



INFORMATION REGARDING ENVIRONMENTAL AUDIT REPORTS

August 2007

VICTORIA'S AUDIT SYSTEM

An environmental audit system has operated in Victoria since 1989. The *Environment Protection Act 1970* (the Act) provides for the appointment by the Environment Protection Authority (EPA Victoria) of environmental auditors and the conduct of independent, high quality and rigorous environmental audits.

An environmental audit is an assessment of the condition of the environment, or the nature and extent of harm (or risk of harm) posed by an industrial process or activity, waste, substance or noise. Environmental audit reports are prepared by EPA-appointed environmental auditors who are highly qualified and skilled individuals.

Under the Act, the function of an environmental auditor is to conduct environmental audits and prepare environmental audit reports. Where an environmental audit is conducted to determine the condition of a site or its suitability for certain uses, an environmental auditor may issue either a certificate or statement of environmental audit.

A certificate indicates that the auditor is of the opinion that the site is suitable for any beneficial use defined in the Act, whilst a statement indicates that there is some restriction on the use of the site.

Any individual or organisation may engage appointed environmental auditors, who generally operate within the environmental consulting sector, to undertake environmental audits. The EPA administers the environmental audit system and ensures its ongoing integrity by assessing auditor applications and ensuring audits are independent and conducted with regard to guidelines issued by EPA.

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Environmental audit reports are stored digitally by EPA in three parts: the audit report (part A), report appendices (part B) and, where applicable, the certificate or statement of environmental audit and an executive summary (part C). A report may be in colour and black-and-white formats. Generally, only black-and-white documents are text searchable.

Report executive summaries, findings and recommendations should be read and relied upon only in the context of the document as a whole, including any appendices and, where applicable, any certificate or statement of environmental audit.

AUDIT REPORT CURRENCY

Audit reports are based on the conditions encountered and information reviewed at the time of preparation and do not represent any changes that may have occurred since the date of completion. As it is not possible for an audit to present all data that could be of interest to all readers, consideration should be made to any appendices or referenced documentation for further information.

When information regarding the condition of a site changes from that at the time an audit report is issued, or where an administrative or computation error is identified, environmental audit reports, certificates and statements may be withdrawn or amended by an environmental auditor. Users are advised to check [EPA's website](http://www.epa.vic.gov.au) to ensure the currency of the audit document.

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FURTHER INFORMATION

For more information on Victoria's environmental audit system, visit EPA's website or contact EPA's Environmental Audit Unit.

Web: www.epa.vic.gov.au/envaudit

Email: environmental.audit@epa.vic.gov.au

ENVIRONMENT PROTECTION ACT 1970

STATEMENT OF ENVIRONMENTAL AUDIT

I, John Throssell of Parsons Brinckerhoff, a person appointed by the Environmental Protection Authority ('the Authority') under the *Environmental Protection Act 1970* ('the Act') as an environmental auditor for the purpose of the Act, having

1. been requested by the **Department of Treasury and Finance** to issue a certificate of environmental audit in relation to the site located at **1136 - 1138 Nepean Highway Highett Stage 2** ("the site"), owned/occupied by the Department of Treasury and Finance (see **Figure 1** attached to this Statement).
2. had regard to, among other things,
 - i) guidelines issued by the Authority for the purposes of Part IXD of the Act,
 - ii) the beneficial uses that may be made of the site, and
 - iii) relevant State environment protection policies/ industrial waste management policies, namely
 - SEPP Prevention and Management of Contamination of Land
 - SEPP Groundwaters of Victoria
 - SEPP Waters of Victoria
 - Environmental Protection (Industrial Waste Resource) Regulations

in making a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment which may be caused to, any beneficial use made of the site by any industrial processes or activity, waste or substance (including any chemical substance), and

3. completed an environmental audit report in accordance with Section 53X of the Act, a copy of which has been sent to the Authority and the relevant planning and responsible authority.

HEREBY STATE that I am of the opinion that

The site is suitable for the beneficial uses associated with:

- Sensitive use (medium to high density)
- Commercial
- Industrial
- Open space

subject to the following conditions attached thereto:

- a) Groundwater at the site is polluted. Groundwater must not be used for any beneficial use without prior testing and review of results by an environmental auditor (appointed under part IXD of the *Environmental Protection Act 1970*) to confirm its suitability for that use. It may be extracted for the purpose of environmental monitoring or remediation.

- b) Prior to 31 January 2012, the Groundwater Quality Management Plan (GQMP) formulated for the site and accepted by the environmental auditor must be implemented and maintained by the Department of Treasury and Finance and future owners of the site. The GQMP provides details on the groundwater monitoring program including, the monitoring wells to be sampled, laboratory analysis program, methodology, monitoring frequency, program duration, review procedure, reporting requirements and, roles and responsibilities.
- c) The GQMP forms part of this Statement of Environmental Audit and must be provided to all future owners/occupiers of the site.
- d) The GQMP must remain in force until such time as an environmental auditor (appointed under part IXD of the Environmental Protection Act 1970) confirms in writing that the monitoring and management requirements are no longer required, and this confirmation is advised in writing to the EPA and the planning authority. The GQMP has identified a Section 53V audit as the appropriate mechanism for cessation of the groundwater management and monitoring requirements.
- e) Prior to 29 February 2012, an Environmental Management Plan (EMP) must be developed for the site by a suitably qualified professional and accepted by an environmental auditor appointed under Part IXD of the *Environment Protection Act 1970*, and this acceptance advised in writing to EPA and the planning authority.
- f) Prior to 15 March 2012, the Department of Treasury and Finance and future owners of the site must implement and maintain the EMP required by condition (e) of this Statement.
- g) The site must be covered with a physical barrier, such as "fill" (consistent with IWRF 621) to a minimum depth of 1m, unless beneath building slabs, roads, or other concrete structures and must be specified in the EMP. The site in its current condition meets this requirement.
- h) Any landscaped area or garden beds must have at least 1m thickness of soil below the finished surface, which is demonstrated to be suitable for the site and consistent with IWRF 621 as "fill" and must be specified in the EMP.
- i) Access to residual soil impacts in shallow soil (<1mBGL) that could not be remediated due to proximity with the site boundary (as indicated in **Figure 2** attached to this Statement) should be minimised with the placement of either permanent paving, buildings or a barrier of at least 1m of clean fill. Where works require the excavation of soil along the northern, southeastern or southern boundaries, relevant workers should be made aware of the presence of contaminated soil in this area and appropriate protective measures taken during any excavation and maintenance works. Any soil/fill excavated from these areas is to be characterised and disposed to a licensed landfill as appropriate. The management of these soils shall be managed in accordance with the EMP to avoid exposure and/or transport of impact material.
- j) All physical barriers (as required in condition (g) of this Statement), if subsequently damaged or removed during development or occupation of the site, must be reinstated as soon as possible and to the same condition or better as they were prior to disturbance.

The condition of the site is detrimental or potentially detrimental to any (one or more) beneficial uses of the site. Accordingly, I have not issued a Certificate of Environmental Audit for the site in its current condition, the reasons for which are presented in the environmental audit report. The terms and conditions that need to be complied with before a Certificate of Environmental Audit may be issued are as set out as follows:

- Remediation of residual groundwater impacts associated with the site to the extent that relevant beneficial uses of groundwater are restored.

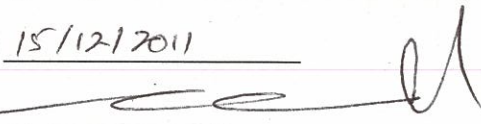
- Removal of all residual soil impacts below the site.

Other related information

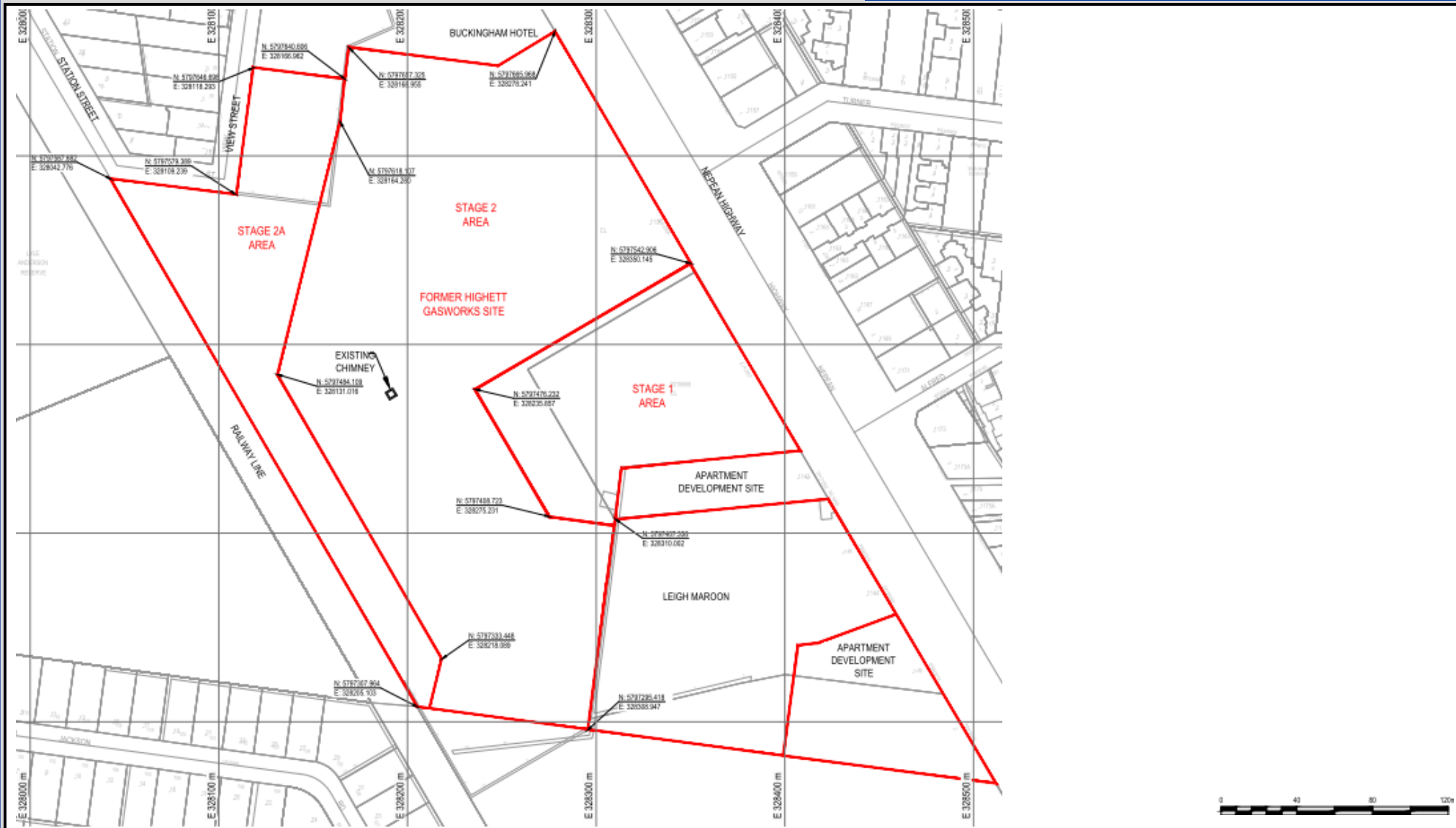
- The site (1136-1138 Nepean Highway Highett Stage 2) is defined by the coordinates presented in the attached survey plan (**Figure 1** attached to this Statement).
- A separate Statement of Environmental Audit has been issued for the adjoining Stage 2A area.
- The Authority has determined that groundwater has been cleaned up to the extent practicable and the site is a groundwater quality restricted use zone (GQRUZ) as illustrated in **Figure 3** attached to this Statement.
- Groundwater below the site is polluted and is not suitable for any beneficial use and should only be extracted for the purpose of environmental monitoring or remediation purposes.
- In accordance with clause 19(3) of the SEPP (Groundwaters of Victoria), the Authority may require periodic reassessment of the practicability of groundwater clean up.
- Soil and groundwater beneath the site may impact on future building footings and other subsurface structures due to its elevated sulphate content and reduced pH.
- Scattered pieces of coke, coal, black stained soil, have been reported at some locations on the site. This material has been removed as far as practicable but minor occurrences may remain within the soil and be uncovered during excavation works.
- Any material excavated from the site and disposed off site must be classified and managed in accordance with relevant statutory regulations and EPA guidelines.
- Any fill or soil imported to the site must be chemically tested soil or fill that classifies as "fill material" in accordance with relevant EPA guidelines.
- In accordance with section 53Z of the Environment Protection Act 1970 the owner/occupier of the site must provide a copy of this Statement to any person who becomes or proposes to become an occupier of the site.
- Not all land uses for which the land is considered suitable by this audit may be allowed under the existing zoning of the Kingston Council Planning Scheme.

This Statement forms part of environmental audit report *Parsons Brinckerhoff, 1136-1138 Nepean Highway Highett 3190 Victoria, (CARMS 37308-2) 2125064A-RPT001-A, 15 December 2011*. Further details regarding the condition of the site may be found in the environmental audit report.

DATED 15/12/2011

Signed: 

ENVIRONMENTAL AUDITOR



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APPROX. HORIZONTAL SCALE



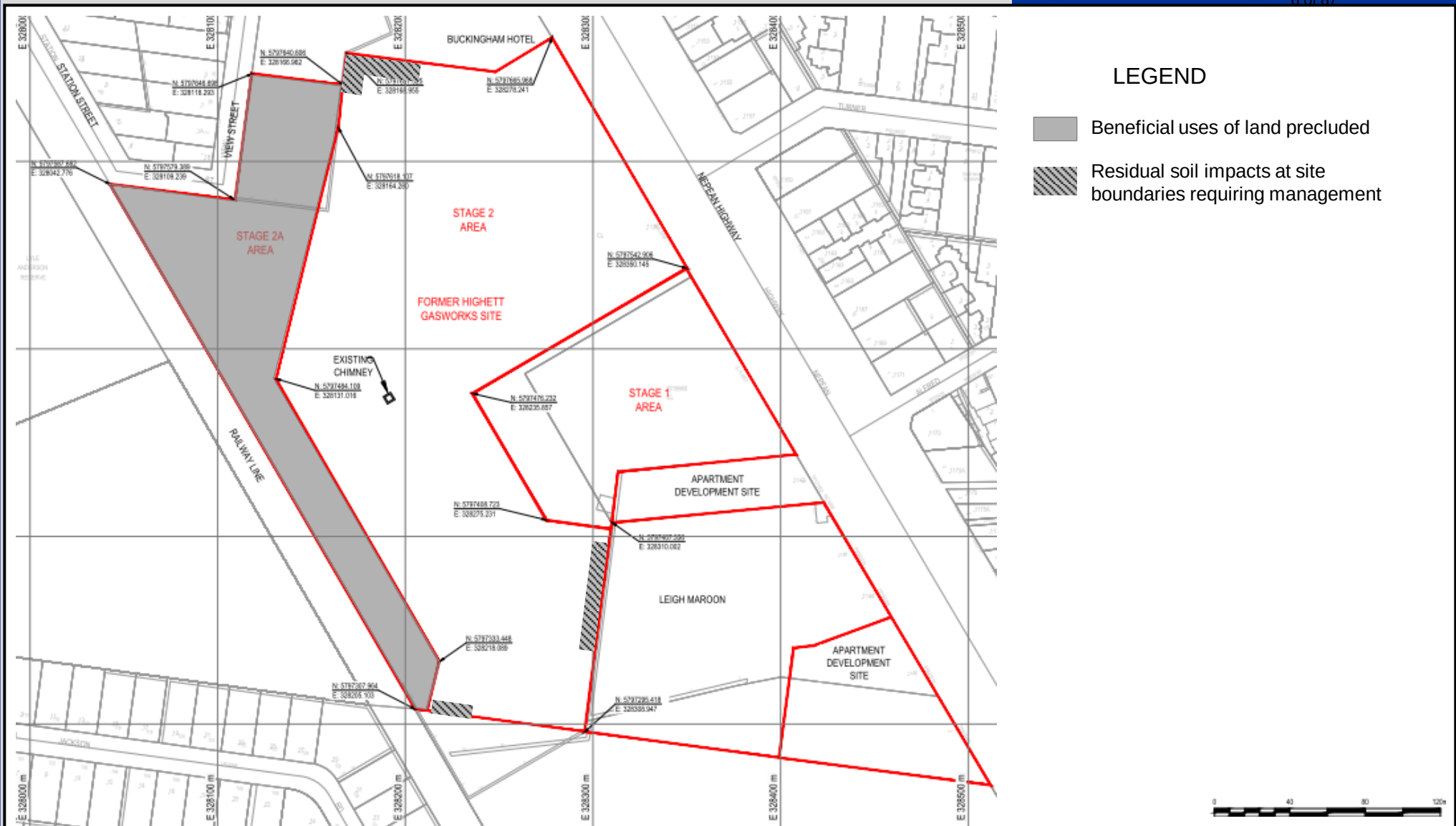
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APPROX. HORIZONTAL SCALE



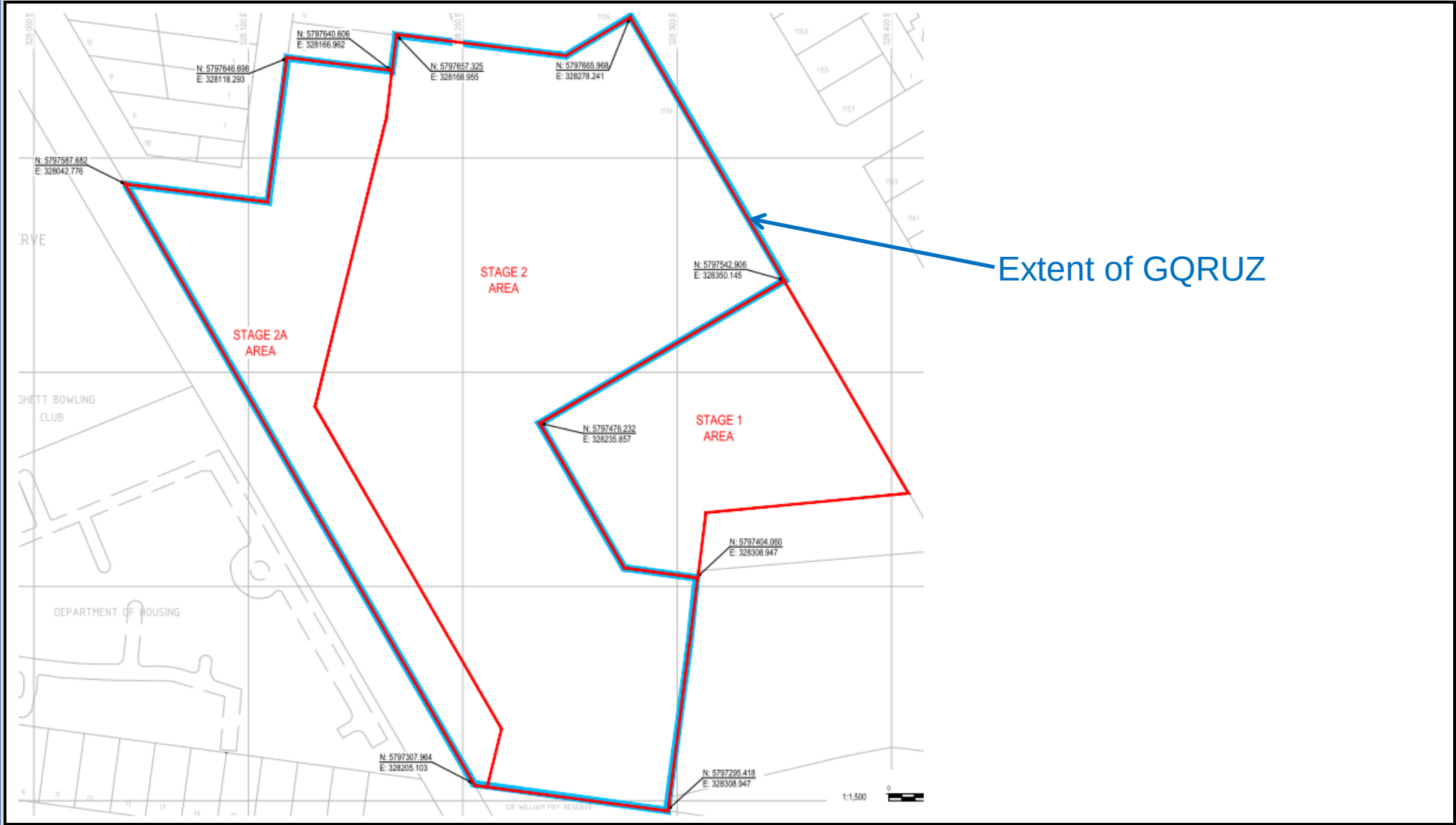
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Extent of GQRUZ



Source:
Golder, May 2010 CUTEP report

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ENVIRONMENT PROTECTION ACT 1970

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1. been requested by the Department of Treasury and Finance to issue a certificate of environmental audit in relation to the site located at **1136 - 1138 Nepean Highway Highett Stage 2A**, owned/occupied by the Department of Treasury and Finance (see **Figure 1** attached to this Statement).
2. had regard to, among other things,
 - i) guidelines issued by the Authority for the purposes of Part IXD of the Act,
 - ii) the beneficial uses that may be made of the site, and
 - iii) relevant State environment protection policies/ industrial waste management policies, namely
 - SEPP Prevention and Management of Contamination of Land
 - SEPP Groundwaters of Victoria
 - SEPP Waters of Victoria
 - Environmental Protection (Industrial Waste Resource) Regulations

in making a total assessment of the nature and extent of any harm or detriment caused to, or the risk of any possible harm or detriment which may be caused to, any beneficial use made of the site by any industrial processes or activity, waste or substance (including any chemical substance), and

3. completed an environmental audit report in accordance with Section 53X of the Act, a copy of which has been sent to the Authority and the relevant planning and responsible authority.

HEREBY STATE that I am of the opinion that

The site is suitable for the beneficial uses associated with:

- none (as indicated in **Figure 2** attached to this Statement).

subject to the following conditions attached thereto:

- a) Groundwater at the site is polluted. Groundwater must not be used for any beneficial use without prior testing and review of results by an environmental auditor (appointed under part IXD of the Environmental Protection Act 1970) to confirm its suitability for that use. It may be extracted for the purpose of environmental monitoring or remediation.
- b) Prior to 31 January 2012, the Groundwater Quality Management Plan (GQMP) formulated for the site and accepted by the environmental auditor must be implemented and maintained by the Department of Treasury and Finance and future owners of the site. The GQMP provides details on the groundwater monitoring program including, the monitoring wells to be sampled, laboratory analysis program, methodology, monitoring frequency, program duration, review procedure, reporting requirements and, roles and responsibilities.

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- e) Prior to 29 February 2012, an Environmental Management Plan (EMP) must be developed for the site by a suitably qualified professional and accepted by an environmental auditor appointed under Part IXD of the *Environment Protection Act 1970*, and this acceptance advised in writing to EPA and the planning authority.
- f) Prior to 15 March 2012, the Department of Treasury and Finance and future owners of the site must implement and maintain the EMP required by condition (e) of this Statement.
- g) No disturbance of soil shall be undertaken prior to the implementation of the EMP.

The condition of the site is detrimental or potentially detrimental to all beneficial uses of land. Accordingly, I have not issued a Certificate of Environmental Audit for the site in its current condition, the reasons for which are presented in the environmental audit report. The terms and conditions that need to be complied with before a Certificate of Environmental Audit may be issued are as set out as follows:

- Remediation of residual groundwater impacts associated with the site to the extent that relevant beneficial uses of groundwater are restored.
- Removal of all residual soil impacts below the site.

Other related information

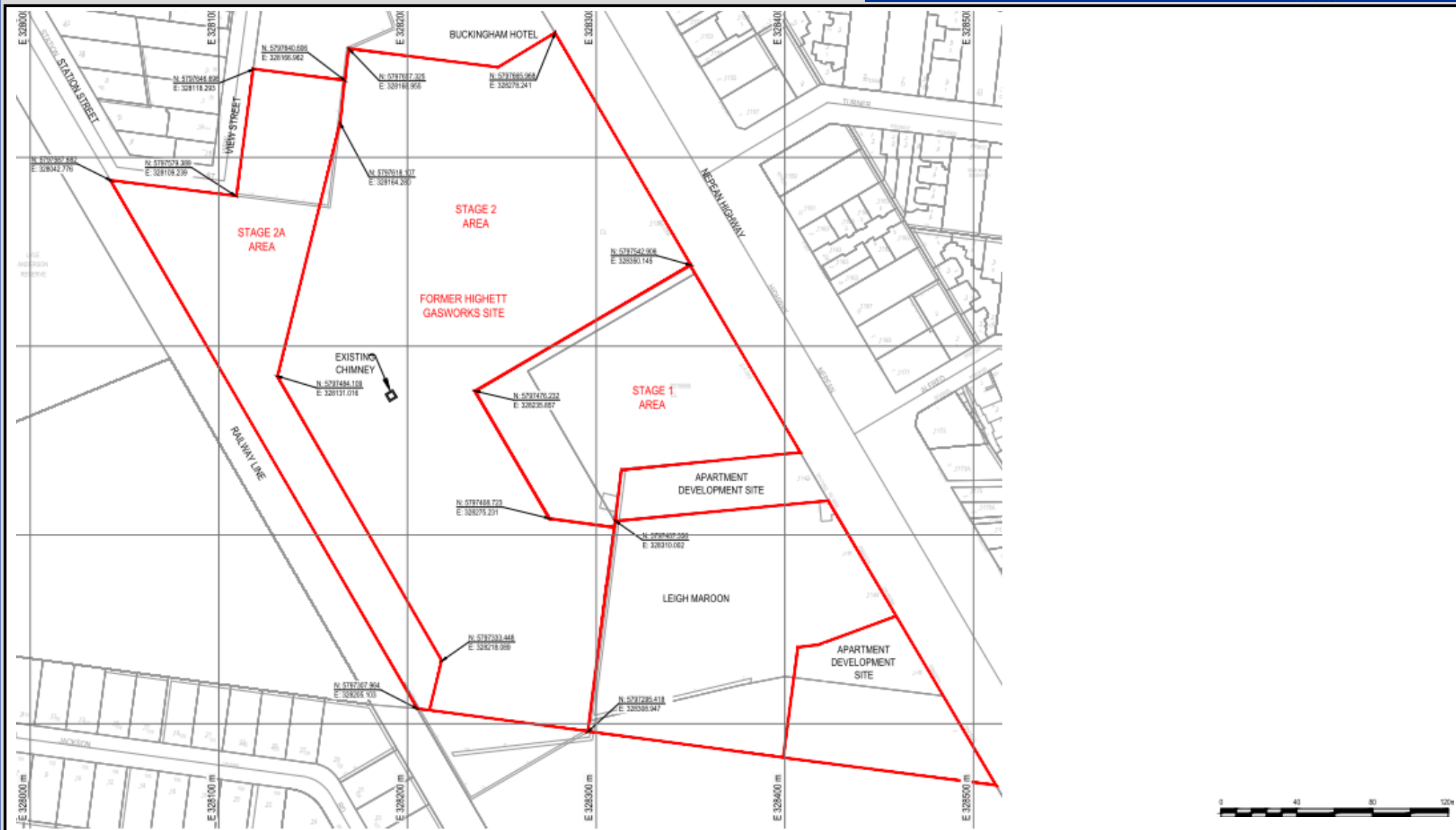
- The site (1136-1138 Nepean Highway Highett Stage 2A) is defined by the coordinates presented in the attached survey plan (**Figure 1** attached to this Statement).
- A separate Statement of Environmental Audit has been issued for the adjoining Stage 2 area.
- The Authority has determined that groundwater has been cleaned up to the extent practicable and the site is a groundwater quality restricted use zone (GQRUZ) (**Figure 3** attached to this Statement).
- Groundwater below the site is polluted and is not suitable for any beneficial use and should only be extracted for the purpose of environmental monitoring or remediation purposes.
- In accordance with clause 19(3) of the SEPP (Groundwaters of Victoria), the Authority may require periodic reassessment of the practicability of groundwater clean up.

This Statement forms part of environmental audit report *Parsons Brinckerhoff, 1136-1138 Nepean Highway Highett 3190 Victoria, (CARMS 37308-2) 2125064A-RPT001-A, 15 December 2011*. Further details regarding the condition of the site may be found in the environmental audit report.

DATED 15/12/2011

Signed: 

ENVIRONMENTAL AUDITOR



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APPROX. HORIZONTAL SCALE



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Golder, 22 July 2011



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Client
Department of Treasury & Finance

Project

Stage 2A
Statement of Audit

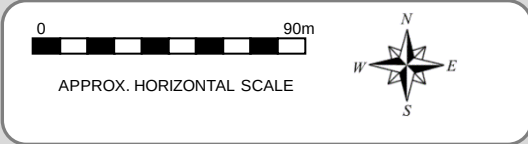
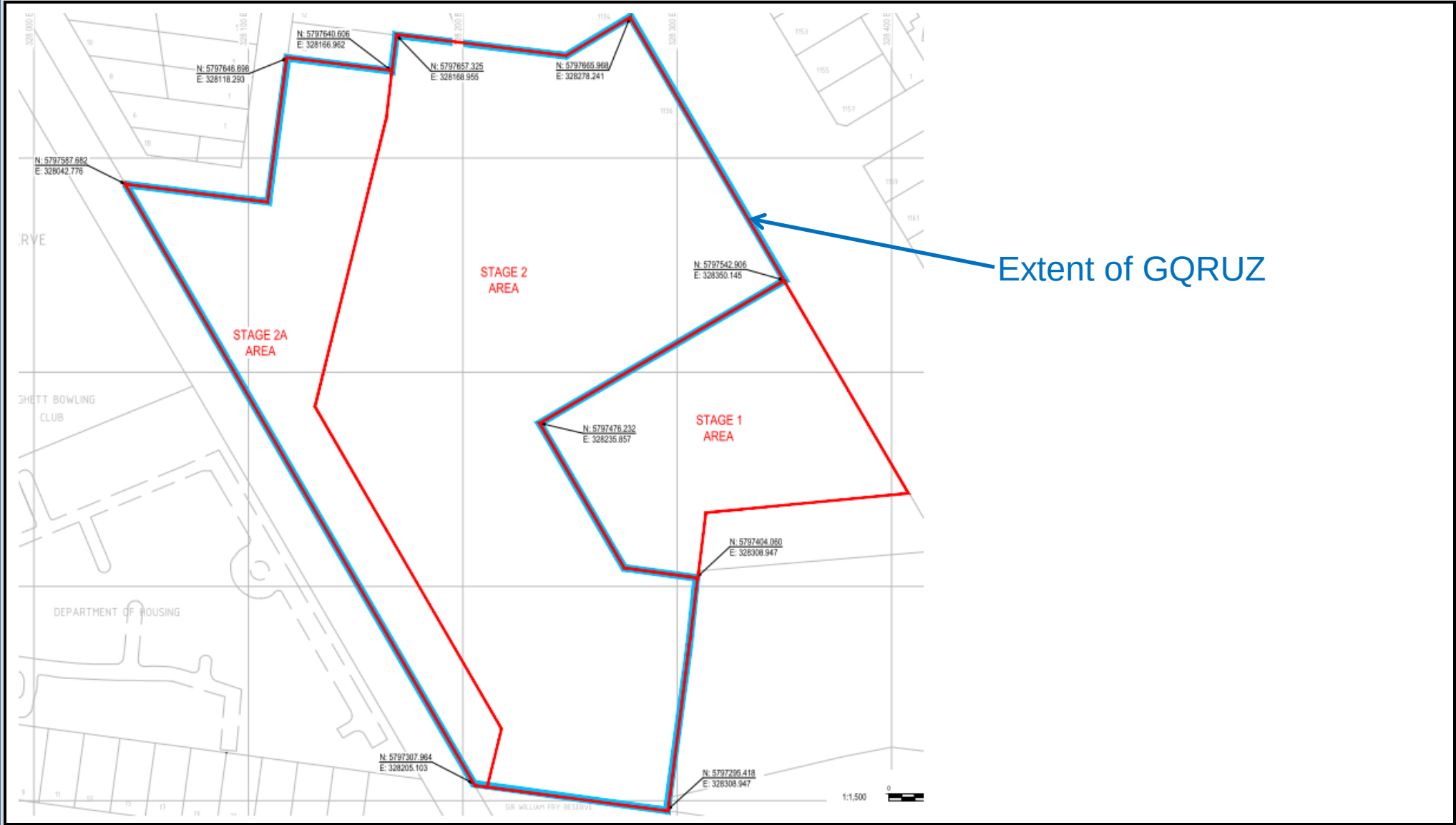
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Source:
Golder, May 2010 CUTEP report

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Client Department of Treasury & Finance	Job No. 2125064A
Project Stage 2A Statement of Audit	File Name 1 Rev. A



**FORMER HIGHETT GASWORKS
1138 NEPEAN HIGHWAY HIGHETT
VICTORIA**

GROUNDWATER QUALITY MANAGEMENT PLAN - STAGES 2 AND 2A Rev 2

REPORT



Report Number. 05613598-199-R-Rev2



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GROUNDWATER QUALITY MANAGEMENT PLAN

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GROUNDWATER QUALITY MANAGEMENT PLAN

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Figure 2	Remaining Boundary Contamination
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APPENDIX A EPA CUTEQ DETERMINATION

APPENDIX B REPORTS OF BOREHOLES AND WELL CONSTRUCTION DETAILS

APPENDIX C SUMMARY OF EXISTING GROUNDWATER DATA

APPENDIX D LIMITATIONS



GROUNDWATER QUALITY MANAGEMENT PLAN

Site Environmental Manager Details

The following table outlines the contact details for the Site Environmental Manager as defined by the GQMP:

Name	Organisation	Date Appointed	Contact Information
			Phone: Mobile: Email:
			Phone: Mobile: Email:
			Phone: Mobile: Email:
			Phone: Mobile: Email:

The contact details shall be updated in this plan should the Site Environmental Manager change.

Document Revision

The following table outlines the minor revisions made to this document:

Date	Nature of Revision	Editor
3 November 2011	Initial GQMP Issue	Golder Associates
15 November 2011	Revision of GQMP based on Auditor comments	Golder Associates
05 December 2011	Revision of GQMP based on Auditor comments	Golder Associates

Any complete revision of the document will be accompanied by a new revision number, i.e. 004, and date, in the upper right hand corner of all pages. All minor changes will be incorporated into this revision and the above table will be updated.



GROUNDWATER QUALITY MANAGEMENT PLAN

ABBREVIATIONS

ACLCA	-	Australian Contaminated Land Consultants Association
AHD	-	Australian Height Datum
APHA	-	American Public Health Association
CEMP	-	Construction Environmental Management Plan
CUTEP	-	Clean Up to the Extent Practicable
EIP	-	Environment Improvement Plan
EMP	-	Environmental Management Plan
EPA	-	Environment Protection Authority (Victoria)
GQMP	-	Groundwater Quality Management Plan
GQRUZ	-	Groundwater Quality Restricted Use Zone
IWMP	-	Industrial Waste Management Policy
MNA	-	Monitored Natural Attenuation
NATA	-	National Association of Testing Authorities
PAH	-	Polycyclic Aromatic Hydrocarbons
QA	-	Quality Assurance
SEPP	-	State Environment Protection Policy
SoEA	-	Statement of Environmental Audit
TDS	-	Total Dissolved Solids
TPH	-	Total Petroleum Hydrocarbons
USEPA	-	United States Environment Protection Agency



GROUNDWATER QUALITY MANAGEMENT PLAN

1.0 INTRODUCTION

1.1 General

This Groundwater Quality Management Plan (GQMP) has been prepared for implementation in the Stage 2 and 2A areas of the Former Highett Gasworks located at 1138 Nepean Highway, Highett (the site") (refer Figure 1).

The two areas have been the subject to assessment and remediation culminating in the determination of Clean Up to the Extent Practicable (CUTEP) by EPA on 8 November 2010 (Appendix A). It is now expected that Statements of Environmental Audit (SoEA) will be completed in November 2011 by Mr. John Throssell of Parsons Brinkerhoff Pty Ltd. (PB) indicating that Stage 2 is suitable for medium density residential and less sensitive uses and Stage 2A is suitable for commercial and less sensitive uses subject to a number of Conditions.

This GQMP has been developed to satisfy the conditions of the CUTEP and hence likely conditions of the SoEA..

1.2 Objectives

The objective of the GQMP is to inform site users including designers, contractors, owners and occupiers of the site conditions and control mechanisms for the management of known and potential human health and environmental risks associated with residual groundwater and soil vapour contamination at the site. Specifically the GQMP has been developed to:

- comply with the requirements of the EPA CUTEP determination and Environmental Audit conditions;
- assess changes in groundwater conditions that may indicate further contamination of the aquifer (above background levels);
- monitor for natural attenuation of the impacts; and
- ensure onsite groundwater contaminants of concern directly associated with the former use of the site as a gasworks, are not migrating offsite to the extent that offsite beneficial uses are placed at risk.

1.3 Overview

As part of the CUTEP determination, a Groundwater Quality Restricted Use Zone (GQRUZ) has been determined. It is expected that the GQRUZ will extend over the entire Stage 2 and Stage 2A site. The key conditions of the CUTEP determination (Appendix A) can be summarised as follows:

- Groundwater must not be extracted from the site for uses other than clean-up or monitoring.
- A Groundwater Quality Management Plan (GQMP) must be developed and implemented for the site to monitor and manage the residual groundwater contamination;
- The GQMP must indicate that a Section 53V audit is the appropriate mechanism for cessation of groundwater monitoring and management at the site;
- Offsite wells 913007 and 9130010 must be included in the monitoring network.

These items are addressed within this GQMP.



GROUNDWATER QUALITY MANAGEMENT PLAN

2.0 BACKGROUND INFORMATION

2.1 Groundwater Regulatory Framework

2.1.1 State Environment Protection Policy Groundwaters of Victoria

The State Environment Protection Policy (SEPP) Groundwaters of Victoria (SEPP Groundwater) (Reference 1) sets out the beneficial uses to be protected. The SEPP Groundwater classifies groundwater into five segments on the basis of background salinity (TDS) levels. Each segment has defined beneficial uses for protection, and the SEPP Groundwater specifies that all of these beneficial uses must be protected. Therefore, assessment of groundwater contamination must take into account all of these uses.

The SEPP Groundwater indicates that the EPA has the authority to establish Groundwater Quality Restricted Use Zones (GQRUZ) where one or more beneficial uses are precluded due to contamination. It also indicates that if such a zone is established then the groundwater within the zone must be managed to enable the groundwater to be contained within the restricted use zone and that the groundwater must be cleaned up to the extent practicable. The SEPP Groundwater also indicates that the practicability of the clean up must also be periodically reviewed.

2.1.2 Environment Protection Authority Publication 840

EPA Publication 840 "The Clean Up and Management of Polluted Groundwater" (Reference 4) indicates that where polluted groundwater has been identified, the EPA's role is to require clean up. If it is impracticable to clean up groundwater to the level needed to restore beneficial uses, EPA may accept that clean up to the extent practicable has occurred and that, subject to appropriate ongoing management, further clean up is not required. The Publication also establishes a method for determination of the practicability of clean up of the polluted groundwater.

Publication 840 indicates that management of polluted groundwater includes the following key components:

- Clean up objectives (that reflect clean up to the extent practicable);
- Groundwater monitoring;
- Trigger levels;
- A contingency plan;
- Controls on the use of polluted groundwater, including the provision of information to ensure that affected landholders or subsequent landholders are aware of the polluted groundwater and the beneficial uses that are precluded; and
- Periodic review of the practicability of groundwater clean up (to meet the SEPP Groundwater objectives) where this has previously been determined to be impracticable.

2.2 Surface Water Regulatory Framework

The State Environment Protection Policy (SEPP) Waters of Victoria (SEPP Water) (Reference 1) sets out the beneficial uses to be protected. The SEPP Water classifies surface waters into 12 segments based on geographical location. Each segment has defined beneficial uses for protection, and the SEPP Water specifies that all of these beneficial uses must be protected. Therefore, assessment of surface water contamination must take into account all of these uses.



2.3 Summary of Site Conditions

Details of the soil contamination status within Stages 2 and 2A are provided in the Golder Associates report "Environmental Site Assessment and remediation Report, Stage 2 Audit Area, Former Highett Gas Works 1136 Nepean Highway Highett" (Reference 9).

In summary, the site operated as a gas manufacturing facility between 1939 and 1969 and was the last gasworks site to be established in Victoria. The industrial operations associated with the gas manufacturing process have resulted in impacts to both soil and groundwater at the site. The key contaminants identified at the site include Monocyclic Aromatic Hydrocarbons (MAHs), Polycyclic Aromatic Hydrocarbons (PAHs), phenols, Total Recoverable Hydrocarbons (TRH), sulphates and sulphides and cyanide.

During the late 1970s the gasworks was in most part demolished and in the early 1980s a partial remediation of the site was undertaken prior to the site being redeveloped as the Scientific Services Department and Training Centre for the Gas and Fuel Corporation. Based on the available information it is estimated that the volume of previously remediated material was at least 28 000 m³.

Due to limitations in the extent of the remediation due to boundary (Figure 2), proximity to groundwater and remaining gas infrastructure material not meeting the adopted site criteria was assessed as part of a Human Health Risk Assessment (HHRA). This HHRA was based on the risk to indoor users from vapours emanating from the remaining soil. This HHRA found that the soil concentrations remaining at depth was unlikely to present an unacceptable vapour risk whilst the material remaining around the gas infrastructure presents an unacceptable risk.

2.4 Summary of Groundwater Contamination

A substantial amount of groundwater investigation has been undertaken on the site and the hydrogeological conditions on the site are considered to be adequately characterised. Details of the groundwater contamination status are provided in the "Information to Support Clean Up To The Extent Practicable, 1136 Nepean Highway Highett" (Reference 8).

In summary background information of the Brighton Group aquifer indicates that groundwater in general has a TDS of less than 1 000 mg/L, whilst the shallow groundwater at the site indicates TDS concentrations in the range of Segment A2 based on the SEPP.

Based on the adopted criteria groundwater at the site is contaminated with metals, PAHs, MAHs, cyanide, ammonia sulphate and phenol. Whilst offsite wells are contaminated with metals, cyanide, ammonia and sulphate. In general the data suggests that there are three main sources of contamination: the CWG Relief Holder in the northwest corner of the site and the tar dam and stockpiling area in the southern corner of the site.

To assess if natural attenuation of the contaminants of interest is occurring, the physical processes of adsorption and biodegradation were considered. In considering natural attenuation the two main sources of contamination: the northwest corner and the southern corner were considered.

The data from both the northwest and southern corners of the site suggests that groundwater contaminants are being attenuated due to the following evidence down gradient:

- A decrease in the concentrations of key contaminants at the source and downgradient.
- The progressive reducing nature of the groundwater chemistry
- A progressive shift in total ion composition towards a composition more representative of background.



2.5 Regulatory Outcomes for Site

2.5.1 Clean up to the Extent Practicable

Following the site remediation, the Environmental Auditor made a submission to the EPA on 02 June 2010 supporting that CUTEP had been achieved at the site. EPA responded on 08 November 2010 indicating that it had determined that CUTEP had been achieved and by declaring that the site is within a GQRUZ subject to a requirement that groundwater is monitored to support the demonstration of acceptable risks to groundwater following remediation.

Declaration of a Groundwater Quality Restricted Use Zone (GQRUZ) provides a mechanism to prevent groundwater extraction and therefore access to groundwater at the site by site owners, occupiers and third parties. EPA has established in Publication 862 *Groundwater Quality Restricted Use Zone* (July 2002) (Reference 5) that it is its policy when identifying a GQRUZ to “inform the relevant groundwater resource manager and retailer, the relevant local council, and where appropriate, directly affected landholders”. Control of access to groundwater is defined by the Water Act (1989) (Reference 12), which is administered by the Department of Sustainability and Environment (DSE) and Southern Rural Water (SRW). The method for the prevention of groundwater extraction is through Southern Rural Water who is responsible for permitting new wells for groundwater extraction via a licensing system. It is expected that a process initiated by EPA and the water authority will notify relevant stakeholders of the restrictions on groundwater extraction and controls the future access to groundwater at the site.

2.5.2 Statement of Environmental Audit

Mr. John Throssell, Environmental Auditor (Contaminated Land), is expected to issue two Statements of Environmental Audit for the site in November 2011. The SoEAs are expected to indicate that Stage 2 is suitable for medium density residential and less sensitive uses and Stage 2A is suitable for commercial and less sensitive uses subject to a number of Conditions.

3.0 MANAGEMENT RESPONSIBILITIES

3.1 Overall Responsibility

The ‘responsible party’ for the implementation of the GQMP will be the Department of Treasury and Finance or Subsequent Site owners. The responsible party will ensure that procedures in the GQMP and reporting requirements as set out in this document are adhered to.

It is recommended that a person is appointed by the ‘responsible party’ with the responsibility of implementing the GQMP and ensuring its compliance by all site users. It is recommended that such a person would assume the role of Site Environmental Manager for the site.

3.2 Site Owner

The site owner shall ensure that access to all monitoring wells at the site remains possible during the required monitoring periods and that wells shall be protected from damage.

In accordance with Section 53ZX of the Environment Protection Act (1970), all site occupants are required to be provided with a copy of the SoEA and the GQMP to alert them to the condition of the site including the restriction on groundwater use at the site. The site owner shall be responsible for this.

Any future owners and/or occupiers of the site should be informed, by provision of the SoEA, that the groundwater at the site is unsuitable for use.

Any future Conditions of Sale placed on transfer of site ownership must also make reference to the GQMP.



3.3 Site Environmental Manager

For the purposes of this document, the Site Environmental Manager shall be considered to be the party responsible for the day-to-day management of the GQMP. The name and contact details of the appointed Site Environmental Manager shall be nominated in the table on page iii) of this GQMP.

It is the Site Environmental Manager's responsibility to:

- Maintain all site records related to implementation of this GQMP.
- Ensure that the required parties such as the Environmental Consultant or the Environmental Auditor are engaged to implement the requirements of the GQMP.
- Ensure that all records as required under the GQMP are made available to the Environmental Consultant and the Environmental Auditor to complete reporting required under the GQMP.
- Manage the implementation of any recommendations made by those parties in relation to work undertaken in accordance with this GQMP.
- Inform the owner of any non-conformances with the procedures and requirements of this GQMP.
- Ensure that access to the groundwater monitoring wells within the designated monitoring network and ensure that the monitoring points are retained in a serviceable state.
- Provide all site occupants with a copy of the Statement of Environmental Audit and the GQMP to alert them to the condition of the site.

3.4 Site Occupier

It is the responsibility of the site occupier to ensure that access to the groundwater monitoring wells within the designated monitoring network is maintained and to ensure that the monitoring points remain in a serviceable state during their occupation of the site.

3.5 Environmental Consultant

Monitoring, response to issues and review and reporting activities must be conducted by a suitably trained and qualified environmental consultant. It is preferable that an Environmental Consultant be used from a company that is a member of the Australian Contaminated Land Consultants Association (ACLCA).

It is the Environmental Consultant's responsibility to:

- Plan, conduct and report on the GQMP activities in accordance with the GQMP and referenced guidance.
- Make recommendations for action arising from the monitoring.
- Notify Responsible Parties and the appointed Environmental Auditor ("Auditor") if the adopted trigger levels are exceeded.



GROUNDWATER QUALITY MANAGEMENT PLAN

3.6 Environmental Auditor

The role of the Environmental Auditor (which may or may not be one person over the life of the project) is to:

- Assess the data and associated recommendations provided by the Environmental Consultant to identify whether the GQMP has been adhered to.
- Assess whether the requirements for implementing the groundwater contingency plans have been met.
- Inform the EPA that groundwater or vapour contingency plans have been activated should this be the case.
- Review the contingency plans triggered by this GQMP.
- Review any proposed changes to the GQMP including the termination of vapour or groundwater monitoring under the GQMP.

3.7 Environment Protection Authority

It is the responsibility of the EPA to:

- Review the status of the CUTEP and GQRUZ determined for the site.

Determine if and when implementation of the groundwater monitoring under the GQMP can be ceased using the relevant process at the time.

4.0 GENERAL MANAGEMENT

4.1 General Environmental Management

Good environmental management procedures should be followed by all contractors and consultants working on the site. It is the responsibility of the site contractors to manage their works to minimise potential impacts on the site and the surrounding environment. Such procedures shall include:

- Appropriate chemical and fuel storage.
- Refuelling of equipment to reduce the risk of spillage.
- Appropriate waste control and disposal methods.
- Minimising dust generation.
- Minimising offsite tracking of soil.
- Control, management and discharge of site stormwater.

To manage these obligations, it is preferable (and good practice) that site contractors develop a Construction Health Safety and Environmental Management Plan (CHSEMP) for the site. Such a CHSEMP should reflect the requirements of this GQMP as well as EPA guidance such as the general principles outlined in "Environmental Guidelines for Major Construction Sites", Best Practice Environmental Management Series, EPA Publication 480, February 1996.

The above environmental management obligations are common to all development sites in Victoria and so have not been further documented as part of this GQMP.

The environmental management procedures adopted for the works shall be documented by the contractor in accordance and a record kept by the Site Environmental Manager in accordance with this GQMP.



4.2 Occupational Health and Safety

The Statutory Environmental Audit process considers the health and safety effects of remaining chemicals in soil at the site. However, managers, contractors and subcontractors who work on this site remain responsible for all health and safety issues associated with their activities. A Construction Health Safety and Environmental Management Plan (CHSEMP) should be prepared for works on the site with the involvement of an occupational hygienist. The Plan should consider potential risks posed by the soil and groundwater on the site.

As part of the site induction for all workers or people visiting the site, the specific health and safety issues for the site shall be outlined by the Contractor as well as the existence and requirements of this GQMP.

5.0 GROUNDWATER QUALITY MANAGEMENT PLAN

5.1 Aim of Groundwater Monitoring

The aim of the groundwater monitoring as part of this GQMP is to confirm that the groundwater results following completion of site remediation remain stable or reduce from those results obtained to support the completion of the Environmental Audit.

5.2 Extraction of Groundwater

Groundwater must not be extracted from within the site for any other purpose than monitoring or clean up. The extraction of groundwater requires the issuing of a license by the relevant authority in this case Southern Rural Water. The identification by EPA that the site is in a Groundwater Quality Restricted Use Zone (GQRUZ) should prevent the future issuing of any extractive license within the GQRUZ.

Where groundwater is extracted, it must be disposed of in accordance with Victorian EPA guidelines with testing as appropriate.

5.3 Maintenance of Well Network

To protect the groundwater monitoring wells from damage they shall be highlighted and fenced-off where necessary. All contractors and owners shall be made aware of the location of the groundwater monitoring wells by the Site Environmental Manager.

Should any of the monitoring wells become damaged or be found to be in an inappropriate location for the development, the existing well shall be decommissioned in accordance with the Water Act (1989). The well shall be replaced to an equivalent depth, screen interval and construction standard to the damaged/ decommissioned well. Should any changes to this be required, the Environmental Consultant shall review any replacement location or change in construction of the replacement well. The replacement well shall be installed by a licensed driller and registered in accordance with the Water Act (1989). All borelogs for the monitoring well network are included in Appendix B of this GQMP.

Material excavated from the site must be sampled at a rate set by an Environmental Consultant with consideration of EPA Industrial Waste Regulation Guidelines (IWRG) 702 and analysed for parameters shown in Table 2 of EPA IWRG 621. Once the soil is categorised, it may be disposed offsite to a landfill or treatment facility subject to EPA regulations.

Following installation, the well location and measuring point level shall be resurveyed and the GQMP updated with this information and the borelog (Appendix B).



GROUNDWATER QUALITY MANAGEMENT PLAN

5.4 Groundwater Monitoring

5.4.1 Network and Monitoring Frequency

The groundwater monitoring wells to be monitored as part of the GQMP are presented in Table 1 and shown on Figure 3.

All compliance wells in Table 1 shall be dipped for groundwater level on a yearly basis, prior to any sampling. Sampling of the wells will also occur on a yearly basis as identified in Table 1. It is expected that all other wells located on the site have been decommissioned in accordance with the Water Act (1989).

Table 1: Summary of Compliance Well Locations

Well	Easting	Northing	# RL of TOC	Screen Interval (m BGL)	Depth of Borehole (m BGL)
9010001	328083.5	5797528	37.873	5.1-9.1	10
9020001	328113.6	5797469	38.043	5.5-10.1	10.1
9030002	328158.8	5797392	38.236	5.9-9.9	10
9050001	328213.2	5797312	38.01	5.9-9.9	11
9120001**	328276.1	5797613	41.42	9.9-13.9	13.9
9130003	328055.6	5797409	36.207	6.0-10.0	10
9130005	328156.9	5797340	35.537	4.0-10.1	10.1
9130006	328043.3	5797534	35.644	4.2-10.2	10.2
9130007	328139.8	5797278	34.06	4.5-10.5	10.5
9130010	328256.4	5797284	38.072	6.0-10.0	10
9130011	328027.7	5797556	35.645	5.0-11.0	11
9140003	328264.4	5797385	38.301	5.0-10.0	10
9140005	328236.1	5797376	38.16	5.2-8.2	11
9140006	328208.8	5797330	37.952	5.0-10.0	10
9140007	328199.0	5797576	39.953	6.0-11.0	12
9140008	328058.2	5797584	38.473	6.0-10.0	10
9150001	328065.3	5797560	38.014	14.8-17.8	17.8
9150002	328263.1	5797384	38.149	16.4-19.4	19.4
9150003	328235.2	5797376	38.132	17.5-20.5	20.5
BH6	328063.8	5797562	37.933	7.5-10.5	10.5
BHF35	328158.3	5797442	38.327	4.3-10.3	10.3

NOTES:

AHD: Australian Height Datum,
 TOC: Top of Casing
 BGL: Below Ground Level (post remediation surface levels)
 Eastings and Northings, AMG Coordinate System
 # RL to TOC may change for many of the above monitoring wells due to shortening of monitoring wells based on changes in surface topography.
 ** Well considered to be reflective of background conditions

5.4.2 Sampling Procedures

All groundwater monitoring will be undertaken in accordance with EPA's Groundwater Sampling Guidelines (Reference 3) using low flow sampling techniques, including amendments or replacement guidelines that may be published in the future. Procedures used shall include appropriate consideration of sampling methods and decontamination procedures.

A groundwater sampling plan including health, safety and environmental procedures shall be prepared by a suitably qualified environmental consultant prior to the commencement of groundwater sampling.

During each monitoring round, prior to groundwater sampling of any of the nominated groundwater monitoring wells, groundwater depth measurements will be undertaken. Depths will be measured from the same point at the top of each well casing (i.e. to the point to which the wells have been surveyed).



GROUNDWATER QUALITY MANAGEMENT PLAN

During purging and immediately prior to samples being collected from the monitoring wells field parameters of electrical conductivity, temperature, redox potential, dissolved oxygen and pH will be measured and recorded.

All field parameter measurements shall be recorded on a sampling record form such as that presented in Appendix C of the EPA Groundwater Sampling Guidelines (Reference 3). The completed sampling record form shall be included as part of the reporting of the monitoring event.

Samples from all monitoring wells shall be transported to the laboratory under chain-of-custody procedures. A copy of the chain-of-custody forms shall be included as part of the reporting of the monitoring event.

5.4.3 Analytical Plan

Samples from all monitoring wells shall be transported to the analytical laboratory under chain-of-custody procedures. A copy of the chain-of-custody form shall be included as part of the reporting of the monitoring event.

All samples will be analysed for:

- Total Petroleum Hydrocarbons (TPH)
- Monocyclic Aromatic Hydrocarbons (MAH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Cyanide (total)
- Sulphate
- Metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn)
- Ammonia
- Nitrate
- Phenolic compounds.
- Natural attenuation parameters (nitrate, sulphate, Ferrous Iron, Methane)
- Major anions and cations

5.4.4 Analytical Procedures

The analytical methods will comply with USEPA, APHA, EPA Victoria or equivalent methods. The laboratory as part of their reporting procedures shall state these. All laboratories must be NATA endorsed for the analyses undertaken.

All Certificates of Analysis received from the primary and secondary laboratories shall be presented as part of the reporting for each monitoring event. The reporting limits used by both the primary and secondary laboratories shall be less than or equal to the following:



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Table 2: Laboratory Reporting Limits

Parameter Group	Maximum Laboratory Reporting Limit (mg/L)
Total Petroleum Hydrocarbons (TPH)	0.02
Monocyclic Aromatic Hydrocarbons (MAH)	0.001
Polycyclic Aromatic Hydrocarbons (PAH)	0.001
Cyanide (total)	0.005
Sulphate	1
Ammonia	0.01
Nitrate	0.01
Phenolic Compounds	0.001

5.4.5 QC Procedures

A data quality plan shall be implemented as part of the monitoring program. As a minimum, the following shall be undertaken:

- Documentation of the sampling methodology undertaken against sampling and field contamination procedures.
- Field duplicates and field splits shall be collected at a rate of 5 percent of Primary samples. All duplicates will be analysed for the same range of analytes as the primary sample.
- A wash blank will also be collected for every day of sampling during each sampling event and will be analysed for the same range of analytes as the primary sample.
- The laboratories used for the groundwater analytical works shall implement a full quality assurance program including the analysis of internal spikes, duplicates and method blanks.
- The QA results shall be reported in terms of completeness. The target completeness shall be 95%. An assessment of the reasons for non-conformances with this target shall be reported and data qualifiers used should issues be found.

5.5 Compliance Targets

The compliance targets have been developed based on the historical data for the site with the view that the groundwater contamination profile should comply with the SEPP Groundwater so that the protected beneficial uses of groundwater for the area are maintained. The compliance targets for the site are shown in Table 7. For analytes copper, nickel, zinc and nitrate where the background concentrations are considered to exceed the criteria outlined in the SEPP, background concentrations¹ shall be considered as part of the compliance target and these are outlined in Table 7 below.

It should be noted that should the regulator requirements alter in the future, these criteria may require revision to ensure that all relevant guidelines are complied with.

Should the compliance targets be reached, no further groundwater monitoring would be expected to be required. This is subject to the requirements of Section 8 of this GQMP.

¹ These concentrations have been based on the maximum observed level in wells 9130009, 9120001 and BH1. Should the concentrations observed in these wells increase in the future the compliance target should be adjusted to reflect these increases.



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Table 3: Groundwater Compliance Targets

Chemical	Maintenance of Ecosystems (mg/L)	Groundwater Extractive Use Criteria (mg/L)				Background Concentration (mg/L)
	Aquatic (Marine) Ecosystems (95% Protection)	Potable Water Supply	Primary Contact Recreation	Irrigation	Stock Watering	
Inorganics						
Arsenic	0.0023 ^B	0.007	0.05	0.1	0.5	
Cadmium	0.0055 ^E	0.002	0.005	0.01	0.01	
Chromium (Total)	0.0274	0.05	0.05	0.1	1	
Copper	0.0013	2	1	0.2	0.4 ^A	0.053
Lead	0.0044	0.01	0.05		0.1	
Mercury	0.0004 ^B	0.001	0.001	0.002	0.002	
Nickel	0.070	0.1	0.1	0.2	1	0.23
Zinc	0.015 ^D	3.0	5	2	20	0.29
Sulphate (as SO ₄)		250	400			
Ammonia (as N)	0.9	0.5	0.01			
Nitrate (as N)	7.0 ^I	11	10		30	14
Cyanide (Total)	0.004 ^F	0.08	0.1			
Other Organics						
Naphthalene	0.070					
Anthracene	0.0004 ^B					
Phenanthrene	0.0006 ^B					
Fluoranthene	0.001 ^B					
Benzo(a)pyrene	0.0001 ^B	0.00001	0.00001			
Total PAH	0.003 ^H					
TPH (>C ₉)	10 ^H		0.6			
Benzene	0.7	0.001	0.001 ^G			
Toluene	0.18	0.8 ^G	0.8 ^G			
Ethyl Benzene	0.005	0.3 ^G	0.3 ^G			
Xylenes	0.075	0.6 ^G	0.6 ^G			
Styrene		0.03 ^G	0.03 ^G			
2 Chlorophenol	ID		0.3			
2 4 Dichlorophenol	0.16 ^D		0.2			
2 4 6 Trichlorophenol	ID	0.01	0.02			
Pentachlorophenol	0.022	0.01	0.01			
2 3 4 6 Tetrachlorophenol	ID	0.001	0.001			
Phenol	0.40		0.05 ^H			

Notes:

A – the criteria used was the most sensitive criteria for the range of criteria for a variety of livestock.

B – Note that chemicals marked (B) are based on low reliability toxicity and should be used with caution.

D – May not protect key test species from chronic toxicity.

E – The values have been calculated using a hardness of 30 mg/L CaCO₃.

F – Based on ANZECC 2000 data for fresh and marine waters.

G – Based on 1996 Australian Drinking Water Guidelines for health but not protective of aesthetics (Reference 11).

H – NSW EPA Guidelines for Assessing Service Station Sites – value based on odour and aesthetics, due to formation of visible sheen.

I – Further to the adopted criteria for nitrate, it is noted that the Errata slip in ANZECC (2000) states that "Page 3.4-5, Table 3.4.1, Nitrate - "Delete all trigger values and replace with "Under review"". This means that the nitrate (as N) ecosystem criterion of 0.158 mg/L adopted by Golder for this project is now considered uncertain.

Golder has sourced a Memorandum available on the Ministry for the Environment New Zealand website as "Important information for users deriving aquatic ecosystem trigger values for nitrate" dated 30 September 2002 by National Institute of Water & Atmospheric Research Ltd. It recommends a Nitrate-N guideline (95%) of 7.0 mg/L. This criterion was derived using ANZECC (2000) methods and so is considered likely to be suitable for use in Victoria. It has been recommended as part of this report that the Auditor review the basis for the nitrate criteria used for this project with a view to adopting 7.2 mg/L (nitrate as N) as the compliance target.

ID – Insufficient data to derive a reliable trigger value.



5.6 Trigger Conditions

The results of the groundwater monitoring shall be reviewed after each compliance sampling event and consider the following changes to site conditions:

- 1) An observed change in groundwater flow direction.
- 2) An observed increase in groundwater concentration of greater than 10 per cent per round over two consecutive compliance monitoring events in any one well for a parameter exceeding the compliance targets outlined in Table 7.

Should any of the above occur; the contingency plan will be triggered and implemented.

The results of monitoring and management shall be reviewed after each sampling event and assessed against the trigger conditions shown in Section 5.7 below. Should any of the trigger conditions be met, the initial actions shown in Section 5.7 shall be enacted.

5.7 Groundwater Contingency Plan

If any of the Trigger Conditions are reached during routine monitoring, the following process shall be undertaken in order to assess the significance of the issue and to implement contingency measures if required.

- 1) Groundwater monitoring frequency (of all compliance wells) shall be increased to monthly for a minimum period of three months to assess if there is a trend in the issues noted.
- 2) If no trend is found and no further issue is noted, then the standard monitoring frequency shall be reinstated.
- 3) Should a trend of non-compliance be found, then the Environmental Consultant shall further assess the issue and develop a management or remediation plan for the groundwater. An Environmental Auditor shall be appointed to assess this plan.
- 4) Upon agreement, the plan shall be implemented.

5.8 Reporting of Groundwater Monitoring

5.8.1 Site Data

A copy of the existing site data used to support the Environmental Audit for the site is attached as Appendix C for use in reporting of subsequent monitoring. Table E presents groundwater level information for wells in the monitoring network together with the groundwater analytical data for wells in the monitoring network.

An electronic database shall be maintained by the Site Owner (initially DTF) of all historic sampling events. As each additional sampling event is conducted, the Environmental Consultant shall update this database for future reference of the Site Owner.



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5.8.2 Reporting of a Monitoring Event

The monitoring data will be collected and compiled by the Environmental Consultant after each sampling event (yearly). A report along with the tabulated results of all the monitoring wells will be provided to the Site Owner at this time. The Site Owner shall also make a copy of this information available to the site occupier. The report shall set out:

- The scope of monitoring works undertaken.
- The sampling and analytical procedures followed.
- The field data collected and field sampling records.
- The chain-of-custody forms.
- The Certificates of Laboratory Analysis.
- Tabulated data of the groundwater depths and levels.
- Tabulated summaries of the field parameters measured and the groundwater analytical data.
- An assessment of trends in the compliance contaminants.
- An assessment of data quality in terms of completeness using the data quality objectives set out in AS4482.1-2005 (Reference 2). Any problems with the final analytical data shall be identified and corrective action will be taken and documented where such problems are identified.
- An assessment of the data against the compliance and trigger levels set in the GQMP.
- Groundwater elevations including flow direction and calculated gradients and estimated groundwater flow velocities.
- Recommendations for additional action and implementation of contingency actions in accordance with the GQMP.

The reports shall be made available to the Site Owner and Site Occupants.

5.9 Damage or Moving of Groundwater Compliance Wells

The monitoring network may be required to fit into the development plans for the site. If the development requires that any of the monitoring wells need to be moved due to their location, the well should be replaced in a similar location that fits in with the development plans, if possible. The final locations of the monitoring points to be moved will require Auditor agreement prior to installation.

The monitoring network and frequency of sampling shall be periodically reviewed by an Environmental Auditor (Contaminated Land) in accordance with this GQMP and it is expected that with time the number of wells required to be sampled will decrease.

Should any of the monitoring wells become damaged or need to be replaced, the existing well shall be decommissioned in accordance with the Water Act (1989). The well shall be replaced to an equivalent depth, screen interval and construction standard to the damaged well. The replacement well shall be installed by a licensed driller and registered in accordance with the Water Act (1989). The well location and measuring point level shall be resurveyed and this GQMP updated. The borelog for the well shall be completed and form part of the reporting for the sampling event.

The borelogs and well construction details for the monitoring wells to be sampled as part of this GQMP are provided in Appendix B.



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6.0 REVIEW OF GQMP DATA

6.1 Records of Monitoring and Inspection

The originals of all monitoring reports and actions taken under this GQMP shall be kept in one place at a location nominated by the Site Owner so that the information can be easily reviewed.

6.2 Review by an Environmental Auditor (Contaminated Land)

The monitoring reports prepared by the consultant shall be submitted to an EPA appointed Environmental Auditor (Contaminated Land) for review after the initial two years of monitoring at the site or if any of the trigger conditions are met.

The Environmental Auditor (Contaminated Land) shall review the data and provide an opinion as to whether any significant change has occurred in the status of the vapour or groundwater pollution at the site and assess whether trigger levels have been reached. The Environmental Auditor (Contaminated Land) shall also provide any recommendations for change to the monitoring program or for further actions deemed necessary to be undertaken based on the available information. Any suggested changes as an outcome of the review would require a revision of the GQMP and approval by the Environmental Auditor.

The Auditor shall prepare a review confirming the required actions for the groundwater monitoring and management or recommending alternative actions if appropriate. The time for the next period of Auditor review would also be set at this time by the Auditor.

The outcomes and recommendations of the review shall be provided to the Site Owner and Site Occupants.

6.3 Review by EPA

The EPA may review the practicality of clean up of the groundwater in accordance with clause 19 (3) of the SEPP Groundwater (Reference 13) and require additional assessment, management or remediation actions to be undertaken.

The EPA will also need to be part of any review aimed at ceasing all or some of the monitoring components in the GQMP as set out below.

7.0 CLOSURE OF THE GQMP

The potential exists for the closure and cessation of GQMP activities associated with the groundwater. The requirements for the closure of the groundwater monitoring are as follows:

- 1) All of the compliance targets for groundwater outlined in Table 7 have been met on and off the site in two consecutive monitoring rounds. That is the beneficial uses of the groundwater on and off the site have been restored to the satisfaction of an Environmental Auditor appointed pursuant to the Environment Protection Act 1970 and the EPA. **OR**

Through risk assessment, the risks posed to protected beneficial uses of groundwater on and offsite for which the groundwater concentrations still exceed the compliance targets outlined in Table 7 are shown to be acceptable to the satisfaction of an Environmental Auditor appointed pursuant to the Environment Protection Act 1970 and the EPA.

- 2) By agreement with an Environmental Auditor and the EPA that the aims of the groundwater monitoring as set out in this GQMP have been met. This will need to be demonstrated through completion of an Environmental Audit in accordance with Section 53V of the EP Act.



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Closure of the GQMP related to groundwater monitoring or other selected activities within the Plan shall be documented by a letter from EPA indicating that GQMP procedures can be ceased at the site. All wells no longer required for monitoring shall be decommissioned in accordance with the Water Act (1989).

8.0 LIMITATIONS

Your attention is drawn to the “Limitations” include in Appendix D. The statements presented in that attachment are intended to advise you of what your realistic expectations of this report should be. That information is not intended to reduce the level of responsibility accepted by Golder Associates, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

9.0 REFERENCES

- Reference 1 Australian and New Zealand Environment and Conservation Council, 1992 (ANZECC), Australian Water Quality Guidelines for Fresh and Marine Waters. Canberra, November 1992.
- Reference 2 Australian Standard AS 4482.1-2005 Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1 : Non-volatile and Semi-volatile Compounds, 2005
- Reference 3 Environment Protection Authority, Victoria (April 2000). Groundwater Sampling Guidelines, EPA Publication 669
- Reference 4 Environment Protection Authority, Victoria (April 2002) The Clean Up and Management of Polluted Groundwater, EPA Publication 840.
- Reference 5 Environment Protection Authority, Victoria (July 2002) Groundwater Quality Restricted Use Zone, EPA Publication 862.
- Reference 6 Environment Protection Authority, Victoria (June 2009). Environment Protection (Industrial Waste Resource) Regulations 2009
- Reference 7 Golder Associates (2009b) “*Human Health Risk Assessment, Highett Gasworks Site, 1136-1138 Nepean Highway Highett, Victoria*” October 2009 Report No. 05613598/131 Rev1
- Reference 8 Golder Associates (May 2010) “Information to Support Clean Up To The Extent (Version 5, Former Highett Gas Works 1136 Nepean Highway Highett, Victoria)” (05613598-182-R-Rev0)
- Reference 9 Golder Associates (09 July 2010) “Environmental Site Assessment and remediation Report, Stage 2 Audit Area, Former Highett Gas Works 1136 Nepean Highway Highett, Victoria”
- Reference 10 Golder Associates (2011) “Human Health Risk Assessment of Class 2 Material Below Buildings, Former Highett Gasworks, 1136-1138 Nepean Highway Highett, Victoria” January 2011 (05613598-190-R-Rev 0)
- Reference 11 National Health and Medical Research Council & Agriculture and Resource Management Council of Australia and New Zealand (NHMRC) (1996) Australian Drinking Water Guidelines. 1996.
- Reference 12 State Government of Victoria (1989) Water Act, Amendments July 2004.
- Reference 13 State Government of Victoria (1997) State Environment Protection Policy (Groundwaters of Victoria), Victoria Government Gazette No S160 Wednesday 17 December 1997.
- Reference 14 State Government of Victoria (2002) State Environment Protection Policy (Prevention and Management of Contamination of Land) no. s95 4 June 2002.



Report Signature Page

GOLDER ASSOCIATES PTY LTD

A handwritten signature in blue ink, reading "Natalie McKay".

Natalie McKay
Senior Environmental Engineer

A handwritten signature in blue ink, reading "Ian Kluckow".

Ian Kluckow
Principal

NRM/IMK/nrm

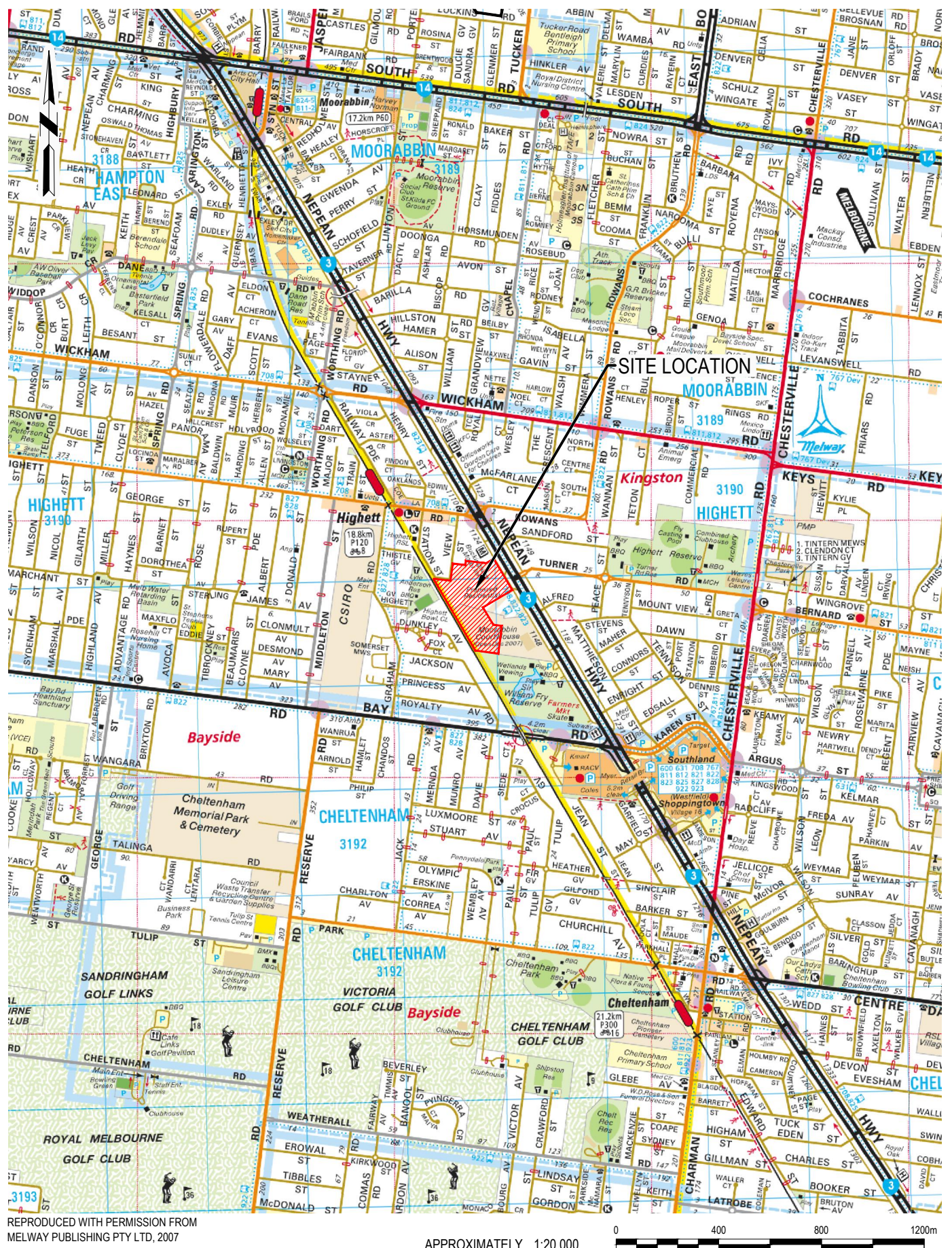
A.B.N. 64 006 107 857

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FIGURES



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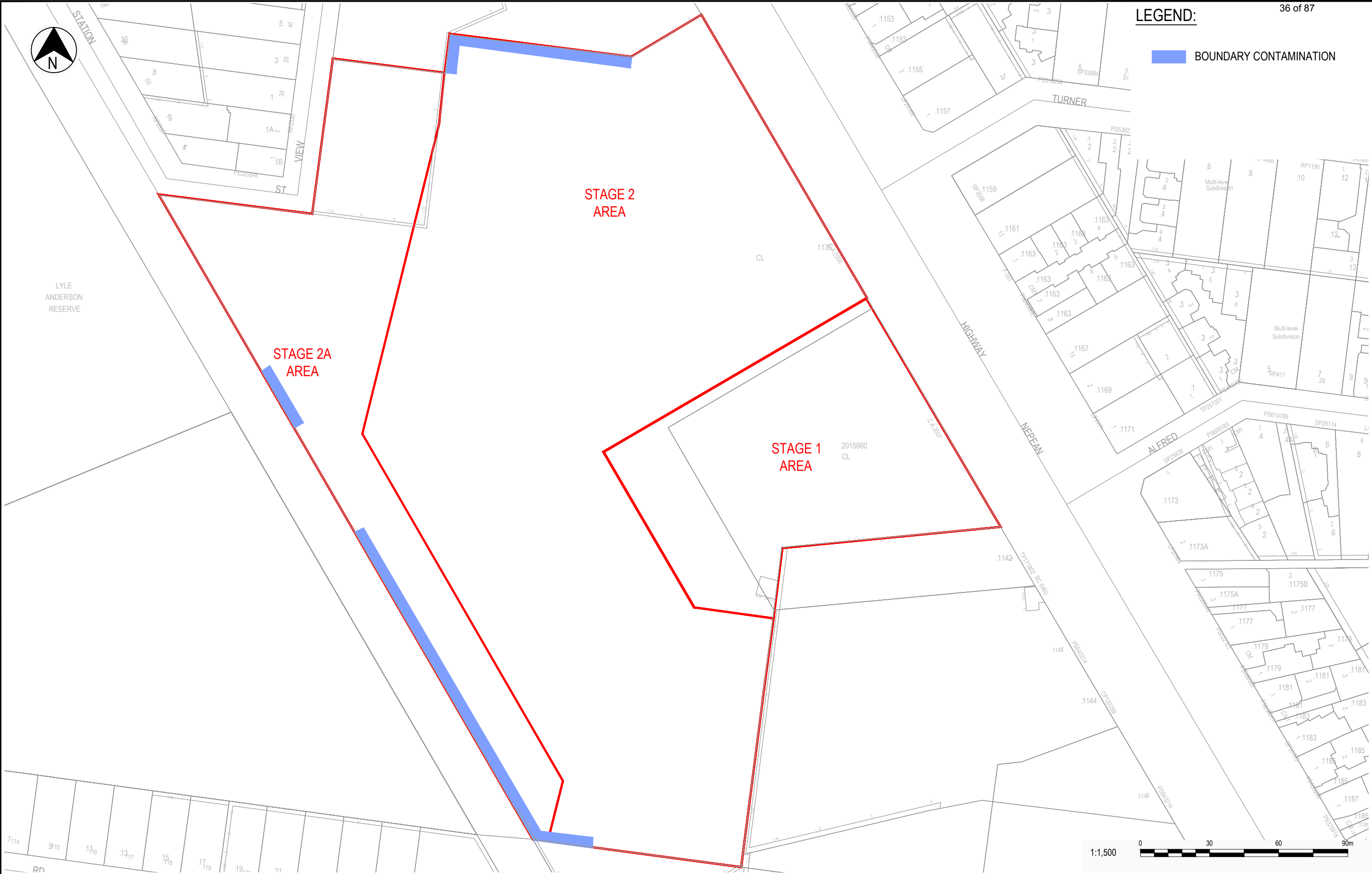
CLIENT	DEPT. OF TREASURY & FINANCE
DRAWN	JC/MLL 06.05.10
CHECKED	NRC 06.05.10
SCALE	APPROX. 1:20,000

PROJECT	HIGHETT GASWORKS REMEDIATION
TITLE	SITE LOCALITY PLAN
PROJECT No	05613598/F438
FIGURE No	FIGURE 1

REV No

LEGEND:

BOUNDARY CONTAMINATION



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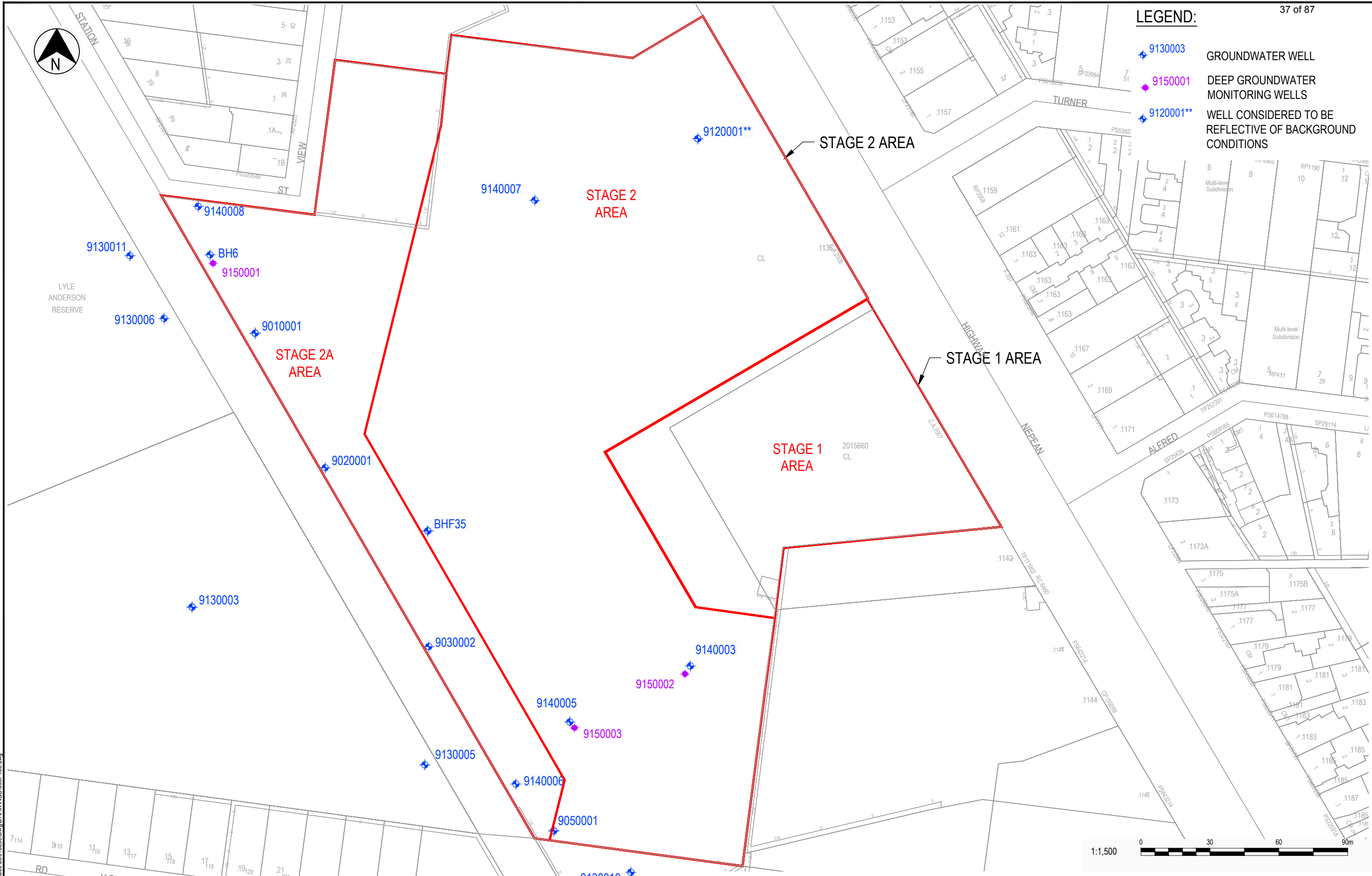


Golder Associates
Building 7, Botanica Corporate Park,
570 - 588 Swan Street, Richmond, Victoria 3121
Telephone (03) 8862 3500 Facsimile (03) 8862 3501

CLIENT DEPT. OF TREASURY AND FINANCE		PROJECT HIGHTT GAS WORKS REMEDIATION	
DRAWN JC/MLL	15.11.11	TITLE REMAINING CONTAMINATION ON SITE BOUNDARY	
CHECKED NRM	15.11.11		
SCALE 1:500	A3	PROJECT No 05613598/F464	FIGURE No FIGURE 2

LEGEND:

- 9130003 GROUNDWATER WELL
- 9150001 DEEP GROUNDWATER MONITORING WELLS
- 9120001** WELL CONSIDERED TO BE REFLECTIVE OF BACKGROUND CONDITIONS



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CLIENT DEPT. OF TREASURY AND FINANCE		PROJECT HIGHTT GAS WORKS REMEDIATION	
DRAWN JC/MLL	05.12.11	TITLE GROUNDWATER MONITORING WELL LOCATIONS	
CHECKED NRM	05.12.11		
SCALE 1:500	A3	PROJECT No 05613598/F466	FIGURE No FIGURE 3



APPENDIX A

EPA CUTEF DETERMINATION

8 November 2010

Our Ref: 37308-2

John Throssell
Parsons Brinckerhoff Pty Ltd
P O Box 19016
Southbank VIC 3006

Dear John Throssell,

**CLEAN UP OF GROUNDWATER TO THE EXTENT
PRACTICABLE – 1136 NEPEAN HIGHWAY, HIGHTT**

Thank you for your correspondence dated 27 May 2010, and subsequent additional information, requesting advice as to whether the Environment Protection Authority ("the Authority") is satisfied that groundwater pollution has been cleaned up to the extent practicable at the above site.

Pursuant to Clause 19 of the *State environment protection policy (Groundwaters of Victoria)* ("SEPP (GoV)"), the Authority on 3 November 2010 determined that:

1. groundwater pollution at the site has been cleaned up to the extent practicable; and
2. the site is a Groundwater Quality Restricted Use Zone ("GQRUZ").

In finalising the environmental audit for this site, you must ensure that the following are included in the Statement of Environmental Audit ("SoEA"):

- (1) a condition restricting groundwater use for existing and potential precluded extractive beneficial uses of groundwater;
- (2) a condition with sufficient detail to make clear the required ongoing monitoring and management;
- (3) a condition requiring compliance with a groundwater quality management plan;
- (4) as an attachment to the SoEA, a detailed groundwater quality management plan (GQMP) identifying a s.53V audit as the appropriate mechanism for cessation of the groundwater management and monitoring;
- (5) in the "other related information" section
 - i. a note that the Authority has determined that:
 - a. groundwater has been cleaned up to the extent practicable, and
 - b. the site is a GQRUZ;
 - ii. information relating to the pollution of groundwater such as a list of beneficial uses of groundwater for which you consider the site suitable; and

Lvl 3, 200 Victoria Street
Carlton
Victoria 3053
GPO Box 4395
Melbourne Victoria 3001
T: 03 9695 2722
F: 03 9695 2610
DX 210082
www.epa.vic.gov.au

- iii. a note that, in accordance with clause 19(3) of SEPP (GoV), the Authority may require periodic reassessment of the practicability of groundwater clean up.

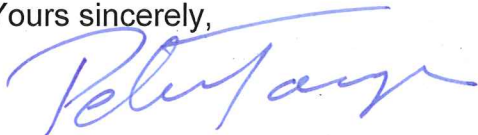
You must also ensure that the environmental audit report clearly delineates the extent of the GQRUZ.

EPA understands that Department of Treasury and Finance (DTF) will remain in control of the site for approximately the next two years. EPA expects that DTF will ensure that responsibility for the GQMP will be formally handed onto future site owners to ensure that the GQMP is appropriately completed.

Off-site wells 9130007 and 9130010 should be included in the GQMP.

If you have any questions, please contact Anne Northway on 03 9695 2579.

Yours sincerely,



PETER DOMINIC TANGE
MANAGER, ENVIRONMENTAL PERFORMANCE UNIT
DELEGATE OF THE AUTHORITY



APPENDIX B

REPORTS OF BOREHOLES AND WELL CONSTRUCTION DETAILS



Log Sheet - Land Remediation Department

GJS 42 of 87

PROJECT: HIGHTH 1997

BOREHOLE No: B46

LOCATION: 33.8m. S. of NW corner
5.2m E. of rail fence

PARISH: Moorabbin

STATUS: Monitoring

SURFACE ELEVATION: 37.643m

EASTING: 328100

DATE: 7/10/97

DATUM: Ground Level (AHD)

NORTHING: 5797550

DEPTH: 10.5m

DRILL TYPE: Hollow Auger

BCL: 48143

PAGE: 1 of 1

OPERATOR: G. Webb

LOGGED: H. Szabo

OLD BORE No: n/a

DESCRIPTION	GRAPHIC LOG	DEPTH	SAMPLES	REMARKS	S.W.L.	BORE DETAILS
CRUSHED ROCK, lt brown, dry, coarse, gravelly, becoming sandy CLAY, lt brown, dry, grading to; CLAY, red, brown, yellow, occ grey, hard, dry, sandy		0.0 0.5 1.0 1.5 2.0 2.5 3.0		BORE DETAILS: Riser: 0-7.5m Screen: 7.5-10.5m (3m) Grout: 0-6.5m Bentonite Seal: 6.5-7m (0.5m) Sand: 7-10.5m (3.5m)		
CLAYEY SILT / SANDY SILT, orange, red, occ grey, dry, moist sand, no odour		3.0 3.5 4.0 4.5 5.0 5.5 6.0				
SANDY SILT / SILTY SAND, pink, orange, lt brown @ 7.5m, moist, fine-grained		6.0 6.5 7.0 7.5 8.0 8.5 9.0		8/10/97 5.98m		
		9.0 9.5 10.0	S1	PID 226 ppm limited sample recovered		
SANDY SILT, pink, orange, moist no vis. contain, strong odour		9.0 9.5 10.0	S2	SPT 15 blows/50mm PID 212 ppm pneumatic odour		
Groundwater encountered at 9m		10.0 10.5				

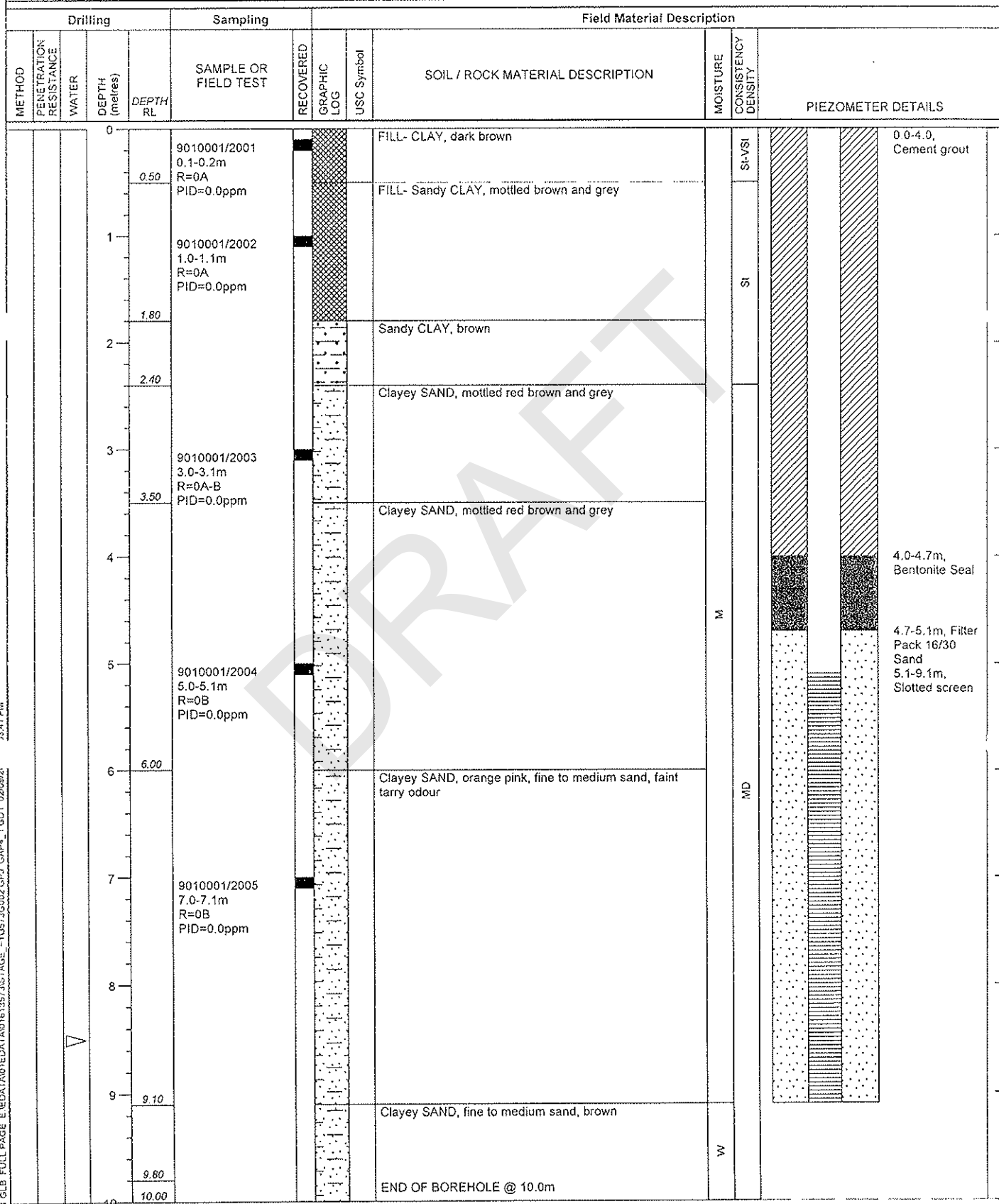


REPORT OF BOREHOLE: 9010001

CLIENT: VGPG
PROJECT: Hydrogeological Investigations
LOCATION: Highett
JOB NO: 01613573

POSITION:
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 115 mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
DRILL RIG: Edson 2000
DRILLER: STATEWIDE
LOGGED: AA DATE: 3/6/02
CHECKED: *lu* DATE: 2/8/02



This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for Environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for Geotechnical purposes.

GAP gINT FN. F01d
RLO



REPORT OF BOREHOLE: 9020001

CLIENT: VGPG
 PROJECT: Hydrogeological Investigations
 LOCATION: Hightett
 JOB NO: 01613573

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 115 mm HOLE DEPTH: 10.10 m

SHEET: 1 OF 1
 DRILL RIG: Edson 2000
 DRILLER: STATEWIDE
 LOGGED: AA DATE: 5/6/02
 CHECKED: *ew* DATE: 2/7/8

Drilling				Sampling		Field Material Description					PIEZOMETER DETAILS	
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	
			0	0.20					FILL- TOPSOIL			
				0.80					FILL- Gravelly SAND, grey	D	MD	0.0-4.5m, Cement grout
			1						FILL, CLAY, mottled red brown and with some fine to medium sand	M	SI	
				1.80					Clayey SAND, yellow brown, fine to medium sand, hard cemented sand	M		
			2									
				3.00					red brown	D-M	L	
			3									
				4.20					Clayey SAND, yellow brown, red brown, fine to medium sand, becoming softer			4.5-5.5m, Bentonite Seal
			4									
				6.80					Clayey SAND, yellow brown, red brown and yellow pink, becoming wet	M	SI	5.5-10.1m, Filter Pack 16/30 Sand
			5									
				8.30					medium to coarse sand			6.1-10.1m, Slotted screen
			6									
				9.80					END OF BOREHOLE @ 10.1m	W		
			7									
				10.10								
			8									
			9									
			10									
			11									

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GAP GINT FN. F01d
 RL0



REPORT OF BOREHOLE: 9030002

CLIENT: VGPG
 PROJECT: Hydrogeological Investigations
 LOCATION: Highett
 JOB NO: 01613573

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 115 mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
 DRILL RIG: Edson
 DRILLER: STATEWIDE
 LOGGED: AA DATE: 3/6/02
 CHECKED: *lu* DATE: 2/9/2

Drilling				Sampling		Field Material Description						
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	PIEZOMETER DETAILS
SA			0		9030002/2001 0.5-0.6m R=1B PID=0.0ppm			FILL- Sandy GRAVEL, brown, with some ash	M	MD	0.0-4.5m, Cement grout	
			0.90					FILL- Sandy GRAVEL, with some clay, coal odour				
			1.80					SAND, red brown, fine sand				
			2.50		9030002/2002 7.5-7.6m R=1B-C PID=0.0ppm			Sandy CLAY, grey, fine to medium sand, red brown, with some mottled brown sands	D-M	MD	4.5-5.5m, Bentonite Seal	
			4.50					Clayey SAND, fine to medium sand, red brown to orange brown, with some grey clay				
			6.80					Clayey SAND, pink orange, fine to medium sand, faint sweet perfume odour				
			8.80					Clayey SAND, grey, fine to medium sand				
			9.80					END OF BOREHOLE @ 10.0m				
			10.00									
								M	SI	5.5-10.0m Filter Pac. 16/30 Sand 5.94-9.94m, Slotted screen		
									W			

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for Environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for Geotechnical purposes.

GAP gINT FN. F01d
 RL0



REPORT OF BOREHOLE: 9050001

CLIENT: VGPG
PROJECT: Hydrogeological Investigations
LOCATION: Hightett
JOB NO: 01613573

POSITION:
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 115 mm HOLE DEPTH: 11.00 m

SHEET: 1 OF 2
DRILL RIG: Edson
DRILLER: STATEWIDE
LOGGED: AA DATE: 3/6/02
CHECKED: *en* DATE: 29/2

Drilling				Sampling		Field Material Description							
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	PIEZOMETER DETAILS	
			0		9050001/2001 0.1-0.2m R=0A PID=0.0ppm				FILL- Clayey SAND, brown with some grey				0.0-4.5m, Cement grout
			1	1.00	9050001/2002 1.0-1.1m R=0A PID=0.0ppm				yellow brown, trace coarse gravel		SI		
			1.70										
			2		9050001/2003 2.0-2.1m R=0A PID=0.0ppm				Silty CLAY, dark grey				
			2.50						Clayey SAND, fine to medium sand		MD		
			3	3.50									
			4	4.20					SILT, dark grey		F-SI		
			5						Clayey SAND, fine to medium sand, yellow brown				4.5-5.5m, Bentonite Seal
			5.30						Clayey SAND, white to grey white, with mottled yellow brown, fine to medium sand		M		
			6										5.5-10.0m, Filter Pack 16/30 Sand 5.9-9.9m, Slotted screen
			7								SI		
			8										
			9										
			9.50										
			10						Clayey SAND, medium to coarse, orange brown and orange, pale grey clay				

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for Environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for Geotechnical purposes.

GAP gINT FN. F01d
RL0

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REPORT OF BOREHOLE: 9050001

CLIENT: VGPG
 PROJECT: Hydrogeological Investigations
 LOCATION: Highett
 JOB NO: 01613573

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 115 mm HOLE DEPTH: 11.00 m

SHEET: 2 OF 2
 DRILL RIG: Edson
 DRILLER: STATEWIDE
 LOGGED: AA DATE: 3/6/02
 CHECKED: *aw* DATE: 2/7/02

Drilling				Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE CONSISTENCY DENSITY	PIEZOMETER DETAILS
			10					Clayey SAND, medium to coarse, orange brown and orange, pale grey clay	M	St
			10.50					Clayey SAND, fine to medium sand, yellow brown, grey clay		
			11	11.00				END OF BOREHOLE @ 11.0m		
			12							
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							

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GAP gINT FN, F01d
 RLO

CLIENT: VGPG
PROJECT: Hydrogeological Investigations
LOCATION: Hightett
JOB NO: 01613573

POSITION:
SURFACE RL: m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 115 mm HOLE DEPTH: 13.90 m

SHEET: 1 OF 2
DRILL RIG: Edson 2000
DRILLER: STATEWIDE
LOGGED: AA DATE: 5/6/02
CHECKED: *[Signature]* DATE: 25/8

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GAP gINT FN. F01d
RL0

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REPORT OF BOREHOLE: 9120001

SHEET: 2 OF 2

DRILL RIG: Edson 2000

DRILLER: STATEWIDE

LOGGED: AA DATE: 5/6/02

CHECKED: *W* DATE: *25/0*

CLIENT: VGPG
 PROJECT: Hydrogeological Investigations
 LOCATION: Highett
 JOB NO: 01613573

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 115 mm HOLE DEPTH: 13.90 m

Drilling				Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE CONSISTENCY DENSITY	PIEZOMETER DETAILS
			10					Clayey SAND, fine to medium, red brown and yellow brown		 Slotted screen
			11							
			12							
			13	13.00				Clayey SAND, fine to medium sand, with soem coarse sand		 Slotted screen
			13.90					END OF BOREHOLE @ 13.9m GROUNDWATER ENCOUNTERED @ 13.0m		
			14							
			15							
			16							
			17							
			18							
			19							
			20							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for Environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for Geotechnical purposes.

GAP gINT FN. F01d
 RL0



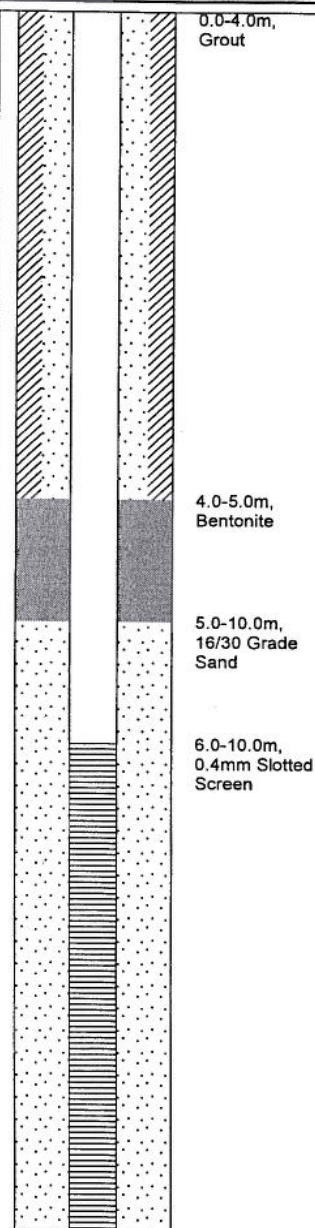
REPORT OF BOREHOLE: 9130003

CLIENT: VGPG
PROJECT: Hightett Gasworks Remediation
LOCATION: Hightett
JOB NO: 01613573

COORDS: 328056 m E 5797408.8 m N AMG84
SURFACE RL: 36.31 m DATUM: AHD
INCLINATION: -90°
HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
DRILL RIG:
DRILLER: South Western Drilling
LOGGED: NRC DATE: 17/12/02
CHECKED: DATE:

Drilling				Sampling		Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE CONSISTENCY DENSITY
Solid Auger			0	0.20 36.11				FILL - Silty SAND, brown grey, fine grained sand Silty SAND, red silt, white fine grained sand	
			1						
			2						
			3	2.80 33.51				Clayey SAND, grey brown, fine grained sand	
			4						
			5	4.50 31.81				grey, increased clay content	
			6						
			7						
			8	8.00 28.31				yellow grey, medium grained sand	
			9		9130003/2001 9.00-9.10m R = 0A				
			10	10.00 26.31				END OF BOREHOLE @ 10.00 m GROUNDWATER ENCOUNTERED @ 8.0m	
			11						
			12						



This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.



REPORT OF BOREHOLE: 9130005

SHEET: 1 OF 1

CLIENT: VGPB
 PROJECT: Highett Gasworks Remediation
 LOCATION: Highett
 JOB NO: 01613573

COORDS: 328157.3 m E 5797340.1 m N AMG84
 SURFACE RL: 35.63 m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 125 mm HOLE DEPTH: 10.00 m

DRILL RIG:
 DRILLER: South Western Drilling
 LOGGED: NRC DATE: 24/1/03
 CHECKED: *L* DATE:

Drilling				Sampling		Field Material Description			
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE CONSISTENCY DENSITY
									PIEZOMETER DETAILS
			0	35.53				FILL - PAVERS FILL - Sandy GRAVEL, medium to coarse gravel, brown sand	0.0-2.0m, μ 18 PVC Grout
			1	34.63				SAND, grey brown, fine sand	
			1.40	34.23				grey yellow orange, trace clay	
			2						2.0-3.0m, Bentonite
			3	32.63				Clayey SAND, fine grained, yellow orange sand	3.0-10.0m, 16/30 Grade Sand
			4	31.43				medium grained sand	4.0-10.0m, 0.4mm Slotted Screen
			5						
			6						
			7	28.63				fine to medium grained	
			8		9130005/1 8.00-8.10m R = 0A				
			9						
			10	25.63				END OF BOREHOLE @ 10.00 m GROUNDWATER ENCOUNTERED @ 7.0m	
			11						
			12						

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

GAP gINT FN. F01 RL



REPORT OF BOREHOLE: 9130006

CLIENT: VGP
PROJECT: Highett Gasworks Remediation
LOCATION: Highett
JOB NO: 01613573

COORDS: 328043.8 m E 5797534.4 m N AMG84
SURFACE RL: 35.87 m DATUM: AHD
INCLINATION: -90°
HOLE DIA: 125 mm HOLE DEPTH: 10.20 m

SHEET: 1 OF 1
DRILL RIG:
DRILLER: South Western Drilling
LOGGED: LJK DATE: 24/1/03
CHECKED: *[Signature]* DATE:

Drilling				Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE CONSISTENCY DENSITY
										PIEZOMETER DETAILS
			0	35.77					FILL- SAND, fine to medium, brown, trace silt, fine to coarse, dark brown pale brown	
			1	34.87					Clayey SAND, fine to coarse, brown, red and grey	
			2	34.37					Clayey SAND, medium to coarse, red brown with some yellow and grey staining	
			3	32.87					increased content of clay	
			4							
			5							
			6	30.27					pale brown	
			7	28.87					pale brown with some pink staining	
			8	27.47					pale red brown	
			9	26.87					pale brown yellow	
			10	25.67					END OF BOREHOLE @ 10.20 m GROUNDWATER ENCOUNTERED @ 9.0m	
			11							
			12							

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GAP gINT FN. F01d
RL2



REPORT OF BOREHOLE: 9130007

SHEET: 1 OF 1

CLIENT: VPGP
 PROJECT: Hightett Gasworks Remediation
 LOCATION: Hightett
 JOB NO: 01613573

COORDS: 328139.8 m E 5797278 m N AMG84
 SURFACE RL: 34.15 m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: 125 mm HOLE DEPTH: 10.00 m

DRILL RIG:
 DRILLER: South Western Drilling
 LOGGED: LJK DATE: 25/1/03
 CHECKED: DATE:

Drilling			Sampling		Field Material Description					PIEZOMETER DETAILS	
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY
			0	34.15					FILL- Silty CLAY, brown		
				0.40					SAND, pale orange brown, fine		
			1	33.75							
				1.50					grey		
			2	32.65							
				2.90					Clayey SAND, yellow brown, fine		
			3	31.25							
				4.10					SAND, grey, fine		
			4	30.05							
			5								
			6								
			7								
			8								
			9								
			10	24.15	9130007/1 9.50-9.60m R = 0A				END OF BOREHOLE @ 10.00 m GROUNDWATER ENCOUNTERED @ 6.8m		
			11								
			12								

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GAP gINT FN. F01d
 RL2



REPORT OF BOREHOLE: 9130010

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
 DRILL RIG: Geoprobe
 DRILLER: Numac
 LOGGED: NC DATE: 20/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation				
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION	
Solid Auger		0	0.20			FILL- Sandy SILT, low plasticity, brown, minor rock and brick inclusions			0.0 - 4.5m, Grout
						FILL- Sandy SILT, low plasticity, dark grey, black, minor brick inclusion			
		1	1.00			FILL- SAND, medium grained, brown			
			1.60			FILL- SAND, fine gravel, pale yellow			
		2	2.20			FILL- Clayey SAND, fine to medium gravel, pale brown, Sandy CLAY pockets, yellow/brown, low to moderate plasticity			
			3.00			becoming brown @ 3.0m			
			3.20			coke/black material @ 3.2m			
		4	4.00			FILL- Clayey SAND, medium grained, orange/brown			
			4.20			Clayey SAND, medium grained, pale yellow/pale brown			4.5 - 5.5m, Bentonite
			4.80			pale orange/brown			
		5							5.5 - 10.0m, 16/30 Sand
		6							6.0 - 10.0m, PVC 0.4mm Slotted Screen
			6.50			SAND, medium grained, brown			
		7	7.00			SAND, medium grained, pinky brown			
		8							
			8.20			brown			
			8.50			Clayey SAND, medium to coarse grained, pinky brown			
		9	9.00			grey/brown, medium to coarse grained			
			10.00						

END OF BOREHOLE @ 10.00 m

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GAP GINT FN. F05
 RL2



REPORT OF BOREHOLE: 9130011

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 11.00 m

SHEET: 1 OF 2
 DRILL RIG: Geoprobe
 DRILLER: Numac
 LOGGED: NC DATE: 20/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		0	0.15			FILL- Silty CLAY, low plasticity, brown Sandy CLAY, moderate plasticity, orange/brown, with trace grey		0.0 - 3.6m, Grout
		1						
		2						
		3						
		3.40				Sandy CLAY, moderate plasticity, pale brown/orange		3.6 - 4.6m, Bentonite
		4						
		4.60				Clayey SAND, medium grained, grey/orange, brown		4.6 - 11.0m, 8/16 Sand
		5						5.0 - 11.0m, PVC 0.4mm Slotted
		5.50				Clayey SAND, medium grained, pale brown/pinky brown		
		6				pinky brown sand content increasing		
		6.20						
		7						
		8				very orange/brown		
		8.50						
		9						
		10						

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9130011

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 11.00 m

SHEET: 2 OF 2
 DRILL RIG: Geoprobe
 DRILLER: Numac
 LOGGED: NC DATE: 20/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling		Sampling		Field Material Description and Instrumentation		
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION
						AIRLIFT YIELD (Us)
						CONSTRUCTION
		10				Clayey SAND, medium grained, pale brown/pinky brown
		11	11.00			END OF BOREHOLE @ 11.00 m
		12				
		13				
		14				
		15				
		16				
		17				
		18				
		19				
		20				

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140003

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
 DRILL RIG: Geo Probe
 DRILLER: Numac
 LOGGED: NC DATE: 13/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling		Sampling		Field Material Description and Instrumentation		
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION
						AIRLIFT YIELD (L/s)
						CONSTRUCTION
		0				FILL - Clayey SAND, medium grained, pale brown, minor rock inclusions
		0.50				Silty CLAY, moderate plasticity, brown/grey/red
		1				Sandy CLAY, low plasticity, brown/grey/red
		1.10				Clayey SAND, medium grained, grey/red/brown
		1.70				Clayey SAND, medium to coarse grained, yellow/brown/trace grey
		2				Clayey SAND, medium grained, orange/brown, grey, clay pockets
		3				pale brown/grey
		3.00				SAND, medium grained, yellow/brown
		4				SAND, medium to coarse grained, orange/brown
		4.00				
		5				
		5.20				
		6				
		6.50				
		7				
		8				
		8.20				
		9				
		10				
		10.00				

END OF BOREHOLE @ 10.00 m

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140005

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 11.00 m

SHEET: 1 OF 2
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 12/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (Us)	CONSTRUCTION
Air Blade		0				FILL- Silty CLAY, moderate plasticity, brown, crushed rock pieces		0.0 - 3.4m, Grout, PVC 80, 50mm
		0.30				Silty CLAY, moderate plasticity, yellow grey, siltstone pieces		
		1						
		1.20				Sandy CLAY, low to moderate plasticity, red, brown, grey		
		1.50				Sandy CLAY, low to moderate plasticity, yellow/brown/grey		
		2				SAND, medium grained, yellow medium to coarse grained		
		2.20						
		3				grey/brown		
		3.50				Clayey SAND, medium to coarse grained, grey, brown		3.4 - 4.4m, Bentonite fine chips/granuals
		4				Clayey SAND, medium grained, pale brown/grey		4.4 - 8.2m, 16/30 Sand
		5						5.2 - 8.2m, PVC Slotted
		6				SAND, medium to coarse grained, orange/brown		
		7						
		7.20				SAND, medium to coarse grained, orange/brown		
		8						
		9						
		10						
		10.00						

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GAP gINT FN, F05
 RL2



REPORT OF BOREHOLE: 9140005

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 11.00 m

SHEET: 2 OF 2
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 12/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (Us)	CONSTRUCTION
Air Blade		10					SAND, medium to coarse grained, orange/brown grey/brown		
		11	11.00				END OF BOREHOLE @ 11.00 m		
		12							
		13							
		14							
		15							
		16							
		17							
		18							
		19							
		20							

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140006

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
 DRILL RIG: Geoprobe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation		
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (Us)
							CONSTRUCTION
		0				FILL- Silty CLAY, moderate plasticity, dark brown	0.0 - 3.5m, Grout
		1					
		1.50				FILL- SAND, fine grained, light brown	
		2				FILL- Clayey SAND, fine to medium grained, dark grey	
		2.20					
		3				FILL- Clayey SAND, fine to medium, grey/brown	
		3.10					
		4					3.5 - 4.5m, Bentonite
		4.40				FILL- Clayey SAND, fine to medium grained, pale brown, grey	
		5					4.5 - 10.0m, 16/30 Sand
		5.60				FILL- Clayey SAND, fine grained, orange/brown	
		6					5.0 - 10.0m, PVC Slotted
		7					
		7.50				Clayey SAND, medium grained, orange/brown	
		8					
		9					
		10	10.00				

END OF BOREHOLE @ 10.00 m

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140007

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 12.00 m

SHEET: 1 OF 2
 DRILL RIG: Geo Probe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
Solid Auger		0				FILL- Silty SAND, medium grained, dark brown, brick chips and frequent minor rock inclusions		0.0 - 4.2m, Grout
		1.20				FILL- Silty SAND, medium to coarse grained, red/brown pockets of Silty CLAY, red/brown low plasticity		
		2.00				Clayey SAND, fine to medium grained, pale brown/grey pockets of Sandy CLAY, low to moderate plasticity, grey/pale brown		
		2.50				SAND, fine to medium grained, orange/brown pockets of Clayey SAND, grey/yellow low plasticity		
		3.00				red, brown		
		3.50				clay content increasing, slightly pinky/red/brown		
		4.00				pale pinky/brown		4.2 - 5.2m, Bentonite
		4.60				SAND, medium grained, orange/brown, minor pockets Clayey SAND		
		5.20				red/brown		5.2 - 11.0m, 16/30 Sand
		6.00				very orange/red/brown		6.0 - 11.0m, PVC 0.4mm Slotted
		9.00				SAND, medium to coarse grained, dark yellow/brown		

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140007

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 12.00 m

SHEET: 2 OF 2
 DRILL RIG: Geo Probe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation		
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)
Solid Auger		10				SAND, medium to coarse grained, dark yellow/brown	
		11					
		12	12.00			END OF BOREHOLE @ 12.00 m	
		13					
		14					
		15					
		16					
		17					
		18					
		19					
		20					

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9140008

CLIENT: Vic Urban
 PROJECT: Highett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 10.00 m

SHEET: 1 OF 1
 DRILL RIG: Geoprobe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION	
Solid Auger		0				FILL- Silty CLAY, low plasticity, brown		0.0 - 4.6m, Grout	
		1							
		1.80							
		2				Clayey SAND, medium grained, red/brown Clayey SAND, pocket grey/brown, moderate plasticity			
		3							
		4				SAND, medium grained, orange, brown			
		4.50							
		5				Clayey SAND, medium grained, red/brown		4.6 - 5.6m, Bentonite	
		5.50				pale brown			
		6							
		6.20							
		6.40				SAND, medium grained, yellow/brown, with Clayey SAND pockets, grey, low plasticity pale brown		5.6 - 10.0m, 16/30 Sand	
		7							
		7.00				SAND, medium to coarse grained, orange/brown, trace Clayey SAND pockets		6.0 - 10.0m, PVC 0.4mm Slotted	
		8							
		8.50							
		9				clay becoming less clay @ 9.0m			
		10							
		10.00							

END OF BOREHOLE @ 10.00 m

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150001

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 17.80 m

SHEET: 1 OF 2
 DRILL RIG: Geo Probe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
Solid Auger		0				FILL- Clayey SAND, medium grained, dark brown, minor rock inclusions, Sandy CLAY pockets, brown, moderate plasticity		0.0 - 13.3m, Grout
		1	1.10			FILL- Sandy CLAY, low to moderate plasticity, dark brown, minor rock inclusions		
		2	1.80			FILL- SAND, fine grained, brown		
		3	2.60			FILL- Sandy CLAY, low to moderate plasticity, dark brown		
		4						
		5	5.50			FILL- SAND, medium grained, pinky brown		
		6						
		7	7.60			SAND, medium to coarse grained, pale brown		
		8	8.00			pinky brown		
		9	9.50			SAND, fine grained, pale brown		
		10						

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150001

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 17.80 m

SHEET: 2 OF 2
 DRILL RIG: Geo Probe
 DRILLER: Numac
 LOGGED: NC DATE: 14/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation		
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)
							CONSTRUCTION
Solid Auger		10				SAND, fine grained, pale brown	
		10.50				very wet	
Hollow Auger		11					
		12					
		13					
		14					13.3 - 14.3m, Bentonite Granals
		15					14.3 - 17.8m, 16/30 Sand
		16					14.8 - 17.8m, PVC Slotted
		16.80					
		17				Sandy SILT, fine grained, low plasticity, brown	
		17.80				END OF BOREHOLE @ 17.80 m	
		18					
		19					
		20					

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150002

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 19.40 m

SHEET: 1 OF 2
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 13/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		0				FILL- Clayey SAND, medium grained, pale brown, minor rock inclusions		0.0 - 10.9m, Grout
		0.50				Silty CLAY, moderate plasticity, brown, grey and red		
		1.10				Sandy CLAY, low plasticity, brown, grey and red		
		1.70				Clayey SAND, medium grained, grey, red and brown		
		3.00				Clayey SAND, medium to coarse grained, yellow/brown, trace grey, low clay content		
		4.00				Clayey SAND, medium grained, orange, brown, grey, clay pockets		
		5.20				pale brown/grey		
		6.30				SAND, medium grained, yellow/grey		
		8.00				SAND, medium to coarse grained, orange/brown		
		10						

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150002

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 19.40 m

SHEET: 2 OF 2
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 13/5/08
 CHECKED: JKS DATE: 3/10/08

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION	
		10				SAND, medium grained, yellow/grey			
		11	11.00			coarse grained, yellow/brown			10.9 - 16.0m, Collapse Bentonite
		12							
		13							
		14	14.00			coarse grained, sandy, brown/pink/grey inclusions			
		15							
		16							16.0 - 19.4m, 16/30 Sand
		17							16.4 - 19.4m, PVC Slotted
		18	17.90			SAND, coarse grained, yellow/brown with black rock pieces			
			18.30			ROCK LAYER, difficult to drill, Sandy SILT, medium grained, very wet, brown			
		19							
			19.40			END OF BOREHOLE @ 19.40 m			
		20							

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GAP gINT FN, F05
 RL2



REPORT OF BOREHOLE: 9150003

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 20.50 m

SHEET: 1 OF 3
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 12/5/05
 CHECKED: DATE:

Drilling				Sampling	Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (Us)	CONSTRUCTION
Solid Auger		0				FILL- Sandy GRAVEL, low plasticity, black/brown		0.0 - 10.0m, Grout
		0.50				FILL- Silty CLAY, moderate plasticity, yellow/brown		
		1						
		1.50				FILL- Clayey SAND, medium grained, brown, minor red rock chips		
		2				Sandy CLAY, low plasticity, yellow/brown		
		2.20				SAND, fine grained, orange/brown		
		2.50				SAND, fine to medium grained, yellow/brown		
		2.70				yellow/light brown		
		3				medium brown		
		3.20				Clayey SAND, medium grained, grey/brown		
Hollow Auger		3.50				SAND, medium grained, grey		
		4						
		4.50				SAND, fine to medium grained, pale grey/brown, slight clay content		
		5						
		5.50				Clayey SAND, medium grained, pale brown		
		6				SAND, medium grained, yellow/brown		
						very hard @ 5.0m		
						Odour @ 6.0 to 7.0m and continues		
		7				SAND, fine to medium grained, pale yellow/brown		
		8				Clayey SAND, medium grained, pale yellow/brown		
		9						
		9.60				Clayey SAND, medium grained, grey with hint of green		
		10						

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150003

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 20.50 m

SHEET: 2 OF 3
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 12/5/05
 CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (Us)	CONSTRUCTION	
		10				Clayey SAND, medium grained, grey with hint of green		10.0 - 17.7m, Bentonite ???	
		10.40				pale brown/pale grey			
		10.90							
		11				SAND, medium grained, dark grey, sharp odour on nose, unidentified odour continues			
		12							
		13							
		13.30				SAND, medium grained, dark grey, very wet			
		13.60				SAND, medium grained, grey			
		14							
		15	15.00			very wet			
		16							
		17	17.00			grey/brown			
		17.20				brown		17.7 - 20.5m, 16/30 Sand, PVC Slotted screen	
		18							
		19	19.00			Sandy SILT, low plasticity, brown silt content increasing			
		20							

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GAP gINT FN. F05
 RL2



REPORT OF BOREHOLE: 9150003

CLIENT: Vic Urban
 PROJECT: Hightett Gas Works
 LOCATION: 1136 Nepean Highway
 JOB NO: 05613598

POSITION:
 SURFACE RL: m DATUM: AHD
 INCLINATION: -90°
 HOLE DIA: mm HOLE DEPTH: 20.50 m

SHEET: 3 OF 3
 DRILL RIG: Boart Longyear
 DRILLER: Numac
 LOGGED: NC DATE: 12/5/05
 CHECKED: DATE:

Drilling				Sampling		Field Material Description and Instrumentation			
METHOD	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL / ROCK MATERIAL DESCRIPTION	AIRLIFT YIELD (L/s)	CONSTRUCTION
		20			x	x	Sandy SILT, low plasticity, brown silt content increasing		
			20.50		x	x			
					x	x			
					x	x			
							END OF BOREHOLE @ 20.50 m		
		21							
		22							
		23							
		24							
		25							
		26							
		27							
		28							
		29							
		30							

This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for geotechnical purposes.

GAP gINT FN. F05
 RL2



APPENDIX C

SUMMARY OF EXISTING GROUNDWATER DATA

Table E
Summary Of Analytical Results - Regional Groundwater
Victorian Government Propoerty Group Former Highett Gasworks

reported in mg/L unless stated otherwise.

					pH (units)	Total Dissolved Solids	Metals																	Anions and Cations												
							Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Cobalt	Molybdenum	Selenium	Tin	Antimony	Boron	Barium	Beryllium	Manganese	Iron	Calcium	Magnesium	Sodium	Potassium	Sulphate (as SO4)	Chloride	Bicarbonate (as CaCO3)	Carbonate (as CaCO3)	Ammonia (as N)	Nitrate (as N)	Conductivity	
Laboratory Reporting Limits																																				
Aquatic (Marine) Ecosystems							0.0023	0.0055	0.0274	0.0013	0.0044	0.0004	0.07	0.015	0.001	0.023	0.003	0.035		5.1			0.08										0.9	0.158		
Potable Water Supply					6.5-8.5		0.007	0.002	0.05	2	0.01	0.001	0.1	3			0.01										250					0.5	11			
Primary Contact Recreation					6.5 – 8.5		0.05	0.005	0.05	1	0.05	0.001	0.1	5		0.05	0.01			1	1		0.1			300	400	400				0.01	10			
Irrigation					4.5 – 9		0.1	0.01	0.1	0.2		0.002	0.2	2	0.05	0.01	0.02			0.5	0.1		2													
Stock Watering					6 – 8.5		0.5	0.01	1	0.4	0.1	0.002	1	20	1	0.15	0.02			5					1000								30			
Status	Location	Sample Date	Sample Number	RL of Groundwater (mAHD)																																
Existing	BH6	7-Oct-97	BH6	31.66	4.8	810	0.003	<0.002	<0.005	0.03	0.015	<0.001	<0.005	0.074													140				<0.05	5				
		7-Jan-99	BH6-7/01/1999	31.32	5.6	800	0.002	<0.001	<0.01	<0.01	<0.01	<0.001	<0.01	0.14													320				0.6		1200			
		22-Mar-99	BH6-23/03/1999	31.29		790																										0.84				
		21-Mar-07	BHF6/50200307	30.30	6.7		0.029	<0.001	<0.01	<0.01	<0.01	<0.001	0.04	0.02													270				8.3	0.02				
		27/05/2008	BH6/50270508		6.6	870	0.02	<0.002	<0.01	<0.01	<0.01	<0.001	0.05	0.03											13	13	240	1.2	360	82	170	<2	6.3	0.04		
		10-Jul-09	BH6/50	29.74	7.2	870	0.01	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.053	0.016													380	73	140	<2			0.09			
Existing	BHF35	19-Mar-99	BHF35-19/03/1999	31.57		670	0.01	<0.001	0.04	0.02	<0.01	<0.001	<0.01	0.07	<0.01	<0.01	0.008	<0.01	<0.01			<0.01										0.1	0.15			
		17-Jun-02	9080100-5001	31.26	5.9	630	0.043	<0.0002	<0.01	<0.001	<0.001	<0.0001	<0.005	0.057									40	0.36	13	140	0.1	450	45	28	<2	0.1				
		19-Jul-02	BHF35-0702	31.20	5.8	610	0.011	<0.0002	<0.01	<0.001	<0.001	<0.0001	0.006	0.014									29	2	14	170	<0.05	330	44	20	<2	<0.1	1.7			
		1-Aug-03	1010035/50010803	30.94	5.9	650	0.039	<0.0002	<0.01	<0.001	<0.001	<0.0001	0.011	0.2												0.48	13	160	0.1	300	40	36	<2	0.2	<0.01	
		6-Apr-04	1010035/50050404	30.81			0.035	<0.0002	0.002	<0.001	<0.001	<0.0001	0.1	0.35									0.01									0.1	0.06			
		21-Mar-07	BHF35/50200307	30.59	5.9		0.011	<0.001	<0.01	<0.01	<0.01	<0.001	0.05	0.03																	0.2	<0.01				
		27-May-08	BH35/50270508	30.29	6.1	600	0.02	<0.002	<0.01	<0.01	<0.01	<0.001	0.03	0.02										3.1	11	170	0.4	360	56	13	<2	0.3	1.1			
		29-Jun-09	BHF35/50260609	30.12	6.2	590	0.024	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.044	0.007	0.006	<0.001	0.004	<0.001	<0.001	0.39	0.006	<0.001	0.036	22			330	56	43	<2			0.18			
OFFSITE - DOWNGRAIENT																																				
Existing	9130003	3-Jan-03	913003/50030103	31.03	5.8	130	<0.001	<0.0002	<0.01	<0.001	<0.001	<0.0001	<0.005	0.05											0.95	0.73	37	0.1	28	23	6	<2	<0.1			
		3-Feb-03	9130003/50310103	31.01	5.9	190	<0.001	<0.0002	<0.01	0.003	<0.001	<0.0001	<0.005	0.014											0.39	0.84	41	0.1	26	27	6	<2	<0.1			
		29-Jul-03	9130003/50280703	30.97	6	190	<0.001	<0.0002	<0.01	0.002	0.006	<0.0001	0.02	0.1											0.27	0.77	42	0.1	23	25	4	<2	<0.1	5.9		
		25-Jan-05	9130003/50250105	30.87	5.5		<0.001	<0.0002	<0.01	0.003	<0.001	<0.0001	0.006	0.024													22					<0.1	3.6			
		8-Mar-07	9130003/50070307	30.37	6.2	160	0.001	<0.001	<0.01	<0.01	<0.01	<0.001	0.04	0.02													23				<0.1	4.3				
		22-Mar-07	9130003/50210307	30.29																																
		2-Jun-08	9130003/50020608		5.4	210	<0.01	<0.002	<0.01	<0.01	<0.01	<0.001	0.01	<0.01										0.19	0.63	36	<0.5	23	30	12	<2	<0.1	4.4			
		26-Jun-09	9130003/50250609	29.89	5.7	130	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.029	0.036													23	30	17	<2			4.2			
Existing	9130005	3-Feb-03	9130005/50310103	31.32	7.3	2300	<0.001	<0.0002	<0.01	0.014	<0.001	<0.0001	<0.005	0.051											17	54	950	0.3	700	580	370	<2	0.1			
		30-Jul-03	9130005/50290703	31.07	7	1900	<0.001	<0.0001	0.009	0.002	0.005	<0.0002	0.041	0.13									0.01		8.7	31	590	0.1	800	200	380	<2	<0.1	<0.01		
		25-Jan-05	9130005/50240105	31.01	6.9		<0.001	<0.0002	0.014	0.004	<0.001	<0.0001	<0.005	0.038													790				0.2	0.36				
		7-Mar-07	9130005/5006307		6.1		0.001	<0.001	<0.01	<0.01	<0.01	<0.001	<0.01	0.03																	<0.1	0.03				
		22-Mar-07	9130005/50210307	30.56																																
		30-May-08	9130005/50300508	30.34	7.5	1900	<0.01	<0.002	<0.01	<0.01	<0.01	<0.001	0.01	0.02										9.3	27	600	0.2	800	180	380	<2	<0.1	0.12			
		26-Jun-09	9130005/50250609	29.71	7.4	1800	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.12	0.064													760	200	430	<2			0.12			
Existing	9130006	3-Feb-03	9130006/50310103	30.84	5.7	530	<0.001	<0.0002	<0.01	0.014	<0.001	<0.0001	<0.005	0.052											1	4.1	180	0.1	110	210	8	<2	<0.1			
		30-Jul-03	9130006/50300703	30.70	5.1	530	<0.001	<0.0002	<0.01	0.003	<0.001	<0.0001	<0.005	0.2											0.26	2.8	160	0.1	81	180	6	<2	<0.1	1.9		
		1-Aug-03	9130006/59310703		4.5	470	<0.005	<0.0002	<0.005	0.004	0.003	<0.0001	<0.005	0.17								<0.1			0.5	3.3	160	<1	110	230	<3			6.6		
		28-Jan-05	9130006/50270105	30.81	5		<0.001	<0.0002	<0.01	0.016	0.004	<0.0001	0.006	0.066													98				<0.1	0.53				
		8-Mar-07	9130006/50070307	30.32	5.6	450	0.002		<0.01	<0.01	<0.01	<0.001	0.03	<0.01													140				<0.1	0.8				
		22-Mar-07	9130006/50210307	30.21																																
		2-Jun-08	9130006/50020608	29.90	5.1	470	<0.01	<0.002	<0.01	<0.01	<0.01	<0																								

[illegible]

Table E
Summary Of Analytical Results - Regional Groundwater
Victorian Government Propoerty Group Former Hihgett Gasworks

reported in mg/L unless stated otherwise.

[illegible]

Table E
Summary Of Analytical Results - Regional Groundwater
Victorian Government Property Group Former Hightett Gasworks

reported in mg/L unless stated otherwise.

[illegible]

Table E
Summary Of Analytical Results - Regional Groundwater
 Victorian Government Property Group Former Highett Gasworks

reported in mg/L unless stated otherwise.

					Volatile Halogenated Organics																			
					1,1-Dichloroethane	Dichloromethane	Trichloromethane	1,2-Dichloroethane	Bromodichloromethane	Vinylchloride	Chlorobenzene	1,1,2-Trichloroethane	Chlorodibromomethane	1,2-Dichloropropane	1,1,1-Trichloroethane	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,1,2,2-Tetrachloroethane	1,1-Dichloroethene	1,2-Dichloroethene (cis)	1,2-Dichloroethene (trans)	Tetrachloroethene	Trichloroethene
Laboratory Reporting Limits					0.25	4		1.9		0.1	0.055	1.9		0.27		0.06	0.4	0.7			0.07	0.33		
Aquatic (Marine) Ecosystems																								
Potable Water Supply											0.3													
Primary Contact Recreation					0.004			0.01		0	0.3			1.5		0.04		0.03	0.06		0.01	0.03	0.003	
Irrigation																								
Stock Watering																								
Status	Location	Sample Date	Sample Number	RL of Groundwater (mAHD)																				
Existing	BH6	7-Oct-97	BH6	31.66																				
		7-Jan-99	BH6-7/01/1999	31.32																				
		22-Mar-99	BH6-23/03/1999	31.29																				
		21-Mar-07	BHF6/50200307	30.30																				
		27/05/2008	BH6/50270508																					
		10-Jul-09	BH6/50	29.74																				
Existing	BHF35	19-Mar-99	BHF35-19/03/1999	31.57	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
		17-Jun-02	9080100-5001	31.26	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		19-Jul-02	BHF35-0702	31.20	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		1-Aug-03	1010035/50010803	30.94	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		6-Apr-04	1010035/50050404	30.81																				
		21-Mar-07	BHF35/50200307	30.59																				
		27-May-08	BH35/50270508	30.29																				
		29-Jun-09	BHF35/50260609	30.12																				
OFFSITE - DOWNGRADIENT																								
Existing	9130003	3-Jan-03	913003/50030103	31.03	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		3-Feb-03	9130003/50310103	31.01	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		29-Jul-03	9130003/50280703	30.97	<0.001	<0.005	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		25-Jan-05	9130003/50250105	30.87																				
		8-Mar-07	9130003/50070307	30.37																				
		22-Mar-07	9130003/50210307	30.29																				
		2-Jun-08	9130003/50020608																					
		26-Jun-09	9130003/50250609	29.89																				
Existing	9130005	3-Feb-03	9130005/50310103	31.32	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		30-Jul-03	9130005/50290703	31.07	<0.001	<0.005	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		25-Jan-05	9130005/50240105	31.01																				
		7-Mar-07	9130005/5006307																					
		22-Mar-07	9130005/50210307	30.56																				
		30-May-08	9130005/50300508	30.34																				
Existing	9130006	26-Jun-09	9130005/50250609	29.71																				
		3-Feb-03	9130006/50310103	30.84	<0.001	<0.01	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		30-Jul-03	9130006/50300703	30.70	<0.001	<0.005	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		1-Aug-03	9130006/59310703		<0.001	<0.05		<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
		28-Jan-05	9130006/50270105	30.81																				
		8-Mar-07	9130006/50070307	30.32																				
		22-Mar-07	9130006/50210307	30.21																				
		2-Jun-08	9130006/50020608	29.90																				
Existing	9130011	30-Jun-09	9130006/5029069	29.71																				
		2-Jun-08	9130011/50020608	30.01																				
		2-Jun-08	9130011/50020608_1	30.01																				
		30-Jun-09	9130011/5029069	29.82																				

Table E
Summary Of Analytical Results - Regional Groundwater
Victorian Government Property Group Former Highbury Gasworks

reported in mg/L unless stated otherwise.

[illegible]

Table E
Summary Of Analytical Results - Regional Groundwater
Victorian Government Property Group Former Hightett Gasworks

reported in mg/L unless stated otherwise.

 Golder Associates					Phenols and Cresols														Other		Solvents																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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APPENDIX D

LIMITATIONS

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At Golder Associates we strive to be the most respected global group of companies specialising in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organisational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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Executive summary

This Environmental Audit report has been prepared as required under Section 53W(1) of the 1970 *Environment Protection Act* (the Act) in support of the attached Statements of Environmental Audit regarding the former Highett gasworks property located at 1136-1138 Nepean Highway, Highett VIC 3190. Currently, the site is owned by the Department of Treasury and Finance (DTF) and is likely to be developed as mixed medium to high density residential properties. DTF have initiated a voluntary audit to meet due diligence prior to sale of the property, and have engaged John Throssell of Parsons Brinckerhoff Pty Ltd (PB), an Environmental Auditor appointed under the Act, to conduct a Statutory Environmental Audit (Audit).

The south east corner of the site was transferred to Department of Justice (DoJ) in 2005 and became known as Stage 1.

In 2006 a Statement of Environmental Audit (CARMS 37308-1) was issued for Stage 1 of the site and is now occupied by the DoJ Moorabbin Courthouse. The remainder of the site became known as Stage 2.

In 2010, the Stage 2 audit area was further divided into Stage 2 (eastern portion of the site) and Stage 2A (western portion of the site). The boundary between the two Stages was based upon the extent of known soil impacts associated with the existing gas main easement located along the western boundary of the site) and the amount of space required to remediation this area (Stage 2A) once the gas easement infrastructure is removed in the future.

This report has been prepared in accordance with Section 53X of the Act and other Victorian Environment Protection Authority (EPA) guidelines (EPA Publications 759.1; 865.6; 1147; 860.1) and should be read in conjunction with the existing investigation reports (see **Section 1.3** for list of reports). This audit report addresses both Stages 2 and 2A, and a separate Statement of Audit has been issued for each Stage. The Statements of Audit include a groundwater quality management plan (GQMP) that addresses both Stage 2 and 2A and there is also a requirement for an Environmental Management Plan (EMP) to address residual soil impacts.

Particulars of the audit are summarised in the table below:

Summary of audit information

	Stage 2	Stage 2A
EPA file reference number	CARMS # 37308-2	CARMS # 37308-2
Auditor	John Throssell*	John Throssell*
Auditor term of appointment	7 October 2011 to 7 May 2012	7 October 2011 to 7 May 2012
Name of person requesting audit	Department of Treasury and Finance	Department of Treasury and Finance
Relationship to premises	Owner	Owner
Date of request	5 December 2001	5 December 2001
Date EPA notified of audit	5 December 2001 (David Adams) EPA notified of termination of Mr Adams as Auditor and engagement of Mr Throssell as replacement Auditor occurred 16 October 2007	5 December 2001 (David Adams) EPA notified of termination of Mr Adams as Auditor and engagement of Mr Throssell as replacement Auditor occurred 16 October 2007

	Stage 2	Stage 2A
Completion date of audit	15 December 2011	15 December 2011
Reason for audit	Property transaction due diligence	Property transaction due diligence
Current land use zoning	Residential 1 Zone (R1Z), formerly Public Use Service and Utility (PUZ 1)	Residential 1 Zone (R1Z), formerly Public Use Service and Utility (PUZ 1)
EPA region	Melbourne Metro	Melbourne Metro
Municipality	Kingston	Kingston
Dominant – Lot of plan	Certificate of Title Volume 9598 Folio 389. Plan of Consolidation No. 150995, Parish of Moorabbin. Crown Allotment 2006 on TP835477B. This title includes Stage 1 (on which the Moorabbin Courthouse has been built). This area has been issued with a Statement of Environmental Audit in 2006 and is not part of this Audit.	Certificate of Title Volume 9598 Folio 389. Plan of Consolidation No. 150995, Parish of Moorabbin. Crown Allotment 2006 on TP835477B. This title includes Stage 1 (on which the Moorabbin Courthouse has been built). This area has been issued with a Statement of Environmental Audit in 2006 and is not part of this Audit.
Additional – Lot on plan(s)	Various easements (gas & drainage)	Various easements (gas & drainage)
Site name		
▪ Street No.	1136 - 1138	1136 - 1138
▪ Street Name	Nepean	Nepean
▪ Street Type	Highway	Highway
▪ Suburb	Highett	Highett
▪ Postcode	3190	3190
GIS coordinates (GDA94)		
▪ Latitude	37° 57' 5.6" S	37° 57' 6.4" S
▪ Longitude	145° 02' 46.6" E	145° 02' 42.0" E
Site area (hectares)	~4.7 ha (Stage 2 and 2A = 6.33 ha)	~1.63 ha (Stage 2 and 2A = 6.33 ha)
Members and categories of support team utilised	Alex Blount (contaminant transport and assessment of exposure pathways and risk) Alan Wade (Hydrogeology)	Alex Blount (contaminant transport and assessment of exposure pathways and risk) Alan Wade (Hydrogeology)
Outcome of the audit	Statement of Environmental Audit	Statement of Environmental Audit
Further work or requirements	Implementation of a groundwater quality management plan (GQMP). Environmental management plan (EMP) for areas of residual soil impacts.	Implementation of a groundwater quality management plan (GQMP). Environmental management plan (EMP) for areas of residual soil impacts.
Nature and extent of continuing risk	Groundwater: Elevated petroleum hydrocarbons (including total petroleum hydrocarbons (TPH), benzene, toluene ethylbenzene, and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total phenols, metals, ammonia, sulphate and free cyanide in groundwater pose a potential risk to groundwater users and Port Phillip Bay. Soil: Residual hydrocarbons (including PAHs) and inorganics (including metals (lead,	Groundwater: Elevated petroleum hydrocarbons (including total petroleum hydrocarbons (TPH), benzene, toluene ethylbenzene, and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), total phenols, metals, ammonia, sulphate and free cyanide in groundwater pose a potential risk to groundwater users and Port Phillip Bay. Soil: Residual hydrocarbons (including PAHs) and inorganics (including metals (lead,

	Stage 2	Stage 2A
	arsenic) and sulphates) in soil along parts of the site boundary and below the water table pose a potential risk to site occupants.	arsenic) and sulphates) in soil at depths of less than 1 metre, along parts of the site boundary and below the water table pose a potential risk to site occupants.
Site aquifer formation	Shallow unconfined Quaternary aquifer	Shallow unconfined Quaternary aquifer
Average depth to groundwater	Approximately 6m below ground level across the site.	Approximately 6m below ground level across the site.
Groundwater segment	A2 (variable)	A2 (variable)
Groundwater flow direction	West, north west towards Port Phillip Bay	West, north west towards Port Phillip Bay
Past use/site history	Industrial use	Industrial use
Surrounding land use	Residential, recreational/open space and commercial	Residential, recreational/open space and commercial
Proposed future use	Medium to high density residential	Medium to high density residential

* DTF appointed Dr David Adams of Parsons Brinckerhoff (PB) to conduct a Statutory Environmental Audit (Audit) at this site on 5 December 2001. Dr Adams withdrew from the Audit in October 2007 and Mr John Throssell also of PB was appointed to complete the Audit of the site on 16 October 2007.