATIONS STATUS OF THE ENVIRONMENTAL PROTECTION REQUIREMENTS

#### 3.1 ENVIRONMENTAL SITE INSPECTION

Joint bi-weekly site inspections were conducted by representatives of the Contractor (, CAPCO Project Team and IEC on 8 and 22 November 2018. No non-compliance was recorded during the site inspections.

Findings and recommendations for the site inspection in this reporting month are summarised as follows:

##### 8 November 2018

The Contractor was reminded to:

- Replace the drip tray of suitable size for the air compressor.

##### 22 November 2018

There was no major site observation.

All follow-up actions requested by IEC during the site inspections were undertaken as reported by CAPCO and the Contractor. The abovementioned environmental issues had been addressed and mitigated during the reporting period.

#### 3.2 IMPLEMENTATIONS STATUS OF THE ENVIRONMENTAL PROTECTION REQUIREMENTS

The Contractors have implemented all the environmental mitigation measures and requirements as stated in the Project Profile and EP for the Project. The implementation status of the environmental mitigation measures for this Project during the reporting period is summarised in **Annex C**.








## 4. CONCLUSIONS

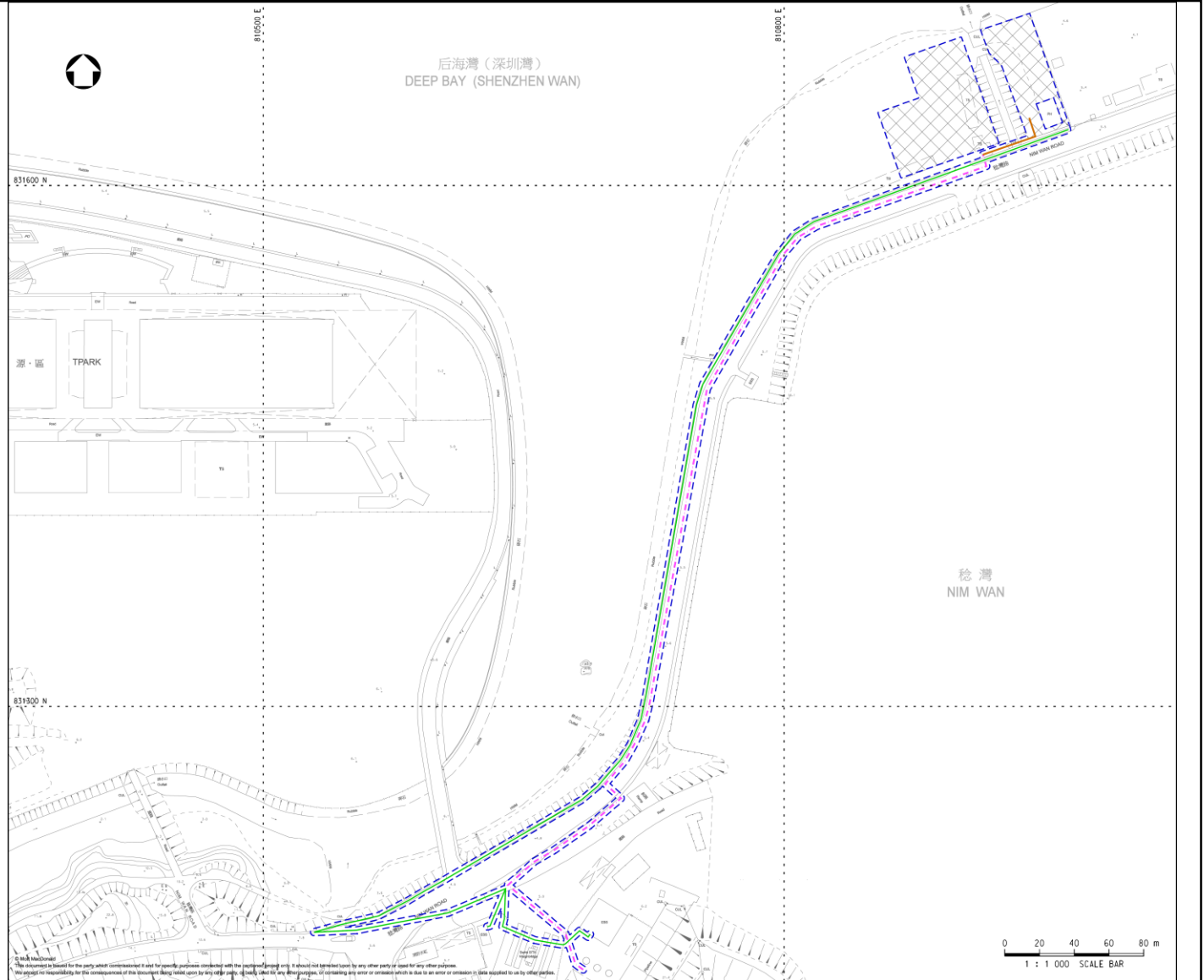
This 1<sup>st</sup> Monthly Environmental Audit Report presents environmental audit findings during the reporting period from 8 to 30 November 2018 in accordance with the Project Profile (PP-546/2017), an Environmental Permit (EP) (EP-536/2017).

The Contractors have implemented possible and feasible mitigation measures to mitigate the potential environmental impacts during construction. The IEC will continue to keep track of the construction programme to ensure compliance of environmental requirements and the effectiveness and efficiency of the mitigation measures implemented. If necessary, the Contractors will provide more mitigation measures to further alleviate the impacts.

## **Appendix A      Indicative Location Plan of Key Project Components for the Project**

Legend

-  Site Boundary
-  Proposed CLP Cable
-  Proposed Gas Pipe And Condensate Pipe (Above Ground)
-  Proposed Gas Pipe And Condensate Pipe (Under Ground)
-  Proposed Landfill Gas Utilization Plant Area



Annex A

Indicative Location Plan of Key Project Components

DATE: 3/12/2018

Environmental  
Resources  
Management



## **Appendix B            Construction Programme for the Reporting Month and Coming Months**

Landfill Gas Power Generation Project at the West New Territories (WENT) Landfill	Year 2018		Year 2019												Year 2020	
	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
Site preparation & Civil Works Construction																
Gas Pipeline Installation																
E&M Construction																
Testing & Commissioning																

## **Appendix C      Summary of Implementation Status of Environmental Mitigation**

**Annex C - Environmental Mitigation Implementation Status for Landfill Gas Power Generation Project at the West New Territories (WENT) Landfill**

**Note:**

- ✓ Compliance of Mitigation Measures
- <> Compliance of Mitigation but need improvement
- x Non-compliance of Mitigation Measures
- ▲ Non-compliance of Mitigation Measures but rectified by the Contractor
- △ Deficiency of Mitigation Measures but rectified by the Contractor
- N/A Not Applicable in Reporting Period

EIA Reference	Recommended Environmental Protection Measures/Mitigation Measures	When to implement the measures?	Implementation Status
<b>Air Quality</b>			
S5.1.1.1	Good Site Management:  Good site management is important to help reduce potential air quality impact down to a minimal level. As a general guide, the Contractor should maintain high standards of housekeeping to prevent emissions of fugitive dust. Loading, unloading, handling and storage of raw materials, wastes or by-products should be carried out in a manner so as to minimize the release of visible dust emission. Any piles of materials accumulated on or around the work areas should be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas should be carried out in a manner minimising generation of fugitive dust emissions. The material should be handled properly to prevent fugitive dust emission before cleaning.	Construction Stage	✓
S5.1.1.1	Disturbed Parts of the Roads:  <ul style="list-style-type: none"> <li>■ Main temporary access points should be paved with concrete, bituminous hardcore materials or metal plates and be kept clear of dusty materials;</li> <li>■ Unpaved parts of the road should be sprayed with water or a dust suppression chemical so as to keep the entire road surface wet.</li> </ul>	Construction Stage	✓
S5.1.1.1	Exposed Earth:  Exposed earth should be properly treated by compaction, hydroseeding, vegetation planting or seeding with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies.	Construction Stage	N/A
S5.1.1.1	Loading, Unloading or Transfer of Dusty Materials:  All dusty materials should be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet.	Construction Stage	✓
S5.1.1.1	Debris Handling:  <ul style="list-style-type: none"> <li>■ Any debris should be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides.</li> </ul>	Construction Stage	✓

EIA Reference	Recommended Environmental Protection Measures/ Mitigation Measures	When to implement the measures?	Implementation Status
S5.1.1.1	<ul style="list-style-type: none"> <li>Before debris is dumped into a chute, water should be sprayed onto the debris so that it remains wet when it is dumped</li> </ul> Transport of Dusty Materials:	Construction Stage	✓
S5.1.1.1	Vehicles used for transporting dusty materials/ spoils should be covered with tarpaulin or similar material. The cover should extend over the edges of the sides and tailboards. Wheel washing:	Construction Stage	✓
<b>Noise</b>			
5.1.2.1	Good site practice to limit noise emissions at source:	Construction Stage	✓
5.1.2.1	<ul style="list-style-type: none"> <li>Only well-maintained plant should be operated on-site and the plant should be serviced regularly over the course of construction period</li> <li>Machines and plant that may be intermittent in use should be shut down between work periods or should be throttled back to a minimum</li> <li>Plant known to emit noise strongly in one direction, should, where possible, be oriented so that the noise is directed away from nearby NSRs</li> <li>Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction period</li> <li>Mobile plant should be sited as far away from NSRs as possible</li> <li>Material stockpiles and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities</li> <li>The Contractor shall at all times comply with all current statutory environmental legislation.</li> </ul> Selection of Quieter Plant:	Construction Stage	✓
5.1.2.1	The contractor should be requested, as far as possible, to use quiet PME, which has a lower sound power level. This is one of the most effective measures to reduce noise emission at source and is increasingly practicable. Use of Movable Noise Barrier:	Construction Stage	N/A
5.1.2.1	Movable noise barriers can be very effective in screening noise from particular items of plant during construction. Noise barriers located along the active works area close to the noise generating component of a PME could produce at least 10dB(A) screening for stationary plant and 5 dB(A) for mobile plant provided the direct line of sight between the PME and the NSRs is blocked. Use of Noise Enclosure / Acoustic Shed:	Construction Stage	N/A
The use of noise enclosure or acoustic shed is to cover stationary PME such as air compressor and generator. With the adoption of noise enclosure, the PME could be completely screened, and noise reduction of 15 dB(A) can be achieved.			

## Water Quality



EIA Reference	Recommended Environmental Protection Measures/ Mitigation Measures	When to implement the measures?	Implementation Status
5.1.3.1	<p>For Construction Site Runoff and Drainage:</p> <ul style="list-style-type: none"> <li>■ Surface runoff should be diverted to sand/silt removal facilities such as sand/silt traps. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to the silt removal facilities.</li> <li>■ Perimeter channels at site boundaries should be provided to intercept storm runoff from outside the site so that it will not wash across the site</li> <li>■ Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit will be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.</li> <li>■ Intercepting channels should be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces.</li> <li>■ Open stockpiles should be covered with tarpaulin or similar fabric during rainstorms.</li> <li>■ Measures should be taken to minimize the ingress of rainwater into trenches. Rainwater pumped out from trenches should be discharged into storm drains via silt removal facilities.</li> <li>■ All discharges from the construction site should comply with the discharge license issued by EPD.</li> </ul>	Construction Stage	✓
5.1.3.1	<p>For General Good Site Practices:</p> <ul style="list-style-type: none"> <li>■ Sewage from the construction workers should be collected by portable chemical toilets and regularly disposed offsite by a licenced contractor.</li> <li>■ Chemicals, fuels/oils and chemical waste storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest container.</li> <li>■ Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal in accordance with the Waste Disposal Ordinance.</li> </ul>	Construction Stage	✓
<b>Waste Management</b>	■	Construction Stage	✓
5.1.4.1	<p>Good Site Practices:</p> <ul style="list-style-type: none"> <li>■ Nomination of an approved person, such as a site manager, to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site.</li> <li>■ Provision of sufficient waste disposal points and regular collection of waste.</li> <li>■ Appropriate measures to minimise windblown litter and dust/odour during transportation of waste by either covering trucks or by transporting wastes in enclosed containers.</li> <li>■ Stockpiles of C&amp;D materials should be kept covered by impervious sheets to avoid wind-blown dust.</li> <li>■ All dusty materials including C&amp;D materials should be sprayed with water immediately prior to any loading transfer operation so as to keep the dusty material wet during material handling at the stockpile areas.</li> </ul>	Construction Stage	✓
5.1.4.1	<p>Waste Reduction Measures:</p> <ul style="list-style-type: none"> <li>■ Sort non-inert C&amp;D materials to recover any recyclable portions.</li> <li>■ Segregation and storage of different types of waste in different containers or skips or stockpiles to enhance reuse or recycling of materials and their proper disposal.</li> <li>■ Encourage collection of recyclable waste such as waste paper and aluminium cans by providing separate labelled bins to enable such waste to be segregated from other general refuse generated by the work force.</li> <li>■ Proper site practices to minimise the potential for damage or contamination of inert C&amp;D materials.</li> </ul>	Construction Stage	✓

EIA Reference	Recommended Environmental Protection Measures/ Mitigation Measures	When to implement the measures?	Implementation Status
5.1.4.1	<ul style="list-style-type: none"> <li>Plan the use of construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.</li> </ul> Inert and Non-inert C&D Materials:	Construction Stage	✓
5.1.4.1	<ul style="list-style-type: none"> <li>The inert C&amp;D materials should be reused on-site as fill material as far as practicable.</li> <li>The surplus inert C&amp;D materials will be disposed of at the Government's PFRFs for beneficial use by other projects in Hong Kong.</li> <li>The non-inert materials should be reused and recycled on-site as far as possible before disposal at the designated landfill site.</li> </ul> Chemical Waste	Construction Stage	✓
5.1.4.1	<ul style="list-style-type: none"> <li>The Contractor will be required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the "Code of Practice on the Packaging Labelling and Storage of Chemical Wastes".</li> <li>Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately.</li> <li>Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosive, flammable, oxidising, irritant, toxic, harmful, corrosive, etc.</li> <li>The Contractor should use a licensed collector to transport and dispose of the chemical wastes at the approved Chemical Waste Treatment Centre or other licensed recycling facilities, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.</li> </ul> General Refuse:	Construction Stage	✓
	<ul style="list-style-type: none"> <li>General refuse should be stored in enclosed bins or compaction units separated from C&amp;D materials.</li> <li>A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from C&amp;D materials.</li> </ul> <b>Landfill Gas Hazard</b>		
	<p>The Contractor will be required to appoint a Safety Officer, trained in the use of gas detection equipment and landfill gas-related hazards, to be present on-site throughout the groundworks phase. The Safety Officer should be provided with an intrinsically safe portable gas detector, appropriately calibrated and capable of measuring the following gases in the ranges indicated:</p> <ul style="list-style-type: none"> <li>Methane (CH<sub>4</sub>) 0-100% Lower Explosion Limit (LEL) and 0-100% by volume</li> <li>Carbon Dioxide (CO<sub>2</sub>) 0-100%; and</li> <li>Oxygen (O<sub>2</sub>) 0-21%</li> </ul> <p>The Safety Officer will be responsible for proposing the monitoring frequency and locations prior to commencement of groundworks.</p>	Construction Stage	✓
	<p>Routine monitoring should be carried out at all excavations, manholes and chambers and any other confined spaces that may have been created by the temporary storage of building materials on-site.</p>	Construction Stage	✓

EIA Reference	Recommended Environmental Protection Measures/ Mitigation Measures	When to implement the measures?	Implementation Status
	<p>All measurements in excavations should be made with the monitoring tube located not more than 10mm from the exposed ground surface.</p> <p>Monitoring of excavations should be undertaken as follows:</p> <p>(a) For excavations deeper than 1m, measurements should be conducted:</p> <ul style="list-style-type: none"> <li>■ At ground surface before excavation commences;</li> <li>■ Immediately before any worker enters the excavation;</li> <li>■ At the beginning of each working day for the entire period the excavation remains open; and</li> <li>■ Periodically throughout the working day whilst workers are in the excavation.</li> </ul> <p>(b) For excavations between 300mm and 1m, measurements should be conducted:</p> <ul style="list-style-type: none"> <li>■ Directly after the excavation has been completed; and</li> <li>■ Periodically whilst the excavation remains open.</li> </ul> <p>(c) For excavations less than 300mm, monitoring may be omitted at the discretion of the Safety Officer or other appropriately qualified person.</p>	Construction Stage	✓
	<p>Depending on the results of the monitoring, actions required will vary and should be set down by the Safety Officer or other appropriately qualified person. As a minimum these should encompass those actions specified in Table 5.1 of the Project Profile of the Project.</p> <p>The Contractor will also be required to implement appropriate safety measures during construction phase, as recommended in Chapter 8 of the Landfill Gas Hazard Assessment Guidance Note.</p>	Construction Stage	✓
<b>Ecology</b>			
5.1.6	<p>Mitigation measures proposed for air, noise, water, waste and landscape could act as precautionary measures to prevent and minimize any indirect disturbance or pollution arisen from construction activities on local ecology and offsite habitat.</p>	Construction Stage	✓
Landscape and Visual			
5.1.7	<p>Good Site Practice:</p> <ul style="list-style-type: none"> <li>■ Extent of works areas will be minimised as far as practicable.</li> <li>■ Construction period will be minimised and construction phasing carefully considered to minimise potential landscape and visual impacts.</li> <li>■ Sensitive hoarding, canvas and / or screens will be used to visually screen the construction activities and works areas.</li> <li>■ Sensitive design of above-ground structures in terms of scale, height and bulk will be adopted to minimise visual impacts.</li> <li>■ Appropriate colours and tones will be used for all hard elements to avoid unnecessary visual intrusion.</li> <li>■ Trees to be retained on-site, if any, will be carefully protected during construction. Detailed Tree Protection Specification should be provided in the Contract Specification, under which the Contractor should be required to submit, for approval, a detailed working method statement for the protection of trees prior to undertaking any works adjacent to all retained trees.</li> <li>■ Trees unavoidably affected will be transplanted where practicable. Where possible, trees should be transplanted directly from existing locations to their final recipient locations without being held in a temporary nursery site.</li> </ul>	Construction Stage	✓

EIA Reference	Recommended Environmental Protection Measures/ Mitigation Measures	When to implement the measures?	Implementation Status
	<p>Detailed Tree Transplanting Specification should be provided in the Contract Specification and sufficient time for preparation should be allowed in the construction programme. Should trees be unavoidably affected, a Tree Preservation and Removal Proposal will be submitted to Lands Department for approval in accordance with Lands Department's Lands Administration Office Practice Note No. 7/2007 or any other relevant guidelines.</p> <ul style="list-style-type: none"> <li>■ Compensatory tree planting will be provided if trees are affected due to the Project. Native species, such as <i>Celtis sinensis</i>, <i>Ficus microcarpa</i>, <i>Litsea glutinosa</i>, <i>Sterculia lanceolata</i> and any other appropriate native tree species should be considered.</li> </ul>		

---

**ERM has over 160 offices across the following countries and territories worldwide**

Argentina	New Zealand
Australia	Norway
Belgium	Panama
Brazil	Peru
Canada	Poland
China	Portugal
Colombia	Puerto Rico
France	Romania
Germany	Russia
Hong Kong	Singapore
Hungary	South Africa
India	South Korea
Indonesia	Spain
Ireland	Sweden
Italy	Switzerland
Japan	Taiwan
Kazakhstan	Thailand
Kenya	UAE
Malaysia	UK
Mexico	US
Myanmar	Vietnam
The Netherlands	

**ERM Hong Kong**

2507, 25/F One Harbourfront  
18 Tak Fung Street  
Hunghom  
Kowloon  
Hong Kong

T: +852 2271 3000

F: +852 2723 5660

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