

Appendix I

Land Fill Gas Risk Assessment (*Golder Associates*)

17 May 2016

Reference No. 1656748-001-P-Rev0

Beau Cong
Spire Group Pty Ltd
9/14-26 Audsley St
Clayton South VIC 3169

LANDFILL GAS RISK ASSESSMENT

10 ALVINA STREET OAKLEIGH SOUTH

Dear Beau

1.0 INTRODUCTION

Spire Group Pty Ltd (Spire) engaged Golder Associates Pty Ltd (Golder) to provide a landfill gas risk assessment as part of the planning process for the redevelopment of the former Clayton West Primary School Site at 10 Alvina Street, Oakleigh South into a residential estate (Figure 1).

2.0 BACKGROUND

We understand that the City of Monash (Council) has refused to approve a Development Plan for the site comprising residential development. The matter has been lodged with the Victorian Civil and Administrative Tribunal.

Schedule 5 of the Development Plan Overlay for the site requires a risk assessment of the gas migration from the neighbouring landfill site. The risk assessment must be in accordance with EPA Publication 788.1 *Best Practice Environmental Management Guidelines, Siting, design, operation and rehabilitation of landfills* October 2010 (BPEM). It is noted that the BPEM has subsequently been updated to Publication 788.3 dated August 2015. This more recent version has been used as the basis for this assessment.

Golder was provided a copy of a landfill gas assessment undertaken for the site:

- Prensa Pty Ltd, March 2014. *Landfill Gas Assessment, 10 Alvina Street Oakleigh South, Victoria* undertaken for Department of Treasury and Finance (Attachment 3)

We note that in its decision summary in relation to the development from the Council meeting on 29 September 2015 (Section 4.5 – Page 73) that Council states the following:

Risk assessment given proximity to a nearby landfill

The DPO5 requires the Applicant to undertake and submit to Council a risk assessment detailing the risk of landfill gas migration from nearby landfills. The risk assessment must be conducted by a



suitably qualified professional, having regard to the relevant EPA Publication to the satisfaction of the responsible authority.

Instead, the applicant has submitted a 'Report on Environmental Due Diligence Review and Advice' prepared by Golder Associates Pty Ltd dated April 2009. This report was prepared for the Victorian Urban Development Authority (Vic Urban).

The report was prepared in excess of 6 years ago and it is considered appropriate that the current application should be supported by an updated study.

We note that the electronic copy of the environmental reports supplied to Golder by Spire and we understand submitted to Council as part of the planning application were incorrectly formatted. The pages of the electronic reports had been reordered such that the Prensa report did not appear as a separate report from the Golder report nor did it appear in its correct page order. As such, it would have been difficult for Council to identify the Prensa report and read it unless the report were correctly reordered. Hence, it is apparent from Council's decision summary that the Prensa landfill gas risk assessment was not identified by Council in the submitted documents nor highlighted by Spire in its submission.

Golder has reordered the Prensa report to its original format and it is attached to this review. As the report was prepared in 2014 to specifically address the landfill gas risk at the proposed development site, this report has been reviewed as part of our landfill gas risk assessment and forms the basis of this review.

3.0 LEGISLATIVE FRAMEWORK

DPO5 requires a landfill gas risk assessment in accordance with the BPEM. As previously noted, the BPEM identified in DPO5 has been revised twice with the latest version being EPA Publication 788.3 dated August 2015. The updates to the BPEM have not significantly altered the manner in which landfill gas assessment is undertaken compared to that set out in EPA Publication 788.1 dated October 2010. This more recent version has been used as the basis for this assessment.

The BPEM provides guidance relating to the technical requirements for siting, design, operation, management and monitoring landfills in Victoria. The guidance provided in the BPEM is expected to be used as the 'default' for mitigating adverse impacts from landfills. Landfill operators and owners are expected to meet the objectives and required outcomes by implementing the relevant best practice measures described by the BPEM as 'suggested measures'. Further, EPA may require additional measures to be undertaken to protect the environment.

The following elements of the BPEM are considered to be relevant to the assessment of landfill gas risk at the Site:

- The BPEM specifies buffer distances to buildings and structures for Type 3 (solid inert waste) and Type 2 (putrescible waste) landfills as 200 m and 500 m respectively.
- The BPEM identifies the following landfill gas action levels (hereafter referred to as BPEM trigger levels)
 - 1% v/v methane and 1.5% v/v carbon dioxide above background concentration within the subsurface geology and subsurface services at the landfill boundary;
 - 10000 ppm of methane within the subsurface services on the landfill and within adjacent areas; and
 - 5000 ppm of methane within buildings and structures on the landfill and in adjacent areas and 1% v/v methane within buildings.
- The recommended way to evaluate the level of risk posed by landfill gas from an individual site is to conduct a site-specific landfill gas risk assessment (LGRA). Guidance on how to complete a LGRA is provided in the Landfill Licensing Guidelines (EPA Publication 1323.2, August 2011).
- Appendix 2 of the Landfill Licensing Guidelines sets out the basic landfill gas risk assessment process as follows:
 - Development of a conceptual model of the landfill and its surroundings;
 - Hazard identification and risk screening; and

- Basic Quantitative risk assessment

These steps have been used in this landfill risk assessment.

4.0 SITE SETTING

4.1 Site Information

The development site at 10 Alvina Street has an area of approximately 2.06 ha (Figure 1). It was the former Clayton West Primary School which has now been demolished. An environmental assessment has been undertaken by Golder Associates for VicUrban in 2009 entitled:

- Golder Associates Pty Ltd, Report on Environmental Due Diligence Review and Advice, Former Clayton West Primary School, 10 Alvina Street, Oakleigh South, Victoria dated 27 March 2009

The report concluded that “*..the site is unlikely to present a significant contamination liability to VicUrban for the proposed residential use, due to the overall low risk and nature of the soil condition.*”

The report did not specifically consider the risk of landfill gas migration.

The site is surrounded by residential properties on all sides with the exception of the former Pioneer Talbot Avenue sand quarry across Alvina Street to the south west.

4.2 Site Geology and Hydrogeology

The 1:63,360 geological Melbourne Map sheet indicates that the property is underlain by the Brighton Group Formation with Tertiary age sediments consisting of non-marine sands, sandy clay, silt and gravel, as well as shelly silty sands and ferruginous sand.

The depth to groundwater and groundwater flow direction will be influenced by the former quarrying in the area of the site but is expected to be around 10 m.

4.3 Summary of Landfills within the BPEM Buffer Zone

The following summaries Golder’s understanding of landfilling activities within 500 m of the site in accordance with the buffer distance set out in the BPEM. The understanding is based on the Prensa review, a search of publically available information and our knowledge of the area.

There are two areas of known or suspected landfilling. Both are located within the former Pioneer site at Talbot Avenue to the south west of the site. Figure 1 indicates the two known landfilling areas; the one in the south east of the site is now Talbot Park and the one in the north west of the site remains vacant land and is part of the proposed development site at 1221-1249 Centre Road, Oakleigh South. There is little publically available information on both of these sites but we understand the following.

Talbot Park

- Talbot Park is located a minimum of 350m from the proposed development site (Figure 1);
- The Prensa report indicates that Talbot Park was a former sand quarry that was backfilled with at least 4.2 m thickness of putrescible waste from around 1977-1978;
- The Prensa report states that monitoring by Council around 2009 indicated no migration of gas at the site boundary but the results could not be released by Council as they were confidential.

1221-1249 Centre Road Oakleigh South

- The former landfill is shown in Figure 1 and is located a minimum of 190m from the proposed development site;
- The landfill is not directly identified in the Prensa report. Golder is aware of the presence of the landfill from past reviews of landfilling in the area. Whilst details of the landfilling are not publicly available, it is understood by Golder that the former sand quarry was around 18 m deep. It was partially filled with putrescible waste between 1970 and 1973 after which time it was capped;

- The site has been the subject of a number of development concepts. A recent search of the Internet indicates a 2015 submission to Council by Talbot Road Finance Pty Ltd for two town planning applications for the site as follows:
 - Backfilling and Site Rehabilitation of the Former Quarry (Application TPA/43336)
 - Use and Development of the Land for Stockpiling of Earth and Treatment of Fill Material (Application TPA/43337)
 - Few details are available but the Council Summary (28 April 2015) identifies and endorsed document submitted to Council with the application as follows:
 - Huntingdale Estate Environmental Site Assessment (Site, Groundwater and Landfill Gas Assessment), Coffey Environments, 8 July 2014.

Golder could not locate the document on the Council website but we would expect that this will provide further information on the risk posed by landfill gas to the site and surrounding sites. Given that the site is potentially moving towards redevelopment, should landfill gas be posing a risk to the site or surrounding sites, this risk would need to be mitigated by the site owners prior to development.

5.0 OVERVIEW OF THE PRENSA REPORT

5.1 General

Prensa completed the landfill gas risk assessment for Department of Treasury and Finance to support the sale of the site. Prensa is a member of the Australian Contaminated Land Consultants Association (ACLCA) and hence in our opinion comprises “suitably qualified professionals” as required by DPO5 for assessing contaminated land issues such as landfill gas.

The stated aim of the report was “...to provide an indication of the potential for landfill gas to be present at the site, which may represent a potential risk to the proposed future residential use of the site.”

The scope of work undertaken can be summarised as follows:

- Review of background information to assess landfill gas risks;
- Site inspection and surface monitoring using a portable landfill gas meter;
- Installation of 3 landfill gas monitoring bores including sampling and analysis for landfill gas;
- Provision of an assessment report.

The detail of the background review included discussion with Council and EPA with information included within this review.

5.2 Landfill Gas Monitoring

Prensa undertook specific monitoring in January 2014 for landfill gas at subsurface features around the site including two stormwater drains and a sprinkler valve. The monitoring was done with a handheld LFG monitor. The readings at the three locations found no methane and low concentrations of carbon dioxide (up to 0.8%) indicating no accumulation of landfill gas in these features adjacent to the site.

Prensa went on in February 2014 to install three landfill gas probes (GB1 to GB3) in the south west corner of the site (refer Figure 1). The probes are located within the area of the site closest to the two landfills. The probes were closest area were installed to around 2m depth and were screened within the natural soils below the overlying fill.

The probes were sampled by Eurofins MGT on 28 February. This included leak testing of the bore prior to sampling, insitu gas screening and then sampling of the gas for confirmatory laboratory testing. The in-situ gas screening did not indicate the presence of methane above the limit of detection of 0.1 %v/v. The subsequent quantification of methane in the laboratory did not detect methane above the limit of reporting of 20 ppm.

The results indicate that landfill gas has not been detected in elevated concentrations in the subsurface soils at these three locations closest to the former landfills.

5.3 Prensa Conclusions

Prensa develop a conceptual model and undertake an assessment of risk concluding that:

“...based on the results of the LFG sampling, it is considered that the potential for LFG to be present at the Site which would pose a potential health risk to future low density residential users of the site is low.”

6.0 LANDFILL GAS RISK ASSESSMENT

6.1 Conceptual Model

Based on the background information presented, the following conceptual model has been developed to consider the landfill risks. Table 2 outlines the key risk factors for landfill gas migration in considering the source-pathway-receptor conceptual model for the site.

Table 1: Summary of Risk Factors

Risk Factor	Talbot Park Landfill Assessment	1221-1249 Centre Road Oakleigh South Landfill Assessment
Source Risk Factors		
Age of Filling	Approx. 38 years	Approx. 43 years
Nature of Waste	Putrescible Waste	Putrescible Waste
Scale of Filling	Unknown but reported filling period only 1 year with 4.2 m thickness of waste	Unknown but filling period 3 years with reported 13 m thickness of waste
Gas Mitigation Measures	None	None
Pathway Risk Factors		
Minimum Distance to Site	350 m	190 m
Geology	Sand and clayey sand geology	
Groundwater	Expected to be around 10 m depth	
Receptor Risk Factors		
Proposed Development	Slab on ground residential use Construction workers and maintenance workers	

The risk factors above support the following conceptual model:

- Source: Putrescible waste located within 500 m of the site at two locations
- Pathway: Subsurface migration through sandy geology
- Receptor: Residents and construction workers in the proposed development

6.2 Risk Screening

In reviewing the source, pathway and receptor risk factors of the conceptual model, we note the following aspects of each which mitigate the potential for linkage of the three to create an unacceptable risk:

Source

- The potential source of the landfill gas is around 40 years old. Waste degrades over time and its ability to produce methane diminishes. Whilst the time will vary based on many factors, the key period of landfill gas production is generally within 30 years of waste placement. As such the likelihood of sites producing significant quantities of landfill gas that may migrate to the development site is diminished and likely to be low;
- The amount of waste placed in the Talbot Road site in particular was low given it was filled for only a year and so the amount of waste is relatively small generally mitigating the time for and degree of gas generation;

- Whilst there were no gas mitigation measures designed for these sites, the current consideration of the 1221-1249 Centre Road Oakleigh South Landfill Assessment for redevelopment indicates that should the site be acting as a landfill gas source, it will be managed in the near future. Furthermore, in the current application to Council for the backfilling of the site, there is evidence that the site has been monitored for landfill gas and that the results have been made available to Council (refer Huntingdale Estate Environmental Site Assessment (Site, Groundwater and Landfill Gas Assessment), Coffey Environments, 8 July 2014.). Given this it would be expected that if the owner or Council were aware of concentrations of landfill gas migrating from the site and impacting upon offsite residential properties that are closer than the development site, then action would have been taken;

Pathway

- Whilst the geology indicates the potential ability for landfill gas to migrate given its permeable nature, the likely poor quality caps, mined and disturbed nature of the site between the landfills and the development site as well as the porous nature of the geology provide opportunity for vertical migration of the gas rather than lateral migration potentially mitigating the amount of gas that could migrate;
- The generally low groundwater level is unlikely to be significantly driving landfill gas migration;
- The distance to the development site of the landfills of around 200 to 400 m also mitigates the potential risk.

Receptor

- There are a significant number of houses that are located closer to the landfills – to the south and east of Talbot Avenue landfill and to the north and west of the 1221-1249 Centre Road landfill (refer Figure 1). It would be expected that if there were a significant receptor risk that these houses would have experienced an issue already;
- The landfill gas monitoring undertaken by Prensa in 2014 including probes installed in the closest corner of the site designed to monitor for gas has not indicated the presence of landfill gas.

6.3 Landfill Gas Risk Assessment Summary

Based on the conceptual model and the review of the key risk factors presented above, we consider that the risk of landfill gas migration occurring and causing an unacceptable human health or environmental impact on the proposed residential development at 10 Alvina Street is low and that no further landfill gas investigation or assessment is warranted. This conclusion is supported by the significant age of the placed waste (around 40 years), the distance to the receptor, the current proposals to Council regarding development of the 1221-1249 Centre Road site and the direct monitoring at the site providing no evidence of landfill gas migration to the site.

When considered in the context of the significant number of existing residential properties that are much closer to the two identified landfill site than the proposed development site, the relative landfill gas migration risk is very low.

7.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled - "Important Information Relating to this Report", which is attached to this report (Attachment 2). The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder Associates has under the contract between it and its client.

We trust this information meets your requirement. Please do not hesitate to contact the undersigned should you have any questions.

Yours sincerely

GOLDER ASSOCIATES PTY LTD



Ian Kluckow
Principal

nf/IMK/nf

Attachments: Attachment 1 - Figure 1 – Locality Plan

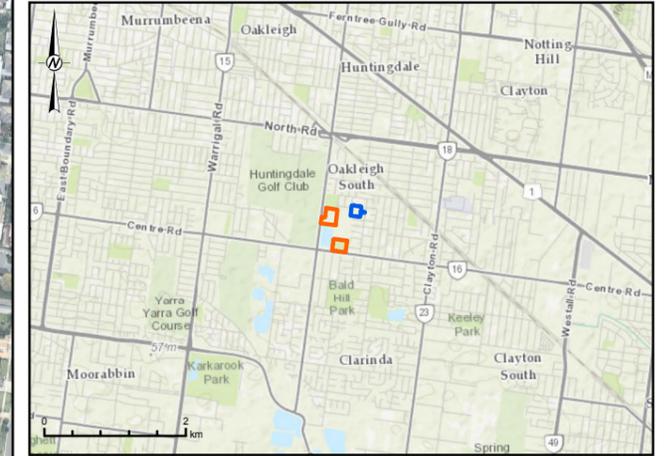
Attachment 2 – Important Information

Attachment 3 - Prensa Pty Ltd, March 2014. *Landfill Gas Assessment, 10 Alvina Street Oakleigh South, Victoria* undertaken for Department of Treasury and Finance

Cc: Thomas Ellicott – Minter Ellison



LOCATION MAP



LEGEND

- GB Landfill Gas Monitoring Locations (Prensa, 2014)
- Distance to Former Landfill
- Approximate Location of Former Landfill
- Proposed Development Site

NOTES

1. Gas Monitoring locations sourced from Prensa Drawing: 13991 LFG Bore Location, 17/02/2014.
2. Road and property information, sourced from VicMap, 30/03/2015.
3. Imagery dated 19/04/2016, sourced from nearmap.com.
4. Location map sourced from Esri online basemaps.

COPYRIGHT

Road and property data © The State of Victoria, Department of Environment, Water Land and Planning, 2015.



REFERENCE SCALE: 1:4,000 (at A3)

PROJECTION: GDA 1994 MGA Zone 55

CLIENT

SPIRE GROUP PTY LTD

PROJECT

LANDFILL GAS RISK ASSESSMENT

TITLE

PROPOSED DEVELOPMENT LOCATION PLAN

CONSULTANT



YYYY-MM-DD	2016-05-16
PREPARED	CJS
DESIGN	-
REVIEW	IMK
APPROVED	IMK

PROJECT No. 1656748 CONTROL 001-R

Rev. 0

FIGURE 1



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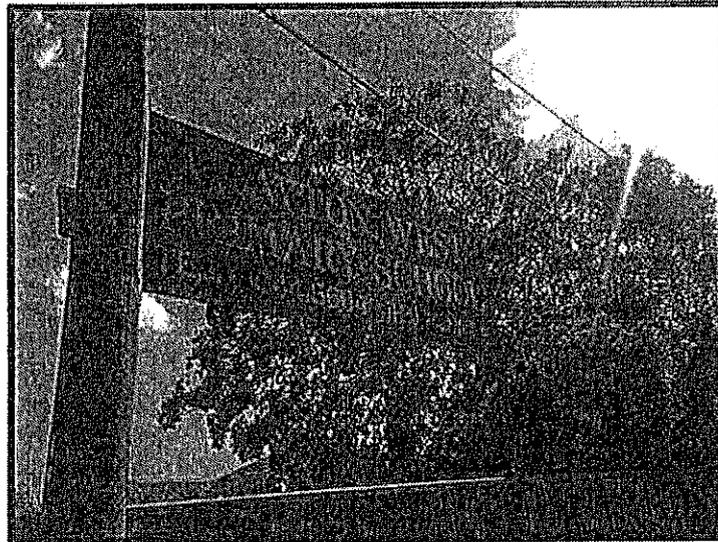
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By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

Any uncertainty as to the extent to which this Report can be used or relied upon in any respect should be referred to Golder for clarification.

Landfill Gas Assessment
10 Alvina Street
Oakleigh South, Victoria

Department of Treasury and Finance
March 2014



prensa 

261-271 Wattletree Road

Malvern VIC 3144

T: 9508 0100

F: 9509 6125

E: admin@prensa.com.au

ABN: 12 142 106 581

Job No: 13991-01: Client No: D0003

Executive Summary

Prensa was engaged by the Department of Treasury and Finance (DTF) to undertake a landfill gas (LFG) assessment at former Clayton West Primary School, located at 10 Alvina Street, Oakleigh South (the Site).

A letter was issued by EPA Victoria (EPAV) relating to the proposed residential rezoning of the Site and its close proximity to the former Talbot Park landfill. The letter noted that the *"Schedule to the Development Plan Overlay (DPO) requires a site assessment to be undertaken on these sites to confirm they are suitable for sensitive uses, prior to the redevelopment for such uses."*

DTF requested an assessment that would assess the potential for LFG to exist at the Site, based on the proposed residential development and in light of the comments provided within the EPAV letter.

The objective of the assessment was to provide an indication of the potential for LFG to be present at the Site, which may represent a potential risk to the proposed future low density residential users of the Site.

Two (2) assessments have previously been undertaken relating to the Site. One (1) assessment involved a site history review, while the other assessment involved gridded soil sampling across the entire Site. The site history review noted the presence of a former quarry located south west of the Site, which was noted to be disused by 1984. Prensa undertook a review of the two (2) assessments and noted that the former quarry was rehabilitated into a park (Talbot Park) by 1984.

A desktop review of Talbot Park found that minimal information was publicly available regarding the use of Talbot Park as a former landfill. Information obtained from EPAV and the City of Monash, indicated that Talbot Park was backfilled with putrescible waste (and possibly also solid inert waste) between 1977-1978. Council records indicated that the landfill was converted into a park circa 1988-1991. Further information obtained from the City of Monash indicated that LFG sampling undertaken at Talbot Park, circa 5 years ago, indicated that methane gas was not migrating off-site from the park boundaries.

However, anecdotal evidence provided to Prensa indicated that LFG has been detected at the boundary between Talbot Park and the Centre Road quarry. As a consequence of the uncertainty regarding whether LFG is present at the Talbot Park boundaries, landfill gas sampling was conducted at the Site.

LFG monitoring was undertaken by Prensa using a hand held LFG meter at the former Clayton West Primary School in January 2014. The monitoring reported non-detectable concentrations of methane at the three (3) locations sampled, which predominantly comprised stormwater drains and service pits at the Site.

In addition, Prensa installed three (3) LFG bores in the southwest corner of the Site. LFG sampling and analysis did not report detectable concentrations of methane in the confirmatory samples collected.

Detailed information about the construction, operation or closure/capping of Talbot Park was largely unavailable, however based on the following multiple lines of evidence it appears unlikely that the Site would be at significant risk of LFG impacts from Talbot Park:

- There appeared to have been only relatively minor landfilling practices over a limited period of time at Talbot Park, with landfilling reported to be over a 2 year period only;
- LFG monitoring at Talbot Park undertaken approximately 5 years ago did not report elevated LFG concentrations;
- There have been large pockets of residential development in the vicinity of the Site and Talbot Park, both prior to and since the landfilling was undertaken, and there are no known incidences of LFG at hazardous concentrations within or nearby adjacent residences;
- Victorian guidance recommends the maintenance of a buffer around a former landfill for 30 years after which time LFG risks are considered to be low. The landfill has been closed for approximately 26 years, which is approaching the Victorian EPA 'minimum risk' requirement for the maintenance of a buffer (30 years);
- The level of capping (if any) installed upon closure of the landfill is unknown. Current nearby site conditions (with public open spaces and vacant areas) may potentially limit pressure build-up and lateral migration of LFG to the site;
- Lateral migration of LFG was not encountered during testing at three (3) locations (including two [2] stormwater drain locations and one [1] sprinkler valve location), tested in January 2014;
- No observable LFG odours or LFG issues were identified at the Site during recent sampling undertaken in January and February 2014; and
- A buffer distance of approximately 400 m exists between the Site and Talbot Park.

Based on the above information and the LFG monitoring undertaken at the Site, it is considered that the potential for methane gas to be present at the Site, which would pose a potential health risk to future low density residential users of the Site is low.

Statement of Limitations

This document has been prepared in response to specific instructions from Department of Treasury and Finance to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by Department of Treasury and Finance and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, Prensa advise that the report should only be relied upon by Department of Treasury and Finance and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and Prensa should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

Prensa is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

Sampling Risks

Prensa acknowledges that any scientifically designed sampling program cannot guarantee all sub-surface contamination will be detected. Sampling programs are designed based on known or suspected site conditions and the extent and nature of the sampling and analytical programs will be designed to achieve a level of confidence in the detection of known or suspected subsurface contamination. The sampling and analytical programs adopted will be those that maximises the probability of identifying contaminants. Department of Treasury and Finance must therefore accept a level of risk associated with the possible failure to detect certain sub-surface contamination where the sampling and analytical program misses such contamination. Prensa will detail the nature and extent of the sampling and analytical program used in the assessment in the assessment report provided.

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Soil contamination can be expected to be non-homogeneous across the stratified soils where present on site, and the concentrations of contaminants may vary significantly within areas where contamination has occurred. In addition, the migration of contaminants through groundwater and soils may follow preferential pathways, such as areas of higher permeability, which may not be intersected by sampling events. Subsurface conditions including contaminant concentrations can also change over time. For this reason, the results should be regarded as representative only.

Department of Treasury and Finance recognises that sampling of subsurface conditions may result in some cross contamination. All care will be taken and the industry standards used to minimise the risk of such cross contamination occurring, however, Department of Treasury and Finance recognises this risk and waives any claims against Prensa and agrees to defend, indemnify and hold Prensa harmless from any claims or liability for injury or loss which may arise as a result of alleged cross contamination caused by sampling.

Reliance on Information Provided by Others

Prensa notes that where information has been provided by other parties in order for the works to be undertaken, Prensa cannot guarantee the accuracy or completeness of this information. Department of Treasury and Finance therefore waives any claim against the company and agrees to indemnify Prensa for any loss, claim or liability arising from inaccuracies or omissions in information provided to Prensa by third parties. No indications were found during our assessments that information contained in this report, as provided to Prensa, is false.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific assessments. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further assessment or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of Department of Treasury and Finance and Prensa recognises that that Department of Treasury and Finance will consider their specific needs and the business risks involved. Prensa does not accept any liability for losses incurred as a result of Department of Treasury and Finance not accepting the recommendations made within this report.

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Appendix C: LFG Construction Borelogs

Appendix D: Eurofins MGT LFG Analytical Results

1 Introduction

Prensa was engaged by Department of Treasury and Finance (DTF) to undertake a landfill gas (LFG) assessment at the former Clayton West Primary School, located at 10 Alvina Street, Oakleigh South, Victoria (the Site).

A site locality plan has been provided as Figure 1 in the Figures section of this report.

2 Background

It was understood that DTF proposes to divest the Site, and as part of the divestment process has applied for the Site to be rezoned from Public Use Zone-Education to residential in accordance with the City of Monash Planning Scheme. EPA Victoria (EPAV) prepared a letter '*DEECD Surplus Land Rezoning Project*' addressed to the Department of Transport, Planning and Local Infrastructure, dated 22 November 2013 (EPAV ref: 5003719), in relation to the proposed re-zoning. The letter related to the proposed rezoning of three former primary schools and their close proximity to "*Former sand quarries [that] have been historically used for land-filling, which has often included the filling of putrescible wastes*". Specifically in regards to the Site, the letter stated that "*Clayton West Primary School is adjacent to the former Talbot Park landfill site.*"

Furthermore, the letter noted that the "*Schedule to the Development Plan Overlay (DPO) requires a site assessment to be undertaken on these sites to confirm they are suitable for sensitive uses, prior to the development for such uses*".

DTF requested a LFG assessment be undertaken to assess the potential for LFG to exist at the Site, based on the proposed residential redevelopment of the Site and in light of the comments provided within the EPAV letter.

3 Objective

The objective of the LFG assessment was to provide an indication of the potential for LFG to be present at the Site, which may represent a potential risk to the proposed future residential use of the Site.

4 Scope of Works

As part of the LFG Assessment, Prensa undertook the following:

- Review of environmental assessment reports relating to the Site;
- LFG Desktop review, including liaising with EPAV and the City of Monash;
- Site inspection and monitoring using a portable LFG monitor;
- Supervision of the service clearance of three (3) locations using a Telstra accredited service locator;
- Supervision of the installation of three (3) LFG bores;
- Supervision of leak testing and sampling of three (3) LFG bores, including methane confirmatory samples; and
- Preparation of this report outlining the findings.

In completing the above tasks, Prensa undertook works in general accordance with the following:

- Environment Protection Act, 1970;
- State Environment Protection Policy (SEPP), *Prevention and Management of Contamination of Land*, 2002;
- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) No.1 Amendment, 2013;
- Victorian EPA Publication 788.1: *Best Practice Environmental Management – Siting, Design, Operation and Rehabilitation of Landfills*, 2010;
- Australian Standard 4482.1, *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile compounds*, 2005;
- Australian Standard 4482.2, *Guide to the Sampling and Investigation of Potentially Contaminated Soil, Part 2: Volatile Substances*, 1999;
- Victorian EPA Publication 1416: *Draft Landfill Gas Fugitive Emissions Monitoring Guidelines*, 2011; and
- EPA Publication 1270: *Assessment of the Potential for Methane Gas Movement from Victorian Landfills*, 2009.

5 Findings

5.1 Site History Findings

5.1.1 Report Review

As part of the site history review for Clayton West Primary School, Prensa reviewed the following documents:

- Atma Environmental (Atma), *Phase 1 Environmental Site Assessment: Former Clayton West Primary School, South Oakleigh, Victoria*, 12 February 2008. The scope of this assessment included a site history review and a site inspection. The report noted that a former quarry was located adjacent the Site to the west/south west and is subject to an environmental audit overlay. The assessment undertook a search of Treatment and Disposal Facilities for Prescribed Wastes on the EPAV website, and found at the time of the assessment that no prescribed waste or disposal facility was found to be within 1 km of the Site. The historical aerial photographs, dating back to 1951, noted the presence of a "quarry pit" located adjacent south west of the Site, which was reported to have expanded in the 1963 aerial photograph and was disused by 1984. No reference was made within the report to the potential for LFG to be present at the Site.
- Atma, *Phase 2 Environmental Site Assessment: Former Clayton West Primary School, South Oakleigh, Victoria*, 15 October 2008. The scope of the assessment included soil sampling from thirty-two (32) gridded locations to 1.0 m using a solid stem auger. No reference was made within the report to the potential for LFG to be present at the Site.
- Prensa, *Clayton West Primary School Desktop Document Review*, 6 December 2011. The scope of the assessment included the review of the two Atma assessments. The report noted that the quarry located south west of the Site, was developed into a recreational park by 1984 (Talbot Park). No reference was made within the report to the potential for LFG to be present at the Site.

5.1.2 Online Review

A review of online resources confirmed that Talbot Park was a former landfill. A City of Monash webpage indicated that numerous sand quarries were located around the Clayton and South Oakleigh areas, with many of these quarries later used as municipal rubbish tips. Talbot Park was listed as a tip that was later rehabilitated into a park between 1988-1991.

5.1.3 EPA Review

Prensa contacted EPAV to obtain information regarding Talbot Park and also reviewed several publicly available EPAV documents. The information obtained from EPAV included the following:

- EPAV provided Prensa with an untitled, un-dated map from the South Eastern Regional Waste Management Group of old landfills located within the Heatherton/Dingley area. The map indicated that the former quarry at Talbot Park had been filled. The map also indicated that two quarries, Consolidated Quarries and City of Oakleigh Ex, formerly existed adjacent to the west and north of Talbot Park, bounded by Huntingdale Road and Centre Road.
- An untitled excel document provided by EPAV to Prensa indicated that Talbot Park was formerly a municipal landfill from 1977-1978. Prior to this the park was used as a sand quarry. The host aquifer was described as unconsolidated sedimentary, and it was reported that a well had been removed from the park. The landfill type was described as 'filling resource excavation' and the landfill was filled with both solid inert and putrescible waste. The estimated depth of the pit was listed as 4.2 m.
- A search of EPAV audit reports indicated that an environmental audit had not been undertaken at Talbot Park, however two (2) audit reports were found to exist for the northern and southern portions of the property located adjacent to Talbot Park to the west, west of Talbot Avenue. Current Melways and the audit reports indicate that this property was a former quarry. No reference was made to the risk of LFG migration within the audit reports.
- Prensa reviewed EPA Publication 1270 'Assessment of the potential for methane gas movement from Victorian Landfills' 2009, which assessed all licensed and formerly licensed landfills recorded in the EPA's database (a total of 260 landfills) for the potential for methane gas migration. It was noted that Talbot Park was not listed as a landfill assessed within this publication.
- A publicly available map on the EPA website titled 'Clayton area current and closed Landfills and Composters' indicates the location of former and current landfills within the Clayton South, Clarinda and Dingley areas. The map did not indicate that a landfill was formerly located at Talbot Park.
- Prensa contacted the EPA auditor who is currently undertaking an audit on the former quarry located adjacent to the west of the Site, located adjacent north and west of Talbot Park, at 1221-1249 Centre Road. The auditor indicated that LFG is present in the monitoring bores located on the mutual boundary between the former Centre Road quarry and Talbot Park. No further information was able to be provided to Prensa due to confidentiality reasons.

5.1.4 City of Monash Review

The City of Monash was contacted to obtain council documentation relating to Talbot Park. Written information obtained from April Williams, Waste Services Project Officer indicated that the council operated a landfill at Talbot Road, which was filled between 1977-1978, with putrescible waste. The landfill was small and some monitoring was undertaken approximately 5 years ago, which showed no

migration of gas at the boundaries. City of Monash was unable to provide the results of the monitoring as the documents were confidential. No further information was provided by the City of Monash.

5.2 Geology

Prensa reviewed the Geological Map Series Melbourne Map Sheet 1:63,360, No. 849, Zone 7, Ringwood. The map identified Quaternary-aged sand ridges and sand hills at the Site. The Site was predominantly surrounded by Quaternary aged high level alluvium.

5.3 Hydrogeology

5.5.1 Surface Water Receptors

The closest surface water receptors to the Site were:

- Various lakes within Huntingdale and Metropolitan Golf Course, located approximately 500 m, 900 m and 1.5 km north west;
- Lakes within the former sand quarry, located approximately 400 m south west;
- A lake within Commonwealth Golf Club located approximately 1.4 km south west;
- Karkarook Lake, located approximately 2.8 km south west;
- Scotchman's Creek, located approximately 3 km north; and
- Port Phillip Bay, located approximately 9 km south of the Site.

5.5.2 Groundwater Database Search

A search of the *Visualising Victoria's Groundwater* online database identified 6 registered groundwater wells within a 500 m radius of the Site. A review of the bores has been summarised in Table 1 below.

Table 1: Summary of Nearby Groundwater Bores

Bore ID	Location	Well Depth (m)	Use	Lithology screened
S9038303/2	200 m south west	15.00	Unknown	Silty clay
109629	480 m south west	50.292	Assessment	Clay and gravel
109629	500 m north west	50.29	Assessment	Clay and gravel
109630	500 m north west	50.29	Assessment	Unknown
109631	500 m north west	50.29	Assessment	Unknown
S9038303/1	500 m north west	6.00	Assessment	Silty sand and silty clay

No standing water level data existed for the groundwater wells.

Anecdotal evidence has indicated that the depth to groundwater at and in the vicinity of the Site is considered likely to be largely influenced by the quarrying and excavation activities undertaken at Talbot Park and 1221-1249 Centre Road. Details regarding the depth to groundwater were unavailable, despite numerous attempts to gain information from the adjacent audit property and nearby area from numerous sources.

5.4 LFG Monitoring

The former quarry to the south west of the Site (currently Talbot Park) was converted into a landfill following closure of the quarry. Closed landfills can continue to produce methane gas for many years following closure, which can potentially migrate offsite through the local geology following a path of least resistance into buildings and houses nearby.

Sarah Fitzpatrick and Holly Butler of Prensa attended the former Clayton West Primary School site on Thursday the 16th of January 2014 to conduct a LFG assessment. A hand held GFM410 LFG monitor was used to statistically measure oxygen, carbon dioxide and methane. Of particular interest was the presence of methane gas, which is a known by-product of landfill decomposition, particularly where putrescible waste has been deposited.

Gas measurements were taken to assess for the presence of landfill related gases. A total of three (3) measurements were taken at, and adjacent to the Site, as outlined in Table 2 below. Only three (3) locations were sampled, due to a lack of suitable locations (such as stormwater drains and service pits) to sample from. The LFG monitor did not register a detectable concentration of methane at any of the three (3) monitored locations.

Table 2: LFG Monitoring Results

Location	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
Stormwater drain, southern boundary of the Site	0	0.1	21.1
Stormwater drain, northern pedestrian walkway to the Site	0	0.8	20.5
Sprinkler valve, south eastern corner of the Site	0	0	21.3

As part of the site inspection, several standpipes were noted adjacent to the southern portion of the Site to the west, in the former Centre Road quarry. A search of the online register of EPA audit sites and a review of Victoria's Groundwater Database were not able to provide any information to indicate whether the standpipes were monitoring wells. The audit report prepared for the northern portion of 1213-1217 Centre Road, Oakleigh South, indicated, that a bore network appears to be present on the former quarry located north of the property (1221-1249 Centre Road), however, no assessment or audit report is publicly available for the former quarry (1221-1249 Centre Road).

5.5 Intrusive LFG Assessment

5.5.1 LFG Bore Installation

Three (3) LFG bores (GB1, GB2 and GB3) were installed along the southern and western boundary of the Site (the closest boundaries to Talbot Park). The LFG bores were installed by Star Drilling on 14th February 2014, using 50 mm PVC piping for the casing. Where possible, bores were sealed with bentonite across both fill and natural soil to ensure that the bores were appropriately sealed so that any gas accumulating would be retained for sampling. The gas bore locations have been illustrated in Figure 2, provided in the Figures section of this report.

Table 3 below outlines the construction details of the LFG bores, in accordance with Table B.3 of EPA Publication 788.1.

Table 3: LFG Bore Construction

Gas Bore	Total Depth	Bore casing	Bore screen	Screen length
GB1	1.8 m	0.0 – 1.0 m	1.0 – 1.8 m	0.8 m
GB2	2.0 m	0.0 – 1.0 m	1.0 – 2.0 m	1.0 m
GB3	1.9 m	0.0 – 1.0 m	1.0 – 1.9 m	0.9 m

The LFG bore construction logs have been included as Appendix C.

5.5.2 LFG Sampling

Helium leak testing was undertaken prior to sampling, to verify the integrity of the construction seal. The leak testing was conducted by Eurofins MGT on 28th February 2014. The LFG bores passed the leak test.

Methane laboratory confirmation samples were also collected using a vacuum chamber to extract gas into a tedlar bag. The gas was sampled at a rate of 1L/min using a calibrated sample pump.

Methane, carbon dioxide, carbon monoxide, oxygen and sulphide readings were also taken using a GA2000 LFG Analyser.

All soil gas probes were sampled in accordance with Victorian EPA Draft Publication 1416 September 2011- Subsurface Geology.

5.5.3 LFG Analytical Schedule

Gas was collected into a sample bag and transported to Eurofins-mgt for methane analysis using Gas Chromatography – Flame Ionization Detection (GC-FID).

5.5.4 LFG Criteria

Detectable methane concentrations were compared to Table 6.4 'LFG Action Levels' in the EPA Publication 788.1: *Siting, Design, Operation and Rehabilitation of Landfills*, 2010, which prescribes action levels based on the location where methane is detected.

5.5.5 LFG Results

Methane peak concentrations of 0.1 %v/v were detected in GB1 and GB2, during sampling. Methane laboratory confirmation samples were also collected using a vacuum chamber to extract gas into a Tedlar bag using a calibrated SKC sample pump. Methane was not detected in the samples analysed.

It is noted that a detection of methane is not uncommon in the first twenty seconds of sampling in LFG bores, as methane is a light compound that can sit at the top of a bore. However, the lab confirmation results (which have a LOR of 20 ppm or 0.002 %v/v) confirmed that methane was not present within the stabilised readings above 20 ppm.

The Eurofins MGT LFG assessment report includes further information relating to the methane assessment and has been included as Appendix D.

6 Conceptual Site Model

6.1 Site Specific Geology

Prensa reviewed the Geological Map Series Melbourne Map Sheet 1:63,360, No. 849, Zone 7, Ringwood. The map identified Quaternary-aged sand ridges and sand hills at the Site. The Site was predominantly surrounded by Quaternary aged high level alluvium.

6.2 Potential Sources of LFG Contamination

6.2.1 Off Site

Potential off site source of LFG contamination is the former landfill property (now Talbot Park) located approximately 400 m south west of the Site and former potential landfill located at 1221-1249 Centre Road.

6.3 Contaminants of Potential Concern

The potential contaminant of concern is methane, a known by product of landfill decomposition, particularly where putrescible waste has been disposed.

6.4 Transport Mechanisms and Exposure Pathways

Methane can migrate through the soil profile, at varying depths above the ground water table.

The main potential exposure pathway for occupants of the Site is vapour inhalation of methane gas.

6.5 Potential Receptors

The on-site human receptors would include the following:

- Contractors during the development of the Site; and
- Users of the proposed future residential development.

7 Significance of Results

Based on the site history review undertaken, it is understood that Talbot Park and the surrounding vacant area adjacent north and north west of Talbot Park, operated as a quarry from sometime between 1956 to 1988. It appears that Talbot Park was filled with putrescible wastes between 1977-1978. Aerial photographs indicated that the Talbot Park area was backfilled by 1988, although the remaining quarry area was not backfilled at this time. Talbot Park area was rehabilitated into a park sometime between 1988-1991, while the remaining quarry area appeared to have been backfilled sometime between 1991-2006.

Prensa contacted both EPAV and the City of Monash to obtain information regarding Talbot Park. Both EPAV and the City of Monash indicated that Talbot Park was formerly a quarry and was subsequently used as a landfill, prior to being rehabilitated into a park. City of Monash indicated that LFG monitoring was undertaken at Talbot Park, circa 5 years ago, which did not detect LFG at Talbot Park. However, Prensa understands that an audit is currently being undertaken at the former quarry located adjacent and north, north west of Talbot Park and anecdotal information exists that suggests that LFG has been detected in LFG bores located at the boundary of the former Centre Road quarry and Talbot Park.

EPAV Publication 788.1 'Siting, Design, Operation and Rehabilitation of Landfills,' 2009, prescribes buffer distances to manage LFG impacts from closed landfills. The buffer distances are measured from the sensitive land use to the edge of the closest cell, or in the absence of knowledge of the cell location, the premise boundary is used as the point of measurement. Publication 788.1 indicates that a buffer zone of at least 500 metres should be maintained from buildings or structures for a minimum period of 30 years following closure, for landfills filled with putrescible waste. It is noted that Clayton West Primary School is located approximately 400 m north east of Talbot Park, and Talbot Park was rehabilitated at the earliest 26 years ago.

Based on the site history information obtained and given that Clayton West Primary School lies within the buffer zone prescribed in EPAV Publication 788.1, it was considered that there was potential for methane gas to exist at the Site. Given the uncertainty associated with the potential for LFG to exist, empirical testing was undertaken to evaluate the risk posed by LFG.

Limited LFG monitoring undertaken using a handheld LFG meter at the former Clayton West Primary School did not report concentrations of methane at the three (3) locations sampled. Additionally, three (3) LFG bores were installed in the southwest corner of the Site (the closest corner to Talbot Park). LFG confirmatory analysis did not report concentrations of methane within the LFG bores. Therefore, based on the results of the LFG sampling, it is considered that the potential for LFG to be present at the Site, which would pose a potential health risk to future low density residential users of the Site is low.

8 Conclusion

Two (2) assessments have previously been undertaken relating to the Site. One (1) assessment involved a site history review, while the other assessment involved gridded soil sampling across the entire Site. The site history review noted the presence of a former quarry located south west of the Site, which was noted to be disused by 1984. Prensa undertook a review of the two (2) assessments and noted that the former quarry was rehabilitated into a park (Talbot Park) by 1984.

A desktop review of Talbot Park found that minimal information was publicly available regarding the use of Talbot Park as a former landfill. Information obtained from EPAV and the City of Monash, indicated that Talbot Park was backfilled with putrescible waste (and possibly also solid inert waste) between 1977-1978. Council records indicated that the landfill was converted into a park circa 1988-1991. Further information obtained from the City of Monash indicated that LFG sampling undertaken at Talbot Park, circa 5 years ago, indicated that methane gas was not migrating off-site from the park boundaries.

However, anecdotal evidence provided to Prensa indicated that LFG has been detected at the boundary between Talbot Park and the Centre Road quarry. As a consequence of the uncertainty regarding whether LFG is present at the Talbot Park boundaries, landfill gas sampling was conducted at the Site.

LFG monitoring was undertaken by Prensa using a hand held LFG meter at the former Clayton West Primary School in January 2014. The monitoring reported non-detectable concentrations of methane at the three (3) locations sampled, which predominantly comprised stormwater drains and service pits at the Site.

In addition, Prensa installed three (3) LFG bores in the southwest corner of the Site. LFG sampling and analysis did not report detectable concentrations of methane in the confirmatory samples collected.

Detailed information about the construction, operation or closure/capping of Talbot Park was largely unavailable, however based on the following multiple lines of evidence it appears unlikely that the Site would be at significant risk of LFG impacts from Talbot Park:

- There appeared to have been only relatively minor landfilling practices over a limited period of time at Talbot Reserve, with landfilling reported to be over a 2 year period only;
- LFG monitoring at Talbot Park, undertaken approximately 5 years ago, did not report elevated LFG concentrations;
- There have been large pockets of residential development in the vicinity of the Site and Talbot Park, both prior to and since the landfilling was undertaken, and there are no known incidences of LFG at hazardous concentrations within or nearby adjacent residences;
- Victorian guidance recommends the maintenance of a buffer around a former landfill for 30 years after which time LFG risks are considered to be low. The landfill has been closed for approximately 26 years, which is approaching the Victorian EPA 'minimum risk' requirement for the maintenance of a buffer (30 years);
- The level of capping (if any) installed upon closure of the landfill at Talbot Park is unknown. Current nearby site conditions (with public open spaces and vacant areas) may potentially limit pressure build-up and lateral migration of LFG to the Site;
- Lateral migration of LFG was not encountered during testing at three (3) locations (including two [2] stormwater drain locations and one [1] sprinkler valve location), tested in January 2014;
- No observable LFG odours or LFG issues were identified at the Site during recent sampling undertaken in January and February 2014; and
- A buffer distance of approximately 400 m exists between the Site and Talbot Reserve.

Based on the above information and the LFG monitoring undertaken at the Site, it is considered that the potential for methane gas to be present at the Site, which would pose a potential health risk to future low density residential users of the Site is low.

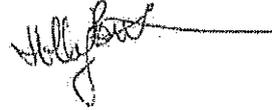
9 Application of this Report

The report should not be separated or reproduced in part and should be read in its entirety.

Prensa Pty Ltd



Sally Bonham
Principal Environmental Consultant



Holly Butler
Senior Environmental Consultant

Figures



prensa 

261-271 Wattletree Rd P: (03) 9508 0100
 Malvern VIC 3144 F: (03) 9509 6125
 PO Box 2203 Wattletree Rd LPO www.prensa.com.au
 Malvern East VIC 3145 admin@prensa.com.au

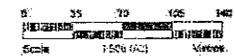
Client: Department of Treasury and Finance

Project: Landfill Gas Assessment

Address: *
 10 Alvina Street, Oakleigh South

Drawing Title:
 Clayton West Site Locality

Job No.: 13991 Client No.: DE003



Legend

-  Site Boundary
-  Talbot Park Boundary
-  Former Centre Road Quarry Boundary

Note: All locations are approximate.
 Image Source:
 Google Earth Pro
 Viewed: 11 Mar 2014

Drawn by:	Date:	Checked by:	Date:
SPF	11/03/14	HAB	11/03/14
File name:	Figure number:	Revision:	
13991 Clayton locality	1	A	



261-271 Wattletree Rd P: (03) 9508 0100
 Malvern VIC 3144 F: (03) 9509 6125
 PO Box 2203 Wattletree Rd LPO www.prensa.com.au
 Malvern East VIC 3145 admin@prensa.com.au

Client: Department of Treasury and Finance

Project: Landfill Gas Assessment

Address: 10 Alivina Street, Oakleigh South

Drawing Title: Clayton West Landfill Gas Bore Locations

Job No.: 13991 Client No.: D0003



Legend

-  Landfill Gas Bore
-  Site Boundary

Note: All locations are approximate
 Image Source: Google Earth Pro
 Viewed: 17 Feb 2014

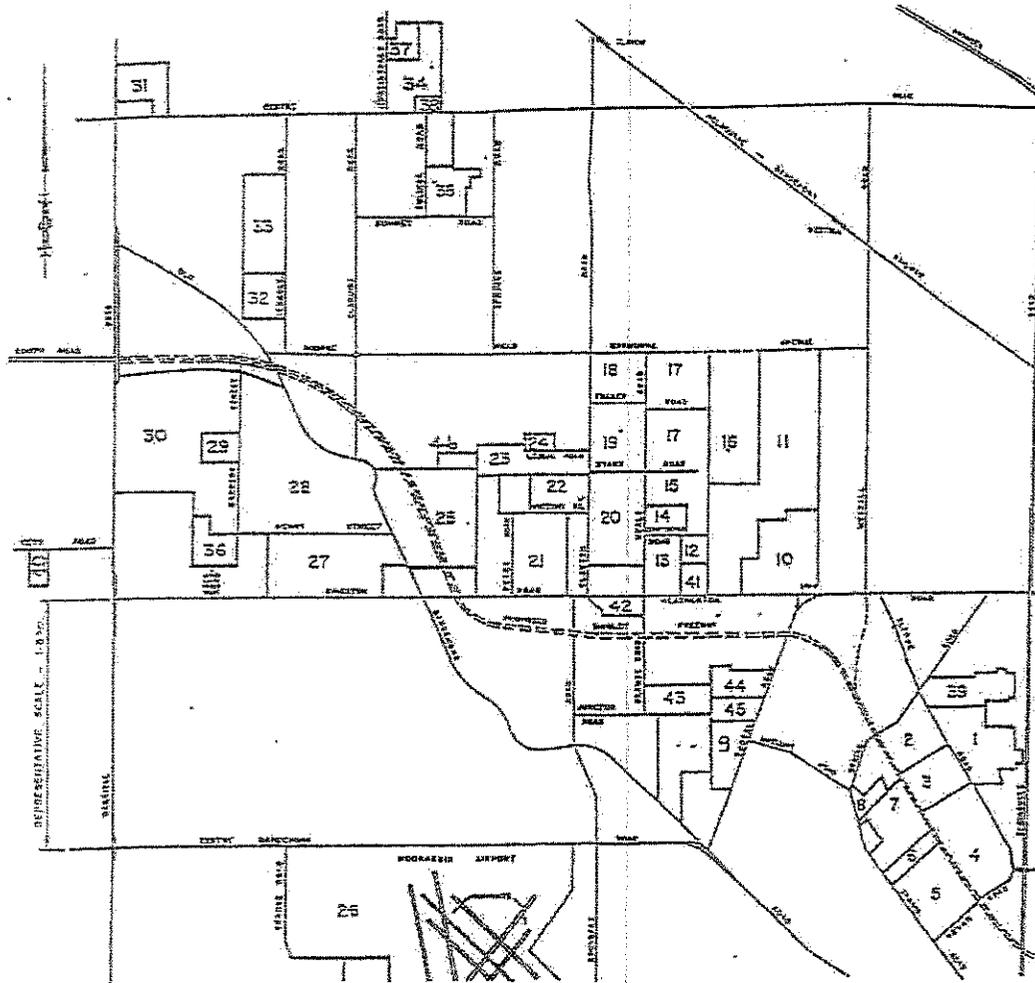
Drawn by:	Date:	Checked by:	Date:
SPF	17/02/14	HAB	17/02/14
File name:	Figure number:	Revision:	
13991 LFG Bore Location	2	A	

Appendix A: EPA Documents

SOUTH EASTERN REGIONAL WASTE MANAGEMENT GROUP

HEATHERTON - DINGLEY AREA

REFUSE DISPOSAL SITES



No.	OWNER	P	I	R
1.	CITY OF GREATER DANDENONG (SPRING VALLEY PARK)			
2.	CORPBM		*	
3.	UNIVERSITY PLANNING DEVELOPMENT (CITY OF WARELEY)			
4.	EX (CITY OF SPRINGVALE)		*	
5.	EX (CITY OF WARELEY)		*	
6.	EX (CITY OF MORIALLOG)		*	
7.	AV DEVELOPMENT (VICITASTE) (CITY OF ALVERA)		*	
8.	ERNEST SMITH CONTRACTORS (BIN SAN NURSERY, ETC)	1		
9.	CITY OF DINGLEY		*	
10.	SPRING VALLEY GOLF CLUB		*	
11.	CITY OF SPRINGVALE		*	
12.	AMATEK LTD.		*	
13.	CITY OF DINGLEY		*	
14.	CITY OF DINGLEY		*	
15.	CLEANWAY	1		
16.	PIONEER		*	
17.	PIONEER		*	
18.	BRAMBLES INDUSTRIES (CLEANWAY)		*	
19.	CITY OF MOORABBIN (OTHER)		*	
20.	PIONEER CONCRETE P/L - PIONEER QUARRIES LTD.		*	
21.	ALIAS SAND SUPPLIES P/L		*	
22.	CITY OF KINGSTON		*	

No.	OWNER	P	I	R
23.	ALIED SAND P/L (SOLID FILL)		1	
24.	COMMONWEALTH OF AUSTRALIA			*
25.	HEATHERTON SAND SUPPLIES		1	
26.	CITY OF MOORABBIN		*	
27.	MELBOURNE WATER		*	
28.	CAVANAGH SAND SUPPLY (SOLID FILL)		*	
29.	CITY OF KINGSTON		*	
30.	CONCRETE QUARRIES		*	
31.	CITY OF DINGLEY		*	
32.	CITY OF BRIGHTON EX		*	
33.	CITY OF DINGLEY		*	
34.	CITY OF CHALLENGE EX		*	
35.	CITY OF SPRINGVALE EX		*	
36.	CITY OF MOORABBIN EX		*	
37.	PROLIFERATION		*	
38.	VIDGATA		*	
39.	VIDGATA		*	
40.	ERNEST SMITH CONTRACTORS		*	
41.	ERNEST SMITH CONTRACTORS		*	
42.	WHELAN WORTHWAY		1	

LEGEND

Existing		Putrescible	P
		Inert	I
Potential	PT		
Filled	F		
Filled Open Space	R		

Appendix B: Council Documents



0 0.4 0.8 1.6 2.4 3.2

Kilometers



Clayton Area current and closed Landfills and Composters

Appendix C: LFG Construction Borelogs

Borehole Log - GB1



Sheet: 1 of 1

Client: Department of Treasury and Finance Job Number: 13991 Site Location: 10 Alvina Street, Oakleigh South Job Type: Landfill Gas Investigation Date: 14/02/2014 License Number: N/A	Driller: Star Drilling Rig: Geoprobe Drill Rig Depth of Hole: 1.8 m Screened Depth: 1.0 - 1.8 m Casing/Screen Diameter: 50 mm Top of Casing (m AHD):	Standing Water Level: Easting: Northing: Coord. Sys.: Drawn By: SPF Approved By: SSB
---	---	---

Comment:
Landfill gas bore

Depth (m)	Well Construction	Method	Graphic Log	Soil/rock description	Sample	PID
0.5	<p>GB1</p> <p>Grout (0.0 - 0.4 m)</p> <p>Bentonite (0.4 - 0.7 m)</p> <p>Sand (0.7 - 1.8 m)</p> <p>Screen (1.0 - 1.8 m)</p>	Hand auger		FILL: SAND (0 - 0.3 m) Brown, loose, dry, coarse grained sand, organic matter, dark grey silty clay pockets, angular bluestone gravel fragments.		
				FILL: SAND (0.3 - 0.5 m) Light grey, loose, dry, brown clay pockets.		
				NATURAL: SAND (0.5 - 0.6 m) Dark grey to black, loose, dry, coarse grained, minor quartz fragments.		
				NATURAL: SAND (0.6 - 1.3 m) Light grey, loose, dry, homogeneous.		
				NATURAL: SAND (1.3 - 1.7 m) Light brown, loose, dry.		
1.0						
1.5		Solid auger		NATURAL: SAND (1.7 - 1.8 m) Yellow, dense, slightly moist, coarse grained.		
2.0				End of borehole at 1.8 m at target depth in natural.		

PRENSA: 14 FEB 2014 13:58:40 PRENSA WELL LOG: 13991 LFIS CLAYTON WEST GRU - 11/02/2014 13:58:40 30.002 Depth Log and In Situ Tool

Borehole Log - GB2



Sheet: 1 of 1

Client: Department of Treasury and Finance Job Number: 13991 Site Location: 10 Alvena Street, Oakleigh South Job Type: Landfill Gas Investigation Date: 14/02/2014 License Number: N/A		Driller: Star Drilling Rig: Geoprobe Drill Rig Depth of Hole: 2.0 m Screened Depth: 1.0 - 2.0 m Casing/Screen Diameter: 50 mm Top of Casing (m AHD):		Standing Water Level: Easting: Northing: Coord. Sys.: Drawn By: SPF Approved By: SSB				
Comment: Landfill gas bore								
Depth (m)	Well Construction	Method	Graphic Log	Subsurface Profile	Sample	PID		
0.5	GB2 Grout (0.0 - 0.4 m) Bentonite (0.4 - 0.7 m)	Hand auger		FILL: SAND (0 - 0.3 m) Brown, loose, dry, coarse grained, dark grey silty clay pockets.				
				FILL: SAND (0.3 - 0.5 m) Light grey, loose, dry, brown clay pockets, minor concrete fragments.				
				NATURAL: SAND (0.5 - 0.6 m) Black to dark grey, loose, dry, coarse grained sand.				
		1.0		Solid auger		NATURAL: SAND (0.6 - 1.3 m) Light grey, loose, dry.		
						NATURAL: SAND (1.3 - 1.6 m) Light brown, loose, dry.		
1.5	Sand (0.7 - 2.0 m) Screen (1.0 - 2.0 m)			NATURAL: SAND (1.6 - 2.0 m) Yellow, dense, slightly moist, coarse grained.				
				End of borehole at 2.0 m at target depth in natural.				

PRENSA LIB 1.0m GB2 Log PRENSA WELL LOG - 13991 LRF CLAYTON WEST.GPJ -> Drawing File -> 14/02/2014 13:59 3:00:02Z Digit Lab and In Situ Test

Borehole Log - GB3



Sheet: 1 of 1

Client: Department of Treasury and Finance Job Number: 13991 Site Location: 10 Alvena Street, Oakleigh South Job Type: Landfill Gas Investigation Date: 14/02/2014 License Number: N/A	Driller: Star Drilling Rig: Geoprobe Drill Rig Depth of Hole: 1.9 m Screened Depth: 1.0 - 1.9 m Casing/Screen Diameter: 50 mm Top of Casing (m AHD):	Standing Water Level: Easting: Northing: Coord. Sys.: Drawn By: SPF Approved By: SSB
---	---	---

Comment:
Landfill gas bore

Depth (m)	Well Construction	Method	Graphic Log	Borehole Profile	Sample	PID
0.0 - 0.4	Grout (0.0 - 0.4 m)	Hand auger		NATURAL: SAND (0 - 0.8 m) Dark grey to black, loose, dry, homogeneous.		
0.4 - 0.7	Bentonite (0.4 - 0.7 m)					
0.8 - 1.5	Sand (0.7 - 1.9 m) Screen (1.0 - 1.9 m)	Solid auger		NATURAL: SAND (0.8 - 1.5 m) Light grey, loose, dry.		
1.5 - 1.9	NATURAL: SAND (1.5 - 1.9 m) Yellow, dense, slightly moist, coarse grained.					
1.9	End of borehole at 1.9 m at target depth in natural.					

PRENSA 1.00 GLB Log PRENSA WILLIAMS 13991 LFB CLAYTON WEST.BPJ <CompanyFile> 1/14/2014 12:58 6:30:00Z D:\log\13991\13991-1-14-2014-12-58-6-30-00Z.Dwg

Appendix D: NATA Analytical Results

Landfill Gas Report – February 2014

Client : PRENSA

Site : Oakleigh South

Eurofins mgt Report No : 410381



**Prepared for;
PRENSA
261-271 Wattletree Rd
Malvern, VIC 3144**

**Prepared by;
Eurofins | mgt
2-5 Kingston Town Close
Oakleigh, VIC 3166**



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1 Quality Control

1.1 Distribution of Report:

Date Issued: 3rd March 2014

Delivery method: email

Copies	Recipient	Copies	Distributor
1	Sarah Fitzpatrick PRENSA 261-271 Wattletree Rd, Malvern, VIC 3144 sarah.fitzpatrick@prensa.com.au	1	Stephen Curwood Eurofins mgt 2-5 Kingston Town Close Oakleigh, VIC 3166 StephenCurwood@eurofins.com.au

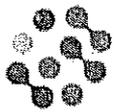
1.2 Authorising Signatures:

Report Prepared by: Stephen Curwood
Field Services Section Head - AIR

Report Authorised by: Peter Richardson
Field Services Manager.
NATA Signatory

2 Scope of Works

Eurofins mgt were engaged by PRENSA to conduct gas monitoring on a landfill site located at the Clayton West Landfill. As requested by PRENSA monitoring was conducted on the three gas bores on site. Monitoring was conducted in accordance with VIC EPA Draft Publication 1416 September 2011 - DRAFT LANDFILL GAS FUGITIVE EMISSIONS. The three bores were also leak tested on the day of sampling.



3 Test Methods

3.1 Subsurface Gas Monitoring

All soil gas Bores were sampled on the 28th February 2014 in accordance with VIC EPA Draft Publication 1416 September 2011 - DRAFT LANDFILL GAS FUGITIVE EMISSIONS, Section 7 SUBSURFACE GEOLOGY. The extractive landfill gas analyser that was used was the GA2000 – Refer Appendix 1: Buildings, Service Pits & Subsurface Monitoring Field Sheets.

3.2 Leak Testing of Gas Bores

All soil gas Bores were leak tested utilising Helium as a tracer in accordance with Eurofins mgt's In-House Method AISOP002.

3.3 Methane Laboratory Confirmation Gas Bag

Sampling as per Eurofins mgt Air Method AO4 – Tedlar bag collection. Analysis as per Eurofins mgt Method AO6 (Gas Bag - FID).

4 Instrumentation

4.1 Extractive landfill gas analyser

The extractive landfill gas analyser that was used to monitor the soil gas bores on site was the GA2000 Landfill Gas Analyser. It should be noted that the landfill gas analyser that was used does meet the performance specifications stated in Table 4.1 of the VIC EPA Draft Publication 1416 September 2011 - DRAFT LANDFILL GAS FUGITIVE EMISSIONS. Refer Appendix 6: Instrumentation Calibration Data.

4.2 Extractive Helium analyser

The Extractive Helium Analyser that we used for leak testing of the bores was the GasCheck 5000is. This unit was calibrated with certified calibration gas. Refer Appendix 6: Instrumentation Calibration Data.

5 Bore Construction

Each gas bore was constructed with 50mm diameter PVC casing and slotted PVC screen. The bores were covered by dedicated bore covers that were locked.. Each probe had its own dedicated end cap that was installed by Eurofins mgt 24 hours prior to sampling. Sampling was conducted using a quick connect fitting. No deficiencies of the bores were noticed that may have prevented a representative sample being taken.



6 Ground Conditions

The ground conditions encountered at the site on the day of sampling were quite dry. The grass coverage was mostly short to ankle high. No dead vegetation was observed around the gas bore locations on the day of sampling.

7 Weather Conditions

Reference to daily weather observations from the BOM website for the closest weather station to the Oakleigh South site (Moorabbin – see link below) show temperatures on the day of sampling ranging from 10°C (min) to 24°C (max) and barometric pressures of 1024hPa (9am) and 1021hPa (3pm). This decrease in pressure throughout the day can aid the upward flow of soil gas due to the pressure gradient between the vadose zone and the atmosphere. Winds speeds of 15 km/h & 22 km/h were recorded at 9am & 3pm respectively. No rain events were recorded in the three days prior to the sampling event.

Date	Rain (mm)	9am		3pm	
		Temperature (°C)	Barometric Press (hPa)	Temperature (°C)	Barometric Press (hPa)
28 th February 2014	<1	15	1024	22	1021

Reference Link – <http://www.bom.gov.au/climate/dwo/201402/html/IDCJDW3052.201402.shtml>

8 Soil Gas Results Summary

8.1 Subsurface Gas Monitoring

Refer Appendix 1: Subsurface Monitoring Field Sheets for details.

8.2 Methane Laboratory Confirmation Results

Refer Appendix 3: Eurofins mgt Laboratory Confirmation Methane Results

8.3 Gas Bore Leak Test Results

Refer Appendix 2: Leak Testing Field Sheets

APPENDICES

APPENDIX 1 —

Subsurface Monitoring Field Sheets



mgt

Eurofins mgt IN-SITU ANALYSER - Field Data Sheet

Client : Prensa
 Site : 10 Alvina Street, Oakleigh South
 Sample Date : 28.2.14
 In-Situ Gas Analysers : GA2000

Barometric Pressure : 1024 (9am) & 1021 (3pm)
 Weather Conditions : Sunny, Light Winds
 Ground Conditions : Dry Grass Coverage
 Probe Description : 50mm PVC with QC fitting

Soil Gas Probe	Sample Time (Hours)	Relative Pressure (mbar)	Flow Reading (l/hr)	In-Situ Readings via Portable Analyser											Comments (incl. Stabilisation Time)
				Ave. VOC's (ppm)	Peak VOC's (ppm)	Peak CH4 %v/v	Peak CO2 %v/v	Min. O2 %v/v	Stabilised Readings						
									CH4 %v/v	CO2 %v/v	O2 %v/v	Balance %v/v	CO ppm	H2S ppm	
GB1	1100	+0.01	0.1	-	-	0.1	1.8	19.3	<0.1	1.8	19.3	78.9	<1	<1	Stable at 60 secs
GB1	1118	-	-	-	-	0.1	1.8	19.3	<0.1	1.8	19.3	78.9	<1	<1	Stable at 45 secs
GB2	1144	+0.05	0.0	-	-	0.1	1.5	19.6	<0.1	1.5	19.6	78.9	<1	<1	Stable at 75 secs
GB2	1201	-	-	-	-	<0.1	1.5	19.4	<0.1	1.5	19.4	79.1	<1	<1	Stable at 30 secs
GB3	1127	+0.00	0.3	-	-	<0.1	0.8	20.1	<0.1	0.8	20.1	79.1	<1	<1	Stable at 80 secs
GB3	1139	-	-	-	-	<0.1	0.8	20.1	<0.1	0.8	20.1	79.1	<1	<1	Stable at 30 secs
Field/Trip Blank	1057	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	>95	<0.1	<0.1	-

Notes: Field/Trip Blank undertaken on tedlar bag containing instrument grade Nitrogen.

**APPENDIX 2 –
Leak Testing Field Sheets**



mgt

Eurofins mgt GAS PROBE MONITORING - Helium Leak Test Field Data Sheet.

Client : Prensa

Site : 10 Alvina Street, Oakleigh South

Sample Date : 28.2.14

Barometric Pressure: 1024 (9am) & 1021 (3pm)

Soil Gas Probe	Sample Time (Hours)	Sample Depth (m)	Internal Diameter (mm)	Initial Pre-Purge Check (Pass / Fail)	Pre Purge He Probe Reading (% vol)	Helium Shroud Conc. (% vol)	Holding Volumes Removed	Purge Time (min)	Post Purge Helium Reading (% vol)	Helium Leak Check (Pass / Fail)	Comments
GB1	1108	1.8	50	Pass	<1	>95	>3	9	<1	Pass	
GB2	1150	2.0	50	Pass	<1	>95	>3	9	<1	Pass	
GB3	1130	1.9	50	Pass	<1	>95	>3	9	<1	Pass	

Purge Analyser: SKC PUMP

Notes:

Helium Analyser : GAS CHECK G3

APPENDIX 3 --

Eurofins mgt Laboratory Confirmation Methane Results

Eurofins | mgt
 2-5 Kingston Town Close
 Oakleigh
 VIC 3168

Attention: Stephen Curwood

Report: 410306-A
 Client Reference: PRENSA
 Received Date: Feb 28, 2014.

Client Sample ID			GB (1)	GB (2)	GB (3)	GB BLANK
Sample Matrix			Air	Air	Air	Air
Eurofins mgt Sample No.			M14-Fe23460	M14-Fe23461	M14-Fe23462	M14-Fe23463
Date Sampled			Feb 28, 2014	Feb 28, 2014	Feb 28, 2014	Feb 28, 2014
Test/Reference	LOR	Unit				
Dissolved Gases						
Methane*	20	ppm	< 20	< 20	< 20	< 20

Eurofins | mgt Internal Quality Control Review and Glossary
General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

*NOTE: pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100ml: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Sur - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test		Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code		
Method Blank									
Dissolved Gases									
Methane*		ppm	< 20		20	Pass			
LCS - % Recovery									
Dissolved Gases									
Methane*		%	101		70-130	Pass			
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Spike - % Recovery									
Dissolved Gases									
Methane*		M14-Fe23461	CP	%	80	70-130	Pass		
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code	
Duplicate									
Dissolved Gases									
Methane*		M14-Fe23461	CP	ppm	< 20	< 20	< 1	30%	Pass

Comments

Sampling has been performed by Eurofins | mgt personnel - Eurofins | mgt is NATA accredited for the collection of water samples in accordance with AS 5667, Victorian EPA Publication 441 & Melbourne Water Publication - Sampling & analysis of Trade Wastes.

Sample Integrity

Custody Seals Intact (if open)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within Holding Time	Yes
Some samples have been subcontracted	No

Authorised By

Peter Richardson	Client Services
Carol Lee	Senior Analyst-Volatiles (VIC)

Glenn Jackson
Laboratory Manager

- Indicates Not Requested
- * Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Eurofins | mgt will not be liable for loss, cost, damage or expense incurred by the client, or any other third party, resulting from the use of any information or representation given in this report. In no case shall Eurofins | mgt be liable for consequential damages resulting, but not limited to, lost profits, damages for loss of business or other production arising from this report. In a document shall not be responsible except in the limited cases set out in the Terms and Conditions. Unless indicated otherwise, the tests were performed on the samples as received.

**APPENDIX 4 –
Site Map & Gas Bore Logs**



261-271 Wattletree Rd P: (03) 9508 0100
 Malvern VIC 3144 F: (03) 9569 6125
 PO Box 2203 Wattletree Rd LFD www.prensa.com.au
 Malvern East VIC 3145 admin@prensa.com.au

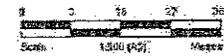
Client: Department of Treasury and Finance

Project: Landfill Gas Assessment

Address: 10 Alvina Street, Oakleigh South

Drawing Title: Clayton West Landfill Gas Bore Locations

Job No.: 13991 Client No.: 00003



Legend

-  Landfill Gas Bore
-  Site Boundary

Note: All locations are approximate
 Image Source: Google Earth Pro
 Viewed: 17 Feb 2014

Drawn by:	Date:	Checked by:	Date:
SPF	17/02/14	HAB	17/02/14

File name:	Figure number:	Revision:
13991 LFG Bore Location	1	A

Borehole Log - GB2



Sheet: 1 of 1

Client: Department of Treasury and Finance Job Number: 13991 Site Location: 10 Alvina Street, Oakleigh South Job Type: Landfill Gas Investigation Date: 14/02/2014 License Number:	Driller: Star Drilling Rig: Drill Rig Depth of Hole: 2.0 m Screened Depth: 1.0 - 2.0 m Casing/Screen Diameter: 50 mm Top of Casing (m AHD):	Standing Water Level: Easting: Northing: Coord. Sys.: Drawn By: SPF Approved By: SSB
---	--	---

Comment:
Landfill gas bore

PRENSA: LIB 1.05.GLB 107 PRENSA WELL LOG 1994 LFG CLAYTON WEST 057 - Drawing Date: 21/02/2014 11:52:25 4/30/02: Dated Log and In Situ Tool

Depth (m)	Well Construction	Method	Graphic Log	Sample	PID
0.0 - 0.4	Grout (0.0 - 0.4 m)	Hand auger	FILL: SAND (0 - 0.3 m) Brown, loose, dry, zero plasticity, coarse grained, dark grey silty clay pockets.		
0.3 - 0.5			FILL: SAND (0.3 - 0.5 m) Light grey, loose, dry, zero plasticity, brown clay pockets, minor concrete fragments.		
0.4 - 0.7	Bentonite (0.4 - 0.7 m)		NATURAL: SAND (0.5 - 0.6 m) Black, dark grey, loose, dry, zero plasticity, coarse grained sand.		
0.6 - 1.3		Solid auger	NATURAL: SAND (0.6 - 1.3 m) Light grey, loose, dry, zero plasticity.		
1.3 - 1.6	Sand (0.7 - 2.0 m)		NATURAL: SAND (1.3 - 1.6 m) Light brown, loose, dry, zero plasticity.		
1.6 - 2.0	Screen (1.0 - 2.0 m)		NATURAL: SAND (1.6 - 2.0 m) Yellow, dense, slightly moist, zero plasticity, coarse grained.		
2.0			End of borehole at 2.0 m at target depth in natural.		

Borehole Log - GB3



Sheet: 1 of 1

Client: Department of Treasury and Finance Job Number: 13991 Site Location: 10 Alvina Street, Oakleigh South Job Type: Landfill Gas Investigation Date: 14/02/2014 License Number:	Driller: Star Drilling Rig: Drill Rig Depth of Hole: 1.9 m Screened Depth: 1.0 - 1.9 m Casing/Screen Diameter: 50 mm Top of Casing (m AHD):	Standing Water Level: Easting: Northing: Coord. Sys.: Drawn By: SPF Approved By: SSB
---	--	---

Comment:
Landfill gas bore

Depth (m)	Well Construction	Method	Graphic Log	Subsurface Profile	Sample	PID
0.0 - 0.4	Grout (0.0 - 0.4 m)	Hand auger		NATURAL: SAND (0 - 0.8 m) Dark grey to black, loose, dry, zero plasticity, homogeneous.		
0.4 - 0.7	Bentonite (0.4 - 0.7 m)					
0.7 - 1.0	Sand (0.7 - 1.9 m)	Solid auger		NATURAL: SAND (0.8 - 1.5 m) Light grey, loose, dry, zero plasticity.		
1.0 - 1.9						
1.5 - 1.9				NATURAL: SAND (1.5 - 1.9 m) Yellow, dense, slightly moist, zero plasticity, coarse grained.		
1.9 - 2.0				End of borehole at 1.9 m at target depth in natural.		

PRENSA 1.00 GLE Log: PRENSA WELL LOG 13991 LEG CLAYTON WEST GPF - Drawing File - 21/02/2014 16:25 8:30 002 - Dagaal Lab and In Situ Tool

APPENDIX 5

Photos of Sample Setup

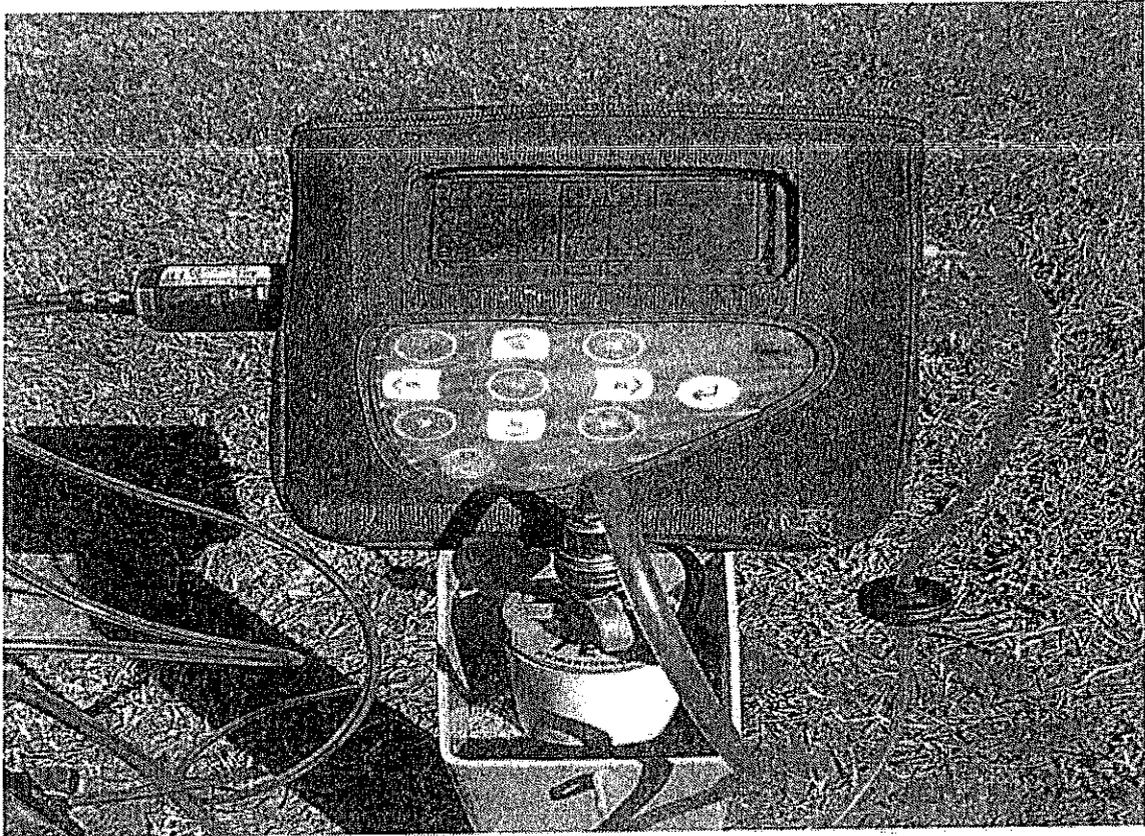


Photo 1 : Sampling with Landfill Gas Analyser

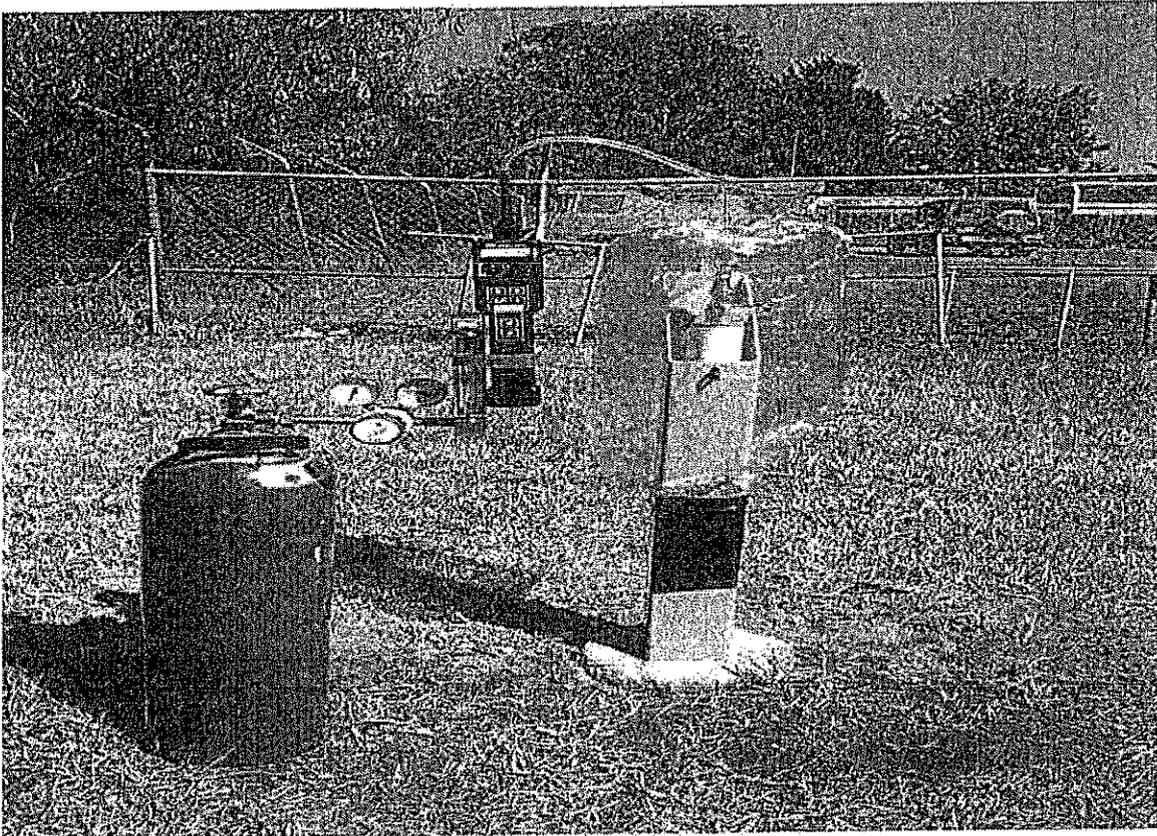


Photo 2 : Leak Testing of Gas Bore

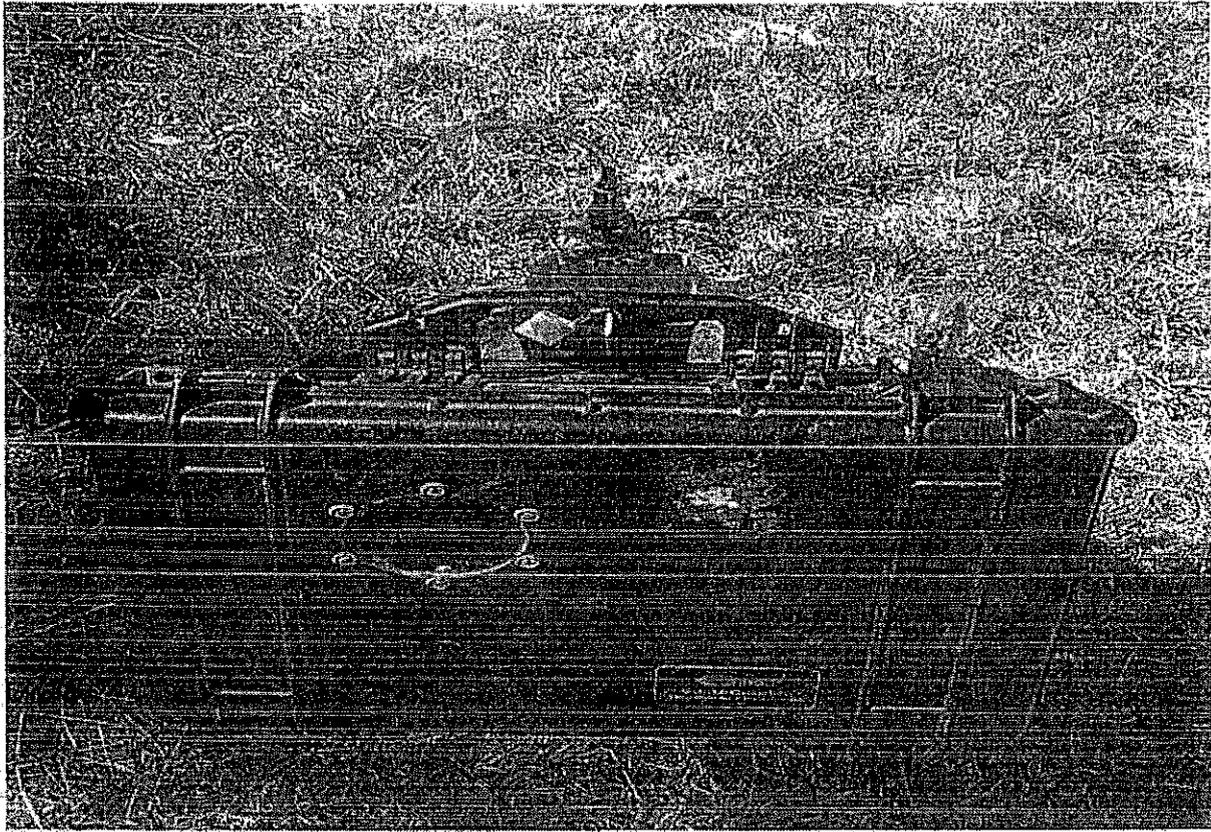


Photo 3 : Lab Confirmation Methane Gas Bag Sampling

**APPENDIX 6 –
Instrumentation Calibration Data**



eurofins

mgt

GA 2000 Serial Number: GA 11503/09Calibrated by: SCCalibration Date: 28/2/14Calibration Time: 10.55**Operations Check**In Line Filter Check Cleaned/Checked Battery Status 100 %**Calibration Gas Used**N2 - Lot Number: 1274596Cylinder Number: 24CO2 / CH4 - Lot Number: 1237007Cylinder Number: 30H2S / CO / CH4 / O2 - Lot Number: 1278129Cylinder Number: 2

Calibrating Gas	Cal Value	Reading	Span Required	Reading	Pass
CH4	60% vol	60.4 %	Y	60.0 %	<input checked="" type="checkbox"/>
CH4 - check Only	2.5% vol	2.5 %	N	- %	<input checked="" type="checkbox"/>
H2S	25 ppm	26 ppm	Y	25 ppm	<input checked="" type="checkbox"/>
O2	18.0% vol	18.1 %	Y	18.0 %	<input checked="" type="checkbox"/>
CO	100 ppm	102 ppm	Y	100 ppm	<input checked="" type="checkbox"/>
CO2	40% vol	40.4 %	Y	40.0 %	<input checked="" type="checkbox"/>

Calibrating Gas	Cal Value	Reading	Span Required	Reading	Pass
CH4	0.0% vol	0.0 %	N	- %	<input checked="" type="checkbox"/>
H2S	0 ppm	0 ppm	N	- ppm	<input checked="" type="checkbox"/>
O2	0.0% vol	0.0 %	N	- %	<input checked="" type="checkbox"/>
CO	0 ppm	1 ppm	Y	0 ppm	<input checked="" type="checkbox"/>
CO2	0.0% vol	0.0 %	N	- %	<input checked="" type="checkbox"/>

RENTALS

EQUIPMENT CERTIFICATION REPORT

GASCHECK 5000IS

This GasCheck 5000is Instrument has been performance checked as follows:

- Check fully charged
- Performance check against He

Date: 26/02/2014

Checked by: P.O.

Signature: P.O.

Please check that the following items are received and that all items are cleaned before return.
A minimum \$30 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	Rec'd	Returned	Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GasCheck 5000is Unit with short probe and nozzle fitted
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GasCheck 5000is Unit Operation check / Battery Voltage, (min 5.0V) <u>5.3</u> V
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Spare battery holder with Spare Alkaline batteries, (min 5.0V) <u>6.0</u> V
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	GasCheckis Manual
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Quick Guide
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Long Probe
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Box-Spanner
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Screwdriver
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Calibration Certificate - Due: <u>21 / 01 / 15</u>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Carry Case

Processor Signature/Initials: P.O.

Quote Reference	<u>CM000526</u>	Condition on return
Customer Ref	<u>00146580</u>	
Equipment ID	<u>GC5000MA</u>	
Equipment serial no.		
Return Date	<u> / /</u>	
Return Time		

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