Runaway Bay Former Landfill: Landfill Gas Monitoring for Runaway Bay Sport and Leadership Excellence Centre

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	11-Sep-13
E10	CH_4	ppm	160
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E10A	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E11	CH_4	ppm	280
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E12	CH_4	ppm	1200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E13	CH_4	ppm	310
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E14	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E14 South Left	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E14 South Right	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E15	CH_4	ppm	310
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E15 North	CH_4	ppm	850
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E16	CH_4	ppm	310
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E16 North	CH_4	ppm	270
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E17	CH_4	ppm	450
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E18	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E19	CH_4	ppm	310
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E20 Left	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E20 Right	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E21 Left	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E21 Right	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E22 Left	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E22 Right	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E23 Left	CH_4	ppm	30
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E23 Right	CH_4	ppm	30
	H_2S	ppm	0
	O_2	% (v/v)	20.9

Runaway Bay Former Landfill: Landfill Gas Monitoring for Runaway Bay Sport and Leadership Excellence Centre

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	11-Sep-13
E24 Left	CH_4	ppm	1650
	H_2S	ppm	0
	O_2	% (v/v)	15.8
E24 Right	CH_4	ppm	1400
	H_2S	ppm	0
	O_2	% (v/v)	16.5
E25	CH_4	ppm	3900
	H_2S	ppm	0
	O_2	% (v/v)	20.1
E26	CH_4	ppm	310
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E27	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E28	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
E29	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E30	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
E31	CH_4	ppm	6500
	H_2S	ppm	0
	O_2	% (v/v)	20.7
West Car park NE Corner	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
West Car park Left NE Corner	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
West Car park Right NW Corner	CH_4	ppm	850
	H_2S	ppm	0
	O_2	% (v/v)	20.9
West Car park NW Corner	CH_4	ppm	270
	H_2S	ppm	0
	O_2	% (v/v)	20.9
West Car park NW Edge	CH_4	ppm	270
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Central Light Pole	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Scoreboard light Pole	CH_4	ppm	270
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Ag pip adj Lodge 9	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
S1	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
S2	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
S3	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S4	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
S5	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S6	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S7	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9

Runaway Bay Former Landfill: Landfill Gas Monitoring for Runaway Bay Sport and Leadership Excellence Centre

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	11-Sep-13
S8	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S9	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S10	CH_4	ppm	120
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S11	CH_4	ppm	60
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S12	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S12A	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S12B	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S12C	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S12D	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S13	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S14	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S15	CH_4	ppm	100
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S16	CH_4	ppm	160
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S17	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S18	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S19	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S20	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S20A	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S21	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S22	CH_4	ppm	180
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S23	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S24	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S25	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
S26	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	11-Sep-13
L7	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L8	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L9	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L10	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L11	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L12	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L13	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
L14	CH_4	ppm	210
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Western Carpark Central Stairs	CH_4	ppm	60
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Storage Containers western carpark	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
W-Beach Volleyball	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
Starage Containers behind lodges	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
Storage shed southern end track	CH_4	ppm	NM
	H_2S	ppm	NM
	O_2	% (v/v)	NM
SW1	CH_4	ppm	240
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW2	CH_4	ppm	240
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW3	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW4	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW5	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW6	CH_4	ppm	200
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW7	CH_4	ppm	240
	H_2S	ppm	0
	O_2	% (v/v)	20.9
SW8	CH_4	ppm	240
	H_2S	ppm	0
	O_2	% (v/v)	20.9

Notes:
Methane Trigger Level = 1.25 % v/v or 12,500 ppm (Environmental Guidelines: Solid Waste Landfills, NSW EPA, 1996)
Shading indicates exceedance of trigger level.
NM = location not monitored (restricted acess or not located)
E = Electrical pit
S= Stormwater drain
Sw = Sewer manhole
L - Light pole

Attachment 3: Calibration Certificates and Specification Sheet for Landfill Gas Meters

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Equipment Report – Eagle Multi-Gas Monitor

This Gas Meter has been performance checked / calibrated* as follows:

Gas Channel	Cal Value	Reading	Pass?
CH4 Check Only	0 % LEL	0.0 % LEL	☑
	50 % LEL	50. % LEL	☑
O2 Check Only	0.0 % vol	0.0 % vol	☑
	18.0 % vol	18.0 % vol	☑
CO Check Only	100 ppm	99 ppm	☑
H2S Check Only	25.0 ppm	25.1 ppm	☑

☐	Electrical Safety Tag attached (AS/NZS 3760)	Tag No: N/A		Valid to:	
☑	Alkaline Batteries	☑	Inline Filter Check	☑	Cleaned
☑	Low alarm set at 10% LEL (5,000ppm)	☑	High alarm set at 50% LEL (25,000ppm)	☑	Battery Status: 6.1 V

* Calibration gas traceability information is available upon request.

Date: 5/9/13 Checked by: Justin

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	Eagle Multi Gas detector Ops check.
☑	☐	Liquid Inhibiting Probe with In-Line Filter
☑	☐	Carry Strap
☑	☐	Spare Alkaline Batteries Qty 1set
☑	☐	Operating Manual
☑	☐	Quick Guide
☑	☐	Carry Case
☑	☐	Battery Status 6.2V
	☐	Check to confirm electrical safety (tag must be valid)
☐	☐	

Processors Signature/ Initials ______________________

TFS Quote Reference		Condition on return
Customer Ref		
Equipment ID	EAGBB	
Equipment serial no.	E2A813	
Return Date & Time	/ /	

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Sydney Branch, Level 1, 4 Talavera Road, North Ryde 2113, Email: RentalsEnviroNSW@thermofisher.com

Adelaide Branch, 27 Beulah Road, Norwood, South Australia 5067, Email: RentalsEnviroSA@thermofisher.com

Brisbane Branch, Unit 2/5 Ross St, Newstead 4006, Email: RentalsEnviroQLD@thermofisher.com

Perth Branch, 121 Beringarra Ave, Malaga WA 6090, Email: RentalsEnviroWA@thermofisher.com

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Equipment Report - GEOTECHNICAL INSTRUMENTS GA2000

This Gas Meter has been performance checked / calibrated* as follows:

Calibration	Cal Value	Reading	Cal Value	Reading	Pass?
CH4	60% vol	60 %	0.00% vol	0.0 %	☑
CH4 -check only	2.5%CH4	2.5 %			☑
H2s	25ppm	25 ppm	0 ppm	0 ppm	☑
O2	20.9% vol	20.9 %	0.00% vol	0.0 %	☑
CO	100ppm	100 ppm	0 ppm	0 ppm	☑
CO2	40% vol	40 %			☑

Operations Check

☑ Electrical Safety Tag attached (AS/NZS 3760)		Tag No:............................	Valid to:............................
☑ Cleaned/checked	☑ In line Filter Check		☑ Battery Status @ 100 %

* Calibration gas traceability information is available upon request.

Date: 2018 / 13 Checked by: Justin

Signed: [signature]

Please check that the following items are received and that all items are cleaned and decontaminated before return. A minimum $20 cleaning / service / repair charge may be applied to any unclean or damaged items. Items not returned will be billed for at the full replacement cost.

Sent	Returned	Item
☑	☐	Sampling Probe with in-Line Filter
☑	☐	1m of Sampling Tube
☑	☐	Carry Strap
☑	☐	Battery Charger and AC/DC Power Supply
☑	☐	Operating Quick Guide behind foam on lid of case
☑	☐	Manual behind foam on lid of case
☑	☐	Spare Inline Filters Qty (2)
☑	☐	Carry case
☑	☐	Data Cable and Software CD or Diskette
☑	☐	Instrument Battery Status @ 100 %
☐	☐	Well cap Quick connect fitting

☑ ☐ ☐ Check to confirm electrical safety (tag must be valid)

Processors Signature/ Initials

TFS Quote Reference		Condition on return
Customer Ref		
Equipment ID	GA2000BE	
Equipment serial no.	12665/10	
Return Date	/ /	
Return Time		

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Memorandum

23 May 2013

To	Runaway Bay Sport and Leadership Excellence Centre		
Copy to	Fbees1@eq.edu.au		
From	Belinda Oberia	Tel	(07) 3316 3954
Subject	Landfill Gas Monitoring Round 22 April 2013	Job no.	41/26317
			Doc No: 41/26317/448440

1 Introduction

GHD was commissioned by The Runaway Bay Sport and Leadership Excellence Centre (RBSLEC) to undertake a round of landfill gas monitoring at the former landfill site, now operating as the RBSLEC, located at the corner of Morala Avenue and Sports Drive, RUNAWAY BAY, Queensland (hereafter referred to as the site).

This round of monitoring was conducted on 22 April 2013 and incorporated structure locations nominated within the Landfill Gas Monitoring Map (Brisbane City Council, 2001). A copy of this site map is provided as Attachment 1.

2 Methodology

Landfill gas monitoring was undertaken on 22 April 2013 using a calibrated portable field measurement unit to obtain instantaneous measurements of the methane, oxygen, carbon monoxide and hydrogen sulphide concentrations. For this monitoring round an Eagle landfill gas meter was utilised. The specifications and calibration certificates for the monitoring equipment used during the 22 April 2013 monitoring round are included in Attachment 3. This meter was selected based on the results of the previous June 2010 and December 2010 monitoring rounds.

The monitoring undertaken during this round included determining concentrations of methane within:

- 4 Soil Atmosphere Gas monitoring wells located along the eastern boundary of the site (Morala Avenue); and
- 112 structures locations (including subsurface electrical pits, light poles, stormwater pits and some site buildings).

These locations were spread across the site and were identified from the site map provided as Attachment 1. Surface emission monitoring was not conducted under this scope of work.

Measurements were collected by placing a length of tubing (connected to the meter) within the structure and noting the range of measurements over a 1 minute period (or until a peak reading was achieved). In line with previous monitoring rounds conducted at the site, a trigger level of 12,500 ppm methane (25% of the LEL of methane) was adopted for this monitoring round. Results tables for this round are provided in Attachment 4.

GHD 145 Ann Street Brisbane QLD 4000 GPO Box 668 Brisbane QLD 4001 Australia
T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

3 Results

Results tables for this round are provided in Attachment 4. Table 1 provides details on general observations made on the day and Tables 2 and Table 3) outline the results for the monitored gas wells and structures.

On the day of monitoring, the weather was fine with 2/8 cloud cover and a light NW breeze. The weather in the preceding week had been mostly fine with one day of rainfall (32 mm). At the time of monitoring, the ground surface was dry. Atmospheric pressure recorded at nearby Bureau of Meteorology Weather station number 40764 (Gold Coast Seaway) was 1014.3 hPa and falling during the course of the day. The recorded temperature was 22.1^{0}C.

Concentrations of oxygen, carbon monoxide and hydrogen sulphide at all locations monitored were as follows:

- Oxygen: 20.9% v/v;
- Carbon monoxide: 0 ppm; and
- Hydrogen sulphide: 0 ppm.
- These results meet the adopted trigger guidelines of Oxygen (20.9% v/v), Carbon monoxide (0 ppm); and Hydrogen sulphide (0 ppm).

Methane concentrations detected at all monitored locations on 22 April 2013 were less than the relevant adopted trigger level (12,500 ppm methane) during this round of monitoring, with the exception of

- Structure E3 at > 50 ,000 ppm methane.

E3 is an electrical service pit located to the north-west of the beach volley ball court and is in close vicinity of other service pits and buildings that are regularly in use

The methane concentration within structure location E3 was greater than the adopted trigger level (12,500 ppm methane, ie.1.25% v/v methane) and the lower explosive limit of methane (50,000 ppm i.e. 5% v/v). The actual methane concentration in E3 was unable to be accurately determined as the detected concentration was greater than the Eagle gas meter's detection limit of 50,000 ppm. As this methane concentration represented an explosion risk if any potential ignition sources were to be introduced to the area, a second round of monitoring was conducted on the pit after one hour to confirm this methane concentration. Details of these results are provided in Table 4 attached. Methane concentrations greater than 50,000 ppm were detected at this location during this second round of monitoring. These results were immediately reported to you (Frank Beeson) verbally and followed up by an email on 23 April 2013.

GHD further notes that although not in excess of the nominated Trigger Level, a number of other service pit locations identified methane concentrations > 1000 ppm indicating that methane is entering and accumulating within these structures. This included:

- E25 (an electrical pit located in the northern end of the west car park) at 9,500 ppm methane;
- E12 (an electrical pit located in the northern end of the west car park) at 1,050 ppm methane; and
- Location West Carpark, Right NW corner (an electrical pit located in the west car park) at 1,150 ppm methane.

Nominated monitoring locations that were unable to be accessed on 22 April 2013 included four soil gas monitoring wells along Morala Avenue which were unable to be located (due to being grassed over), Electrical pits E20 and 21 along the boundary of the carpark on the eastern site boundary (blocked access holes unable to be cleared), electrical pits E14, E27, E28 and stormwater pit S21 within the west car park (unable to be located, covered in soil, debris and shipping containers), and stormwater pits S1, S2 and S4 behind the accommodation blocks (unable to be located or completely covered in debris and leaves).

Additional locations not previously on the scope of works, but monitored this round include a storage shed at the southern end of the track and shipping containers within the western carpark (unable to be opened so reading taken from points (holes) where the meter tube could be inserted).

Follow up discussions with Frank Beeson on 22 April 2013 regarding the elevated methane concentrations within electrical pit E3 indicated the following:

- A sink hole of up to 300mm depth had developed between E2 and E3 to the west of the beach volley ball court and had been backfilled with gravel within the last three years (since GHD's previous landfill gas monitoring round at that location during June 2010);
- E3 was suspected of being the electrical pit access point to the planned accommodation blocks identified as 11, 12 and 13 (however these were not built with the other accommodation blocks numbered 1-9 in 2001). No "as built" plans for trenches and outfalls associated with the electrical connections are available; and
- The E3 pit (and adjacent communications pit) was constructed on a poly-plastic base with a concrete cover. These were thought to be constructed in accordance with the Site Management Plan (SMP) in a manner which maintains an intact clay capping layer.

4 Conclusions

Based on the results of the 22 April monitoring round, GHD made the following conclusions:

- The landfill is still generating landfill gas including methane;
- Methane is entering and accumulating within electrical pits at the site (particularly E3, located to the north-west of the beach volley ball court and is in close vicinity of other service pits and buildings that are regularly in use, and also several electrical pits within the west car park);
- Methane levels less than the adopted trigger level (12,500 ppm methane) were detected within all other structure locations included in this round of monitoring;
- Monitoring of site structures was not exhaustive and was limited to those locations detailed within Section 2 and included within the attached results tables;
- Need for immediate action and further investigation of location E3, and
- Certain locations could not be accessed for monitoring (including the four soil gas monitoring wells located along Morala Avenue).

5 Interim Recommendations

Based upon the conclusions contained in Section 2.3 above, GHD recommended the following (via email on 23 April 2013):

1. Place barricades around the electrical pit, include signage for no smoking and authorised entry only;
2. If the electrical connections are "alive" within this electrical pit to consider isolating the connection to the pit until further gas testing is conducted;

3. RBSLEC to advise the site's owner of the situation and for the site owner to notify The Department of Environment, Heritage and Protection, the local Council and the utility pit owner (if not Gold Coast City Council) of the situation and works to be completed to further investigate;
4. Re-monitoring of the utility pit is recommended immediately (ideally within 48 hours) using a portable GA 2000 gas meter. This meter is capable of measuring higher levels of methane than the Eagle detection meter used on 22/4/13. Following this second round of monitoring, the pit should be vented (if required) to allow accumulated gas to dissipate. Appropriate considerations should be made to prevent water ingress into the pit. If re-monitoring cannot be completed within 48 hours, then the utility pit lid should be carefully removed (so as to avoid any potential sparking) or the pit should be purged with air prior to removal of the lid (if possible) so as to dilute any accumulated gas to acceptable concentrations (i.e <12,500 ppm), until such a time as the second monitoring round can occur. A maximum of 24 hours prior to GHD completing the second monitoring round, GHD recommend that the lid be replaced on the utility pit to allow gas to accumulate within the utility pit for a limited period of time prior to repeat confirmation gas monitoring occurring. Following the initial monitoring, the pit lid should be removed / the pit purged to allow the accumulated gas (if any) to dissipate. Once this is done, the rate of recovery of the gas should be monitored regularly (possibly hourly). It is also recommended that GHD conduct landfill gas monitoring within the nearby site buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures. The connection point for electricity into these buildings should also be monitored for landfill gas if it feeds from this or nearby service pits.
5. GHD can assist the Sports Centre to identify / consider other potential sources of the detected gas (diesel, petrol, decaying vegetation, the nearby sewer pit etc.) based on readily available information and on-site observations. It would be beneficial if the Sports Centre could provide to GHD any information that is available regarding the installation and construction of this electrical pit and nearby underground services(including if the pits were designed to prevent landfill gas intrusion, if the pit and connections trenches are enclosed or installed within gravel/sand only, what the pit connects to, and if there has been any maintenance activities on that structure since the last GHD gas monitoring round in December 2010). If no plans or information is available, GHD can attempt a search for Dial Before you Dig records.
6. For GHD to review the information to be gathered from completing items 3 and 5 and make further recommendations (if required) for management of the methane accumulating within the E3 electrical pit.

Memo Prepared By:	Approved for Issue
Belinda Oberia Environmental Scientist (07) 3316 3954	**Adam Major** Senior Environmental Engineer (07) 3316 3587
GHD Pty Ltd	GHD Pty Ltd

Memorandum

27 May 2013

To	Runaway Bay Sport and Leadership Excellence Centre		
Copy to	Fbees1@eq.edu.au		
From	Belinda Oberia	Tel	(07) 3316 3954
Subject	Landfill Gas Monitoring Round 30 April 2013	Job no.	41/26317, Doc No: 41/26317/448548

1 Introduction

Based on the results of the 22 April monitoring round, GHD was commissioned by The Runaway Bay Sport and Leadership Excellence Centre (RBSLEC) to undertake a follow up round of landfill gas monitoring at the former landfill site, now operating as the RBSLEC.

This round of monitoring was conducted on 30 April 2013 and included electrical pit E3 and the buildings and underground service pits nearby to E3. A copy of this site map is provided as Attachment 1.

2 Methodology

A second landfill gas monitoring round of electrical pit E3 and the buildings and underground service pits nearby to E3 was undertaken by GHD on 30 April 2013 using two calibrated portable field measurement units (an Eagle Gas meter and a GA2000 landfill gas meter). The specifications and calibration certificates for the monitoring equipment used during the 30 April 2013 monitoring round are included as Attachment 2.

The monitoring undertaken during this round included

- An initial gas reading was taken within and immediately above the E3 pit at 10 am representing 24 hours potential accumulation. The electrical pit was then opened and vented until the methane level was consistent with the 10 am ambient atmospheric reading. This took less than 10 minutes. The pit cover was then replaced and hourly potential accumulation readings were recorded within E3 (between 11 am and 3 pm).
- One round of gas monitoring was conducted within the nine, two storey accommodation blocks and two, one storey grounds buildings in the vicinity. Rooms on both lower and upper levels and service connections into and within the buildings were targeted. Landfill gas levels were also checked within the underground services pit adjacent to E3 and the accommodation blocks intermittently between 11 am and 3 pm. A sketch of additional service pits observed (and monitored) on April 22 and 30 are included as Attachment 3.

RBSLEC advised that they were not aware of any updated service pit/ site construction drawings being available for the review (beyond Figure 1 attached). Therefore GHD completed a Dial before You Dig (DBYD) search request which confirmed the presence of Energex electricity connections along the northern and eastern boundaries of the site, and the presence of Telstra cables along the eastern boundary of the site. Details of on-site connections could not be assessed beyond site observation (based on the visual identification of underground service pits and connections boxes located on the walls of the accommodation blocks). A copy of these plans is provided in Attachment 5.

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Memorandum

27 May 2013

To	Runaway Bay Sport and Leadership Excellence Centre		
Copy to	Fbees1@eq.edu.au		
From	Belinda Oberia	Tel	(07) 3316 3954
Subject	Landfill Gas Monitoring Round 9 May 2013	Job no.	41/26317 Doc No: 41/26317/448567

1 Introduction

Based on the results of the 22 April and 30 April monitoring rounds, GHD was commissioned by The Runaway Bay Sport and Leadership Excellence Centre (RBSLEC) to undertake a second follow up round of landfill gas monitoring at the former landfill site, now operating as the RBSLEC.

This round of monitoring was conducted on 9 May 2013 and included electrical pit E3 and the underground service pits in the immediate vicinity to E3. A copy of this site map is provided as Attachment 1.

2 Methodology

A follow up landfill gas monitoring round of E3 and the buildings and underground service pits nearby to E3 was undertaken by GHD on 9 May 2013 using two calibrated portable field measurement units (an Eagle Gas meter and a GA2000 landfill gas meter). The specifications and calibration certificates for the monitoring equipment used during the 9 May 2013 monitoring round are included as Attachment 3.

As per the recommendations following the 30 April round, a two staged approach was adopted on 9 May 2013. Initially, landfill gas monitoring to assess one week potential gas accumulation was conducted within E3, as well as the ambient atmospheric level immediately above E3, and within other underground service pits in the immediate vicinity. Based on the low methane levels measured and discussion with RBSLEC, an additional stage of monitoring did not proceed (that proposed to repeat the conduct landfill gas monitoring within the nearby site buildings and also to repeat monitoring on other nearby underground structures.

3 Results

Results tables for this round are provided in Attachment 4. Table 1 provides details on general observations made on the day and Tables 2 and Table 3) outline the results for the monitored gas wells and structures.

On the day of monitoring, the weather was fine with 4/8 cloud cover and a light S breeze. There had been some light showers in the preceding week including the evening prior to monitoring. At the time of monitoring, the ground surface was slightly moist on the grassed surface, but quickly dried out. Atmospheric pressure recorded on nearby Bureau of Meteorology Weather station number 40764 (Gold Coast Seaway) was 1028.6 hPa and falling during the course of the day. The recorded temperature was 20.3^{0}C.

The barricaded exclusion zone of approximately 2 m noted on 30 April remained in place around the E3

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electrical pit. There were multiple site visitors (high school students) playing and sitting in the vicinity, including within 10m of the E3 pit.

GHD was advised that the electrical pit identified as E3 had remained closed since the last monitoring round on 30 April.

The accumulated methane concentration detected after 9 days of E3 being closed was 460 ppm. This methane level was more than 1000 ppm lower than when left by GHD on 30 April 2013.. As it was unexpected for the methane concentration to decrease to a concentration lower than detected following 2 hours accumulation (1,850 ppm) and 24 hours accumulation (1,250 ppm), it was confirmed with RBSLEC staff that the pit had not been vented since 30 April. This may be due to site specific and climatic conditions. RBSLEC staff confirmed the pit had remained closed between monitoring rounds. .

The maximum methane level detected in the atmosphere immediately above and in the vicinity of E3 was 15 ppm.

The maximum methane level detected within nearby service pits (immediately adjacent to E3) was 80 ppm.

These methane concentrations are taken from the Eagle landfill gas meter result recorded. All locations monitored on 9 May had methane levels less than the detection limit of the GA2000 meter. For all locations monitored, oxygen levels (O_2) were 20.9% v/v, and carbon monoxide (CO) and hydrogen sulfide levels was not detected (0 ppm).

The methane concentrations within all structures monitored on 9 May were less than the adopted trigger level (12,500 ppm).

4 Conclusions

Based on the results of the 9 May monitoring round, GHD made the following conclusions:

- Methane is confirmed to be entering electrical pits (particularly E3). Accumulated methane concentrations appear to fluctuate with time. This may be a result of the effect of changing atmospheric pressure and the ability for some passive venting through the pit cover openings.
- Further investigation or site management is recommended to check methane accumulation within E3.

5 Recommendations

Based upon the conclusions contained in Section 4 above, GHD recommends the following:

1. It is recommended that a follow up round of monitoring be conducted within the next two weeks (to check the potential methane accumulation levels after one month of leaving the cover in place). This can be in a staged approach as follows. Stage 1 – Monitoring of the E3 electrical pits, the ambient level immediately above the E3 pit, and also other underground service pits in the immediate vicinity. If results of E3 are greater than 10,000 ppm then continue to Stage 2 – conduct landfill gas monitoring within the nearby site buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures.
2. It is also recommended that the barricades currently in place be extended to the edge of the canopy (3-5m from pit) if possible until the next monitoring event. Hot works (ie. works with any source of ignition) should be excluded from the area unless monitoring is conducted prior to and during the activity.

3. RBSLEC to regularly vent the E3 pit or consider installation of other passive venting systems. (GHD can provide further guidance if required).
4. A full round of landfill gas monitoring within 3 months (of all nominated structures across the site including accommodation blocks and maintenance sheds in the vicinity of E3) to confirm that the elevated methane levels detected within E3 are not expanding to other nearby structures, and also to confirm if an increase in methane levels is occurring within E25 (in the west carpark) that may progress to greater than the adopted trigger level (12,500 ppm).
5. A more detailed gas assessment should be undertaken if methane results continue to exceed adopted trigger levels or an increase in methane concentration continues. This investigation should assist to identify migration paths for methane and sensitive receptors.

Memo Prepared By:

Belinda Oberia
Environmental Scientist
(07) 3316 3954

GHD Pty Ltd.

Approved for Issue

Adam Major
Senior Environmental Engineer
(07) 3316 3587

GHD Pty Ltd

BEESON, Frank

From: WESTON Vivien [vxwes0@eq.edu.au]
Sent: Wednesday, 5 June 2013 11:53 AM
To: aramsay@goldcoast.qld.gov.au
Cc: dmoir3@eq.edu.au; fbees1@eq.edu.au
Subject: FW: Methane level in Electrical Pit - RBSLEC

Good morning Anita,

Further to the above issue, I now advise as follows;

Further landfill gas monitoring events were undertaken on 22 April 2013, 30 April 2013 and 9 May 2013 by a suitably qualified Environmental Scientist engaged by GHD. Subsequent to those testings a report has been generated that included the following recommendations;

- Continued use of the barricades currently in place. These are to be extended to the edge of the canopy (3-5m from pit) if possible until the next monitoring event. Hot works (ie. works with any source of ignition) should be excluded from the area unless gas monitoring is conducted prior to and during the activity
- It is recommended that a follow up round of monitoring be conducted within the next two weeks (to check the potential methane accumulation levels after one month of leaving the cover in place). This can be in a staged approach as previous.
- RBSLEC to regularly vent the E3 pit or consider installation of other passive venting systems.
- A full round of landfill gas monitoring within 3 months to confirm that the elevated methane levels detected within E3 are not expanding to other nearby structures.
- A more detailed gas assessment should be undertaken if methane results continue to exceed adopted trigger levels or an increase in methane concentration continues.

- An assessment of the capping should also be considered in the areas of subsidence.

Runaway Bay Sport and Leadership excellence centre will adhere to the above recommendations and support further testing as required.

Kind regards

Vivien Weston
A/Senior Financial Accountant
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vxwes0@eq.edu.au
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Cnr Sports Drive & Morala Ave. Runaway Bay Qld Australia 4216
PO Box 294 Runaway Bay Qld 4216

From: WESTON Vivien [mailto:vxwes0@eq.edu.au]
Sent: Thursday, 2 May 2013 9:30 AM
To: 'RAMSAY Anita'
Cc: dmoir3@eq.edu.au

Subject: RE: Methane level in Electrical Pit - RBSLEC

Good morning Anita

An electrician attended site on Monday 29/4/13 and ascertained that the connections in the electrical pit were not Live.
GHD attended site on Tuesday 30/4/13 to re- test the pit after the covers had been removed and gas had dissipated.
GHD recommended that they return to the site in 2 weeks to re-test. No other action has been recommended at this stage.
I will keep you informed.

Regards

Vivien Weston
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PO Box 294 Runaway Bay Qld 4216

From: RAMSAY Anita [mailto:ARAMSAY@goldcoast.qld.gov.au]
Sent: Monday, 29 April 2013 11:40 AM
To: 'WESTON Vivien'
Subject: RE: Methane level in Electrical Pit - RBSLEC

Vivien

I have advised DNRM and the Environmental Section on the below. The electricity pit would have formed part of the overall development of the site.

Please keep Council informed as testing continues.

regards

Anita Ramsay
Senior Property Officer (Acquisitions, Divestment & Leasing)
Property Services
City of Gold Coast

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CITY OF
GOLDCOAST.

From: WESTON Vivien [mailto:vxwes0@eq.edu.au]
Sent: Friday, 26 April 2013 12:50 PM
To: RAMSAY Anita
Cc: fbees1@eq.edu.au
Subject: Methane level in Electrical Pit - RBSLEC
Importance: High

Good afternoon Anita,

Please be advised that a routine pit inspection revealed a high methane level within the underground electrical pit to the north west of the beach volleyball court (identified as E3 on the site map attached). I have also attached a photo for your reference. The testing was done by GHD and their report to us recommended a course of action which included advising the site's owner of the situation and for the site owner to notify DERM , the local Council and the utility pit owner (if not GCCC) of the situation and works to be completed to further investigate, hence this email to you .
In line with their recommendation we have barricaded and signed the affected area, engaged the services of an Electrician to determine whether or not the electrical connections are live and removed the pit lid to allow the accumulated gas to dissipate. GHD are returning to our site on Monday to re-test and make a further recommendation for management of this issue if required.

Please contact Frank Beeson, our Chief Engineer on 55009824 if you require further information.

Kind regards

Vivien Weston
Senior Financial Accountant
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Love our ocean beaches? Have your say and visit www.goldcoastcity.com.au/oceanbeachesstrategy before 3 May.

BEESON, Frank

From: WESTON Vivien [vxwes0@eq.edu.au]
Sent: Wednesday, 5 June 2013 11:53 AM
To: aramsay@goldcoast.qld.gov.au
Cc: dmoir3@eq.edu.au; fbees1@eq.edu.au
Subject: FW: Methane level in Electrical Pit - RBSLEC

Good morning Anita,

Further to the above issue, I now advise as follows;

Further landfill gas monitoring events were undertaken on 22 April 2013, 30 April 2013 and 9 May 2013 by a suitably qualified Environmental Scientist engaged by GHD. Subsequent to those testings a report has been generated that included the following recommendations;

- Continued use of the barricades currently in place. These are to be extended to the edge of the canopy (3-5m from pit) if possible until the next monitoring event. Hot works (ie. works with any source of ignition) should be excluded from the area unless gas monitoring is conducted prior to and during the activity
- It is recommended that a follow up round of monitoring be conducted within the next two weeks (to check the potential methane accumulation levels after one month of leaving the cover in place). This can be in a staged approach as previous.
- RBSLEC to regularly vent the E3 pit or consider installation of other passive venting systems.
- A full round of landfill gas monitoring within 3 months to confirm that the elevated methane levels detected within E3 are not expanding to other nearby structures.
- A more detailed gas assessment should be undertaken if methane results continue to exceed adopted trigger levels or an increase in methane concentration continues.

- An assessment of the capping should also be considered in the areas of subsidence.

Runaway Bay Sport and Leadership excellence centre will adhere to the above recommendations and support further testing as required.

Kind regards

Vivien Weston
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PO Box 294 Runaway Bay Qld 4216

From: WESTON Vivien [mailto:vxwes0@eq.edu.au]
Sent: Thursday, 2 May 2013 9:30 AM
To: 'RAMSAY Anita'
Cc: dmoir3@eq.edu.au

Subject: RE: Methane level in Electrical Pit - RBSLEC

Good morning Anita

An electrician attended site on Monday 29/4/13 and ascertained that the connections in the electrical pit were not Live.
GHD attended site on Tuesday 30/4/13 to re- test the pit after the covers had been removed and gas had dissipated.
GHD recommended that they return to the site in 2 weeks to re-test. No other action has been recommended at this stage.
I will keep you informed.

Regards

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From: RAMSAY Anita [mailto:ARAMSAY@goldcoast.qld.gov.au]
Sent: Monday, 29 April 2013 11:40 AM
To: 'WESTON Vivien'
Subject: RE: Methane level in Electrical Pit - RBSLEC

Vivien

I have advised DNRM and the Environmental Section on the below. The electricity pit would have formed part of the overall development of the site.

Please keep Council informed as testing continues.

regards

Anita Ramsay
Senior Property Officer (Acquisitions, Divestment & Leasing)
Property Services
City of Gold Coast

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From: WESTON Vivien [mailto:vxwes0@eq.edu.au]
Sent: Friday, 26 April 2013 12:50 PM
To: RAMSAY Anita
Cc: fbees1@eq.edu.au
Subject: Methane level in Electrical Pit - RBSLEC
Importance: High

Good afternoon Anita,

Please be advised that a routine pit inspection revealed a high methane level within the underground electrical pit to the north west of the beach volleyball court (identified as E3 on the site map attached). I have also attached a photo for your reference. The testing was done by GHD and their report to us recommended a course of action which included advising the site's owner of the situation and for the site owner to notify DERM , the local Council and the utility pit owner (if not GCCC) of the situation and works to be completed to further investigate, hence this email to you .
In line with their recommendation we have barricaded and signed the affected area, engaged the services of an Electrician to determine whether or not the electrical connections are live and removed the pit lid to allow the accumulated gas to dissipate. GHD are returning to our site on Monday to re-test and make a further recommendation for management of this issue if required.

Please contact Frank Beeson, our Chief Engineer on 55009824 if you require further information.

Kind regards

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BEESON, Frank

From: Belinda Oberia [Belinda.Oberia@ghd.com]
Sent: Tuesday, 7 May 2013 10:58 AM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: GHD to visit May 9th for follow up monitoring.

Hi Frank,

As per our brief phone discussion this morning, I am confirming I will return to site during the **morning of Thursday May 9th**. During this site visit I will conduct a round of landfill gas monitoring around the E3 electrical pit as detailed in my email dated May 2nd (below). Any queries please call.

Kind Regards

Belinda Oberia
Environmental Scientist

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From: Belinda Oberia
Sent: Thursday, 2 May 2013 4:52 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Proposed return visit next week

Hi Frank,

Based on the results of the landfill gas monitoring during my 2nd visit to the Sports Centre on Tuesday (30/4/13), it is recommended that a follow up round of monitoring be conducted within the next week (to check the potential methane accumulation levels after one week of leaving the cover in place).
This can be in a staged approach so as to reduce your costs as much as possible. Stage 1 – Monitoring of the E3 electrical pits, the ambient level immediately above the E3 pit, and also other underground service pits in the immediate vicinity. If results of E3 are greater than 10,000 ppm then continue to Stage 2 – conduct landfill gas monitoring within the nearby site buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures.

It is also recommended that the barricades currently in place be expanded to the edge of the canopy (3-5m from pit) if possible until the next monitoring event. Hot works (ie. works with any source of ignition) should be excluded from the area unless monitoring is conducted prior to and during the activity.

These recommendation is based on the following summary of results (more details are provided at the end of this email):

1) Elevated methane readings seemed to dissipate when the electrical pit was vented;
2) Methane appears to take longer than 24 hours to build up to greater than the lower explosive limit of methane (50,000 ppm);
3) Methane appears to take 1 to 2 hours to build up greater than 1000 ppm.

Variations requested for your purchase order (PO ref 38946) are as follows:
Anticipated costs (ex GST) for GHD to conduct Stage 1 monitoring is $1,950. Stage 2 would cost an additional $600. These costs would include an email report of the interim results for that round of monitoring. Please contact me to confirm that you would like GHD to proceed with this next monitoring round.
The costs of GHD's visit on 30/4/13 will be $2,550 (ex GST).

Please do not hesitate to contact me for any queries relating to this email.

Kind Regards

Belinda Oberia
Environmental Scientist

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Interim results (for your record)

Gas readings for electrical pit E3 conducted on 30/4/13 were as follows:

	Initial reading – 10am . (24 hours closed ltd accumulation)	Vented reading – 10.10am	11am	12pm	3pm
Methane - CH4 (1 = eagle, 2 = GA2000)	(1) 1250 ppm, (2) below meter detection	(1) 100 ppm, (2) below meter detection	(1) 880 ppm, (2) below meter detection	(1) 1850 ppm, (2) below meter detection	(1) 1250 ppm, (2) below meter detection
Oxygen - O2	20.9 %vol	20.9 %vol	20.9 %vol	20.9 %vol	20.9 %vol
Carbon Monoxide - CO	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Hydrogen Sulfide - H2S	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Balance (GA2000)	79.3%	79.0%	79.0%	79.0%	79.0%
Air Pressure (GA2000)	1022 hPa	1022 hPa	1022 hPa	1021 hPa	1020 hPa
BOM Wind data	SSE, 20 km/hr				SE, 22 km/hr
BOM Temp data	24.7 °C				24.8 °C
Notes	Pit had been vented by site personnel in the period between initial monitoring (22/4/13) and 12 pm 29/4/13.	Lid opened and vented, reading after 10 mins consistent with ambient readings at 10 am. Lid replaced 10.10 am	1 hour accumulated reading	2 hour accumulated reading	5 hour accumulated reading

Notes

- BOM station Gold Coast Seaway (040764).
- Ambient monitoring and nearby buildings were max 55 ppm CH4, nearby service pits max 180 ppm CH4 during course of the day.
- Following an initial reading at 10 am, the pit was vented and closed again then hourly readings over 5 hours were conducted (I have only included the 11 am, 12pm and 3 pm readings in this email to show range, but also have 1 pm and 2pm readings).
- Two separate portable gas meters were utilised (An Eagle meter, and a GA 2000 meter)

Previous readings for electrical pit E3 conducted on 22/4/13 were as follows: (CH4 = >50,000 ppm eagle detection limit):

	Initial reading @ 12.30pm.	Ambient immediately above and around pit @ 12.30pm	Immediately adjacent services pit @ 12.30pm	Second reading @1.30pm	Ambient immediately above and around pit@ 1.30pm	Immediately services pit (
Methane - CH4 (eagle meter)	>50,000 ppm	150 ppm	180 ppm	>50,000 ppm	150 ppm	450 ppm
Oxygen - O2	9.6 %vol	20.9 %vol	20.3 % vol	10.2 %vol	20.9 %vol	20.9 % vol
Carbon Monoxide - CO	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Hydrogen Sulfide - H2S	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
BOM Wind data (3pm)				N, 26 km/hr		
BOM Pressure data				1010.1 hPa (falling)		
BOM Temp data				25.4 °C		

Notes

- BOM station Gold Coast Seaway (040764). Nearby service pits max 450 ppm CH4 during course of the day.
- Details of the full round of monitoring conducted on 22/4/13 will be included in a letter report (pending).

From: Belinda Oberia
Sent: Monday, 29 April 2013 12:39 PM
To: 'fbees1@eq.edu.au'
Subject: Return site visit scheduled 30/4/13
Importance: High

Hi Frank,
Just confirming that I have secured an appropriate gas meter and am available to attend site again tomorrow - 30/4/13.
I will pick up the gas meter in the morning and make my way to your site by late morning (approx. 11am).
As you have advised this morning that the pit has been vented/opened over the weekend, could you please instruct your site team to carefully replace the lid on the utility pit this afternoon (and note the time they do this) so that I may check how much accumulation potentially occurs overnight. It would be appreciated if you could organise for someone at your site to assist me with removal/replacement of the lid whilst I am onsite tomorrow.
I will also require access to the nearby buildings if you would like those to be included within this round of monitoring.
Kind Regards

Belinda Oberia
Environmental Scientist

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From: Belinda Oberia
Sent: Tuesday, 23 April 2013 4:29 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Urgent Follow up regarding gas in service pit
Importance: High

Hi Frank,
Just following up from our meeting yesterday afternoon following where I notified you that during my site visit yesterday I measured very high methane levels within the underground electrical pit to the north west of the beach volleyball court (identified as E3 on the site map attached). I have also attached a photo for your reference.

I checked this pit at both 12.30 pm and again at 1.30 pm on 22/4/13. The methane level was assessed as being greater than the lower explosive limit of methane (50,000 ppm), and requires your immediate attention. Please note the actual methane level was unable to be accurately determined as the methane level within the pit was higher than the gas meters detection limit of 50,000 ppm (and this represents an explosion risk if any potential ignition sources are introduced to the area). Methane levels were equal to or less than 350 ppm in nearby electrical and communication underground service pits and at 150 ppm within the atmosphere immediately above the electrical pit, indicating that your immediate focus should be on managing the methane within the electrical service pit indicated.

I trust that you have now placed barricades around the pit and are restricting any potential initiation sources (Including smoking and maintenance activities) from the immediate area.

As I indicated I would yesterday, I have now followed up with some senior landfill gas specialists within GHD and the following is recommended:

1. Place barricades around the electrical pit, include signage for no smoking and authorised entry only;
2. If the electrical connections are "alive" within this electrical pit to consider isolating the connection to the pit until further gas testing is conducted;
3. The Sports Centre to advise the site's owner of the situation and for the site owner to notify DERM , the local Council and the utility pit owner (if not GCCC) of the situation and works to be completed to further investigate;
4. Re-monitoring of the utility pit is recommended immediately (ideally within 48 hours) using a portable GA 2000 gas meter. This meter is capable of measuring higher levels of methane than the Eagle detection meter used on 22/4/13. Following this second round of monitoring, the pit should be vented (if required) to allow accumulated gas to dissipate. Appropriate considerations should be made to prevent water ingress into the pit. If re-monitoring cannot be completed within 48 hours, then the utility pit lid should be carefully removed (so as to avoid any potential sparking) or the pit should be purged with air prior to removal of the lid (if possible) so as to dilute any accumulated gas to acceptable concentrations, until such a time as the second monitoring round can occur. A maximum of 24 hours prior to GHD completing the second monitoring round, GHD recommend that the lid be replaced on the utility pit to allow gas to accumulate within the utility pit for a limited period of time prior to repeat confirmation gas monitoring occurring. Following the initial monitoring, the pit lid should be removed / the pit purged to allow the accumulated gas (if any) to dissipate. Once this is done, the rate of recovery of the gas should be monitored regularly (possibly hourly). It is also recommended that GHD conduct landfill gas monitoring within the nearby site buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures. The connection point for electricity into these buildings should also be monitored for landfill gas if it feeds from this or nearby service pits.
5. GHD can assist the Sports Center to identify / consider other potential sources of the detected gas (diesel, petrol, decaying vegetation, the nearby sewer manhole etc.) based on readily available information and on-site observations. It would be beneficial if the Sports Centre could provide to GHD any information that is available regarding the installation and construction of this electrical pit and nearby underground services(including if the pits were designed to prevent landfill gas intrusion, if the pit and connections trenches are enclosed or installed within gravel/sand only, what the pit connects to, and if there has been any maintenance activities on that structure since the last GHD gas monitoring round in December 2010). If no plans or information is available, GHD can attempt a search for Dial Before you Dig records.
6. For GHD to review the information to be gathered from completing items 3 and 5 and make further recommendations (if required) for management of the methane accumulating within the E3 electrical pit.

Please note that GHDs assistance with items 3 – 6 would constitute a variation to the current scope of works and will incur additional fees. Please call me to discuss.
Kind Regards

Belinda Oberia
Environmental Scientist

GHD
T: +61 7 3316 3954 | V: 413954 | M: +61 415 996 433 | F: +61 7 3316 3333 | E: belinda.oberla@ghd.com
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Please consider our environment before printing this email

BEESON, Frank

From: Belinda Oberia [Belinda.Oberia@ghd.com]
Sent: Thursday, 2 May 2013 4:52 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Proposed return visit next week

Hi Frank,

Based on the results of the landfill gas monitoring during my 2nd visit to the Sports Centre on Tuesday (30/4/13), it is recommended that a follow up round of monitoring be conducted within the next week (to check the potential methane accumulation levels after one week of leaving the cover in place).
This can be in a staged approach so as to reduce your costs as much as possible. Stage 1 – Monitoring of the E3 electrical pits, the ambient level immediately above the E3 pit, and also other underground service pits in the immediate vicinity. If results of E3 are greater than 10,000 ppm then continue to Stage 2 – conduct landfill gas monitoring within the nearby site buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures.

It is also recommended that the barricades currently in place be expanded to the edge of the canopy (3-5m from pit) if possible until the next monitoring event. Hot works (ie. works with any source of ignition) should be excluded from the area unless monitoring is conducted prior to and during the activity.

These recommendation is based on the following summary of results (more details are provided at the end of this email):
1) Elevated methane readings seemed to dissipate when the electrical pit was vented;
2) Methane appears to take longer than 24 hours to build up to greater than the lower explosive limit of methane (50,000 ppm);
3) Methane appears to take 1 to 2 hours to build up greater than 1000 ppm.

Variations requested for your purchase order (PO ref 38946) are as follows:
Anticipated costs (ex GST) for GHD to conduct Stage 1 monitoring is $1,950. Stage 2 would cost an additional $600. These costs would include an email report of the interim results for that round of monitoring. Please contact me to confirm that you would like GHD to proceed with this next monitoring round.
The costs of GHD's visit on 30/4/13 will be $2,550 (ex GST).

Please do not hesitate to contact me for any queries relating to this email.
Kind Regards

Belinda Oberia
Environmental Scientist

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Interim results (for your record)

Gas readings for electrical pit E3 conducted on 30/4/13 were as follows:

	Initial reading – 10am . (24 hours closed lid accumulation)	Vented reading – 10.10am	11am	12pm	3pm
Methane - CH_4 (1 = eagle, 2 = GA2000)	(1) 1250 ppm, (2) below meter detection	(1) 100 ppm, (2) below meter detection	(1) 880 ppm, (2) below meter detection	(1) 1850 ppm, (2) below meter detection	(1) 1250 ppm, (2) below meter detection
Oxygen - O_2	20.9 %vol	20.9 %vol	20.9 %vol	20.9 %vol	20.9 %vol
Carbon Monoxide - CO	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Hydrogen Sulfide - H_2S	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Balance (GA2000)	79.3%	79.0%	79.0%	79.0%	79.0%
Air Pressure (GA2000)	1022 hPa	1022 hPa	1022 hPa	1021 hPa	1020 hPa
BOM Wind data	SSE, 20 km/hr				SE, 22 km/hr
BOM Temp data	24.7 °C				24.8 °C
Notes	Pit had been vented by site personnel in the period between initial monitoring (22/4/13) and 12 pm 29/4/13.	Lid opened and vented reading after 10 mins consistent with ambient readings at 10 am. Lid replaced 10.10 am	1 hour accumulated reading	2 hour accumulated reading	5 hour accumulated reading

Notes
- BOM station Gold Coast Seaway (040764).
- Ambient monitoring and nearby buildings were max 55 ppm CH_4, nearby service pits max 180 ppm CH_4 during course of the day.
- Following an initial reading at 10 am, the pit was vented and closed again then hourly readings over 5 hours were conducted (I have only included the 11 am, 12pm and 3 pm readings in this email to show range, but also have 1 pm and 2pm readings).
- Two separate portable gas meters were utilised (An Eagle meter, and a GA 2000 meter)

Previous readings for electrical pit E3 conducted on 22/4/13 were as follows: (CH_4 = >50,000 ppm eagle detection limit):

	Initial reading @ 12.30pm.	Ambient immediately above and around pit @ 12.30pm	Immediately adjacent services pit @ 12.30pm	Second reading @1.30pm	Ambient immediately above and around pit@ 1.30pm	Immediately services pit (
Methane - CH_4 (eagle meter)	>50,000 ppm	150 ppm	180 ppm	>50,000 ppm	150 ppm	450 ppm
Oxygen - O_2	9.6 %vol	20.9 %vol	20.3 % vol	10.2 %vol	20.9 %vol	20.9 % vol
Carbon Monoxide - CO	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
Hydrogen Sulfide - H_2S	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm
BOM Wind data (3pm)				N, 26 km/hr		
BOM Pressure data				1010.1 hPa (falling)		
BOM Temp data				25.4 °C		

Notes
- BOM station Gold Coast Seaway (040764). Nearby service pits max 450 ppm CH_4 during course of the day.
- Details of the full round of monitoring conducted on 22/4/13 will be included in a letter report (pending).

From: Belinda Oberia

Sent: Monday, 29 April 2013 12:39 PM
To: 'fbees1@eq.edu.au'
Subject: Return site visit scheduled 30/4/13
Importance: High

Hi Frank,
Just confirming that I have secured an appropriate gas meter and am available to attend site again tomorrow - 30/4/13.
I will pick up the gas meter in the morning and make my way to your site by late morning (approx. 11am).
As you have advised this morning that the pit has been vented/opened over the weekend, could you please instruct your site team to carefully replace the lid on the utility pit this afternoon (and note the time they do this) so that I may check how much accumulation potentially occurs overnight. It would be appreciated if you could organise for someone at your site to assist me with removal/replacement of the lid whilst I am onsite tomorrow.
I will also require access to the nearby buildings if you would like those to be included within this round of monitoring.
Kind Regards

Belinda Oberia
Environmental Scientist

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Please consider our environment before printing this email

From: Belinda Oberia
Sent: Tuesday, 23 April 2013 4:29 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Urgent Follow up regarding gas in service pit
Importance: High

Hi Frank,
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I checked this pit at both 12.30 pm and again at 1.30 pm on 22/4/13. The methane level was assessed as being greater than the lower explosive limit of methane (50,000 ppm), and requires your immediate attention. Please note the actual methane level was unable to be accurately determined as the methane level within the pit was higher than the gas meters detection limit of 50,000 ppm (and this represents an explosion risk if any potential ignition sources are introduced to the area). Methane levels were equal to or less than 350 ppm in nearby electrical and communication underground service pits and at 150 ppm within the atmosphere immediately above the electrical pit, indicating that your immediate focus should be on managing the methane within the electrical service pit indicated.

I trust that you have now placed barricades around the pit and are restricting any potential initiation sources (including smoking and maintenance activities) from the immediate area.

As I indicated I would yesterday, I have now followed up with some senior landfill gas specialists within GHD and the following is recommended:

1. Place barricades around the electrical pit, include signage for no smoking and authorised entry only;
2. If the electrical connections are "alive" within this electrical pit to consider isolating the connection to the pit until further gas testing is conducted;
3. The Sports Centre to advise the site's owner of the situation and for the site owner to notify DERM , the local Council and the utility pit owner (if not GCCC) of the situation and works to be completed to further investigate;
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Kind Regards

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BEESON, Frank

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From: Belinda Oberia
Sent: Tuesday, 23 April 2013 4:29 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Urgent Follow up regarding gas in service pit
Importance: High

Hi Frank,
Just following up from our meeting yesterday afternoon following where I notified you that during my site visit yesterday I measured very high methane levels within the underground electrical pit to the north west of the beach volleyball court (identified as **E3** on the site map attached). I have also attached a photo for your reference.

I checked this pit at both 12.30 pm and again at 1.30 pm on 22/4/13. The methane level was assessed as being greater than the lower explosive limit of methane (50,000 ppm), and requires your immediate attention. Please note the actual methane level was unable to be accurately determined as the methane level within the pit was higher than the gas meters detection limit of 50,000 ppm (and this represents an explosion risk if any potential ignition sources are introduced to the area). Methane levels were equal to or less than 350 ppm in nearby electrical and communication underground service pits and at 150 ppm within the atmosphere immediately above the electrical pit, indicating that your immediate focus should be on managing the methane within the electrical service pit indicated.

I trust that you have now placed barricades around the pit and are restricting any potential initiation sources

(including smoking and maintenance activities) from the immediate area.

As I indicated I would yesterday, I have now followed up with some senior landfill gas specialists within GHD and the following is recommended:

1. Place barricades around the electrical pit, include signage for no smoking and authorised entry only;
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6. For GHD to review the information to be gathered from completing items 3 and 5 and make further recommendations (if required) for management of the methane accumulating within the E3 electrical pit.

Please note that GHDs assistance with items 3 – 6 would constitute a variation to the current scope of works and will incur additional fees. Please call me to discuss.
Kind Regards

Belinda Oberia
Environmental Scientist

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BEESON, Frank

From: KINGSTON, Peter [Peter.KINGSTON@dete.qld.gov.au]
Sent: Friday, 26 April 2013 12:21 PM
To: 'BEESON Frank'; 'WESTON Vivien'
Cc: 'dmoir3@eq.edu.au'; VAN WANROOY, Megan
Subject: RE: Urgent Follow up regarding gas in service pit

Thanks Frank!

Peter Kingston
Regional Facilities Manager - South East Region
Department of Education, Training and Employment
peter.kingston@dete.qld.gov.au
Phone: (07) 55834466
Mobile: 0418 876 687
Fax: (07) 55834462
Mail: PO Box 557
Robina DC Q 4226

From: BEESON Frank [mailto:fbees1@eq.edu.au]
Sent: Friday, April 26, 2013 12:15 PM
To: KINGSTON, Peter; 'WESTON Vivien'
Cc: dmoir3@eq.edu.au; VAN WANROOY, Megan
Subject: RE: Urgent Follow up regarding gas in service pit

Peter,
I spoke to Belinda (GHD) this morning, her suggestion regarding this electrical pit was to open the pit and to let it vent, I have done this and also the adjoining comms. pit

Later this afternoon I will replace the lids to these pits and at Belinda's request leave closed over the weekend, and see if there is a build up on Monday's re-testing, and if needed make the necessary adjustments

I have attached some photo's to give you a better idea what we are dealing with visually

Hope this helps
Frank

FRANK BEESON
Chief Engineer
Runaway Bay Sport and Leadership Excellence Centre
Cnr Sports Drive & Morala Ave. Runaway Bay Queensland Australia 4216
PO Box 294 Runaway Bay Qld 4216
P:(07) 5500 9824 / F:5500 9989 / M: 0414 791263

From: KINGSTON, Peter [mailto:Peter.KINGSTON@dete.qld.gov.au]
Sent: Friday, 26 April 2013 7:22 AM
To: 'WESTON Vivien'
Cc: 'dmoir3@eq.edu.au'; VAN WANROOY, Megan; 'fbees1@eq.edu.au'
Subject: RE: Urgent Follow up regarding gas in service pit

Hi Viv,
Thanks for forwarding the email and for the photo of the barricade around the pit.

I think our best course of action is to ask GHD for assistance in implementing their advice, including advice on notifications to DERM (now Environment and Heritage Protection http://www.ehp.qld.gov.au/) and GCCC.

Maintenance funding is available to cover the cost of all the urgent work.

We'll seek advice from our colleagues in environmental management, maintenance and real estate.

Thanks very much,
Pete

Peter Kingston

Regional Facilities Manager - South East Region
Department of Education, Training and Employment
peter.kingston@dete.qld.gov.au
Phone: (07) 55834466
Mobile: 0418 876 687
Fax: (07) 55834462
Mail: PO Box 557
Robina DC Q 4226

From: WESTON Vivien [mailto:vxwes0@eq.edu.au]
Sent: Wednesday, April 24, 2013 5:49 PM
To: KINGSTON, Peter
Cc: dmoir3@eq.edu.au
Subject: FW: Urgent Follow up regarding gas in service pit
Importance: High

Hi Pete

Further to our earlier conversation here is the email received in relation to the high level of methane in the electrical pit detailed above.
As mentioned we have taken action to place barricades around the electrical pit and erected signage for no smoking and authorised entry only. Photo attached
Frank has since contacted an electrician to come and check whether the electrical connections are live and he should visit the site on Friday.

I would very much appreciate if you could assist us in relation to how we proceed with this and whether or not we have access to funds from Emergency allocation to ensure that the problem is rectified as soon as possible.

Should you require any further information please contact Frank Beeson on 5500 9824 or myself.

Regards and thanks

Viv
Vivien Weston
A/Senior Financial Accountant
P:(07) 5500 9970 | F:(07) 5500 9918 |
vxwes0@eq.edu.au
Runaway Bay Sport & Leadership Excellence Centre
Cnr Sports Drive & Morala Ave. Runaway Bay Qld Australia 4216
PO Box 294 Runaway Bay Qld 4216

From: BEESON, Frank [mailto:fbees1@eq.edu.au]
Sent: Wednesday, 24 April 2013 4:47 PM
To: 'WESTON Vivien'
Subject: FW: Urgent Follow up regarding gas in service pit
Importance: High

FRANK BEESON
Chief Engineer
Runaway Bay Sport and Leadership Excellence Centre
Cnr Sports Drive & Morala Ave. Runaway Bay Queensland Australia 4216
PO Box 294 Runaway Bay Qld 4216
P:(07) 5500 9824 / F:5500 9989 / M: 0414 791263

From: Belinda Oberia [mailto:Belinda.Oberia@ghd.com]
Sent: Tuesday, 23 April 2013 4:29 PM
To: fbees1@eq.edu.au
Cc: Adam Major
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Importance: High

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BEESON, Frank

From: Belinda Oberia [Belinda.Oberia@ghd.com]
Sent: Tuesday, 23 April 2013 4:29 PM
To: fbees1@eq.edu.au
Cc: Adam Major
Subject: Urgent Follow up regarding gas in service pit
Importance: High
Attachments: E3 electrical pit Runaway Bay Sports Centre 22 04 2013.JPG; site monitoring map 22 04 2013.pdf

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Just following up from our meeting yesterday afternoon following where I notified you that during my site visit yesterday I measured very high methane levels within the underground electrical pit to the north west of the beach volleyball court (identified as **E3** on the site map attached). I have also attached a photo for your reference.

I checked this pit at both 12.30 pm and again at 1.30 pm on 22/4/13. The methane level was assessed as being greater than the lower explosive limit of methane (50,000 ppm), and requires your immediate attention. Please note the actual methane level was unable to be accurately determined as the methane level within the pit was higher than the gas meters detection limit of 50,000 ppm (and this represents an explosion risk if any potential ignition sources are introduced to the area). Methane levels were equal to or less than 350 ppm in nearby electrical and communication underground service pits and at 150 ppm within the atmosphere immediately above the electrical pit, indicating that your immediate focus should be on managing the methane within the electrical service pit indicated.

I trust that you have now placed barricades around the pit and are restricting any potential initiation sources (including smoking and maintenance activities) from the immediate area.

As I indicated I would yesterday, I have now followed up with some senior landfill gas specialists within GHD and the following is recommended:

1. Place barricades around the electrical pit, include signage for no smoking and authorised entry only;
2. If the electrical connections are "alive" within this electrical pit to consider isolating the connection to the pit until further gas testing is conducted;
3. The Sports Centre to advise the site's owner of the situation and for the site owner to notify DERM , the local Council and the utility pit owner (if not GCCC) of the situation and works to be completed to further investigate;
4. Re-monitoring of the utility pit is recommended immediately (ideally within 48 hours) using a portable GA 2000 gas meter. This meter is capable of measuring higher levels of methane than the Eagle detection meter used on 22/4/13. Following this second round of monitoring, the pit should be vented (if required) to allow accumulated gas to dissipate. Appropriate considerations should be made to prevent water ingress into the pit. If re-monitoring cannot be completed within 48 hours, then the utility pit lid should be carefully removed (so as to avoid any potential sparking) or the pit should be purged with air prior to removal of the lid (if possible) so as to dilute any accumulated gas to acceptable concentrations, until such a time as the second monitoring round can occur. A maximum of 24 hours prior to GHD completing the second monitoring round, GHD recommend that the lid be replaced on the utility pit to allow gas to accumulate within the utility pit for a limited period of time prior to repeat confirmation gas monitoring occurring. Following the initial monitoring, the pit lid should be removed / the pit purged to allow the accumulated gas (if any) to dissipate. Once this is done, the rate of recovery of the gas should be monitored regularly (possibly hourly). It is also recommended that GHD conduct landfill gas monitoring within the nearby site

buildings (and also recheck the other nearby underground service pits) to confirm landfill gas is not accumulating within these structures. The connection point for electricity into these buildings should also be monitored for landfill gas if it feeds from this or nearby service pits.

5. GHD can assist the Sports Center to identify / consider other potential sources of the detected gas (diesel, petrol, decaying vegetation, the nearby sewer manhole etc.) based on readily available information and on-site observations. It would be beneficial if the Sports Centre could provide to GHD any information that is available regarding the installation and construction of this electrical pit and nearby underground services(including if the pits were designed to prevent landfill gas intrusion, if the pit and connections trenches are enclosed or installed within gravel/sand only, what the pit connects to, and if there has been any maintenance activities on that structure since the last GHD gas monitoring round in December 2010). If no plans or information is available, GHD can attempt a search for Dial Before you Dig records.
6. For GHD to review the information to be gathered from completing items 3 and 5 and make further recommendations (if required) for management of the methane accumulating within the E3 electrical pit.

Please note that GHDs assistance with items 3 – 6 would constitute a variation to the current scope of works and will incur additional fees. Please call me to discuss.

Kind Regards

Belinda Oberia
Environmental Scientist

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WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

CLIENTS PEOPLE PERFORMANCE

Next call will be mid January 2012 for appointment for Service JB 16/12/11

2 February 2011

David Morgan
Sport Super Centre
Cnr Sports Drive and Morala Avenue
RUNAWAY BAY QLD 4216

Our ref: 41/20337/415677
Your ref:

Dear David,

Landfill Gas Monitoring
December 2010 Report

As requested, GHD attended the Sports Super Centre site on the 16 December 2010 to undertake landfill gas monitoring. Following the recommendations from the previous monitoring round, a selection of locations (as listed below), were monitored during this round. Table 1 attached, provides details on general observations made on the day and Table 3 outlines the results for the selected structures monitoring locations.

Locations monitored December 2010
E10, E12, E21, E24 Left, E24 Right, E25, E26, West Car Park NE Corner, West Car Park NE Corner, West Car Park Right NW Corner, West Car Park NW Corner, Storeroom 1 and Storeroom 2.

All locations were compliant with the relevant adopted trigger level (12,500 ppm methane) during this round of monitoring; however detectable levels of methane were recorded at the following locations.

Location E26 (and electrical pit located at the southern boundary to the west car park) returned results of 1000 ppm methane for the second consecutive monitoring round. Although this methane level is below the relevant adopted trigger level of 12,500 ppm methane, it represents an increase in concentration at this location since the December 2009 monitoring round.

Location E25 (an electrical pit) located in the northern end of the west car park, returned a result of 1000 ppm methane. This is an increase in methane concentration when compared to the previous June 2010 round of monitoring (500 ppm).

Location E10 (an electrical pit located on the north-eastern side of the running track) returned a result of 500 ppm methane this round which is the first instance of a detectable level of methane recorded when compared to the historical dataset for this location. Due to this detection, additional electrical pits on the northern and southern edges of the running track (towards the scoreboard end) were also monitored. Methane levels of 5000 ppm and 2000 ppm were detected at these respective additional locations. These locations were not previously included in the monitoring program, however are recommended to be included in future visits (and have been assigned as monitoring locations E9A and E10A for the northern and southern pits respectively).

Methane was not able to be detected within Storerooms 1 and 2 during this monitoring round. As these locations recorded results of 1000 ppm methane and 500 ppm methane respectively in June 2010, any trends in methane levels at these locations will continue to be assessed in future monitoring events.

Based upon this information, it is recommended that:

1. Biannual monitoring (as a minimum) be scheduled at the selected locations detailed above to continue assessing trends in gas conditions for the site. A full assessment (monitoring of all site locations) is recommended on an annual basis (with the next monitoring round to be undertaken in June 2010).
2. Additional monitoring locations E9A and E10A (electrical pits on the northern and southern edges of the running track towards the scoreboard end) be included in future partial and full gas assessments at the site.
3. Storerooms 1 and 2 continue to be regularly opened to allow any potential methane build up to dissipate.

If you have any questions or require any further details, please don't hesitate to contact Adam Major or myself.

belinda.oberia@GHD.com

Yours sincerely,

Update Plan

eg. Ground water testing.

Belinda Oberia
Environmental Scientist
(07) 3316 3954

TABLE 1: General Weather Conditions and Site Observations

Date	Atmospheric Pressure		Wind Speed	Wind Direction (degrees)	Temp.	Weather Conditions		Rainfall Over Preceding Week	Comments	Initials
	(hPa)	Rising/Falling	(km/h)		(°C)	Current	Preceding Week	(mm)		
26-Jun-08	1023.1	Falling	17	315	16.3	Fine conditions, cool a.m. warming and dry with light breeze.	Predominantly fine conditions with only light showers.	20	Monitoring locations clearly visible with genrally good access. Some pits/drains not as per map, some on site not shown etc. Gas equipment measures CH4 >500ppm only	TK
26-Sep-08	1020.2	Falling	20	0	23.9	Light early showers, then fine. Light S to SE winds	Predominately fine conditions	1.4	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Gas like odour in south west carpark.	BO
15-Dec-08	1006.2	Rising	22	270	26.8	Fine and sunny with light breeze.	Some showers.	20.6	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Some water observed in electrical pits in west carpark.	BO
26-Mar-09	1021.7	Falling	22	155	26.7	Fine and sunny with light breeze.	Predominantly fine conditions with light showers.	6.8	Partial assessment only (9 locations). Recent addtion of vent at NE corner of west carpark. Gas equipment measures CH4 >500ppm only.	BO
5-Jun-09	1016.3	Falling	7	292.5	24.4	Overcast with showers. Slight WNW breeze	Some showers.	19.6	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Some water observed in electrical pits in west carpark.	BO
25-Sep-09	1017.3	Falling	7	90	23.5	Overcast with showers. Slight WNW breeze	Predominantly fine and sunny	0.6	Partial assessment only (10 locations). Good site acess. Vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO
19-Dec-09	1015.5	Falling	17	22.5	26.1	Cloudy and overcast. 7/8 cloud cover. Light breeze. Storms predicted	Mostly fine with light showers	3.2	Partial assessment only (10 locations). Good site acess. vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO
4-Jun-10	1012.6	Falling	17	315	16.5	Fine and sunny with light breeze.	Some showers.	140.22	Full site assessment. Good site acess, vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO
16-Dec-10	1007.7	Falling	20	315	28	Cloudy and overcast. 7/8 cloud cover. Intermittent breeze. Storms predicted	Some showers plus 45.8mm rainfall in one day (4 days prior to monitoring)	47.6	Partial assessment. Good site acess, vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO

Notes

Atmospheric pressure, wind speed/ direction, temperature and daily rainfall data to be obtained from the Bureau of Meteorology. Gold Coast Seaway Station (No 40764.)

TABLE 2: Boundary Soil Atmosphere Gas Monitoring Wells

Location	Parameter	Units	Sampling Date								
			26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	13-Dec-09	4-Jun-10	16-Dec-11
	Boundary Wells										
MW1	CH_4	% (v/v)	0	0	0	NM	0	NM	NM	0	NM
	H_2S	ppm	0	0	0	NM	0	NM	NM	0	NM
	O_2	% (v/v)	20.9	20.9	20.9	NM	20.9	NM	NM	20.9	NM
MW2	CH_4	% (v/v)	0	0	0	NM	0	NM	NM	0	NM
	H_2S	ppm	0	0	0	NM	0	NM	NM	0	NM
	O_2	% (v/v)	19.4	20.8	19	NM	20.1	NM	NM	20.2	NM
MW3	CH_4	% (v/v)	0	NM	NM	NM	NM	NM	NM	NM	NM
	H_2S	ppm	0	NM	NM	NM	NM	NM	NM	NM	NM
	O_2	% (v/v)	18.7	NM	NM	NM	NM	NM	NM	NM	NM
MW4	CH_4	% (v/v)	0	0	0	NM	soil fas	NM	NM	0	NM
	H_2S	ppm	0	0	0	NM	0	NM	NM	0	NM
	O_2	% (v/v)	20.1	20.9	20.5	NM	20.5	NM	NM	20.5	NM

Notes:

Methane Trigger Level = 1.25 % v/v (Environmental Guidelines: Solid Waste Landfills, NSW EPA, 1996)

Shading indicates exceedance of trigger level

Bold indicates detection of methane

NM = Parameter not monitored this round

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	10-Dec-09	4-Jun-10	16-Dec-10	Maximum CH_4 Reading
E1	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E2	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E3	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E4	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E5	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E6	CH_4	ppm	< 500	< 500	< 500		< 500			< 500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E7	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E8	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E9	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E9A	CH_4	ppm									2000	2000
	H_2S	ppm									0	0
	O_2	% (v/v)									19.6	20.9
E10	CH_4	ppm	<500	<500	<500	<500	<500	< 500	< 500	<500	500	500
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.0	20.9
E10A	CH_4	ppm									5000	5000
	H_2S	ppm									0	0
	O_2	% (v/v)									17.8	20.9
E11	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E12	CH_4	ppm	1000	<500	<500	500	1000	< 500	< 500	1000	< 500	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.7	20.9	20.5	20.9	20.9	20.9	20.9	20.9	20.6	20.9
E13	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.6		20.9			20.9		20.9
E14	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E14 South Left	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E14 South Right	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E15	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E15 North	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E16	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E16 North	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E17	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E18	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E19	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E20	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E20 Left	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E20 Right	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9

* ELECTRICAL PIT
NTH EAST SIDE
OF RUNNING TRA
(NEW)
LOCATIONS

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	20-Jun-08	28-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	10-Dec-09	4-Jun-10	16-Dec-10	Maximum CH_4 Reading
E21	CH_4	ppm	< 500	<500	<500		500	< 500	< 500	<500	< 500	500
	H_2S	ppm	0	0	0		0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9	20.9	20.9	20.9	20.3	20.9
E21 Left	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E21 Right	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E22	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E22 Left	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E22 Right	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E23	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E23 Left	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E23 Right	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E24	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			17.1		20.9
E24 Left	CH_4	ppm	< 500	<500	500	<500	500	< 500	< 500	<500	< 500	500
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
E24 Right	CH_4	ppm	< 500	<500	<500	<500	<500	< 500	< 500	<500	< 500	0
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.5	20.9	20.9
E25	CH_4	ppm	< 500	<500	1000	500	1000	< 500	1000	500	500	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.7	20.9	20.9	20.1	20.9	20.9
E26	CH_4	ppm	< 500	<500	<500	<500	<500	< 500	500	1000	1000	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	19.1	20.9	20.9
E27	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.5			20.9		20.9
E28	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E29	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.6		20.6			20.6		20.9
E30	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
E31	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.3		20.3			20.3		20.9
West Car park NE Corner	CH_4	ppm	<500	0	3500	21000	1500	< 500	< 500	500	< 500	21000
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	16.1	20.9	20.9	20.9	20.4	20.9	20.9
West Car park Left NE Corner	CH_4	ppm	<500	<500	<500		<500			<500	<500	0
	H_2S	ppm	0	0	0		0			0	0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9	20.9
West Car park Right NW Corner	CH_4	ppm	4000	<500	500	1000	<500	< 500	1000	<500	<500	4000
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	15.6	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
West Car park NW Corner	CH_4	ppm	<500	<500	0	<500	<500	< 500	< 500	<500	< 500	0
	H_2S	ppm	0	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
West Car park NW Edge	CH_4	ppm	<500	<500	0		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.4		20.4			20.4		20.9
Central Light Pole	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Scoreboard light Pole	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Ag pip adj Lodge 9	CH_4	ppm	NM	NM	NM		NM			NM		0
	H_2S	ppm	NM	NM	NM		NM			NM		0
	O_2	% (v/v)	NM	NM	NM		NM			NM		0.0

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	23-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10	16-Dec-10	Maximum CH_4 Reading
S1	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S2	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S3	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S4	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S5	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S6	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S7	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S8	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.7	20.9		20.9			20.9		20.9
S9	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S10	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S11	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S12	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S12A	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S12B	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S12C	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S12D	CH_4	ppm	0	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S13	CH_4	ppm	NM	NM	NM		NM			<500		0
	H_2S	ppm	NM	NM	NM		NM			0		0
	O_2	% (v/v)	NM	NM	NM		NM			20.9		20.9
S14	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S15	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S16	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S17	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S18	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S19	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S20	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S20A	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S21	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S22	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
S23	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	28-Jun-08	28-Sep-08	15-Dec-08	20-Mar-09	5-Jun-09	25-Sep-09	10-Dec-09	4-Jun-10	16-Dec-10	Maximum CH_4 Reading
SW Outside reception	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.6	20.9		20.9			20.9		20.9
SW Main Carpark	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.6	20.9		20.9			20.9		20.9
SW Adjacent trampolines	CH_4	ppm	NM	<500	<500		<500			<500		0
	H_2S	ppm	NM	0	0		0			0		0
	O_2	% (v/v)	NM	20.9	20.9		20.9			20.9		20.9
Store Room 1	CH_4	ppm	<500	<500	<500		<500			1000	<500	1000
	H_2S	ppm	0	0	0		0			0	0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9	20.9
Store Room 2	CH_4	ppm	< 500	<500	<500		<500			500	<500	500
	H_2S	ppm	0	0	0		0			0	0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9	20.9
Mens toilet main entrance	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Electrical pit Beach Volleyball	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Dewatering Sump	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Confined Space	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Manhole	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L1	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L2	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L3	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L4	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L5	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L6	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L7	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L8	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L9	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L10	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L11	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L12	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L13	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
L14	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Western Carpark Central Stairs	CH_4	ppm	< 500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
W-Beach Volleyball	CH_4	ppm	<500	<500	<500		<500			<500		0
	H_2S	ppm	0	0	0		0			0		0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9		20.9
Starage Containers behind lodges	CH_4	ppm					<500			<500		0
	H_2S	ppm					0			0		0
	O_2	% (v/v)					20.9			20.9		20.9

Notes:
Methane Trigger Level = 1.25 % v/v or 12,500 ppm (Environmental Guidelines: Solid Waste Landfills, NSW EPA, 1996)
Shading indicates exceedance of trigger level
NM = location not monitored
* Partial monitoring round completed March 2009
E = Electrical pit S= Stormwater drain L=Light pole

CLIENTS | PEOPLE | PERFORMANCE

21 June 2010

Mr Nick Pye
Sports Super Centre
Cnr Sports Drive and Morala Avenue
RUNAWAY BAY QLD 4216

Our ref: 41/20337/406167
Your ref:

Dear Nick,

Landfill Gas Monitoring
June 2010 Report

As requested, GHD attended the Sports Super Centre site on the 4 June 2010 to undertake a full round of landfill gas monitoring (monitoring of all site locations). Table 1 attached, provides details on general observations made on the day and Table 3 outlines the results for the selected structures monitoring locations.

All locations were compliant with the relevant adopted trigger level (12,500 ppm methane) during the June round of monitoring; however detectable levels of methane were recorded at the following locations.

Location E12 (an electrical pit located in the northern end of the west car park adjacent the oval), and location E26 (and electrical pit located at the southern boundary to the west car park) returned results of 1000 ppm methane. Although this methane level is below the relevant adopted trigger level of 12,500 ppm methane, it represents an increase in concentration at both locations since the last monitoring round in December 2009.

Location E25 (an electrical pit) located in northern end of the west car park, returned a result of 500 ppm methane. This is a decrease in methane concentration when compared to the previous December 2009 round of monitoring (1000 ppm).

Location West car park NE corner returned a result of 500 ppm methane this round which is within the lower end of the range of historical results for this location.

Storerooms 1 and 2 recorded results of 1000 ppm methane and 500 ppm methane respectively. This appears to be the first time a detectable result has occurred in either of these locations. It is noted that after approximately 5 minutes, the store rooms were monitored again, with no detectable levels of methane recorded, indicating that any build up of methane quickly dissipated. It is recommended that these two locations be added to the next round of monitoring.

Based upon this information, it is recommended that:

1. Storerooms 1 and 2 be regularly opened and vented to allow any potential methane build up to dissipate. Future monitoring events will be used to determine methane concentration trends at these locations, and whether any further action is required to manage the accumulation of methane at these locations.
2. Biannual monitoring (as a minimum) be scheduled at the selected locations detailed below to continue assessing trends in gas conditions for the site. It is recommended that another partial round

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of monitoring be undertaken in December 2010, for the selected locations, with the addition of Storerooms 1 and 2. A full assessment (monitoring of all site locations) is recommended to continue on an annual basis.

Locations that should remain on a 6 monthly monitoring schedule
E10, E12, E21, E24 Left, E24 Right, E25, E26, West Car Park NE Corner, West Car Park NE Corner, West Car Park Right NW Corner, West Car Park NW Corner, Storeroom 1 and Storeroom 2.

If you have any questions or require any further details, please don't hesitate to contact Adam Major or myself.

Yours sincerely,

BelMM

Belinda Oberia
Environmental Scientist
(07) 3316 3954

TABLE 1: General Weather Conditions and Site Observations

Date	Atmospheric Pressure		Wind Speed	Wind Direction (degrees)	Temp.	Weather Conditions		Rainfall Over Preceding Week	Comments	Initials
	(hPa)	Rising/Falling	(km/h)		(°C)	Current	Preceding Week	(mm)		
26-Jun-08	1023.1	Falling	17	315	16.3	Fine conditions, cool a.m. warming and dry with light breeze.	Predominantly fine conditions with only light showers.	20	Monitoring locations clearly visible with genrally good access. Some pits/drains not as per map, some on site not shown etc. Gas equipment measures CH4 >500ppm only	TK
26-Sep-08	1020.2	Falling	20	0	23.9	Light early showers, then fine. Light S to SE winds	Predominately fine conditions	1.4	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Gas like odour in south west carpark.	BO
15-Dec-08	1006.2	Rising	22	270	26.8	Fine and sunny with light breeze.	Some showers.	20.6	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Some water observed in electrical pits in west carpark.	BO
26-Mar-09	1021.7	Falling	22	155	26.7	Fine and sunny with light breeze.	Predominantly fine conditions with light showers.	6.8	Partial assessment only (9 locations). Recent addtion of vent at NE corner of west carpark. Gas equipment measures CH4 >500ppm only.	BO
5-Jun-09	1016.3	Falling	7	292.5	24.4	Overcast with showers. Slight WNW breeze	Some showers	19.6	Site acess good, map locations approximate only. Gas equipment measures CH4 >500ppm only. Some water observed in electrical pits in west carpark.	BO
25-Sep-09	1017.3	Falling	7	90	23.5	Overcast with showers. Slight WNW breeze	Predominantly fine and sunny	0.6	Partial assessment only (10 locations). Good site acess, vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO
19-Dec-09	1015.5	Falling	17	22.5	26.1	Cloudy and overcast. 7/8 cloud cover. Light breeze. Storms predicted	Mostly fine with light showers	3.2	Partial assessment only (10 locations). Good site acess, vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO
4-Jun-10	1012.0	Falling	17	315	16.5	Fine and sunny with light breeze.	Some showers.	140.22	Full site assessment. Good site acess, vents operating effectively. Gas equipment measures CH4 >500ppm only.	BO

Notes

Atmospheric pressure, wind speed/ direction, temperature and daily rainfall data to be obtained from the Bureau of Meteorology, Gold Coast Seaway Station (No 40764.)

TABLE 2: Boundary Soil Atmosphere Gas Monitoring Wells

Location	Parameter	Units	Sampling Date							
			26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10
	Boundary Wells									
MW1	CH_4	% (v/v)	0	0	0	NM	0	NM	NM	0
	H_2S	ppm	0	0	0	NM	0	NM	NM	0
	O_2	% (v/v)	20.9	20.9	20.9	NM	20.9	NM	NM	20.9
MW2	CH_4	% (v/v)	0	0	0	NM	0	NM	NM	0
	H_2S	ppm	0	0	0	NM	0	NM	NM	0
	O_2	% (v/v)	19.4	20.9	19	NM	20.1	NM	NM	20.2
MW3	CH_4	% (v/v)	0	NM	NM	NM	NM	NM	NM	NM
	H_2S	ppm	0	NM	NM	NM	NM	NM	NM	NM
	O_2	% (v/v)	18.7	NM	NM	NM	NM	NM	NM	NM
MW4	CH_4	% (v/v)	0	0	0	NM	soil fas	NM	NM	0
	H_2S	ppm	0	0	0	NM	0	NM	NM	0
	O_2	% (v/v)	20.1	20.9	20.5	NM	20.5	NM	NM	20.5

Notes:

Methane Trigger Level = 1.25 % v/v (Environmental Guidelines: Solid Waste Landfills, NSW EPA, 1996)

Shading indicates exceedance of trigger level

Bold indicates detection of methane

NM = Parameter not monitored this round

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	26-Jun-08	26-Sep-08	15-Dec-08	20-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10	Maximum CH_4 Reading
E1	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E2	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E3	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E4	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E5	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E6	CH_4	ppm	< 500	< 500	< 500		< 500			< 500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E7	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E8	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E9	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E10	CH_4	ppm	<500	<500	<500	<500	<500	< 500	< 500	<500	0
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
E11	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E12	CH_4	ppm	1000	<500	<500	500	1000	< 500	< 500	1000	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.7	20.9	20.5	20.9	20.9	20.9	20.9	20.9	20.9
E13	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.6		20.9			20.9	20.9
E14	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E14 South Left	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E14 South Right	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E15	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E15 North	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E16	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E16 North	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E17	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E18	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E19	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E20	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E20 Left	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E20 Right	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10	Maximum CH_4 Reading
E21	CH_4	ppm	< 500	<500	<500		500	< 500	< 500	<500	500
	H_2S	ppm	0	0	0		0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9	20.9	20.9	20.9	20.9
E21 Left	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E21 Right	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E22	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E22 Left	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E22 Right	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E23	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E23 Left	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E23 Right	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E24	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			17.1	20.9
E24 Left	CH_4	ppm	< 500	<500	500	<500	500	< 500	< 500	<500	500
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
E24 Right	CH_4	ppm	< 500	<500	<500	<500	<500	< 500	< 500	<500	0
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
E25	CH_4	ppm	< 500	<500	1000	500	1000	< 500	1000	500	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.7	20.9	20.9	20.1	20.9
E26	CH_4	ppm	< 500	<500	<500	<500	<500	< 500	500	1000	1000
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	19.1	20.9
E27	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E28	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E29	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.6		20.5			20.6	20.9
E30	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
E31	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.3		20.3			20.3	20.9
West Car park NE Corner	CH_4	ppm	<500	0	3500	21000	1500	< 500	< 500	500	21000
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	16.1	20.9	20.9	20.9	20.4	20.9
West Car park Left NE Corner	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
West Car park Right NW Corner	CH_4	ppm	4000	<500	500	1000	<500	< 500	1000	<500	4000
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	15.6	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
West Car park NW Corner	CH_4	ppm	<500	<500	0	<500	<500	< 500	< 500	<500	0
	H_2S	ppm	0	0	0	0	0	0	0	0	0
	O_2	% (v/v)	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
West Car park NW Edge	CH_4	ppm	<500	<500	0		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.4		20.4			20.4	20.9
Central Light Pole	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Scoreboard light Pole	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Ag pip adj Lodge 9	CH_4	ppm	NM	NM	NM		NM			NM	0
	H_2S	ppm	NM	NM	NM		NM			NM	0
	O_2	% (v/v)	NM	NM	NM		NM			NM	0.0

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10	Maximum CH_4 Reading
S1	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S2	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S3	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S4	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S5	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S6	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S7	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S8	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.7	20.9		20.9			20.9	20.9
S9	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S10	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S11	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S12	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S12A	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S12B	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S12C	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S12D	CH_4	ppm	0	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S13	CH_4	ppm	NM	NM	NM		NM			<500	0
	H_2S	ppm	NM	NM	NM		NM			0	0
	O_2	% (v/v)	NM	NM	NM		NM			20.9	20.9
S14	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S15	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S16	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S17	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S18	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S19	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S20	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S20A	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S21	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S22	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
S23	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9

TABLE 3: Sub -Surface Structure Emissions

Location	Parameter	Units	26-Jun-08	26-Sep-08	15-Dec-08	26-Mar-09	5-Jun-09	25-Sep-09	19-Dec-09	4-Jun-10	Maximum CH_4 Reading
SW Outside reception	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.6	20.9		20.9			20.9	20.9
SW Main Carpark	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.6	20.9		20.9			20.9	20.9
SW Adjacent trampolines	CH_4	ppm	NM	<500	<500		<500			<500	0
	H_2S	ppm	NM	0	0		0			0	0
	O_2	% (v/v)	NM	20.9	20.9		20.9			20.9	20.9
Store Room 1	CH_4	ppm	<500	<500	<500		<500			1000	1000
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Store Room 2	CH_4	ppm	< 500	<500	<500		<500			500	500
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Mens toilet main entrance	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Electrical pit Beach Volleyball	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Dewatering Sump	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Confined Space	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Manhole	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L1	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L2	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L3	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L4	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L5	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L6	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L7	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L8	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L9	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L10	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L11	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L12	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L13	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
L14	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Western Carpark Central Stairs	CH_4	ppm	< 500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
W-Beach Volleyball	CH_4	ppm	<500	<500	<500		<500			<500	0
	H_2S	ppm	0	0	0		0			0	0
	O_2	% (v/v)	20.9	20.9	20.9		20.9			20.9	20.9
Starage Containers behind lodges	CH_4	ppm					<500			<500	0
	H_2S	ppm					0			0	0
	O_2	% (v/v)					20.9			20.9	20.9

Notes:

Methane Trigger Level = 1.25 % v/v or 12,500 ppm (Environmental Guidelines: Solid Waste Landfills, NSW EPA, 1996)
Shading indicates exceedance of trigger level.
NM = location not monitored.
* Partial monitoring round completed March 2009
E = Electrical pit S= Stormwater drain L=Light pole