



Environmental Management Plan

Demolition and Remediation

Former Macdonaltown Gasworks Site
Burren Street
ERSKINEVILLE NSW

September 2012
JBS 40913 – 15164 (Revision 5)
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Environmental Management Plan

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 Environmental Pty Ltd 40913-15972 Rev C, August 2011

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List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

- As Arsenic
- Cd Cadmium
- Cr Chromium
- Cu Copper
- BTEX Benzene, Toluene, Ethylbenzene and Xylenes
- B(a)P Benzo (a) pyrene
- DECC NSW Department of Environment and Climate Change
- DECCW NSW Department of Environment, Climate Change and Water
- DoP NSW Department of Planning
- DQO Data Quality Objectives
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- OCP Organochlorine Pesticide
- SAR Site Audit Report
- SAS Site Audit Statement
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- TPH Total Petroleum Hydrocarbons (C₆-C₉ and C₁₀-C₃₆)
- Zn Zinc

1 Introduction

JBS Environmental Pty Ltd was engaged by Incoll Management Pty Ltd (Incoll) on behalf of Rail Corporation NSW (RailCorp) to prepare an Environmental Management Plan (EMP) for proposed remediation and earthworks of the former Macdonaldtown Gasworks site. The former gasworks site is located on Burren Street, Erskineville, NSW and identified as Part Lot 50 in Deposited Plan (DP) 1001467 (herein referred to as the Site). Previous investigations at the Site have identified sub-surface environmental impact in fill, deeper soils and shallow groundwater resulting from previous heavy industrial use of the Site. In August 2000 the Site was declared to pose a Significant Risk of Harm (SROH) to human health and the environment, by the NSW Environmental Protection Authority (EPA). In 2002 RailCorp entered into a Agreed Voluntary Investigation Proposal with the NSW EPA, with the objective of producing a Remedial Action Plan (RAP) for the Site. Records indicate that in 2008 the requirements of the Voluntary Investigation Proposal had been satisfied.

It is understood that RailCorp intend to complete the remediation prescribed in the RAP to enable continued commercial use of the Site, and that planning works have commenced. Additionally, since completion of the RAP and SAR, RailCorp has advised that a section of land contained within the Chullora Railway Workshops, located on Worth Street, Chullora, NSW may be available for treatment of soil excavated from the site.

This EMP has been prepared as part of the Part 3a development approval, noting that revision of the EMP will be required on finalisation of the remedial strategy for the Site.

The EMP provides procedures to control demolition and remediation works to ensure that soil, water and air emissions caused by the works meet published regulatory guidelines and/or any environmental emissions are minimised to the extent possible.

This document should be read in conjunction with the Remedial Action Plan (RAP) prepared for the site in '*Remedial Action Plan, Former Macdonaldtown Gasworks, Burren Street, Erskineville*' (CH2M Hill, 2007) and the addendum '*Remedial Strategy, Former Macdonaldtown Gasworks, Burren Street, Erskineville*' (JBS 2011).

2 Project Summary

2.1 Details of Remediation Site

The site undergoing remediation (the Site) is located on Burren Street, Erskineville NSW. The Site location is shown in **Figure 1** and details provided in **Table 1**. The Site details are summarised below and described in more detail in the following sections.

Table 1 Site Details

Lot/DP	Part Lot 50 in DP 1001467
Address	Burren Street, Erskineville, NSW
Local Government Authority	City of Sydney
Site Zoning	'Railways Zone' in Sydney Regional Environmental Management Plan 26
Current Use	Vacant Land
Geographical Co-ordinates	Lat: -33.917° North, Long: 151.199° East (southern corner)
Site Area	7,732m ²

A Site layout plan is provided as **Figure 2**. This plan has been adopted from previous CH2M HILL studies completed on the Site.

The Site has been previously delineated into eight areas by CH2M Hill (March 2007) 'Delineation & Characterisation Sampling and review of Remedial Options' (CH2M Hill 2007a). These areas are shown on **Figure 3** and include:

- **Gasholders**: encompasses both Gasholder structures adjoining the western boundary. The Southern Gasholder remains intact with the superstructure standing approximately 12 metres above the ground surface. The above ground structure of the Northern Gasholder has been demolished, however the brick annulus structure remains intact beneath the ground;
- **Retort**: encompasses the footprint of the former Retort House, Tar Wells, Condensers, Coal and Shale Storage areas and other building structures associated with the gasworks operations (office, amenities, etc). These buildings and structures have been demolished and associated structures are no longer visible above the ground surface. However some underground structures remain in place, including the two Tar Wells, pipework, brick flooring and foundations and concrete slabs;
- **Gas Purifier**: encompasses the footprint of the former Purifier Beds, Scrubbers and Gas Meters. Similar to the Retort Area, the only remaining structures are buried below the ground surface;
- **Northeast**: includes the majority of the northeast section of the Site;
- **South Central**: includes the portion along the central southeast boundary;
- **Southwest**: includes the majority of the southern area of the Site;
- **Retaining Wall**: includes the filled area embankment along the northern Site boundary; and
- **Western Lot**: includes the small rectangular section of land that extends west to Burren Street.

A site inspection was completed by JBS on the 25th March 2010. The Site was found to be overgrown with vegetation. Several stockpiles of predominantly soil and railway ballast based materials were located over the eastern portion of the Site, which were being removed during the site inspection. It was reported by RailCorp representatives that the observed works were being undertaken to remove all stockpiled materials. The northernmost former gasholder was observed as a circular area of exposed brickwork. The southernmost gasholder was observed to be substantially intact. Some brick and metallic debris, presumably associated with the former operation of the Site as a gasworks, was distributed throughout the remainder of the property.

2.1.1 Surrounding Landuse

Surrounding land-uses include:

- North – Covered rail sidings are present adjoining the northern boundary of the former gasworks. Further north is Macdonaldtown station and associated rail corridor;
- South-east – A noise barrier and access roadway is located adjoining the south-eastern boundary of the Site. Further south is the rail corridor associated with the Illawarra and south-west rail corridor; and
- West – Residences fronting Burren Street, Erskineville are located adjoining the eastern boundary of the Site. Residences consist of detached and semi-detached low and medium density dwellings and small yard areas. The residential area of Erskineville is located further west.

2.2 Purpose of the Environmental Management Plan (EMP)

This Environmental Management Plan (EMP) has been designed to ensure, via the implementation of a number of ongoing monitoring and management measures pertaining to the proposed remediation program, that the risk associated with contamination, to users of the adjoining commercial and residential properties, and the surrounding environment is acceptable. The remediation works are being undertaken to make the Site suitable for continued rail/industrial use. The EMP includes the acceptable levels of environmental constituents in soil and groundwater to facilitate this future use, as agreed upon by the relevant stakeholders.

It should be noted that the EMP is in no way intended to replace or supersede existing Environmental Management Plans and / or Health and Safety Plans required for the Site. Instead the EMP should be considered as a supplement to these documents and particularly targeted to deal with issues unique to the proposed demolition and remediation works as necessitated by the Site's environmental status.

2.3 Proposed Earthworks and Treatment Works on the Site

The demolition and earthworks are proposed to be undertaken in distinct stages as described following:

- Demolition component of the works including the removal of any former gasworks buildings and infrastructure not considered items of significant heritage and archaeological potential, and includes the connection shed, former tar wells, condensate pits and existing concrete pavement overlying areas of contaminated soils.

- Excavation component of the works consisting of the installation of excavation support as required (i.e. shoring) and excavation of soils identified as contaminated.
- Dewatering of proposed area of excavation by the installation of dewatering spears to allow excavation of soils below the depth of the water table.
- Stockpiling of the soils within a controlled location on the Site to facilitate remediation of the material, or later backfilling, dependent on the contamination status of the soils. Where the proposed remediation works required on soils involve treatment, either on or off site, the remediation process may require licensing under the *Protection of the Environment Operations* (POEO) Act 1997;
- Treatment of some contaminated soil within a controlled location on the Site to remediate the material.
- Backfilling of excavations with fill materials characterised as being environmentally and geotechnically suitable for placement within the Site sub-surface.

The works are being undertaken to facilitate remediation works. The likely site setup and configuration required on the Macdonaldtown Site during remediation is shown on **Figure 4**.

2.3.1 Demolition

The demolition stage of the works will be the initial stage of the works if required. The demolition works will include the removal of any above ground infrastructure on site that is assessed to be:

- Not an item of significant heritage or archaeological potential; and
- Not an on-going source of contamination.

In undertaking demolition works RailCorp shall only use WorkCover accredited contractors. All demolition works shall be undertaken as per relevant statutes and Australian and International Standards.

The majority of the demolished materials will be transported off-site for recycling. This will include the concrete and masonry wastes from removal of Site pavements. All other wastes shall be transported to an appropriately licensed facility for processing.

2.3.2 Earthworks

The proposed earthworks are designed to allow the associated remediation activities to be undertaken.

Substantial environmental data are available for the Site to characterise the extent of contaminated soils and groundwater. The areas of the Site which are known to be contaminated and have been identified in the proposed earthworks program are shown on **Figure 3**, and include:

- The central part of the northern Site boundary;
- The central part of the western Site boundary;
- The centre of the Site, including an apparent 'primary tar source zone', approximately 10 m east of the Southern Gas Holder; and
- Shallow areas potentially across the remainder of the Site.

The earthworks shall include:

- Installation of soil retention structures (i.e. shoring) as required to protect adjoining properties and heritage items during proposed excavation works;
- In areas of impacted soil, excavation of overlying non-impacted material, if present, and stockpiling separately on the Site;
- Dewatering of areas of proposed excavation of impacted soils. The water accumulated during dewatering may require treatment. Treated water may be suitable for re-injection along the south-eastern boundary to maintain water level underlying adjoining structures;
- Excavation of impacted soils and transport to a stockpiling and material holding area, the location of which is to be determined; and
- Filling of excavations with the stabilised soil or with clean, validated fill material assessed as suitable for use on the Site.

2.3.3 Proposed Treatment Works

Treatment of excavated impacted soil by bioremediation or stabilisation with calcium- or magnesium-oxide based cement, as appropriate. This may involve the following tasks:

- General handling for the construction of windrows, spreading and/or turning of contaminated soil as part of bioremediation works; and
- Addition of cement, mixing and curing of contaminated soil as part of cement stabilisation.

Any soil treatment works on the site will need to be undertaken within a designated and controlled area.

2.4 Proposed Treatment Works Off Site

Given the significant area restrictions on the Site, RailCorp has advised that a section of land contained within the Chullora Railway Workshops, located on Worth Street, Chullora, NSW is available for treatment of soil excavated from the site. The location of the treatment site is displayed in **Figure 5**. The extent of the potential treatment area is shown on **Figure 6**, and likely configuration during remediation works shown on **Figure 7**.

2.4.1 Proposed Treatment Works

The activities proposed to be completed on the Chullora treatment site are as follows:

- Receipt of contaminated soils / materials from the Macdonaldtown former gasworks remediation;
- Storage of contaminated soils / materials within stockpiles or similar;
- Treatment of contaminated soils / materials by immobilisation, as appropriate for off-site disposal to an appropriately licensed facility;
- Treatment of contaminated soils by bioremediation, typically within biopiles or landfarm windrows, as appropriate, for disposal to landfill at a lower waste classification.

3 Contaminants of Concern

On the basis of the review of the previous site assessments the following chemicals/constituents of potential concern (COPCs) have been identified for each of the media assessed.

Soils

- Monocyclic aromatic hydrocarbons (MAH), being benzene, toluene, ethylbenzene & xylenes (BTEX));
- Polycyclic aromatic hydrocarbons (PAH);
- Phenolic compounds (phenol and cresol isomers);
- Heavy metals (localised fill materials); and
- Asbestos.

Surface Water and Groundwater

- Monocyclic aromatic hydrocarbons (MAH), being benzene, toluene, ethylbenzene & xylenes (BTEX));
- Polycyclic aromatic hydrocarbons (PAH);
- Phenolic compounds (phenol and cresol isomers);
- Heavy metals including arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), lead (Pb), nickel (Ni) and zinc (Zn); and
- Cyanides

Soil Vapour

- BTEX compounds and naphthalene as based on outcomes of computer simulation only.

The following sections provide a summarised environmental risk profile of the main COPC that have been identified on the Site at concentrations above that considered appropriate for environmental protection.

3.1 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are ubiquitous in the environment, with natural background levels resulting from forest fires, volcanoes and possibly production by some plants. However, a significant fraction of PAHs resulting in the environment are due to anthropogenic sources (e.g. burning of fuel, internal combustion engines etc.). Their widespread occurrence results largely from formation and release during the incomplete combustion of coal, oil, petrol and wood, but PAHs are also components of petroleum and its products. PAHs reach the marine environment via sewage discharges, surface run-off, industrial discharges, oil spillages and deposition from the atmosphere. Exposure to PAHs can be via absorption through the skin, ingestion, and inhalation via dust and/or vapours.

PAHs have a low water solubility and hydrophobic in nature (i.e. not dissolving easily or mixing easily with water) and so they will tend to be associated with inorganic and organic material in suspended solids and sediments. In general, most PAHs (with the exception of some low-molecular weight compounds, such as naphthalene) will be strongly sorbed by particulate matter and biota in the aquatic environment.

3.2 Benzene

Benzene (C_6H_6) is a liquid at room temperature and pressure. It is soluble in water, has a low to moderate tendency to sorb to particulates and is highly volatile.

Production of benzene is associated primarily (>90%) with the petrochemical industry, with a smaller proportion produced as a by-product of coke production and small quantities derived from natural gas. Most benzene is used as a constituent of BTX (benzene-toluene-xylenes) in vehicle, aviation and other fuels, where benzene is used to increase the octane rating. This use has increased globally with the widespread introduction of unleaded petrol and the increasing use of vehicular transport in developing nations.

During production and use, benzene is released primarily to the atmosphere, although it is quite mobile between environmental compartments. Entry into water may be direct or via atmospheric deposition, run-off and leaching. Low but significant levels may also arise from releases from natural sources, such as vegetation and fossil fuels. Exposure to benzene can be via absorption through the skin, ingestion, and inhalation via dust and/or vapours.

3.3 Toluene

Toluene has a large number of applications in both industrial and consumer products.

The largest single use of unisolated toluene, as BTX mixture, is the incorporation of the reformat mixture into petrol to produce high octane fuel. In addition, approximately 35% of isolated (technically pure) toluene is backblended into petrol to increase the octane ratings.

Of toluene that is released to the environment, the atmosphere provides the main sink for toluene with only relatively small amounts are lost to the aqueous environment. Possible routes of entry for toluene into surface waters include; direct discharges of industrial effluents, especially from chemical production and refinery Sites; spillage; leaching and run-off and atmospheric deposition. Exposure to benzene can be via absorption through the skin, ingestion, and inhalation via dust and/or vapours.

3.4 Phenol

Phenol is both a manufactured chemical and a natural substance. It is a colorless-to-white solid when pure. The commercial product is a liquid. Phenol has a distinct odor that is sickeningly sweet and tarry.

Phenol can be tasted and smelled at levels lower than those that are associated with harmful effects. Phenol evaporates more slowly than water, and a moderate amount can form a solution with water.

Phenol is used primarily in the production of phenolic resins and in the manufacture of nylon and other synthetic fibers. It is also used in slimicides (chemicals that kill bacteria and fungi in slimes), as a disinfectant and antiseptic, and in medicinal preparations such as mouthwash and sore throat lozenges.

Following small, single releases, phenol is rapidly removed from the air (generally, half is removed in less than a day). Phenol generally remains in the soil only about 2 to 5 days. Phenol can remain in water for a week or more. Larger or repeated releases of phenol can remain in the air, water, and soil for much longer periods of time. Phenol does not build up in fish, other animals, or plants.

4 Implementation of the EMP

4.1 Identification of Potential Environmental Emissions

As discussed in **Section 2.3** a substantial program of demolition and earthworks are proposed to be undertaken on the Site. This has been summarised in **Table 2** with the potential environmental emissions (including emissions to soil, air and water) associated with each identified activity. Procedures required to control potential environmental emissions to acceptable levels have been identified, and are noted in the table for each proposed activity.

4.2 Responsibilities

The demolition and remediation on the Site shall be undertaken under the guidance of a Principal Contractor who is yet to be appointed. The Principal Contractor will be responsible for the implementation of the majority of procedures provided in the EMP. It is noted that where the specific procedures are technical or complex in nature then the Principal Contractor may appoint appropriately qualified agents (i.e., environmental consultants) to fulfil the requirements of the procedure, or advise the appropriate implementation of the procedure. The responsibility of ensuring the advice from the technical subconsultants is endorsed by RailCorp and implemented, will rest with the Principal Contractor.

A formal list of procedures is provided to the EMP based on an assessment of potential environmental emissions from anticipated site works required for the demolition and earthworks. Specific responsibilities are nominated for the implementation of these procedures.

4.3 Environmental Procedures on Remediation Site

A number of environmental procedures have been referred to in **Table 2**, for control of the potential emissions on the former gasworks site. A copy of each environmental procedure referred to is provided in **Appendix A**. A separate Air Quality Management Plan (AQMP) has been prepared for the Macdonaldtown site, which is provided as **Appendix B**.

To allow the implementation of each procedure, relevant parties are to be allocated the responsibility for execution. To this effect, the responsible party(s) for each procedure and responsibilities are shown against the list of procedures in **Table 3** following. Each organisation will be required to be familiar with the requirements of each of the relevant procedures.

4.4 Environmental Procedures on Treatment Site

A number of environmental procedures have been referred to in **Table 4**, for control of the potential emissions on the treatment site. A copy of each environmental procedure referred to is provided in **Appendix C**. A separate AQMP has been prepared for the Chullora site, which is provided as **Appendix D**.

To allow the implementation of each procedure, relevant parties are to be allocated the responsibility for execution. To this effect, the responsible party(s) for each procedure and responsibilities are shown against the list of procedures in **Table 5** following. Each organisation will be required to be familiar with the requirements of each of the relevant procedures.

Table 2: Review of Potential Environmental Impacts on Remediation Site

Activity	Potential Impacts	Management Procedure
Off-Site Disposal of Wastes	Noise generation Dust generation Sediment migration Traffic impacts Odour generation Contamination of heavy equipment	01 Airborne Hazard Control 05 Emergency Response 06 Noise Control 07 Traffic 09 Handling of Contaminated Soil 11 Sediment Control 13 Decontamination of Heavy Equipment 14 Environmental Monitoring 15 Waste Classification
Excavation of Soils	Noise generation Dust generation Sediment migration Odour generation Disturbance to existing flora / fauna Contamination of heavy equipment	01 Airborne Hazard Control 02 Flora & Fauna 03 Heritage / Archaeological 04 Visual Impacts 05 Emergency Response 06 Noise Control 09 Handling of Contaminated Soil 11 Sediment Control 13 Decontamination of Heavy Equipment 14 Environmental Monitoring 17 Environmental Criteria 18 Management of Unexpected Free Tar
Handling/Treatment of Soils	Noise generation Dust generation Air Emissions Odour Generation Sediment migration Contamination of heavy equipment	01 Airborne Hazard Control 05 Emergency Response 06 Noise Control 09 Handling of Contaminated Soil 10 Tented Enclosure 11 Sediment Control 13 Decontamination of Heavy Equipment 14 Environmental Monitoring 17 Environmental Criteria 18 Management of Unexpected Free Tar
Soil Sampling	Noise generation Dust generation Sediment migration Contamination of heavy equipment Disturbance to existing flora / fauna	01 Airborne Hazard Control 02 Flora & Fauna 03 Heritage / Archaeological 05 Emergency Response 06 Noise Control 09 Handling of Contaminated Soil 11 Sediment Control

Activity	Potential Impacts	Management Procedure
		13 Decontamination of Heavy Equipment 14 Environmental Monitoring
Dewatering	Noise generation Contaminated water discharge Impacts on Adjoining Structures	05 Emergency Response 06 Noise Control 08 Protection of Adjoining Structures 13 Decontamination of Heavy Equipment 14 Environmental Monitoring 16 Groundwater Treatment 17 Environmental Criteria
Stockpiling of Soils	Noise generation Dust generation Odour generation Sediment migration Contamination of heavy equipment Release of contaminants to sub-surface soils and groundwater	01 Dust and Airborne Hazard Control 05 Emergency Response 06 Noise Control 09 Handling of Contaminated Soil 11 Sediment Control 13 Decontamination of Heavy Equipment 14 Environmental Monitoring
Contingency	-	18 Management of Unexpected Free Tar

Table 3: Summary of Responsibilities for Environmental Procedures: Remediation Site

Procedure	Principal Contractor	Environmental Consultant	Council
EMP 01 Airborne Hazards Control	X		
EMP 02 Flora & Fauna	X	X	
EMP 03 Heritage / Archaeological	X	X	
EMP 04 Visual Impacts	X		
EMP 05 Emergency Response	X	X	
EMP 06 Noise Control	X	X	
EMP07 Traffic	X	X	
EMP08 Protection of Adjoining Structures	X		
EMP09 Handling of Contaminated Soil	X		
EMP10 Tented Enclosure	X	X	
EMP11 Sediment Control	X		
EMP13 Operation of Site Office	X		
EMP13 Decontamination of Heavy Equipment	X		
EMP14 Environmental Monitoring	X	X ¹	
EMP15 Waste Classification	X	X ¹	
EMP16 Groundwater Treatment	X	X ¹	
EMP17 Environmental Criteria	X	X ¹	
EMP 18 Management of Unexpected Free Tar	X	X ¹	
EMP19 Community Consultation	X	X	
EMP20 Incident Reporting	X	X ¹	
EMP21 EMP Review	X	X ¹	X
EMP22 Training	X	X ¹	

Notes 1: To include consultation with and/or endorsement by the appointed Site Auditor as required

Table 4: Review of Potential Environmental Impacts on Treatment Site

Activity	Potential Emissions	Management Procedure
Handling/Treatment of Soils	Noise generation Dust generation Air Emissions Odour Generation Sediment migration Contamination of heavy equipment	23 Dust and Airborne Hazard Control 24 Emergency Response 25 Noise Control 28 Handling of Contaminated Soil 29 Sediment Control 31 Decontamination of Heavy Equipment 32 Environmental Monitoring
Stockpiling of Soils	Noise generation Dust generation Odour generation Sediment migration Contamination of heavy equipment Release of contaminants to sub-surface soils and groundwater	23 Dust and Airborne Hazard Control 24 Emergency Response 25 Noise Control 27 Odour Control 28 Handling of Contaminated Soil 29 Sediment Control 31 Decontamination of Heavy Equipment 32 Environmental Monitoring
Off site disposal of Treated Waste	Noise generation Dust generation Odour generation Contamination of heavy equipment	23 Dust and Airborne Hazard Control 24 Emergency Response 25 Noise Control 27 Odour Control 28 Handling of Contaminated Soil 29 Decontamination of Heavy Equipment 30 Environmental Monitoring

Table 5: Summary of Responsibilities for Environmental Procedures: Treatment Site

Procedure	Principal Contractor	Environmental Consultant
23. Dust and Airborne Hazard Control	X	
24. Emergency Response	X	X
25. Noise Control	X	X
26. Traffic	X	X
27. Odour Control	X	X
28. Handling of Contaminated Soil	X	
29. Sediment Control	X	
30. Operation of Site Office	X	
31. Decontamination of Heavy Equipment	X	
32. Environmental Monitoring	X	X ¹
33. Community Consultation	X	X

34. Incident Reporting	X	X ¹
35. EMP Review	X	X ¹
36. Training	X	X ¹

Notes 1: To include consultation with and/or endorsement by the appointed Site Auditor as required

5 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the Site, and it is limited to the scope defined herein. Should information become available regarding conditions at the Site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Figures

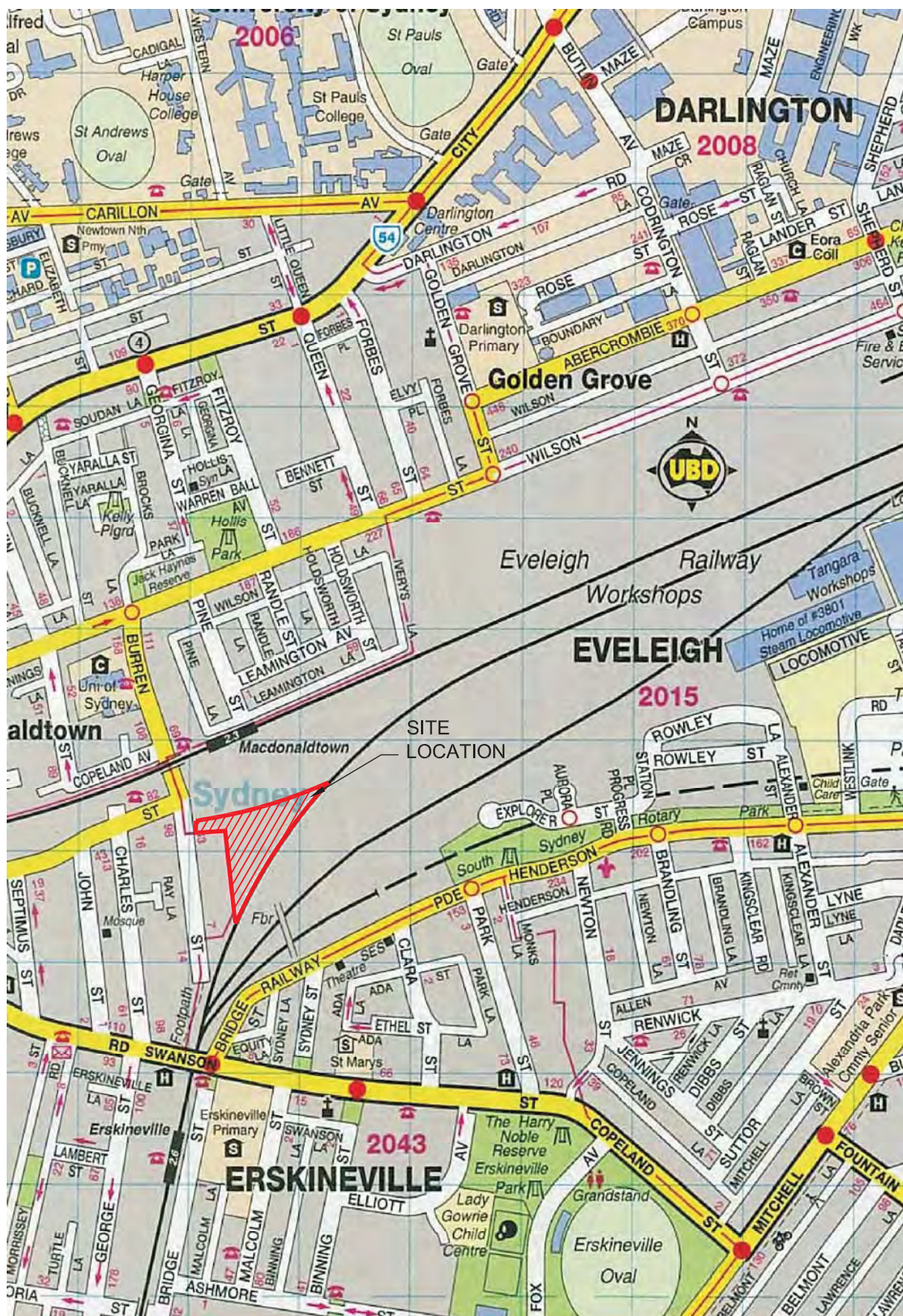
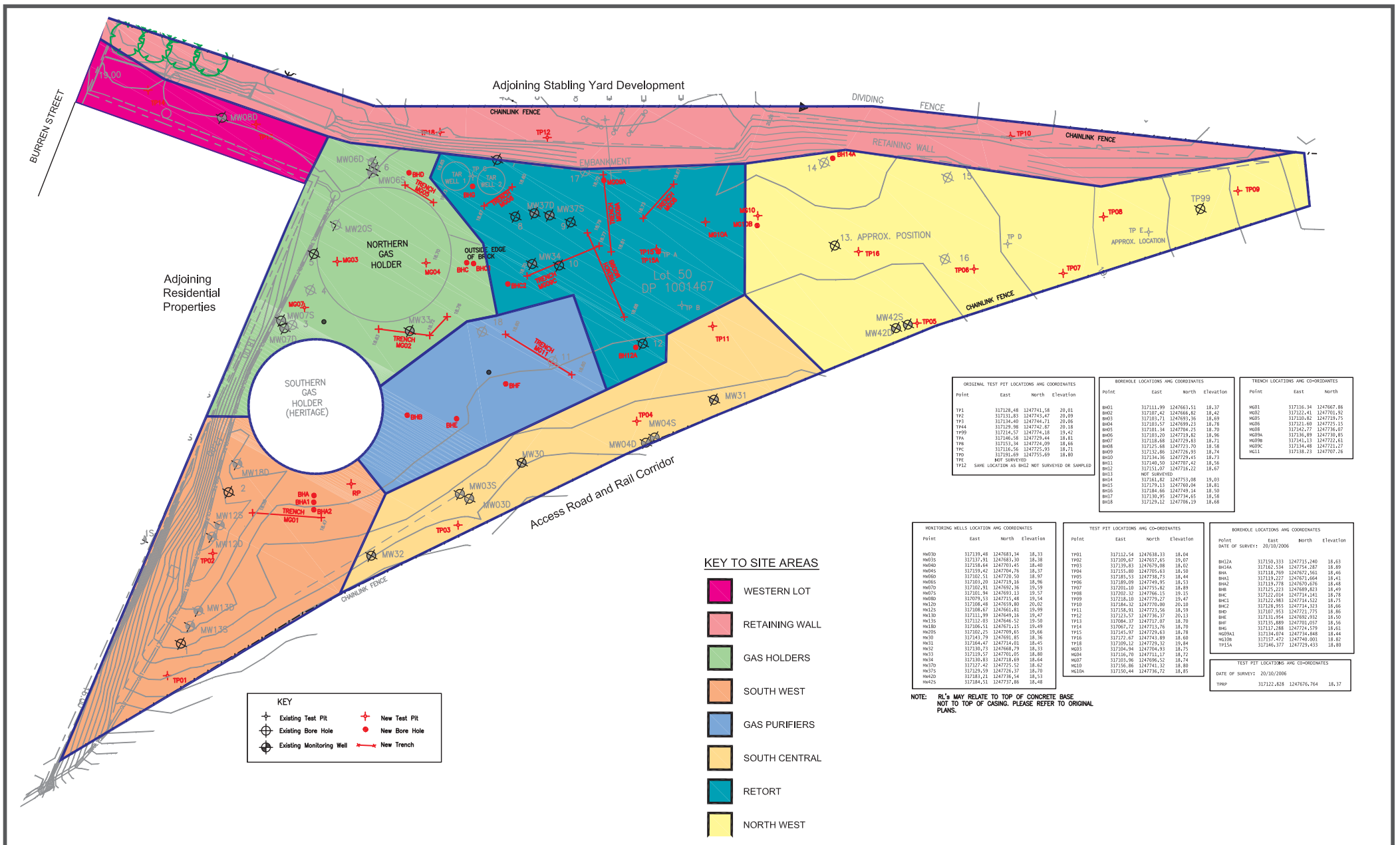


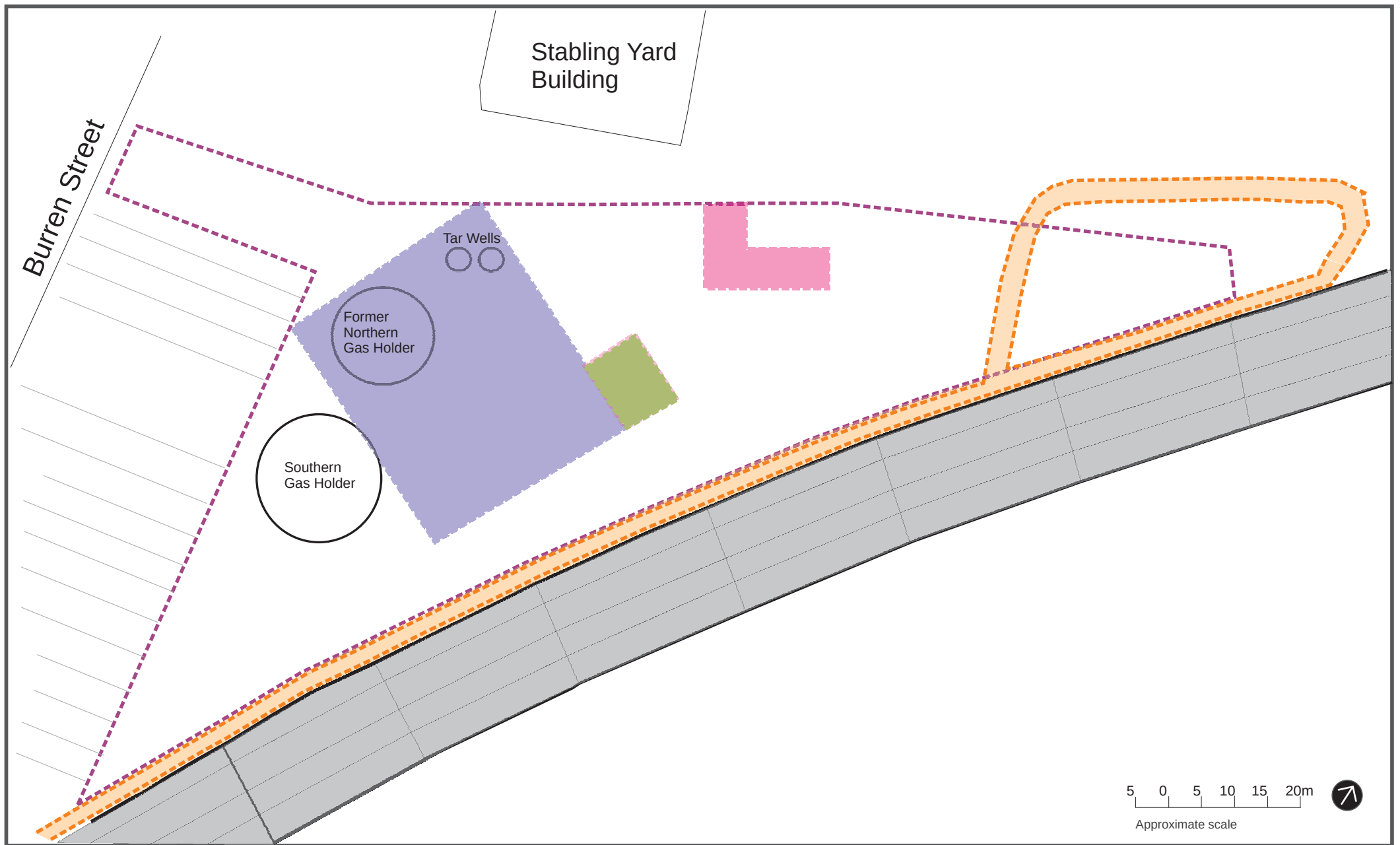
Figure 1 Site Location (Macdonaldtown)



Figure 2 **Current Macdonaldtown Site Plan**

CH2M Hill (2007)
Note- All locations shown are approximate only





- Site Boundary
- Temporary Enclosure
- Air Emissions Treatment System
- Water Treatment System

- Site Access Road
- Water Treatment System

Figure 4 **Macdonaldtown Remediation Proposed Site Setup**

As adapted from Figure 4 CH2M Hill 2007



LEGEND

 Proposed Site Area Available
for Remediation Works



0 50m
Approximate scale

Figure 6 **Treatment Area Site Plan**

Department of Lands (2010)
Note- All locations shown are approximate only

File Name: 40913_02

Appendix A
Environmental Management Procedures
Macdonaldtown Remediation Site

Appendix A Macdonaldtown Remediation Site Management Procedures - Contents Page

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<i>'Air Quality Management Plan, Former Macdonaldtown Gasworks'</i> JBS Environmental Pty Ltd 40913-15972 Rev C, August 2011.	Provided as Appendix B to this EMP

Airborne Hazards Control		EMP01
Responsibility:	Principal Contractor	
Frequency:	All site works	
Location:	Site	
Objective:	To minimise dust, odour and air toxin emissions from demolition, earthworks and remediation.	

Procedure

Excavation and handling of soils has the potential to generate dust and odour emissions. Soils underlying the site that have been impacted by free tar and other gasworks waste site are malodorous.

Asbestos containing materials have also been found to be potentially present in fill materials located across the site. Previous environmental assessments have identified that asbestos occurs within the bonded matrix of these fibre cement fragments. No free asbestos fibres have been identified in soils.

Addison et al ('The Release of Dispersed Asbestos from Soil', Institute of Occupational Medicine Report No. TM/88/14, September 1988) have found that very high levels of respirable dust require to be generated before significant airborne concentrations of asbestos fibres were produced from soils contaminated with respirable asbestos fibres. It is considered that fibre cement sheet fragments require to be subjected to intensive mechanical processes to cause the release of asbestos fibres.

Asbestos containing fibre cement fragments present in the site sub-surface on the site are considered not to pose a risk. However where the fragments are disturbed by excavation works asbestos fibres will potentially be released. Measures to control dust emissions will be sufficient to control potential asbestos emissions. Airborne asbestos fibre monitoring will be required for confirmation.

Standards

All operations on site are to be conducted so that concentrations of dust, odour and other hazardous substances satisfy those stipulated in NSW DECC published and endorsed guidelines. These guidelines include:

- NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality' and
- Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'.

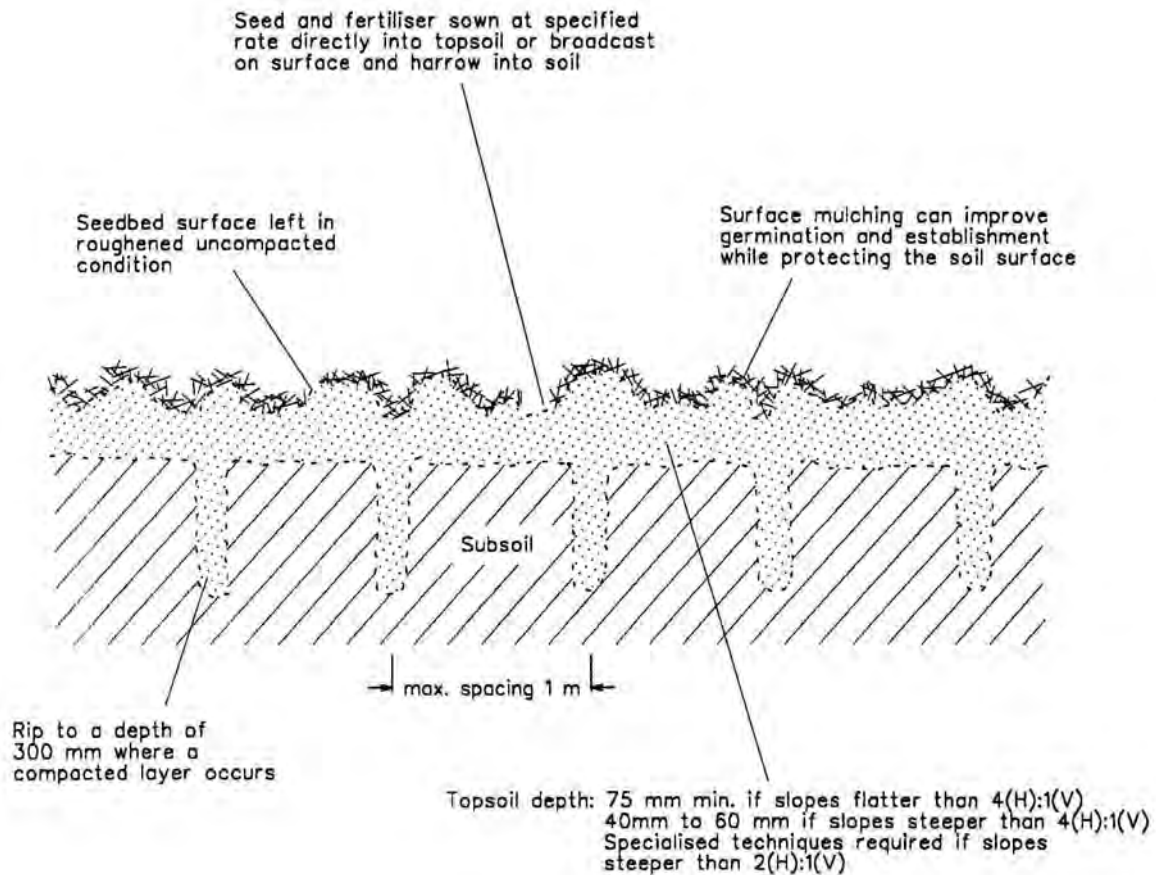
Control

All works on site should be conducted in accordance with the '*Air Quality Management Plan, Former Macdonaldtown Gasworks*' JBS Environmental Pty Ltd 40913-15972 Rev C, June 2011

This will include a program of boundary monitoring for dust, asbestos and odours and management of emissions in accordance with current industry best practices, including enclosure of all works involving material from the former Northern Gasholder area, former Gasworks area and treatment of soils.

It is noted that additional specific requirements have been developed for soils which are identified as potentially malodorous as detailed in EMP09 Handling of Contaminated Soil and EMP10 Tented Enclosure which shall also reduce dust, odour and potential asbestos emissions. The requirements of this procedure should be reviewed in accordance with the additional requirements of these other procedures.

Flora and Fauna		EMP02
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	All site works	
Location:	All areas on site where threatened flora or fauna or noxious and exotic weeds are potentially present	
Objective:	To eliminate potential impacts to threatened species and minimise noxious and exotic weeds	
Procedure It is noted that to date, no threatened or endangered flora or fauna species have been identified on the site. Grass is present across the majority of the site, while high canopy vegetation is generally restricted to areas along site boundaries. The Flora and Fauna Assessment conducted for the project has concluded that the remediation program will have minimal impact on the existing species populations. Nonetheless, in the event that potentially endangered flora or fauna species are encountered during the project then works shall be undertaken in a manner that negates potential impact. Where the proposed remediation works disturb areas that require reinstatement as vegetated areas, the revegetation plan will be guided by RailCorp and should include consultation with neighbouring residences. The following shall be undertaken at the completion of works to encourage return of flora and fauna to the site: • The disturbed area of the site shall be grassed on a progressive basis prior to practical completion of the work stage to minimise potential sediment generation. Methodologies be employed in the re-seeding of excavations should be directed by the Flora and Fauna Consultant appointed to the project, or, in the absence of this advice, as shown on Figure 02-1; • Unless otherwise advised by the Flora and Fauna Consultant, prior to the placement of any grass seed, or turf, on the remediated sections of the site, the surface shall be scarified to promote germination; and/or • It shall be ensured that construction traffic keeps to formed roads and designated haulage routes and avoids these areas. <u>Noxious and Exotic Weeds</u> Where noxious and exotic weed species are identified in areas of proposed earthworks, then these shall be removed and disposed of. These areas shall be reseeded as directed by the Flora and Fauna Consultant appointed to the project, or, in the absence of this advice, as shown in Figure 02-1.		

Re-Seeding Excavations
Fig 02-1


Construction Notes

1. Loosen compacted soil before sowing any seed.
2. Work the ground only as much as necessary to prepare a good seedbed.
Do not over-cultivate ground.
3. Cultivate soils rich in organic matter as little as possible.
4. Avoid rotary hoe cultivation.
5. Avoid cultivation in very wet or very dry conditions.
6. Cultivate on the contour where possible.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'

Heritage / Archaeological		EMP03
Responsibility:	Principal Contractor Heritage Consultant Site Auditor Environmental Consultant	
Frequency:	All site works	
Location:	Site area	
Objective:	To ensure that any potential items of heritage or archaeological significance are appropriately recorded and handled	
Procedure Assessment works previously completed on the Former Macdonaldtown gasworks site have identified several potential heritage and/or archaeological items of significance, including the Southern Gas holder and the brick ring annulus of the former northern gas holder. Based on the findings of recent investigative work, archaeological supervision and monitoring will be necessary wherever remediation occurs in areas identified as having 'significant archaeological potential'. The process of archaeological monitoring will require documentation. Remediation of the site, particularly machine excavation around the Southern Gasholder is to be adequately planned and supervised in order to avoid damage to the structure. Archival recording of the footprint of the Retort House and the former Superintendent residence is required in accordance with the recommendations provided in the City Plan heritage ' <i>Macdonaldtown Gasworks, Archaeological Test Excavation Report for RailCorp</i> ' August 2010. Remediation should be undertaken in such a way as to allow implementation of the City Plan Heritage ' <i>Former Macdonaldtown Gasworks Heritage Interpretation Plan</i> ' August 2010, particularly with respect to the remnants of the Northern Gasholder. In areas outside those assessed to have 'significant archaeological potential', where a potential item of archaeological or heritage significance is uncovered, then works shall be ceased in the proximity of the item and advice sought from an appropriately qualified archaeological or heritage consultant.		

Visual Impacts		EMP04
Responsibility:	Principal Contractor	
Frequency:	All site works	
Location:	Site boundaries	
Objective:	To minimise visual impacts of works to surrounding areas	
Procedure		
Visual impacts of the works shall be minimised where possible to retain the visual amenity of the area in the proximity of the site. This shall be undertaken by: • Provision of site fencing with dust screen (i.e. shade cloth) to height of fencing; • Reducing the extent of waterlogged or areas of ponded water; • Use of neutral colours for the construction of any Tented Enclosure as described in procedure EMP11 Tented Enclosure; • Use of neutral or natural colour fabrics (i.e. green / black / beige) for covering stockpiles of contaminated soils; • Construction of stockpiles to height no greater than 5m; • Selection of natural colours (i.e. green or brown) for site amenity structures as visible from outside of the site where possible; and • Shielding of plant and equipment associated with other soil and groundwater treatment areas by use of fencing provided with dust screen.		

Emergency Response		EMP05
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Where uncontrolled releases of potential environmental pollutants occurs	
Location:	All areas on site	
Objective:	To minimise environmental impacts of all incidents on site	
Procedure		
Environmental incidents on the site which would require potential emergency response would relate to a spill of hazardous liquid or material on soils on the site, or in the proximity of a stormwater discharge point. For spills on land the following shall be undertaken: • Identify source of spill and stop when / if safe to do so; • Identify area of spill and clear area of all personnel; • Notify RailCorp, City of Sydney Council (within 24hrs), and Environmental Consultant of spill; • Construct earthen bunding using earth moving equipment available on site to contain spill; • Environmental Consultant to coordinate the pumping of liquid waste out of the containment structure and disposal to a licensed waste facility; • If solid waste, Environmental Consultant coordinate the excavation and removal of the hazardous material to a secure area (or Tented Enclosure); and • Assess soils in vicinity of environmental incident for contamination and conduct remediation works where contamination has occurred. For spills to the site stormwater system the following shall be undertaken: • Identify source of spill and stop when / if safe to do so; • Identify onshore circumference of spill and clear area of all personnel; • Notify RailCorp, City of Sydney Council and Environmental Consultant of spill with 24 hours; • Environmental Consultant to instruct containment of area of spill in water by placement of temporary absorbent booms (available on site) to create 'coffer dam' around stormwater outlet to prevent discharge of spilt material; • Environmental Consultant to coordinate a liquid waste tanker to be brought onto site and pump directly from water contained within the impacted area of the constructed coffer dam until visual evidence of spill removed. Alternately water may be pumped to the water treatment plant established on site as per EMP16 Groundwater Treatment. All emergency responses should be followed up with EMP20 Incident Reporting and EMP21 Review.		

Noise Control		EMP06
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	All site works	
Location:	Site boundaries and nearest off-site occupied areas	
Objective:	To minimise impacts of noise emissions on adjoining land users	
Procedure The following measures shall be employed during the site works to minimise environmental noise emissions in the proximity of occupied areas in the vicinity of the site, including residential areas at the north and east of the site:		
• Normal hours of work will be between 7.30 am and 5.30pm Monday to Friday and 7.30am to 3.30pm on Saturdays. No work shall be conducted on Sundays or public holidays or outside the above hours unless approved by RailCorp and deemed to be crucial to the control of potential environmental emissions from the site; • Where possible, all site noise sources should be compliant with maximum allowable noise levels specified in the Noise and Vibration Management Plan for the project (required to be completed prior to the commencement of works, in accordance with City of Sydney approval conditions); • The conditions of exhaust systems on the excavators and other heavy machinery will be assessed to ensure that they are operating efficiently; • If generators or pumps are required for use on the site, they will be properly shrouded to reduce emitted noise levels; • Maintenance and repairs being undertaken outside normal working hours provided that it is done as far as away from occupied premises as possible, no heavy machinery is involved and noise generated is inaudible at noise sensitive premises; • A communication and complaints register will be maintained to ensure that any concerns of local residents and members of the public are recorded and addressed as detailed in EMP19 Community Consultation; and • Concerns over noise generation will be communicated to all site personnel and contractors during site inductions.		
Where the controls provided are insufficient to minimise noise levels to the required level, a noise monitoring program shall be undertaken during the site works. Requirements of noise monitoring are detailed in EMP15 Environmental Monitoring. The results of the noise monitoring program shall be used to determine the most effective noise control measures.		

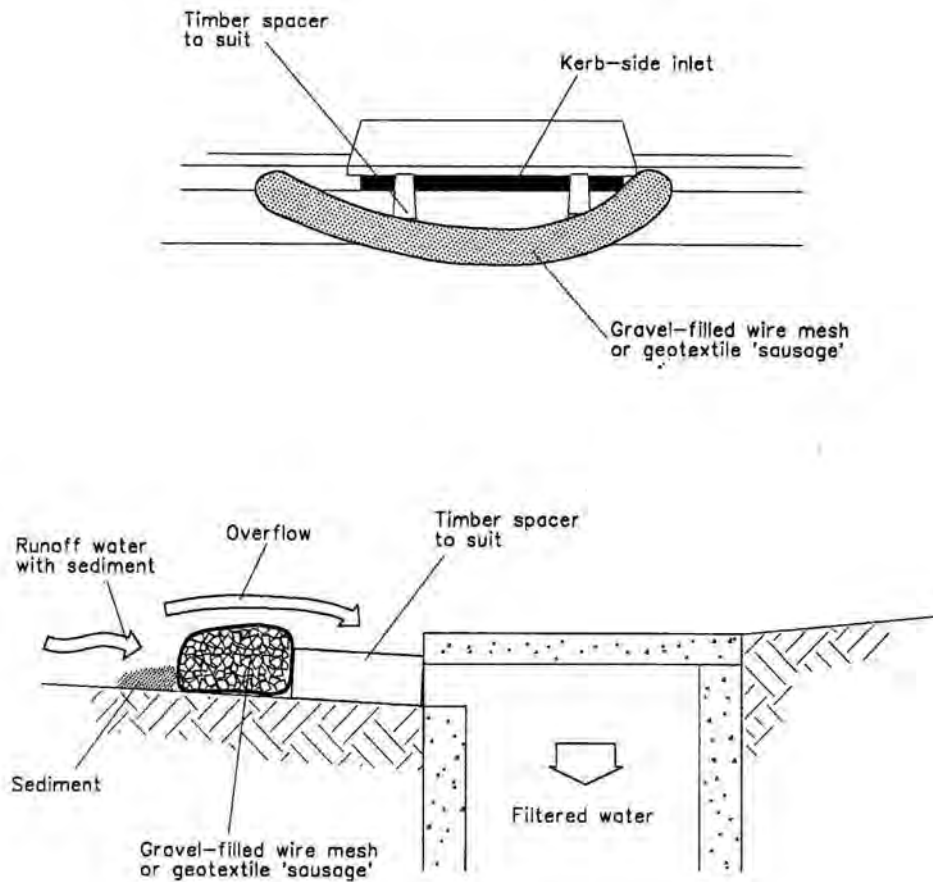
Traffic		EMP07
Responsibility:	Principal Contractor	
Frequency:	Heavy vehicle movements as generated by site works	
Location:	Road network in proximity of site	
Objective:	To minimise impacts on local road network	
Procedure		
Heavy vehicles shall minimise use of local roads in the Erskineville area. In the proximity of the site, heavy vehicles shall proceed by Erskineville Road (to the south). Preferred vehicle routes will be confirmed once vehicle / parking requirements for the remediation have been assessed.		

Protection of Adjoining Structures		EMP08
Responsibility:	Principal Contractor	
Frequency:	All excavation and dewatering works	
Location:	Structures in proximity of site	
Objective:	To eliminate potential structural impacts on adjoining structures	
Procedure		
Existing residential dwellings are present in a close proximity of the site's western boundary. A significant proportion of the proposed excavation work is located in the vicinity of this boundary. Excavation and dewatering works undertaken in the proximity of the site boundary have the potential to cause structural impacts to these structures. The following measures are required to be implemented to prevent structural impacts occurring:		
Prior to undertaking excavation works,		
- A detailed geotechnical assessment shall be undertaken on the site and surrounding area. The geotechnical assessment shall specify the required lateral extent, depth and method of installation of sub-surface soil retention structures (i.e. shoring) on the boundary of the proposed excavation works; - A dilapidation survey undertaken of all structures in the vicinity of the site identified by the geotechnical assessment as potentially being subject to structural impacts from the works; - Installation of survey points at locations in the proximity of the excavation works to allow assessment of settlement during works. Completion of two 'baseline' surveys of these points prior to any excavation or dewatering works;		
During excavation, dewatering, treatment and site reinstatement works:		
- The integrity of the soil retention structures shall be continually assessed during the works by continual observation by the Principal Contractor; - Surveys at weekly intervals, or as advised by the Structural Engineer, shall be undertaken of the survey points in the proximity of the works. Where deflection is recorded at any survey point, advice shall be sought from a qualified geotechnical engineer as to the significance of the variation;		
Post remediation works:		
A post works dilapidation survey shall be undertaken of each of the properties surveyed prior to the works.		
Where any potential for failure of soil retention structures or excessive settlement on adjoining properties is observed during the works, all earthworks and associated dewatering shall be ceased / minimised. Excavations shall be backfilled if possible. Earthworks shall not recommence until the source of the failure / settlement is identified and appropriate measures are put in place to rectify.		

Handling of Contaminated Soil		EMP09
Responsibility:	Principal Contractor	
Frequency:	Handling of contaminated soils, including stockpiled soils and sub-surface contaminated materials	
Location:	Areas of site containing contaminated soils	
Objective:	To control potential environmental emissions from contaminated soils	
Procedure		
Potential hazardous emissions (dust, odour and vapours) may be released during the handling of contaminated materials on the site. Measures shall be put in place to minimise such emissions. These measures shall include: - Measures detailed in EMP Appendix B: <i>'Air Quality Management Plan, Former Macdonaldtown Gasworks'</i> JBS Environmental Pty Ltd 40913-15972 Rev C, June 2011; - Handling and processing of all contaminated soils as per a materials tracking system developed for the site; - Transport of all contaminated soils along designated and marked 'contaminated' and 'non-contaminated' haul routes throughout the site. These routes shall be clearly identified on a site plan as posted within the Site. A heavy vehicle decontamination area shall be clearly marked on this plan. All persons engaged on the site shall be aware of the preferred haulage routes; and - Water used at heavy vehicle wash down points will be treated as contaminated water and decontaminated in the same manner as other contaminated water generated at site prior to discharge.		

Tented Enclosure		EMP10
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Excavation of source zones, storage / stockpiling of malodorous soils and onsite treatment of soils	
Location:	Tented Enclosure(s)to be confirmed (minimum required extent shown on Figure 4)	
Objective:	To ensure that any environmental emissions from treatment areas comply with environmental guidelines	
Procedure A Tented Enclosure may be used for the stockpiling of all contaminated (including malodorous) soils generated by earthworks on the site. The Tented Enclosure requirements are to be confirmed once the details of materials and layout to be used are provided to RailCorp. The Tented Enclosure shall be designed appropriately trained professionals, must be constructed to be compliant with relevant building and safety codes and regulations for such structures. The Tented Enclosure shall be designed and operated so as atmospheric emissions comply with those identified in relevant environmental guidelines at all times. These guidelines include: • NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality'; • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'; and • Ambient air criteria provided to US EPA (2004) 'Region IX Preliminary Remediation Goals' for constituents not available in local literature. No recognisable odours shall be discharged from the Tented Enclosure. The Tented Enclosure shall be constructed of a metal clad or fabric structure sufficiently sized to allow the operation of tippers, excavators and associated equipment required for the stockpiling and handling of soils and any associated equipment. Openings in the structure shall be minimised so as to reduce ventilation requirements. The Tented Enclosure shall be ventilated so that the structure is maintained under a constant negative pressure. The discharge of Tented Enclosure ventilation shall be directed through a GAC filter appropriately sized so as to ensure removal of potentially malodorous constituents as per AQMP01 Odour Control (Appendix B). Tippers shall be required to enter and exit the Tented Enclosure to allow the placement and removal of soils. Tipper speeds when exiting the Tented Enclosure shall be minimised to the extent possible to prevent wake effects at the rear of the tipper causing uncontrolled release of odours from the Tented Enclosure. Where wake effects and associated discharge of recognisable odours are evident at tipper exit from the Tented Enclosure, then ventilation of the Tented Enclosure shall require to be increased.		

Sediment Control		EMP11
Responsibility:	Principal Contractor	
Frequency:	Disturbance of soils or storage of exposed soils	
Location:	Stockpiles and exposed areas generated by demolition and earthworks	
Objective:	To control potential sediment generation and migration	
Procedure		
<u>Equipment</u>		
The following general equipment will be required to allow construction of sediment control devices:		
• Gravel filter sock; • Sediment fencing; • Stakes / star pickets; and/or • Plastic or other material to cover stockpiles.		
<u>Sediment Control Devices – Stormwater Drains</u>		
Stormwater drains are located along the site boundaries. Figure 11-1 shows the sediment control devices that shall be applied to all stormwater drains.		
<u>Sediment Control Devices – Stockpiles</u>		
Where possible, stockpiles will be placed upslope of open excavations, so any releases of sediment can enter the open excavation. Stockpiling will be required throughout the works. These shall be located away from stormwater inlets in controlled areas of the site (such as the Tented Enclosure in EMP11 Tented Enclosure).		
Figure 11-2 shows the sediment controls that will be applied to stockpiles where run-off is unable to enter the open excavation.		
<u>Stormwater Diversion</u>		
Where stockpiles are required to remain in place for significant durations of time, controls shall be put in place to minimise the contact of stormwater flows with stockpiled materials. This shall include the use of stormwater diversion devices. Stormwater diversion devices that will be used on the project are shown on Figure 11-3 .		
<u>Staging of Works</u>		
Works shall be staged so as to minimise the quantity of stockpiled material at any one time.		
<u>Covering Stockpiles</u>		
Stockpiles that are observed to be in place for a substantial period of time and are generating excessive sediment consequent of rainfall events or otherwise shall be covered. It should be noted that covering of stockpiles is also required by AQMP01 Odour Control (Appendix B).		

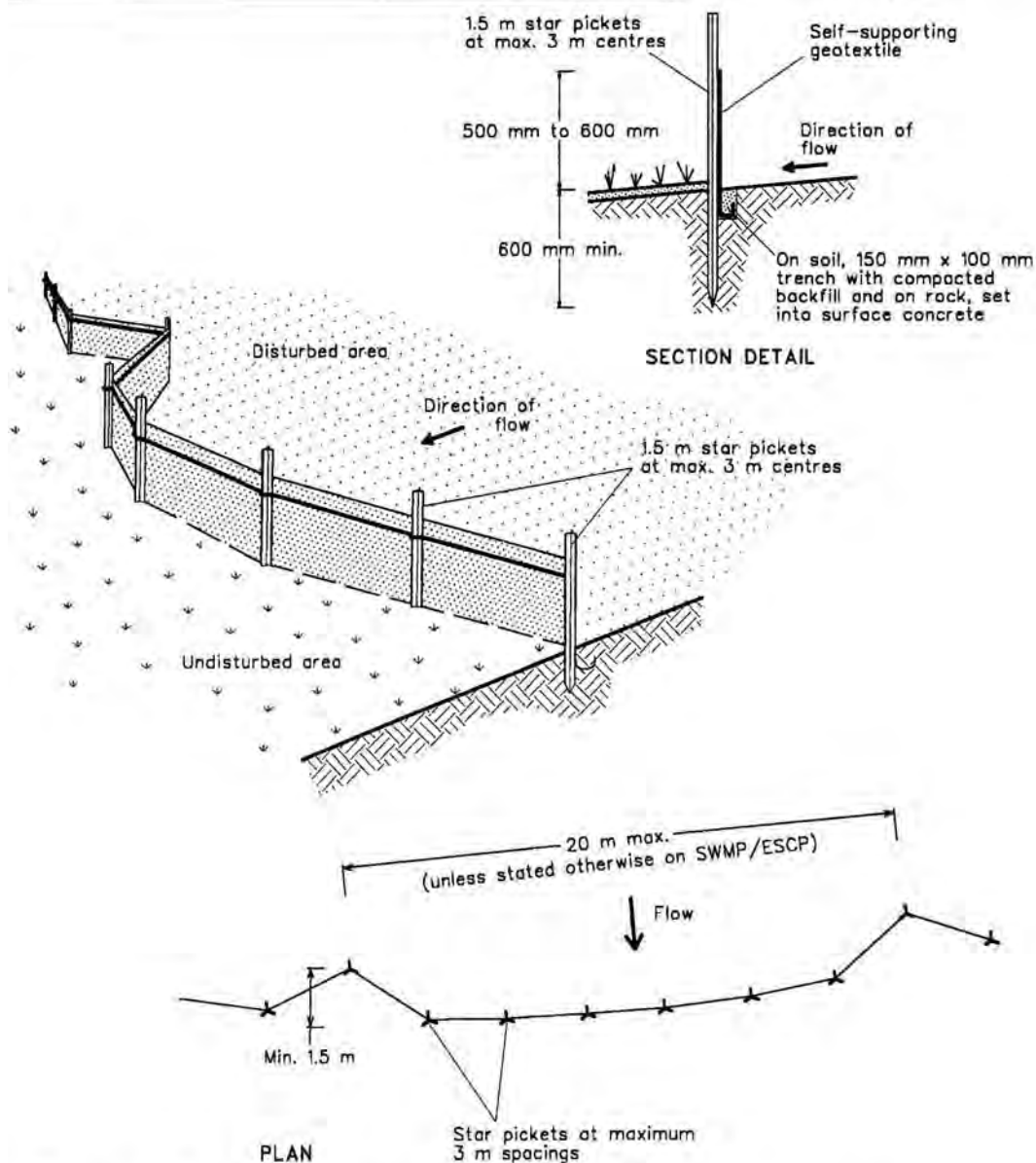
Sediment Control Devices – Stormwater Drains
Fig 11-1


NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

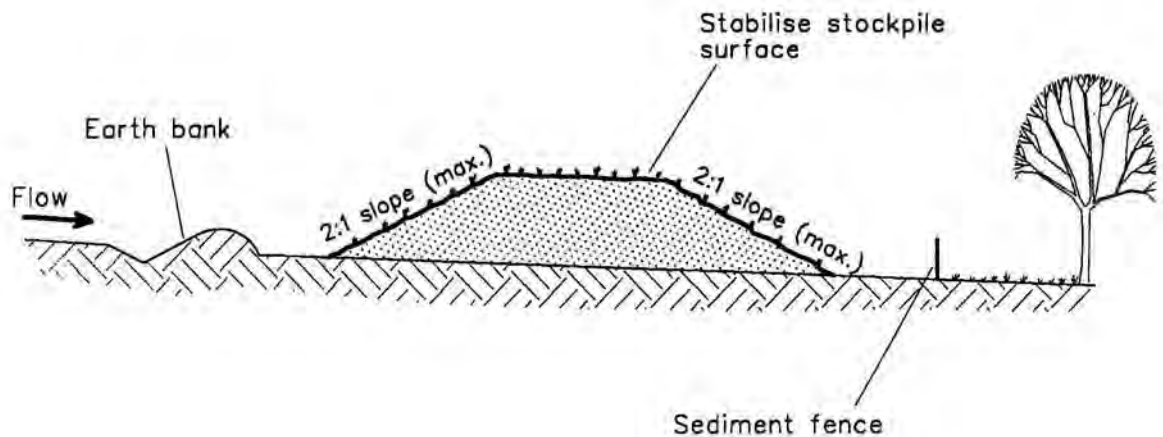
1. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit.
2. Fill the sleeve with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening of the kerb inlet leaving a 100 mm gap at the top to act as an emergency spillway.
5. Maintain the opening with spacer blocks.
6. Form a seal with the kerbing and prevent sediment bypassing the filter.
7. Fit to all kerb inlets at sag points.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'

Sediment Control Devices – Stockpiles
Fig 11-2

Construction Notes

1. Construct sediment fence as close as possible to parallel to the contours of the site.
2. Drive 1.5 metre long star pickets into ground, 3 metres apart.
3. Dig a 150 mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
4. Backfill trench over base of fabric.
5. Fix self-supporting geotextile to upslope side of posts with wire ties or as recommended by geotextile manufacturer.
6. Join sections of fabric at a support post with a 150 mm overlap.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'



Construction Notes

1. Locate stockpile at least 5 metres from existing vegetation, concentrated water flows, roads and hazard areas.
2. Construct on the contour as a low, flat, elongated mound.
3. Where there is sufficient area topsoil stockpiles shall be less than 2 metres in height.
4. Rehabilitate in accordance with the SWMP/ESCP.
5. Construct earth bank (Standard Drawing 5-2) on the upslope side to divert run off around the stockpile and a sediment fence (Standard Drawing 6-7) 1 to 2 metres downslope of stockpile.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'

Operation of Site Office		EMP12
Responsibility:	Principal Contractor	
Frequency:	Duration of demolition and earthworks	
Location:	Principal Contractor Site Office and Amenities Building	
Objective:	To minimise waste generation from the Site Office	
Procedure Some wastes will be produced by the operation of the site office. These will be reduced and handled by the following measures: • Provide systems in Site Office to minimise paper and resource usage. • Provide a front lift bin for office / crib garbage, dispose regularly.		

Decontamination of Heavy Equipment		EMP13
Responsibility:	Principal Contractor	
Frequency:	Heavy equipment demobilisation from the Site	
Location:	Heavy equipment decontamination area.	
Objective:	To ensure that contamination does not leave the site	
Procedure		
Heavy earthmoving equipment will come in contact with contaminated soils and groundwater while engaged in earthmoving activities on the site. Prior to heavy equipment moving off site, or conducting operations in validated areas (i.e. non contaminated areas) of the site, decontamination will be required to be undertaken. A heavy vehicle decontamination station shall be provided on the site to this effect. This station shall be provided with the following: • A hardstand base, bunding on perimeters and a sumped collection point at the lowest point to prevent contamination of underlying soils; • Storage tanks or appropriate treatment systems for temporary storage and / or treatment of contaminated water / rinse solutions; • Pumps provided within drainage sump for collection of contaminated wash and rinse solutions; • Long handled brushes for general exterior cleaning; • Wash solutions selected to remove and reduce the hazards associated with the contaminants (i.e. DECON 90); • Rinse solutions selected to remove contaminants and contaminated wash solutions; • Pressurised sprayers for washing and rinsing, particularly hard to reach areas; • Long handled brushes, rods and shovels for dislodging contaminants and contaminated soil caught in tyres and the undersides of vehicles and equipment; • Containers to hold contaminants and contaminated soils removed from tyres and the undersides of vehicles and equipment; • Wash and rinse buckets for use in decontamination of operator areas inside vehicles and equipment; and • Containers for storage and disposal of contaminated wash and rinse solutions, damaged or heavily contaminated parts, and equipment to be discarded. Subsequent to heavy equipment moving out of the Decontamination Area for transport off site, or use on validated areas of the site, it shall be inspected by the contractors Health and Safety Representative provided to the site works. Heavy equipment shall be moved out of the Decontaminated Area subject to authorisation of the Health and Safety Representative that decontamination is complete. Decontamination shall be appropriate for the extent of potential contact with contaminated materials on the site. It is noted that tippers engaged on the site only to be loaded with contaminated materials will have sufficiently less potential contamination than earthmoving machinery used to excavate or stockpile contaminated materials, and decontamination need not be as comprehensive as described.		

Environmental Monitoring		EMP14
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	Duration of demolition and earthworks	
Location:	Site boundaries and nearby residential areas	
Objective:	To assess compliance with environmental standards for works	
Procedure A program of environmental monitoring shall be undertaken at the site. The extent of required monitoring is described following: <u>Noise Monitoring</u> Noise monitoring shall be undertaken throughout the demolition and earthworks at the residential areas in the proximity of the site. The requirements of the noise monitoring program including locations and frequency of monitoring, applicable noise criteria, reporting requirements and responsible parties shall be directed by the Acoustic Consultant appointed to the project. <u>Atmospheric Monitoring</u> Dust, asbestos, odour and VOC monitoring will be required for the duration of the remedial works. Requirements for air monitoring are provided in the 'Air Quality Management Plan, Former Macdonaldtown Gasworks' JBS Environmental Pty Ltd 40913-15972 Rev C, June 2011.		

Waste Tracking and Classification		EMP15
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	Where soils and/or liquids are identified as requiring to be disposed off-site	
Location:	Site	
Objective:	To ensure that contaminated and surplus material on the site are appropriately disposed of	
Procedure		
The Principal Contractor shall be responsible for implementing a waste tracking system for the duration of the project. Details of the proposed waste tracking system shall be provided to RailCorp for endorsement prior to the commencement of site works. Materials identified as surplus to the site's requirements shall be identified as wastes where: • Levels of environmental impact present in soils or liquids exceeds adopted soil assessment criteria (refer to Procedure EMP17); or • Soils or liquids are identified as contaminated and not suitable to be used on the site; or • Soils or liquids have no appropriate beneficial use in off-site applications. This is anticipated to consist of surplus soils as generated by earthworks and waste products generated by groundwater treatment (i.e. recovered coal tar) and spent activated carbon from filters used during the works. Waste shall be classified in accordance with NSW DECCW (2009) 'Waste Classification Guidelines Part 1: Classifying Waste', with the following exceptions: • Materials which are subject to immobilisation prior to off-site disposal shall be additionally assessed in accordance with NSW DECC (2008) 'Waste Classification Part 2: Immobilisation of Waste'; • Materials which include 'activated carbon' shall be additionally classified in accordance with NSW EPA (1999) 'General Approval of the Immobilisation of Contaminants in Waste 1999/04 Activated carbon waste'; or • Material which comprises coal tar contaminated soil shall be additionally classified in accordance with NSW EPA (2005/14) 'General Approval of the Immobilisation of Coal Tar Contaminated Soil from Former Gasworks Sites'.		

Groundwater Treatment		EMP16
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	Generation of dewater	
Location:	Periphery monitoring wells and water treatment plant	
Objective:	To prevent contamination of surface water bodies and groundwater underlying and downgradient of the site.	
Procedure		
Groundwater that will be generated by draining of saturated fill materials is anticipated to be contaminated and will require treatment. The treated groundwater may then either be: • Re-used on site for dust control or odour suppression systems; • Discharged to sewer, following receipt of a Trade Waste licence with Sydney Water; or • Discharged to stormwater, with approval from Council.		
<u>Groundwater Treatment Plant</u>		
The groundwater treatment plant (GTP) will require to be precisely configured by pre-works commissioning trials. However it is anticipated that the GTP and is likely to comprise the following components: • Oil / water separator to remove phase separated contamination; • Sand / green sand filters to remove turbidity and some heavy metals. It is noted that efficiency of heavy metal removal may be improved where pH correction is undertaken prior to sand filters; and • GAC filter provided to remove hydrocarbon constituents and some heavy metals. GAC filters will require to be appropriately sized to ensure sufficient contact times for removal of required constituents.		
In sizing the GTP potential water inflows should be considered, and an assessment of design considerations may require pump testing on the site.		
<u>Discharge Standards – On site Re-use / Re-injection</u>		
Where groundwater is to be re-used on the site, or re-injected into the sub-surface, the quality of the groundwater will require to at least equal to the existing upgradient groundwater quality or better.		
<u>Discharge Standards – Discharge to Stormwater</u>		
Waters shall not be discharged from the site into stormwater (leading to Alexandra Canal) unless contaminant levels are found to comply with all relevant guidelines contained within ANZECC/ARMCANZ (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' and prior written approval has been obtained from City of Sydney Council		
<u>Treated Water Not Meeting Criteria</u>		
Where contaminant levels in waters for discharge are found to exceed those listed and re-injection is not available, these waters shall be disposed of as either trade waste to sewer (subject to the conditions of the site's trade waste licence) or to a licensed liquid waste facility.		
<u>Sampling and Analysis of Treated Water</u>		
The Environmental Consultant shall coordinate testing and inspection of waters to assess the compliance of treated waters with the discharge criteria. Testing shall be undertaken daily at the discharge point from the GTP and shall provisionally include the following parameters: • Heavy metals (Al, As, Cd, Cu, Cr, Pb, Mn, Hg, Ni and Zn); • Total petroleum hydrocarbons (TPH); • Volatile organic compounds (VOCs); • Polycyclic aromatic hydrocarbons (PAHs); • Total phenol; • Total suspended solids (TSS); and • pH		

In undertaking this assessment, the Environmental Consultant may eliminate parameters from the testing regime that are inappropriate for the potential contaminants on the site, or are consistently found to be well below assessment criteria.

Environmental Criteria		EMP17		
Responsibility:	Principal Contractor Site Auditor Environmental Consultant			
Frequency:	Throughout earthworks where imported fill is required or dewater is generated			
Location:	Site			
Objective:	To assess the environmental condition of fill materials used on site or water generated by site dewatering			
Procedure				
Soils				
Any soils requiring to be used as filling material on the site shall be required to meet the Remediation Acceptance Criteria (RAC) for total concentrations specified in the Remedial Action Plan (CH2M Hill 2007) and the site specific leachability criteria endorsed by the appointed Site Auditor.				
Table of Soil Environmental Criteria (all units in mg / kg) as taken from CH2M Hill 2007				
Analyte	Depth Range			
	0-1.5m	1.5-2.5m	2.5-4.0m	4.0-8.0m
Heavy metals				
As (total)	500	-	-	-
Cd	100	-	-	-
Cr	500 ¹	-	-	-
Cu	5,000	-	-	-
Hg (inorganic)	75	-	-	-
Ni	3,000	-	-	-
Zn	35,000	-	-	-
Monocyclic Aromatic Hydrocarbons				
Benzene	1 ³	1 ³	1 ³	1 ³
Toluene	1.4 ²	2.6	4	7.9
Ethylbenzene	3.1 ²	11.1	17.6	34.8
Total xylene	14 ^{2, 3}	14 ³	14 ³	14 ³
Polycyclic Aromatic Hydrocarbons (PAHs)				
PAHs (total)	100	-	-	-
Benzo(a)pyrene	5	_ ⁴	_ ⁴	_ ⁴
Naphthalene	-	3.8	6.0	11.8
Acenaphthene	-	_ ⁴	_ ⁴	_ ⁴
Fluorene	-	_ ⁴	_ ⁴	_ ⁴
Pyrene	-	_ ⁴	_ ⁴	_ ⁴
Benzo(b)fluoranthene	-	_ ⁴	_ ⁴	_ ⁴
Chrysene	-	_ ⁴	_ ⁴	_ ⁴

Other Constituents				
Total Phenol	42,500	-	-	-
Cyanide (complex	2,500	-	-	-
Asbestos	No detection of fibres in surface soils (0.5m depth). No visible fragments in surface soils (0.5m depth). ⁵			

Note: 1. Value is for Cr(VI) and used as a conservative concentration as a preliminary screening value for chromium.

2. Criteria for toluene, ethylbenzene and xylenes at 0-1.5m are ecological health based and considered appropriate to screen for aesthetic criteria (i.e. malodorous material) in surface soils.

3. Risk based values are lower than laboratory analytical limits of reporting (LORs) and health investigation levels (HILs), therefore less conservative HILs applied to all depths.

4. Not of concern. Based on the outcomes of vapour fate and transport modelling reported in CH2M Hill (2007b) the contaminant was considered to have a low vapour potential at the nominated soil temperature of 15°C.

5. Adopted criteria in CH2M Hill (2007b) on the basis of Australian Contaminated land Consultants Association (2002) 'Asbestos in Soils – Code of Practice'.

Groundwater and Surface Water

Environmental criteria are required to assess the appropriateness of dewater for re-use on the site or discharge to stormwater. Environmental criteria require to be determined by the process outlined in NSW DECC (2007) 'Guidelines for the Assessment and Management of Groundwater Contamination'.

The site lies within the Cooks River catchment boundary established by the DECC (<http://www.environment.nsw.gov.au/ieo/CooksRiver/map.htm>). The interim water quality objectives established in NSW Government (2006) 'Environmental Objectives for Water Quality and River Flow' for waterways affected by urban development in the Cooks River catchment include:

- Protection of aquatic ecosystems;
- Visual amenity; and
- Secondary contact recreation.

These water quality objectives are required to be applied at the point of ecological discharge, which has been found by previous assessments to be Alexandra Canal to the west of the site.

Levels of TDS in groundwater have been found by recent assessments to be well below 2000mg/l. This would indicate that groundwater underlying the Site could potentially be used for drinking water. However this is not considered an immediately possible potential beneficial use. Groundwater extraction is currently prohibited by DWE. Drinking water will require to be considered as a potential future use however, in anticipation that the prohibition of extraction may be lifted. Noting the commercial / industrial nature of the area and by review of historical bore records, where water is considered suitable for drinking, the most likely use for extracted groundwater would be irrigation or industrial purposes.

The following criteria will be considered to allow each of these beneficial uses to be assessed:

- 95% protection levels for marine waters provided to ANZECC/ARMCANZ (2000) to be assessed at Alexandra Canal;
- Recreational water quality criteria provided to Section 5.2.3 of ANZECC/ARMCANZ (2000) to be assessed at Alexandra Canal;
- Recreational and aesthetic water quality criteria provided to Section 5.2.3.3 of ANZECC/ARMCANZ (2000) to be assessed at Alexandra Canal;
- Irrigation water quality criteria provided to Section 9.2.5 of ANZECC / ARMCANZ (2000) to be applied as a long term objective (on removal of the groundwater extraction ban) on the site boundary; and
- Drinking water criteria provided to NRMCC (2004) 'Australian Drinking Water Guidelines' to be applied as a long term objective at the site boundary.

It is noted that the above summarised Australian guidelines do not provide guidelines for several substances. In these cases, DEC (2007) instructs that laboratory detection limits should be used as preliminary investigation levels. For substances with no drinking water criteria, reference has also been made to 'tap water criteria' provided to US EPA Region 9 (2004) 'Preliminary Remediation Goals'. It is noted that these are intended as preliminary criteria, and may be based on toxicological data and exposure parameters that may be less conservative than those which may be endorsed for use in Australia. Criteria are summarised in the table

following for constituents which have been recorded above laboratory detection limits in groundwater underlying the site.

Table of Water Environmental Criteria (µg/l)

	Aquatic Ecosystems ¹	Recreation ³	Visual Amenity ⁴	Drinking Water ⁹	Irrigation ¹¹	LOR ⁷
Total Petroleum Hydrocarbons						
TPH (C ₆ – C ₃₆)	7 ²	-	No sheen or odour	-	-	250 ⁷
Monocyclic Aromatic Hydrocarbons						
Benzene	500	10	-	1	-	1
Toluene	180 ²	-	-	800	-	
Ethylbenzene	5 ²	-	-	300	-	
Xylene (M+O+P)	625 ²	-	-	600	-	
Isopropylbenzene	30 ²	-	-	660 ⁶	-	
n-propylbenzene	-	-	-	240 ⁶	-	
1,3,5-trimethylbenzene	-	-	-	12 ⁶	-	
1,2,4-trimethylbenzene	-	-	-	12 ⁶	-	
Tert-butylbenzene	-	-	-	240 ⁶	-	
p-isopropyltoluene	-	-	-	-	-	
n-butylbenzene	-	-	-	240 ⁶	-	
Trihalomethanes						
Bromodichloromethane	-	-	-	250	-	
Halogenated Aromatic Compounds						
1,2-Dichlorobenzene	160	-	-	1,500	-	
1,4-Dichloeobenzene	60	-	-	40	-	
Halogenated Aliphatic Compounds						
Vinyl chloride	100	-	-	0.3	-	1
1,1-Dichloroethane	250 ²	-	-	810 ⁶	-	
1,1-Dichloroethene	700 ²	-	-	30	-	
Cis-1,2-dichloroethene	700 ²	-	-	-	-	
Trans-1,2-dichloroethene	700 ²	-	-	60	-	
1,1,1-Trichloroethane	270 ²	-	-	3200 ⁶	-	
Trichloroethene	330 ²	30	-	0.028 ⁶	-	1
Tetrachloroethene	70 ²	10	-	50	-	1
1,2,3-trichloropropane	-	-	-	0.0056 ⁶	-	
Phenols						
Phenol	400	2	-	11,000 ⁶	-	
2-methylphenol	-		-	1800 ⁶	-	
3&4-methylphenol	-		-	180 ⁶	-	
2,4-dimethylphenol	2 ²		-	730 ⁶	-	
Heavy Metals						
Aluminium	0.5 ²	200	-	200 ⁸	5,000	
Arsenic (III/V)	2.3 ² / 4.5 ^{2, 5}	50	-	7	100	
Barium	-	1000	-	700	-	
Boron	5,100 ²	1000	-	4000	500	
Cadmium	0.7 ¹	5	-	2	10	
Chromium (III)	10	50	-	-	-	
Chromium (VI)	4.4		-	50	100	
Copper	1.3	1000	-	2,000	200	
Lead	4.4	50	-	10	2000	
Manganese	80 ²	100	-	500	200	
Mercury	0.1 ¹	1	-	1	2	
Nickel	70	100	-	20	200	
Zinc	15	5000	-	3000 ⁸	2000	
Polycyclic Aromatic Hydrocarbons						
Naphthalene	70	-	-	6.2 ⁶	-	10 0.1
2-methylnaphthalene	-	-	-	-	-	
Acenaphthylene	-	-	-	-	-	
Acenapthene	-	-	-	370 ⁶	-	
Fluorene	-	-	-	240 ⁶	-	

Phenanthrene	0.62	-	-	-	-	0.1
Anthracene	0.01 ²	-	-	1800 ⁶	-	
Fluoranthene	1 ²	-	-	1500 ⁶	-	
Pyrene	-	-	-	180 ⁶	-	
Benzo(a)anthracene	-	-	-	0.092 ⁶	-	
Chrysene	-	-	-	9.2 ⁶	-	
Benzo(b&k)fluoranthene	-	-	-	0.092 ⁶	-	
Indeno(1,2,3-cd)perylene	-	-	-	0.092 ⁶	-	
Benzo(g,h,i)perylene	-	-	-	-	-	0.1
Dibenz(a,h)anthracene	-	-	-	-	-	0.1
Benzo(a)pyrene	0.1 ²	0.01	-	0.01	-	0.1
OTHERS						
Ammonia	910 ¹⁰	10	-	500 ¹⁴	-	
Cyanide	4	-	-	80	-	

- 95% protection levels (marine ecosystems) have been used. When these levels fail to protect key test species, the 99% protection levels were used - ANZECC/ARMCANZ (2000).
- Insufficient data to derive a reliable trigger value. In these instances, reference has been made to low reliability trigger levels contained in ANZECC/ARMCANZ (2000).
- Recreational purposes - Table 5.2.3 ANZECC/ARMCANZ (2000)
- Recreational water quality and aesthetics – s.5.2.3.3 ANZECC/ARMCANZ (2000)
- Criteria for As (V) selected
- US EPA Region 9 (2004) tap water criteria
- Laboratory limit of reporting provided for substances with insufficient published ecological / health investigation guidelines, or where published guidelines fall below laboratory limit of detection.
- Based on aesthetic considerations. No Health based guideline published.
- NHMRC NRMCC (2004) 'Australian Drinking Water Guidelines'
- At pH 8.0
- ANZECC / ARMCANZ (2000) Section 9.2.5, long term vales used.

Contingency – Management of Unexpected Free Tar		EMP18
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	As required through demolition and remediation	
Location:	Western half of site, or any areas in proximity of former gasworks infrastructure	
Objective:	To ensure the management of unexpected free tar does not result in the release of offensive odours or harmful gas emissions.	
Procedure		
It is not anticipated that free tar will be encountered during remediation external to the temporary enclosure, subject to site setup in accordance with Figure 4 of this REMP, and based on the available dataset. This procedure is intended to be used as a contingency only in the event that free tar is encountered external to the enclosure. Should any free tar material be encountered external to the temporary enclosure, the material will require assessment by the Remediation Consultant prior to excavation. Works in the area should cease until the Remediation Consultant has determined the appropriate controls for that location. The controls required are likely to be specific to the occurrence of the free tar, and are likely to depend on the vertical and lateral extent of the tar, whether the tar is present in decommissioned infrastructure, or occurs within the soil profile and the seasonal conditions at the time of the remediation. Consideration should also be given to OH&S requirements for remediation of the area. All controls deemed necessary for the specific occurrence, in addition to those required by this REMP should be applied prior to the commencement of excavation of the free tar, and should also ensure: • The free tar material remains securely covered for the duration between the first encounter with the material and the remedial excavation works. Plastic sheeting, soil, steel plates or other appropriate cover may be used for this purpose; • Wherever possible any sampling required to characterise the free tar and adjacent material should be undertaken prior to the commencement of remedial excavations for the free tar. Appropriate disposal locations should also be confirmed prior to commencement; and • Where free tar is encountered external to the temporary enclosure the material will need to be excavated and transported to a licensed landfill for treatment or disposal. During remediation of free tar external to the enclosure the following should be undertaken as a minimum, additional to any controls deemed necessary for the specific occurrence: • Temporary windscreens should be installed around the perimeter of the free tar area prior to remediation. The windscreens should be constructed from plastic or tightly woven mesh which will be effective in reducing wind velocities over the free tar remediation area. Wherever possible windscreens should be installed to a height of at least 1.8m above grade. • Odour monitoring at the nominated receptor locations shall be undertaken at hourly intervals in accordance with AQMP05. • The area within the windscreens shall be fitting with controls to enable moistening of the exposed area and stockpiled materials. Dependent on the nature of the free tar impact this may be achieved with a sprinkler system on the boundary of the screened area or by the provision of hoses within the remediation area. • Remediation shall commence with removal of any adjacent infrastructure or soil to the practical extent. Care should be taken to ensure that removal of adjacent material does not spread the free tar impact. Excavated soil and infrastructure shall be stockpiled on plastic sheeting pending assessment for treatment, cement stabilisation and/or disposal to landfill. • Where supernatant is present overlying the free tar (i.e. within buried tanks or pipe lines) the liquid shall be pumped into liquid-tight trucks or sludge boxes. The trucks or boxes to be used for collection shall be placed as close to the free tar source as is practical. Collected supernatant shall be transported to a licensed liquid waste facility for treatment / disposal. • The remaining tar shall be excavated or removed by suction where appropriate. Where air emissions can be controlled from the free tar remediation area consideration should be given to heating the tar in-situ above ambient temperatures to reduce the viscosity or mixing with fly ash to increase manageability during removal. The recovered tar shall be placed into liquid waste tanks or liquid-tight trucks lined with soil or sludge boxes. The trucks/ boxes to be used for collection shall be placed as close to the free tar source as is practical. Collected tar shall be transported to a licensed waste facility for treatment / disposal or covered and stored within the temporary enclosure on the site until such		

time as removal can be arranged.

- Following removal of all visible free tar from the area to the satisfaction of the Remediation Consultant, waste tracking documentation for the impacted material shall be completed in accordance with the requirements of the RAP. On completion of these works remedial and validation works may continue in accordance with the RAP.

Community Consultation		EMP19
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Prior to and throughout demolition and remediation	
Location:	Communities in the proximity of site	
Objective:	To ensure the expectations of the community are met in the completion of demolition and earthworks.	
Procedure Prior to the commencement of the works the local community shall be informed of the scope and nature of the proposed works. This shall comprise at least the following: • Requirement for works; • Proposed scope of works; • Type and source of contamination on site; • Environmental contaminants present underlying the site and potential health impacts; • Proposed controls to minimise environmental emissions from the site; and • Contact persons and numbers for registering enquiries / complaints about the works. All households within 500m of the site boundaries shall be provided with the above information at least 2 weeks prior to the commencement of works. This information shall be provided by way of a newsletter. <u>Community Complaints</u> A Community Complaints hotline shall be maintained throughout the duration of the works. A contact number and person shall be notified by signage provided to the site boundary. The following procedure shall be adhered to in handling community complaints: • Any complaint received by telephone, correspondence or visitation will be registered using the attached Form 19.1, or similar; • The complaint shall be investigated by a representative of the Principal Contractor and the Environmental Consultant within 12 hours of the date and time of the complaint; • The complaint report shall be reviewed and approved by a representative of RailCorp; • If justified, a remedial action shall be prepared with the remedial action report reviewed and approved by a representative of RailCorp; • If action is required, it shall be implemented immediately if urgent, otherwise within 48 hours of the complaint; • The person who notified the complaint shall be notified of the action taken; and • All complaints shall be tabled and reviewed in respect of the requirements of the EMP. Where EMP changes are required these shall be made in accordance with EMP20 Incident Reporting and EMP21 EMP review.		

Community Complaint Summary
Form 19-1

COMPLAINT SUMMARY – NATURE OF AND ACTION TAKEN

Complaint No: _____ Date Received: _____

 Complaint made by: _____
 (telephone, mail, email, other)

Complainant: _____

Nature of Complaint: _____

Action Taken: _____ date of action: _____

Follow up with Complainant: _____ date of follow up: _____

SIGNED: _____ Date: _____

Incident Reporting		EMP20
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	IMMEDIATELY When environmental incidents occur	
Location:	Areas on site where incidents have occurred	
Objective:	To provide a reporting and review mechanism for incidents to allow the update of the EMP	
Procedure RailCorp shall be notified immediately of any incidents requiring emergency response that occur. The Principal Contractor shall facilitate the completion of environmental incident forms for any environmental incident that occurs on the site. The Environmental Consultant shall review all incident forms. Incident forms shall include community complaints (as per EMP18 Community Consultation) that require remedial actions. An example of an environmental incident form is provided as Form 20-1 .		

Name	Area/Company	Contact Details
-----	-----	-----
-----	-----	-----
-----	-----	-----

INCIDENT EVALUATION

Section to be completed by the General Manager (Principal Contractor) and relevant personnel concerned with the incident.

Cause(s) and Contributing Factor(s):

List those factors that caused / contributed to the incident.

Controls which could be used:

Consider: Hierarchy of Controls (elimination, substitutionetc.). List all that are appropriate.

-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----

What was the task being performed at the time of the incident? -----

Was the person trained / inducted? -----

Was there adequate Supervision? -----

Was there a risk assessment for the task, were controls implemented? -----

ACTION PLAN (RECTIFICATION / PREVENT RECURRENCE)

General Manager to assess and decide on appropriate actions in response to the incident. Upon completion of recommended action(s), the General Manager is to sign off as confirmation. Completion of the actions shall also act as the close out of the report.

Recommended Action	Target Date	Action By	Task Completed (Initial and Date)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Agreed Actions Complete and Incident Closed Out

Authorised by General Manager: _____ (Signature and date)

ADMINISTRATION

Improvement Register is to be updated by the General Manager, ensuring confidentiality of persons involved in the incident.

Incident has been added to Improvement Register: # _____

WorkCover or Insurer Notification required: _____ Completed Date: _____

Circulation register to be completed upon receiving and reviewing this report.

CIRCULATION

Name: _____ Signature: _____

Date: _____

(Person Reporting)

Name: _____ Signature: _____

Date: _____

(General Manager)

Name: _____ Signature: _____

Date: _____

(Client – if applicable)

EMP Review		EMP21
Responsibility:	Principal Contractor Site Auditor Environmental Consultant RailCorp	
Frequency:	Subsequent to environment incidents. Subsequent to changes in program of works.	
Location:	Not applicable	
Objective:	To ensure that the EMP is current and appropriate for the site	
Procedure Subsequent to any environmental incidents on the site and/or a significant modification to the implemented scope of works the Environmental Management Plan shall be reviewed by the Environmental Consultant. All new copies of Environmental Management Plans shall be re-distributed to all parties by the Environmental Consultant. On finalisation of revision, the Environmental Management Plan shall be provided to RailCorp for review / approval. RailCorp shall advise acceptability of revisions (or otherwise) within seven days of receipt.		

Training		EMP22
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Throughout implementation of Environmental Management Plan	
Location:	-	
Objective:	To ensure that persons responsible for preparation of the EMP are competent.	
Procedure Any person who is required to be responsible for technical activities in relation to the implementation of the EMP shall: • Be inducted as the requirement and method of the specific activity by the Environmental Consultant or their nominated representative; or • Have undertaken the 24 hour Health and Safety Training for Hazardous Waste / Materials under OSHA 29 CFR 1910:120 or equivalent.		

Appendix B
Air Quality Management Plan
Former Macdonaldtown Gasworks Site

Air Quality Management Plan

Incoll Management Pty Ltd

On behalf of
Rail Corporation NSW

Former Macdonaldtown Gasworks

August 2011
JBS 40913 – 15972 Revision C
© JBS Environmental Pty Ltd

Air Quality Management Plan

Incoll Management Pty Ltd
On behalf of
Rail Corporation NSW

Former Macdonaldtown Gasworks

August 2011
JBS 40913 – 15972 Rev C
JBS Environmental Pty Ltd

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Appendices

- Appendix A – Air Quality Management Procedures

List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

- As Arsenic
- Cd Cadmium
- Cr Chromium
- Cu Copper
- BTEX Benzene, Toluene, Ethylbenzene and Xylenes
- B(a)P Benzo (a) pyrene
- DECCW NSW Department of Environment, Climate Change and Water
- DQO Data Quality Objectives
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- OCP Organochlorine Pesticide
- SAR Site Audit Report
- SAS Site Audit Statement
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- TPH Total Petroleum Hydrocarbons (C₆-C₉ and C₁₀-C₃₆)
- Zn Zinc

1 Introduction

1.1 Introduction and Objectives

JBS Environmental Pty Ltd was engaged by Incoll Management Pty Ltd (Incoll) to prepare an Air Quality Management Plan (AQMP) for the proposed remediation works on the site of the former Macdonaldtown Gasworks, Erskineville, NSW (**Figure 1**). The AQMP is required to monitor and control potential air emissions from the proposed works. The provisions of the AQMP has been incorporated into the Environmental Management Plan (EMP) prepared for the project.

An Air Quality Assessment¹ (AQA) has been prepared for the remediation program at the former gasworks site. The AQA assessed a range of potential sources for air emissions into the surrounding area. It was assessed that unacceptable levels of air pollutants will not occur at the surrounding areas during the site works where a range of control and monitoring provisions are implemented on the site. The AQMP has been prepared to document the recommended control and monitoring works as identified by the AQA.

This AQMP is solely for remedial works undertaken at the former Macdonaldtown Gasworks. Treatment works undertaken at the designated off site facility at the Chullora Railway Workshops are discussed in a separate report as follows '*Air Quality Management Plan, Former Macdonaldtown Gasworks – Chullora Materials Receipt Facility*' JBS Environmental Pty Ltd 40913-16613 Revision C, August 2011.

1.2 Site Identification

The site undergoing remediation (the Site) is located on Burren St, Erskineville NSW. The Site location is shown in **Figure 1** and details provided in **Table 1**. The Site details are summarised below and described in more detail in the following sections.

Table 1 Site Details

Lot/DP	Part Lot 50 in DP 1001467
Address	Burren Street, Erskineville, NSW
Local Government Authority	City of Sydney
Site Zoning	'Railways Zone' in Sydney Regional Environmental Management Plan 26
Current Use	Vacant Land
Geographical Co-ordinates	Lat: -33.917° North, Long: 151.199° East (southern corner)
Site Area	7,732m ²

A Site layout plan is provided as **Figure 2**. This plan has been adopted from previous CH2M HILL studies completed on the Site.

The Site has been previously delineated into eight areas by CH2M Hill (March 2007) '*Delineation & Characterisation Sampling and review of Remedial Options*' (CH2M Hill 2007a). These areas are shown on **Figure 3** and include:

¹ Air Quality Assessment– Former Macdonaldtown Erskineville, NSW JBS Environmental Pty Ltd August 2011 (JBS 2011)

- Gasholders: encompasses both Gasholder structures adjoining the western boundary. The Southern Gasholder remains intact with the superstructure standing approximately 12 metres above the ground surface. The above ground structure of the Northern Gasholder has been demolished, however the brick annulus structure remains intact beneath the ground;
- Retort: encompasses the footprint of the former Retort House, Tar Wells, Condensers, Coal and Shale Storage areas and other building structures associated with the gasworks operations (office, amenities, etc). These buildings and structures have been demolished and associated structures are no longer visible above the ground surface. However some underground structures remain in place, including the two Tar Wells, pipework, brick flooring and foundations and concrete slabs;
- Gas Purifier: encompasses the footprint of the former Purifier Beds, Scrubbers and Gas Meters. Similar to the Retort Area, structures only remain buried below the ground surface, with no above ground structures remaining;
- Northeast: includes the majority of the northeast section of the Site;
- South Central: includes the portion along the central southeast boundary;
- Southwest: includes the majority of the southern area of the Site;
- Retaining Wall: includes the filled area embankment along the northern Site boundary; and
- Western Lot: includes the small rectangular section of land that extends west to Burren Street.

A site inspection was completed by JBS on the 25th March 2010. The Site was found to be overgrown with vegetation. Several stockpiles of predominantly soil and railway ballast based materials were located over the eastern portion of the Site, which were being removed during the site inspection. It was reported by RailCorp representatives that the observed works were being undertaken to remove all stockpiled materials. The northernmost former gasholder was observed as a circular area of exposed brickwork. The southernmost gasholder was observed to be substantially intact. Brick and metallic debris presumably associated with the former operation of the Site as a gasworks was distributed throughout the remainder of the property.

1.2.1 Surrounding Landuse

Surrounding land-uses include:

- North – Covered rail sidings are present adjoining the northern boundary of the former gasworks. Further north is Macdonaldtown station and associated rail corridor;
- South-east – A noise barrier and access roadway is located adjoining the south-eastern boundary of the Site. Further south is the rail corridor associated with the Illawarra and south-west rail corridor; and
- West – Residences fronting Burren St, Erskineville are located adjoining the western boundary of the Site. Residences consist of detached and semi-detached low and medium density dwellings and small yard areas. The residential area of Erskineville is located further west.

1.3 Purpose

This AQMP has been designed to ensure, that the risk to the remediation workforce on the former gasworks site, adjoining railway and residential properties, and the surrounding environment is acceptable. This will be achieved by the implementation of a number of ongoing monitoring and management measures pertaining to the proposed demolition and earthworks and associated environmental management works.

The AQMP is intended to form part of the EMP being prepared for the site.

1.4 Responsibilities

The remediation works on the site shall be undertaken under the guidance of a Principal Contractor who is yet to be appointed. The Principal Contractor will be responsible for the implementation of the majority of procedures provided in the AQMP and EMP. It is noted that where the specific procedures are technical or complex in nature then the Remediation Consultant as appointed to the project shall fulfil the requirements of the procedure, or advise the appropriate implementation of the procedure.

A formal list of procedures is provided to the AQMP based on an assessment of potential environmental emissions from anticipated site works required for the demolition, earthworks and building works. Specific responsibilities are nominated for the implementation of these procedures within the relevant procedure.

1.5 Proposed Demolition and Earthworks on the Site

The demolition and earthworks are proposed to be undertaken in distinct stages as described following:

- Demolition component of the works including the removal of any former gasworks buildings and infrastructure not considered items of significant heritage and archaeological potential, and includes the connection Shed, former tar wells, condensate pits and existing concrete pavement overlying areas of contaminated soils.
- Excavation component of the works consisting of the installation of excavation support as required and excavation of soils identified as contaminated.
- Dewatering of proposed area of excavation by the installation of dewatering spears to allow excavation of soils below the depth of the water table.
- Stockpiling of the soils within a controlled location on the Site to facilitate remediation of the material, or later backfilling, dependent on the contaminated status of the soils. Where the proposed remediation works required on soils involve treatment, either on or off site, the remediation process may require licensing under the *Protection of the Environment Operations* (POEO) Act 1997; and
- Backfilling of excavations with fill materials characterised as being environmentally and geotechnically suitable for placement within the Site sub-surface.

The works are being undertaken to facilitate remediation works.

1.5.1 Demolition

The demolition stage of the works will be the initial stage of the works. The demolition works will include the removal of all above ground infrastructure on site that is assessed to be:

- not an item of significant heritage or archaeological potential; and
- an on-going source of contamination.

In undertaking demolition works RailCorp shall only use WorkCover accredited contractors. All demolition works shall be undertaken as per relevant statutes and Australian and International Standards.

The majority of the demolished materials will be transported off-site for recycling. This will include the concrete and masonry wastes from removal of Site pavements. All other wastes shall be transported to an appropriately licenced facility for processing.

1.5.2 Earthworks

The proposed earthworks are designed to allow the associated remediation activities to be undertaken.

Substantial environmental data are available for the Site to characterise the extent of contaminated soils and groundwater. The areas of the Site which are known to be contaminated and have been identified in the proposed earthworks program include:

- The central part of the northern Site boundary;
- The central part of the western Site boundary;
- The centre of the Site, including an apparent 'primary tar source zone', approximately 10 m east of the Southern Gas Holder; and
- Shallow areas potentially across the remainder of the Site.

The earthworks shall include:

- Installation of soil retention structures (i.e. shoring) as required to protect adjoining properties and heritage items during proposed excavation works;
- In areas of impacted soil, excavation of overlying non-impacted material, if present, and stockpiling separately on the Site;
- Dewatering of areas of proposed excavation of impacted soils. The water accumulated during dewatering may require treatment;
- Excavation of impacted soils in source zones within a purpose built tented enclosure;
- Excavation of impacted soils external to the tented enclosure and transport into the enclosure as required;
- Treatment of suitable excavated impacted soil by bioremediation within the tented enclosure;
- Filling of excavations with the bioremediated soil or with clean, validated fill material assessed as suitable for use on the Site.

1.6 Proposed Treatment Works Off Site

Given the significant area restrictions on the Site, RailCorp has advised that a section of land contained within the Chullora Railway Workshops, located on Worth Street, Chullora, NSW is available for treatment of soil excavated from the site. The location of the treatment site is displayed in **Figure 4**. The potential treatment area is provided in **Figure 5**. A separate AQMP has been prepared for the proposed works at Chullora as follows 'Air Quality Management Plan, Former Macdonaldtown Gasworks – Chullora Materials Receipt Facility' JBS Environmental Pty Ltd 40913-16613 Revision C, August 2011.

1.6.1 Proposed Treatment Works

The activities proposed to be completed on the Chullora treatment site are as follows:

- Receipt of contaminated soils / materials from the Macdonaldtown former gasworks remediation;
- Storage of contaminated soils / materials within stockpiles or similar;
- Treatment of contaminated soils / materials by immobilisation;

1.7 Excavation, Filling and Land Formation

Excavation, filling and land formation will involve reinstatement of the site with treated material validated as suitable for reuse on the site, or imported clean, fill material certified as VENM in accordance with the Remedial Action Plan (RAP) for the site.

The proposed filling will involve placement of up to 22 000m³ of fill with reinstatement of to restore the pre-remediation levels.

1.8 Identification of Potential Air Emissions

Several potential sources of air emissions have been identified in the AQIA's prepared for the proposed works. These are briefly listed following in **Table 1.3**.

Table 1.3: Summary of Air Emissions

Stage	Task	Potential Emissions
Preliminary	Project planning and licensing	-
Site Establishment I	Setup of site offices, sediment and erosion controls	-
Remediation Stage I	1A – assessment/soil sampling of northern boundary retaining wall 1B- construction of internal turning circle, vegetation removal	Particulates
	1C – excavation/validation of the top 0.5m of fill material of the entire site surface. Transfer of excavated soil to Chullora for treatment prior to disposal to landfill	Particulates, Air Toxins
	1D – excavation/validation of four hotspots to depths of 1-2m	Particulates, Air Toxins
Site Establishment II	Installation of temporary enclosure, associated air extraction/treatment system and water treatment system	-

Stage	Task	Potential Emissions
Remediation Stage II	2A- commission air and water treatment system 2B – excavate/validate areas within enclosure. Transfer of excavated soil to Chullora for treatment prior to disposal to landfill 2C – reinstate enclosure excavation with imported Virgin Excavated Natural Material (VENM) or Excavated Natural material (ENM)	Particulates, air toxins, odours
Remediation Stage III	3A – excavate/validate areas external the enclosure. Excavated material unsuitable for onsite bioremediation within enclosure to be transferred to Chullora for treatment prior to disposal to landfill 3B –Material assessed as suitable for remediation by bioremediation to be stockpiled for treatment within enclosure 3C – reinstatement of site using VENM or ENM, landscaping as required	Particulates, air toxins, odours
Disestablishment	Decommissioning of air and water treatment plants, disestablishment of enclosure and site offices	-

The most significant potential emissions have been identified as occurring from:

- Particulate, chemical and odour emissions from soil excavation activities;
- Particulate, chemical and odour emissions from soils stockpiling and handling; and
- Particulate, chemical and odour emissions from the receipt and handling of fill materials.

1.9 Environmental Procedures

A number of environmental control and monitoring provisions have been recommended in the AQIA's prepared for the remediation program. These have been prepared as outline air quality management procedures, are provided in **Appendix A**, and are summarised in **Table 1.4** following.

Table 1.4: Summary of Air Quality Management Procedures

Procedure No.	Name
01	Dust and Airborne Hazard Control
02	Odour Prevention and Control
03	Odour Masking
04	Handling of Environmentally Impacted Material
05	Air Monitoring – Odours
06	Air Monitoring – Volatile Organic Compounds
07	Air Monitoring – Particulates
08	Air Monitoring – Asbestos
10	AQMP Review
11	Training

2 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Figures

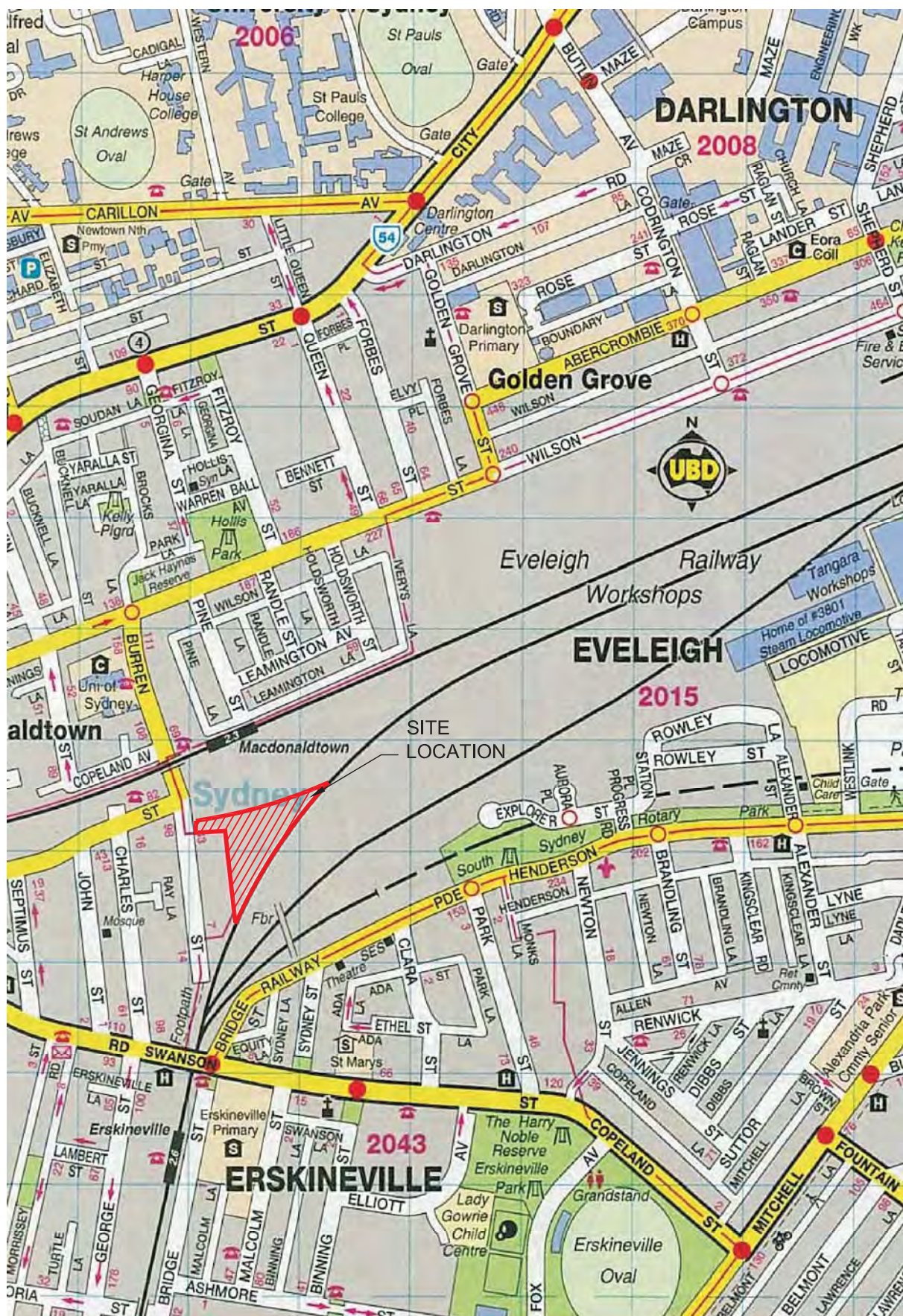


Figure 1 Site Location (Macdonaldtown)



Figure 2 **Current Macdonaldtown Site Plan**

CH2M Hill (2007)
Note- All locations shown are approximate only

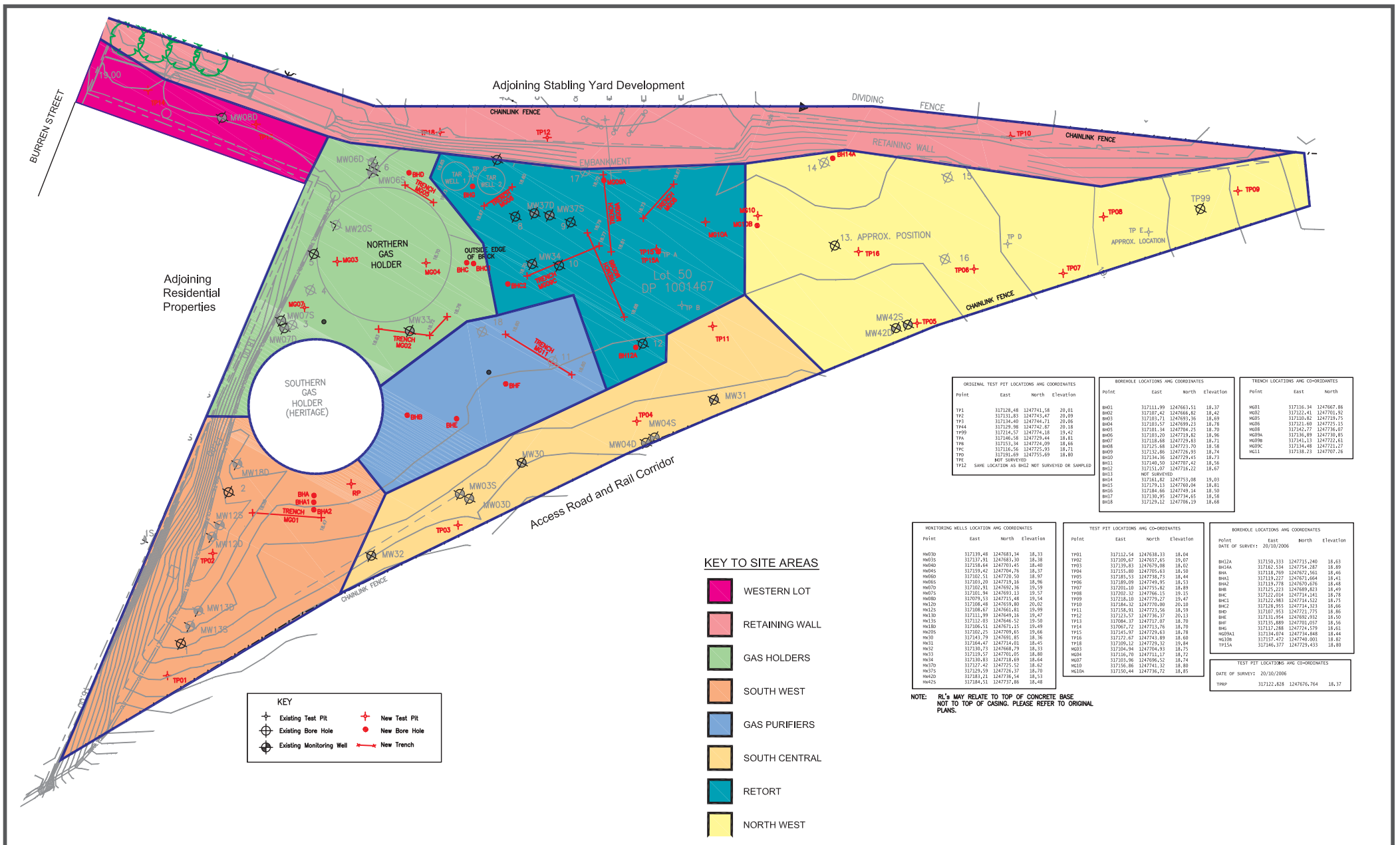


Figure 3 Site Areas

CH2M Hill (2007)
Note- All locations shown are approximate only

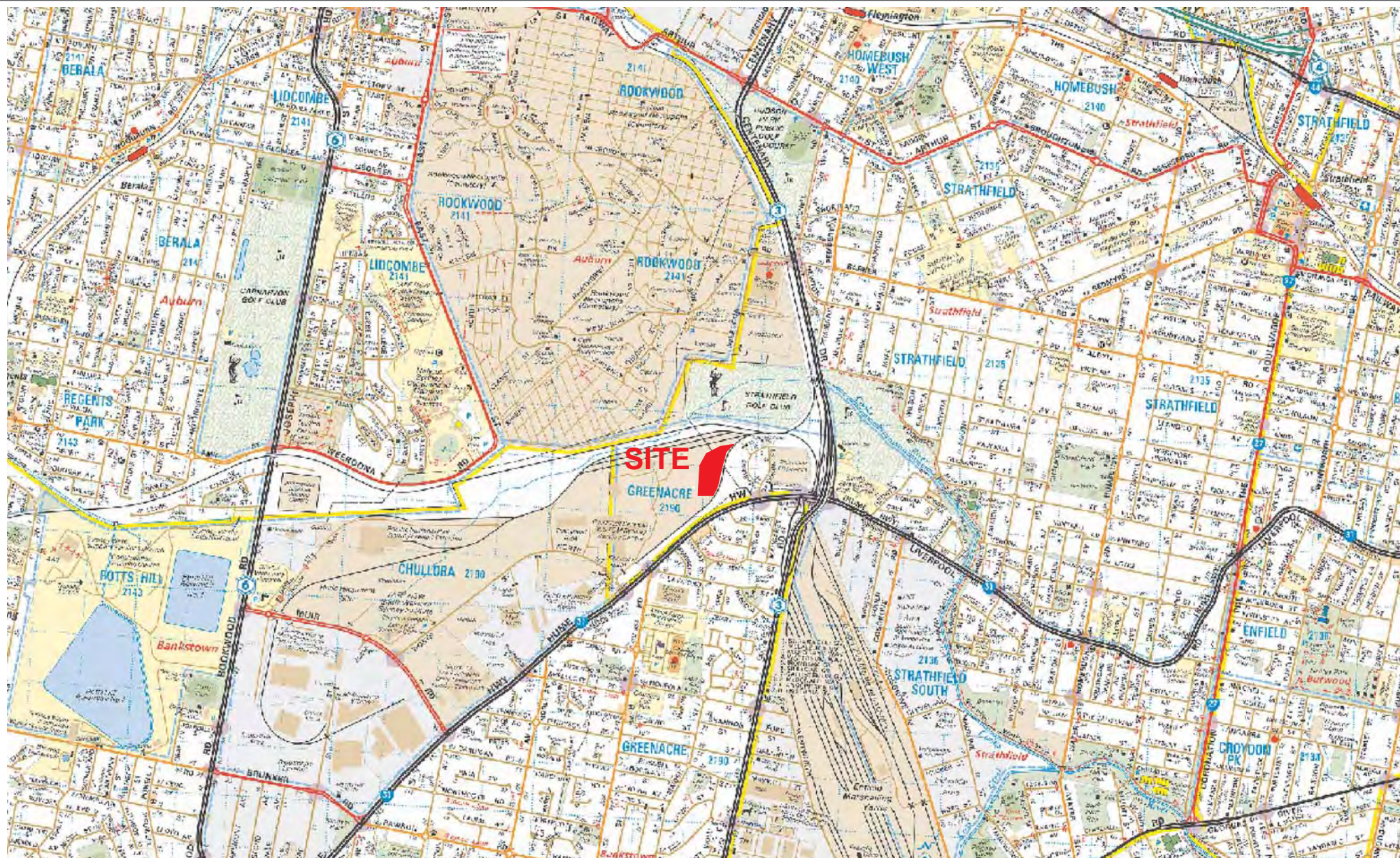


Figure 4 Chullora (Treatment) Site Location



LEGEND

 Proposed Site Area Available for Remediation Works



0 50m
Approximate scale

Figure 5 **Chullora Site Plan**

Department of Lands (2010)
Note- All locations shown are approximate only

Appendix A
Air Quality Management Procedures

Odour Prevention and Control		AQMP01
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Disturbance of potentially malodorous / impacted soils	
Location:	All areas on site	
Objective:	To minimise potential odour impacts	
Procedure		
Malodorous materials will be disturbed during remediation of the site. Coal tar based impact has been identified in soils underlying the majority of the site with the greatest impacts in soil observed in the vicinity of former Northern Gasholder and Retort House. Areas containing free tar (i.e. the former tar wells, pipework etc.) are also likely have the potential to generate offensive odours if exposed and/or disturbed. Extensive measures require to be undertaken to control potential odour generation and odour emissions from the site as detailed below. The measures require to be sufficient to prevent recognition of offensive odours at residential and commercial properties in proximity of the site. The construction and operation of the tented enclosure will be the main method of odour control. Odour control measures shall be employed within the tented enclosure comprising: • Maintenance of the interior of the enclosure at a negative pressure relative to the surrounding environment. Where a negative pressure is able to be effectively maintained there is a reduced importance of the sealing of the enclosure with the surrounding ground level; and • Venting of all emissions from the tented enclosure through a granular activated carbon (GAC) filter.		
<u>Construction of GAC Odour Control Filters</u>		
GAC odour control filters are required as described in EMP11 Tented Enclosure and the water treatment plant as described in EMP17 Groundwater Treatment. GAC filters shall be installed and operated as per the following requirements: • All GAC filters used for odour control shall consist of three distinct units connected in series. The first and second unit shall be identically sized and the third unit must be at least 25% of the capacity of the preceding units; • An air sampling port shall be installed between the first and second filter vessel; • The sizing of the GAC filters will require to be determined at the commencement of the works. The GAC filters shall be sufficiently sized so that at commissioning stage (under actual project conditions) there is no recognisable odour between the first and second filters. The potential for odour emissions to increase during the works shall be considered (where applicable) and correction factors determined where necessary to ensure appropriate sizing of filters; and GAC Filters will become saturated during the source of the works. Monitoring is required to assess when Filter saturation occurs. This shall be undertaken by daily monitoring of the air sampling port between the first and second GAC filter using a PID. Where the PID records a reading above 10ppm, an air sample shall be collected and assessed for a recognisable odour. Where a recognisable odour is detected the filter shall be considered to be saturated and replaced with new GAC media.		
<u>Odour Prevention Measures</u>		
<i>Tented Enclosure of Excavation and Soil Handling Works</i>		
Any works involving the disturbance of free tar or areas of malodorous soils within the former gasworks area or Northern Gasholder will need to be undertaken within a tented enclosure. Disturbance of these materials includes excavation, stockpiling, handling, treatment and vehicle loading. The tented enclosure shall be designed and operated such that atmospheric emissions comply with those identified in relevant environmental guidelines at all times. These guidelines include: • NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality'; • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'; and • Ambient air criteria provided to US EPA (2004) 'Region IX Preliminary Remediation Goals' for constituents not available in local literature. No recognisable odours shall be discharged from the tented enclosure. The tented enclosure shall be constructed of a metal clad structure sufficiently sized to allow the operation of tippers, excavators and associated equipment required for the excavation, stockpiling and handling of soils and any associated		

equipment. Openings in the structure shall be minimised so as to reduce ventilation requirements.

Tipplers and other heavy machinery shall be required to enter and exit the tented enclosure to allow the removal of soils. The following must apply to any tipper loads removing malodorous soil or other material from the tented enclosure:

- Tipper speeds when exiting the tented enclosure shall be minimised to the extent possible to prevent wake effects at the rear of the tipper causing uncontrolled release of odours. Where wake effects and associated discharge of recognisable odours are evident at tipper exit from the tented enclosure, then ventilation shall require to be increased; and
- Spraying of the exposed malodorous soil surface with an odour sealing solution. A mixture of 'Anotec 0307' (<http://anotec.com.au/prod.htm>) or similar and water may be suitable to be used for this purpose. Covering of the load to prevent particulate emissions.

Excavation of Malodorous Materials – Areas external to the Tented Enclosure

Any works involving the disturbance of free tar or areas of malodorous soils external to the enclosure will require the following measures to be implemented to prevent odour emissions. These measures shall include (but are not limited to):

- Restriction of excavation areas in surface soils to no greater than 400m²;
- Restriction of excavation areas in the northern retaining wall area to no greater than 25m²;

Where larger sized excavations are required, area additional to above sizes shall be managed by:

- Tipping at the upwind portion of the site works to the extent possible to maximise dispersion distances to off-site properties (if possible); and / or
- Covering of all tipper loads; and / or
- Sealing of the malodorous stockpiled soil surface by covering. Appropriate sealing may include spraying of the malodorous surface with a hydromulch, or placement of a sufficient thickness of odourless soils over the malodorous materials; and/ or
- Spraying of the exposed malodorous soil surface with an odour sealing solution. A mixture of 'Anotec 0307' (<http://anotec.com.au/prod.htm>) or similar and water may be suitable to be used for this purpose. This may be prepared by the mixing of one 20L drum of Anotec 307 in 1,000L of water; and
- Continuous monitoring odours in accordance with **AQMP5.0 Odour Monitoring**.

Stockpiling of Soil – Areas external to the Tented Enclosure

Where stockpiles are to be left in place external to the tented enclosure they shall be covered in nonmalodorous materials, secured plastic sheeting or low permeability geofabric to prevent odorous emissions. If it is necessary for stockpiles to remain uncovered external to the tented enclosure then to prevent offensive odours at the site boundaries:

1. The uncovered stockpiles must not be placed in Zone 5 as shown on **AMP Fig1.1**;
2. The material must be demonstrated to contain concentrations below the following odour based criteria:

Contaminant	Odour Based Criteria for Uncovered Stockpiling (mg / kg)
Benzene	2.5
Ethylbenzene	5
Toluene	10
Xylene (total)	10
Cresols	—
Acenaphthene	35
Naphthalene	25
Phenol	40

Any materials stockpiled uncovered on site will remain subject to the management requirements of AQMP02 Odour Masking and AQMP03 Dust and Airborne Hazard Control;

Malodorous Materials Movement Scheduling – Areas external to the Tented Enclosure

Some malodorous materials will require removal from site without pre-treatment. Odour control measures may not be able to maintained when the material is in transit.

The Environmental Consultant appointed to the Project shall advise the most appropriate period of each day to undertake these works based on an assessment of meteorological conditions. Results of environmental monitoring as undertaken during these works, including odour and VOC assessment as per AQMP05 Air Monitoring – Odours and AQMP06 Air Monitoring – Volatile Organic Compounds, shall be used to confirm that the advised meteorological conditions are appropriate.

Conditions which maximise separation distances to downwind receptors and increase dispersion of emissions shall be favoured. Removal of malodorous materials from site shall be optimised during these periods to the extent possible. It is anticipated that this will typically comprise afternoon periods. The environmental consultant shall be aware that conditions that favour odour dispersion may not favour reduction in dust emissions.

Similarly where the environmental consultant advises that non favourable meteorological conditions are present, movement and handling of potentially malodorous materials outside the area of the tented enclosure will be prevented (where possible).

Handling / exposure of malodorous materials shall not occur during any periods where unacceptable levels of odour or VOC emissions are identified by AQMP05 Air Monitoring – Odours and / or AQMP06 Air Monitoring – Volatile Organic Compounds.

Odour Masking

All measures possible must be undertaken to prevent odour emissions prior to adopting odour masking measures as described in AQMP03 Odour Masking.

Odour Masking		AQMP02
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Disturbance of potentially malodorous / impacted soils	
Location:	All areas on site	
Objective:	To minimise potential odour impacts	
Procedure		
Extensive measures are proposed to control odour emissions. The nature of the available odour controls means that they are not able to be immediately applied to sources of odour emissions. During some periods of the works momentary 'puffs' of odour may occur during the periods where odour controls are being implemented. The degree of recognition of these odours will be able to be reduced by the operation of an odour masking system, however it is noted that the odour masking system shall not be used as a substitute for proper odour control technologies. <u>Odour Masking System</u> An odour masking system will require to be established along all site boundaries prior to the disturbance of potentially malodorous materials. Once established, the odour masking system shall only be implemented where environmental monitoring identifies that all other odour control procedures have failed and odour emissions are unable to be prevented. This system shall comprise the following: • Provision of odour control solution consisting of a mixture of 'Anotec 0307' (http://anotec.com.au/prod.htm) or similar and water. This shall be prepared by the mixing of one 20L drum of Anotec 307 in 1,000L of water (or as per manufacturer's instructions for other products); • Provision of an odour control solution spray system consisting of raised irrigation line (at least 1.5m above ground level) provided with sprinkler heads at a frequency of: - o One head per 5m on the northern, eastern and southern boundaries; and - o One head per 1.5m for the western site boundary; • Sprinkler heads should be capable of delivering a fine mist of odour control solution with no discernible droplets; and • Continuous supply of odour control solution to the raised irrigation line at a sufficient frequency to supply at least 100ml/minute to each sprinkler head included in the irrigation line. Given the proximity of neighbouring residents along the western boundary, installation and operation of the odour masking system must be designed so that the odour masking solution does not affect the adjacent properties. This may require trials prior to the commencement of excavations and/or programming of works such that excavation of malodours soils does not occur during unfavourable conditions. <u>System Operation</u> The odour masking system shall not be used as a substitute for proper odour control technologies. The odour masking system shall only be used during periods where short duration puffs of odour may occur and only where all odour control technologies, as described in AQMP01 Odour Prevention and Control are being implemented. The odour masking system shall operate for a maximum of four hours on any day. The operation of the Odour Masking System shall be recorded on Form AQMP02.1.		

Odour Masking System Operation

Form AQMP02.1

[illegible]

Dust and Airborne Hazard Control		AQMP03
Responsibility:	Head Contractor	
Frequency:	All site works	
Location:	Site Areas External to the Tented Enclosure	
Objective:	To minimise dust emissions from demolition and earthworks.	
Procedure		
<u>Dust and Asbestos Risk</u>		
Excavation and handling of soils has the potential to generate dust emissions.		
Asbestos containing materials have been found to be potentially present in fill materials located across the site in the vicinity of the former Northern Gasholder. Previous environmental assessments have identified that asbestos occurs within the bonded matrix of fibre cement fragments. At the time of assessment of these areas no testing was undertaken to identify the presence of free asbestos.		
Addison et. al. ('The Release of Dispersed Asbestos from Soil', Institute of Occupational Medicine Report No. TM/88/14, September 1988) have found that very high levels of respirable dust must be generated before significant airborne concentrations of asbestos fibres were produced from soils contaminated with respirable asbestos fibres. It is considered that fibre cement sheet fragments must be subjected to intensive mechanical processes to cause the release of asbestos fibres.		
Asbestos containing fibre cement fragments present in the site sub-surface on the site are not considered to pose a risk. However where the fragments are disturbed by excavation works asbestos fibres will potentially be released. Measures to control dust emissions will be sufficient to control potential asbestos emissions.		
<u>Standards</u>		
All operations on site are to be conducted so that concentrations of dust and other hazardous substances satisfy those stipulated in NSW DECCW published and endorsed guidelines. These guidelines include:		
• NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality' and • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'.		
<u>Control</u>		
Measures shall be undertaken to reduce airborne emissions from site activities including:		
• Water sprays used for dust suppression across unsealed areas of the site, stockpiles and other dust generating areas. All potential dust generating areas (i.e. areas of exposed soils) require to be watered on an hourly basis during periods of site operation or significant dust generation; • A water misting system will be established on site boundaries of areas of soil handling in close proximity of residential properties; • Stockpile heights shall be minimised where possible; • Where stockpiles are to be left in place for significant periods of time, they shall be covered, or seeded to promote vegetation growth, to prevent dust emissions; and • Where unfavourable meteorological conditions exist (i.e. strong winds directed at residential properties) site works shall be restricted to those with low potential for atmospheric emissions. This shall also include consideration of reduced production rates during these periods to minimise dust emissions.		
Regular maintenance shall be undertaken of sprinkler heads, as used for dust control throughout the site, to prevent clogging.		
It is noted that additional specific requirements have been developed for soils which are identified as potentially malodorous as detailed in AQMP01 Odour Control and AQMP04 Handling of Environmentally Impacted Soil which shall also reduce dust and potential asbestos emissions. The requirements of this procedure should be reviewed in accordance with the additional requirements of these other procedures.		

Handling of Environmentally Impacted Soil		AQMP04
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Handling of environmentally impacted soils, including stockpiled soils and receipt of impacted materials	
Location:	Areas of site containing environmentally impacted soils	
Objective:	To control potential environmental emissions from contaminated soils	
Procedure		
Potential hazardous emissions (dust, odour and vapours) may be released during the handling of environmentally impacted materials on the site. Measures shall be put in place to minimise such emissions. These measures shall include: - Measures detailed in AQMP01 Odour Control; - Measures detailed in AQMP02 Odour Masking; - Measures detailed in AQMP03 Dust and Airborne Hazard Control; - Transport of all impacted soils as per designated and marked 'impacted' and 'non-impacted' haul routes throughout the site. These routes shall be clearly identified on a site plan as posted within the Site. A heavy vehicle decontamination area shall be clearly marked on this plan. All persons engaged on the site shall be aware of the preferred haulage routes. The identification of preferred routes will assist in the appropriate placement and ready deployment of odour control methods, and prevent transport of impacted materials along site boundaries (where possible).		
Where air quality management provisions are insufficient to allow compliance with monitoring criteria as detailed in AQMP05 Air Monitoring – Odours and/or AQMP06 Air Monitoring – Volatile Organic Compounds and/or AQMP07 Air Monitoring – Particulates and/or AQMP08 Air Monitoring – Asbestos, then the relevant works shall be ceased until more favourable meteorological conditions or more appropriate work methods are available. The Environmental Consultant shall advise more appropriate meteorological conditions.		

Air Monitoring – Odours		AQMP05
Responsibility:	Head Contractor Site Auditor Environmental Consultant	
Frequency:	Handling / excavation of malodorous materials	
Location:	Site boundaries and nearby residential areas	
Objective:	To assess compliance with environmental standards for works	
Procedure A program of atmospheric monitoring shall be undertaken throughout the earth works. The extent of required monitoring is described following: <i>Odour</i> Odour monitoring shall be undertaken by an appropriately qualified consultant at the downwind boundaries of the site. Odour monitoring shall be commenced prior to subsurface disturbance on the site. Odour monitoring shall be undertaken at three locations as a minimum spaced no greater than 20m along the downwind boundary at a frequency of: - Hourly during periods of handling of potentially malodorous materials external to the tented enclosure; and - A minimum of twice daily during other periods. Odour monitoring shall further be undertaken at least once daily at the receptors nearest to the site, as shown on Figure AQMP5.1. This consists of the nearest residential locations. Odour monitoring shall be undertaken using a 'Nasal Ranger' field olfactometer. A single odour measurement shall be undertaken at each monitoring location. Where an odour strength of 2-4 odour units or greater is recorded, an additional four odour measurements shall undertaken on a 1 minute basis. Odour measurements shall be recorded on Form AQMP05.1. Where three (or more) of the total five readings record an odour strength of or in excess of 2-4 odour units (based on coal tar recognition): - the odour masking system as described in AQMP02 Odour Masking shall be activated (where appropriate); - monitoring shall be increased to an hourly frequency until the odour strengths recorded at all locations on the downwind boundary do not exceed 2 – 4 odour units over two consecutive hours. Once achieved the monitoring frequency may be returned to the minimum twice daily requirement; and - the measures prescribed in AQMP01 Odour Prevention and Control shall be reviewed for adequacy in relation to site activities. Improvements or recommendations arising out of the review shall be incorporated into a revised AQMP for the site as per AQMP09 Review. Personnel who undertake odour monitoring shall be non-smokers and shall be free of any nasal / sinus conditions that may affect the ability to detect / recognise odours.		

Receptor No.	Description	Distance from Site	Easting	Northing
1	1 Leamington St Erskineville	100m North	332244	6247859
2	Railway Offices, within Stabling Shed	20m North	332263	6247744
3	Railway Workshops, nearest to site	60m East	332269	6247645
4	95 Railway Pde Erskineville	100m South	332342	6247537
5	15 Burren St Erskineville	10m West	332265	6247624
6	31 Burren St Erskineville	10m West	332252	6247669



Figure 5.1 **Locations of Monitoring Locations**

Air Monitoring – Odours
Form AQMP05.1

Date: _____

Downwind Locations (complete as per monitoring periods)

7-8am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

8-9am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

9-10am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

10-11am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

11-12am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

12am-1pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

1-2pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

2-3pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

3-4pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

4-5pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

5-6pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

Static Locations

Time: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

4. _____ OU 5. _____ OU 6. _____ OU

Additional Measurements: _____

Completed by: _____

Air Monitoring – Volatile Organic Compounds		AQMP06																																
Responsibility:	Head Contractor Site Auditor Environmental Consultant																																	
Frequency:	Handling / receipt / storage of malodorous materials																																	
Location:	All site works external to the tented enclosure																																	
Objective:	To assess compliance with environmental standards for works																																	
Procedure																																		
A program of atmospheric monitoring shall be undertaken at the site throughout the remediation works outside the Soil Enclosure Area. The extent of required monitoring is described following: <i>Volatile Organic Compounds (VOCs) – Photo-Ionisation Detector</i> Assessment for VOCs shall be undertaken using a photo-ionisation detector (PID) provided with a 10.6eV bulb. Prior to use and at least on a daily basis the calibration of the PID shall be checked by comparison to a fresh air and isobutylene standard. The calibration check shall be recorded as per the appropriate PID calibration forms. VOC monitoring shall be undertaken at all times in the proximity of handling of malodorous materials. Contaminants identified on the project site which have potentially significant health impacts are considered to occur within malodorous materials. The identification of malodorous materials is an appropriate measure for the potential presence of significant levels of VOCs. The PID shall be maintained by an attended operator within a distance of approximately 2m during all periods of handling malodorous materials. Where the operator is unable to safely remain within 2m of the works area (consequent of heavy equipment or otherwise) the PID may be affixed to an excavator or similar in proximity of the works. PID measurements shall be undertaken as one hour averages. The action level to assess PID readings requires to be determined on the basis of the separation distance to the nearest potentially exposed receptor. Locations of nearest receptors and separation distances are shown on Figure AQMP6.1 attached. The separation distance to the nearest receptor requires to be calculated by estimating the distance from the area of the malodorous materials to the nearest receptor. This is the sum of the distance from the site boundary to the receptor, and the downwind distance from the malodorous materials to the site boundary. The PID screening criteria are summarised following:																																		
<table><tr><th>Separation Distance (m)</th><th>PID Screening Criteria (ppm)</th></tr><tr><td>50</td><td>0.1</td></tr><tr><td>100</td><td>0.2</td></tr><tr><td>150</td><td>0.3</td></tr><tr><td>200</td><td>0.3</td></tr><tr><td>250</td><td>0.4</td></tr><tr><td>300</td><td>0.4</td></tr><tr><td>350</td><td>0.5</td></tr><tr><td>400</td><td>0.5</td></tr><tr><td>450</td><td>0.6</td></tr><tr><td>500</td><td>0.6</td></tr><tr><td>600</td><td>0.7</td></tr><tr><td>700</td><td>0.7</td></tr><tr><td>800</td><td>0.8</td></tr><tr><td>900</td><td>0.9</td></tr><tr><td>1000</td><td>0.9</td></tr></table>			Separation Distance (m)	PID Screening Criteria (ppm)	50	0.1	100	0.2	150	0.3	200	0.3	250	0.4	300	0.4	350	0.5	400	0.5	450	0.6	500	0.6	600	0.7	700	0.7	800	0.8	900	0.9	1000	0.9
Separation Distance (m)	PID Screening Criteria (ppm)																																	
50	0.1																																	
100	0.2																																	
150	0.3																																	
200	0.3																																	
250	0.4																																	
300	0.4																																	
350	0.5																																	
400	0.5																																	
450	0.6																																	
500	0.6																																	
600	0.7																																	
700	0.7																																	
800	0.8																																	
900	0.9																																	
1000	0.9																																	
Where the screening criteria are exceeded then measures as required by EMP02 Odour Control shall be implemented to reduce VOC emissions. It is noted measures identified as appropriate for odour emissions are also appropriate for control of VOC emissions. Subsequent to implementation of odour control measures, an additional air sample shall be required to be collected using a Draeger Tube. All PID monitoring results require to be recorded on Form AQMP6.1. The recording of repeated elevated reading will require a substantial review of work methods in accordance with AQMP09 review. <i>Volatile Organic Compounds (VOCs) – Draeger Tube</i> Draeger tube samples require to be collected where the PID screening level is exceeded and the maximum PID reading for the day has been recorded. Draeger tube samples require to be specific to benzene.																																		

Draeger tube ID 81081841 shall be used for sampling. This tube is specific to benzene and has a benzene detection limit of 0.5ppm. Draeger tube samples shall be collected at a height of 1.5m immediately overlying the malodorous materials. Some works may require to be temporarily ceased to allow collection of the sample.

Draeger tubes shall be sampled in strict accordance with the manufacturer specifications. Sampling shall be undertaken using a Draeger Accuro Pump. It shall be ensured that the recommended number of strokes are undertaken with the collection of each sample.

All Draeger tube monitoring results require to be recorded on Form AQMP6.1. The recording of repeated elevated reading will require a substantial review of work methods in accordance with AQMP09 review.

The Draeger tube action level shall be set at a detection of benzene overlying the source (0.5ppm). Where a detection is recorded and odour controls have been implemented, works shall require to be modified. This shall include consideration of:

- Cessation of works until more favourable meteorological conditions are available; and/or
- Reduction in scale of works with VOC impacted / malodorous materials.



 Proposed Site Area Available for Remediation Works

 50m contours from site



0 50m
Approximate scale

Figure 6.1

Approximate Radial Distance from Remediation Site

Department of Lands (2010)

Note- All locations shown are approximate only

Date: _____

Sampling Locations at 2m Distance Downwind of Work Zone (complete as per monitoring periods)

7-8am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

8-9am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

9-10am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

10-11am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

11-12am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

12am-1pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

1-2pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

2-3pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

3-4pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

4-5pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

5-6pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

Comments:

Completed by: _____

Air Monitoring – Particulates / Dust		AQMP07
Responsibility:	Head Contractor Site Auditor Environmental Consultant	
Frequency:	Duration of earth works	
Location:	Site boundaries	
Objective:	To assess compliance with environmental standards for works	
Procedure		
A program of atmospheric monitoring shall be undertaken throughout the earth works. The extent of required monitoring is described following: <i>Dusts – Realtime Particulate Monitoring</i> Assessment of realtime levels of dusts shall be undertaken by appropriately qualified personnel observing site boundaries. Where visible dusts are observable on the site boundaries then actual site measurements shall be undertaken by a 'DUSTTRAK' Aerosol Monitor at the downwind site boundary. The averaged level of PM₁₀ (particulate matter less than 10 microns in diameter) over a period of 30s shall be required to be less than 50µg/m³ at the downwind portion of the site boundary. Where the acceptable level of dust is exceeded by real-time aerosol monitoring, then the measures prescribed in AQMP03 Dust and Airborne Hazard Control shall be reviewed for adequacy in relation to site activities. Improvements or recommendations arising out of the review shall be incorporated into a revised AQMP for the site as per AQMP08 AQMP Review. All measurements shall be recorded in Form AQMP07.1. <i>Dusts – Deposition Monitoring</i> Dust deposition monitoring shall be undertaken by dust deposition gauges maintained permanently at three locations identified on Figure AQMP7.1. These locations have been determined on the basis of siting requirements in AS2922-1997 'Ambient Air – Guide for Siting of Sampling Units' to the extent possible. Collection and analysis of samples shall be undertaken in accordance with AS3580.10.1-2003 'Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method'. Samples shall be collected and analysed on a monthly basis throughout the works. Where the level of dust deposition exceeds 2g/m²/month the implementation of AQMP03 Dust and Airborne Hazard Control shall be reviewed. <i>Dusts – Laboratory Analysis of Particulates</i> Confirmatory sampling shall be undertaken of the realtime particulate measurements being generated by the monitoring. This shall be undertaken by the fortnightly collection of an ambient air sample by a high volume sampling method. A high volume sampler shall be operated for a minimum period of 8 hours during site operation at a downwind location on the site boundary. Sample collection and analysis shall be in accordance with AS3580.9.6-1990 'Ambient Air – Determination of Suspended Particulate Matter PM₁₀ – High Volume Sampler with Size Selective Inlet Gravimetric Method'. Realtime measurements shall be taken at hourly intervals adjoining the sampler. The laboratory reported result of the high volume sampler shall be compared to the average of the realtime measurements. Where a significant discrepancy is identified (RPD>50% as calculated in accordance with AS4482.1-2005) the calibration of the Dusttrak (dust monitor) shall be confirmed by manufacturer service. Repeated significant discrepancies in measurements will require revision of the AQMP in accordance with AQMP9 Review.		

Air Monitoring – Dusts / Particulates
Form AQMP07.1

Date: _____

Dusts Visible at Site Boundaries?

7-8am	◇ No	◇ Yes	_____
8-9am	◇ No	◇ Yes	_____
9-10am	◇ No	◇ Yes	_____
10-11am	◇ No	◇ Yes	_____
11-12am	◇ No	◇ Yes	_____
12am-1pm	◇ No	◇ Yes	_____
1-2pm	◇ No	◇ Yes	_____
2-3pm	◇ No	◇ Yes	_____
3-4pm	◇ No	◇ Yes	_____
4-5pm	◇ No	◇ Yes	_____
5-6pm	◇ No	◇ Yes	_____

Dust-Trak Measurements

Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s

Completed by: _____

Air Monitoring – Asbestos		AQMP08
Responsibility:	Head Contractor Site Auditor Environmental Consultant	
Frequency:	Duration of works in the vicinity of the former Northern Gasholder	
Location:	Site boundaries and nearby residential areas	
Objective:	To assess compliance with environmental standards for works	
Procedure A program of atmospheric monitoring shall be undertaken throughout the earth works. The extent of required monitoring is described following: <i>Asbestos</i> Asbestos containing materials have been identified in shallow soils in the vicinity of the former northern gasholder. When active excavation works occur in the vicinity of known areas of asbestos impacted fill, or other areas assessed by the environmental consultant as having a high potential to be impacted, asbestos monitoring shall be undertaken. The potential generation of asbestos fibres shall be assessed by the daily static monitoring for asbestos fibres at three locations on the site boundary. These locations shall consist of at least one upwind and one downwind location. Sampling shall be undertaken in accordance with NIOSH Method 7400 'Asbestos and Other Fibres by PCM'. All results shall be required to meet the acceptance criteria as specified in the NOHSC 'Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres (2 nd edition)' of <0.01 fibres/ml. Where fibres are recorded in downwind locations then the presence of asbestos fibres shall be confirmed by analysis using TEM analysis (as per NIOSH method 7402). Where asbestos fibres are identified then dust control procedures shall be reviewed as in accordance with AQMP03 Dust and Airborne Hazard Control. The recording of asbestos fibres will require a substantial review of work methods in accordance with AQMP09 review.		

AQMP Review		AQMP9
Responsibility:	Head Contractor Site Auditor Environmental Consultant RailCorp	
Frequency:	Subsequent to environment incidents. Subsequent to changes in program of works.	
Location:	Not applicable	
Objective:	To ensure that the AQMP is current and appropriate for the site	
Procedure The Air Quality Management Plan shall be reviewed by the Environmental Consultant subsequent to either of the following: - any environmental incident on the site; - repeated exceedances of daily monitoring criteria for dust (AQMP 07), asbestos (AQMP 08), VOCs (AQMP 06) and/or odours (AQMP 05); or - a significant modification to the implemented scope of works. All new copies of Air Quality Management Plans shall be re-distributed to all parties by the Environmental Consultant. The Environmental Management Plan will require to be updated with the provisions of the revised Air Quality Management Plan. On finalisation of revision, the Air Quality Management Plan shall be provided to the RailCorp for review / approval. The Authority shall advise acceptability of revisions (or otherwise) within seven days of receipt.		

Training		AQMP10
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Throughout implementation of Environmental Management Plan and AQMP	
Location:	-	
Objective:	To ensure that persons responsible for preparation of the AQMP are competent.	
Procedure		
Any person who is required to be responsible for technical / monitoring activities in relation to the implementation of the Air Quality Management Plan shall:		
• Be inducted as the requirement and method of the specific activity by the Environmental Consultant or their nominated representative; • Have undertaken the 24 hour Health and Safety Training for Hazardous Waste / Materials under OSHA 29 CFR 1910:120 or equivalent; • Have an adequately acute sense of smell to allow operation of a nasal ranger (as confirmed by ability to detect n-butanol odour at a level of 40ppb by dynamic olfactometry in accordance with AS/NZS 4323.3:2001; CEN EN 13725:2003); and • Have completed a Workcover approved Asbestos Removal Supervisor course or equivalent.		

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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Matt Parkinson/ Sumi Dorairaj	-	Draft for client review	-	26/11/2010
B	Matt Parkinson/ Sumi Dorairaj	Charlie Furr	Charlie Furr		14/12/2010
C	Sumi Dorairaj	Matthew Bennett	Draft for client review		09/08/11



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Appendix C
Environmental Management Procedures
Chullora Treatment Site

Appendix C Chullora Treatment Site Management Procedures - Contents Page

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EMP29 Handling of Contaminated Soil	C-9
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EMP31 Operation of Site Office	C-14
EMP32 Decontamination of Heavy Equipment	C-15
EMP33 Environmental Monitoring	C-16
EMP34 Community Consultation	C-17
EMP35 Incident Reporting	C-19
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EMP37 Training	C-24
<i>'Air Quality Management Plan, Former Macdonaldtown Gasworks- Chullora Materials Receipt Facility'</i> JBS Environmental Pty Ltd 40913-16613 Rev C, August 2011.	Provided as Appendix D to this EMP

Dust and Airborne Hazard Control		EMP23
Responsibility:	Principal Contractor	
Frequency:	All site works	
Location:	Entire Treatment Area	
Objective:	To minimise dust emissions from treatment works	

Procedure

Dust and Asbestos Risk

Handling of soils has the potential to generate dust emissions. Asbestos containing materials have also been found to be potentially present in fill materials located across the Macdonaldtown site. Previous environmental assessments at the Macdonaldtown site have identified that asbestos occurs within the bonded matrix of these fibre cement fragments. No free asbestos fibres have been identified in soils.

Addison et al ('The Release of Dispersed Asbestos from Soil', Institute of Occupational Medicine Report No. TM/88/14, September 1988) have found that very high levels of respirable dust require to be generated before significant airborne concentrations of asbestos fibres were produced from soils contaminated with respirable asbestos fibres. It is considered that fibre cement sheet fragments require to be subjected to intensive mechanical processes to cause the release of asbestos fibres.

Asbestos containing fibre cement fragments present in the Macdonaldtown site sub-surface on the site are considered not to pose a risk. However where the fragments are disturbed by excavation works asbestos fibres will potentially be released. Measures to control dust emissions will be sufficient to control potential asbestos emissions.

Standards

All operations on site are to be conducted so that concentrations of dust and other hazardous substances satisfy those stipulated in NSW DECC published and endorsed guidelines. These guidelines include:

- NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality' and
- Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'.

Control

All works on site should be conducted in accordance with the 'Air Quality Management Plan, Former Macdonaldtown Gasworks - Chullora Material Receipt Facility' JBS Environmental Pty Ltd 40913-16613, Rev C, August 2011.

This will include a program of boundary monitoring for dust, asbestos and odours and management of emissions in accordance with current industry best practices.

Measures shall be undertaken to reduce airborne emissions from site activities including:

- Water sprays used for dust suppression across sealed areas of the site, stockpiles and other dust generating areas;
- A water misting system will be established on treatment area boundaries and in areas of soil handling where dust could be released beyond the boundaries of the treatment area;
- Stockpile heights shall be minimised where possible;
- Where stockpiles are to be left in place for significant periods of time, they shall be covered by lightweight silt cloth or otherwise to restrict emissions; and
- Where unfavourable meteorological conditions exist (i.e. strong winds directed at residents) site works shall be restricted to those with low potential for atmospheric emissions.

Regular maintenance shall be undertaken of sprinkler heads throughout the site to prevent clogging.

It is noted that additional specific requirements have been developed for soils which are identified as potentially malodorous as detailed in EMP24 Tented Enclosure, EMP28 Odour Control and EMP29 Handling of Contaminated Soil which shall also reduce dust and potential asbestos emissions which shall also reduce dust, odour and potential asbestos emissions.

Tented Enclosure		EMP24
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Treatment of malodourous soils	
Location:	Tented Enclosure(s)to be confirmed (minimum required extent shown on Figure 4)	
Objective:	To ensure that any environmental emissions from treatment areas comply with environmental guidelines	
Procedure		
A Tented Enclosure will be used for the treatment of all contaminated (including malodorous) soils received from the former Macdonaldtown Gasworks. The Tented Enclosure requirements are to be confirmed once the details of materials and layout to be used are provided to RailCorp. The Tented Enclosure shall be designed appropriately trained professionals, must be constructed to be compliant with relevant building and safety codes and regulations for such structures. The Tented Enclosure shall be designed and operated so as atmospheric emissions comply with those identified in relevant environmental guidelines at all times. These guidelines include: • NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality'; • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'; and • Ambient air criteria provided to US EPA (2004) 'Region IX Preliminary Remediation Goals' for constituents not available in local literature. No recognisable odours shall be discharged from the Tented Enclosure. The Tented Enclosure shall be constructed of a metal clad or fabric structure sufficiently sized to allow the operation of tippers, excavators and associated equipment required for the stockpiling and handling of soils and any associated equipment. Openings in the structure shall be minimised so as to reduce ventilation requirements. The Tented Enclosure shall be ventilated so that the structure is maintained under a constant negative pressure. The discharge of Tented Enclosure ventilation shall be directed through a GAC filter appropriately sized so as to ensure removal of potentially malodorous constituents as per AQMP01 Odour Control (Appendix D). Tippers shall be required to enter and exit the Tented Enclosure to allow the movement of soils. Tipper speeds when exiting the Tented Enclosure shall be minimised to the extent possible to prevent wake effects at the rear of the tipper causing uncontrolled release of odours from the Tented Enclosure. Where wake effects and associated discharge of recognisable odours are evident at tipper exit from the Tented Enclosure, then ventilation of the Tented Enclosure shall require to be increased.		

Emergency Response		EMP25
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Where uncontrolled releases of potential environmental pollutants occurs	
Location:	Entire Treatment Area	
Objective:	To minimise environmental impacts of all incidents on site	
Procedure		
Environmental incidents on the site which would require potential emergency response would relate to a spill of hazardous liquid or material on soils on the site, or in the proximity of a stormwater discharge point.		
For spills on land the following shall be undertaken:		
• Identify source of spill and stop when / if safe to do so; • Identify area of spill and clear area of all personnel; • Notify RailCorp, Strathfield Council (within 24hrs), and the Environmental Consultant of spill; • Construct earthen bunding using earth moving equipment available on site to contain spill; • Environmental Consultant to coordinate the pumping of liquid waste out of the containment structure and disposal to a licensed waste facility; • If solid waste, Environmental Consultant to coordinate the excavation and removal of the hazardous material to a secure area; and • Assess soils in vicinity of environmental incident for contamination and conduct remediation works where contamination has occurred.		
For spills to the site stormwater system the following shall be undertaken:		
• Identify source of spill and stop when / if safe to do so; • Identify onshore circumference of spill and clear area of all personnel; • Notify RailCorp, Strathfield Council (within 24hrs), and the Environmental Consultant of spill; • Environmental Consultant to instruct containment of area of spill in water by placement of temporary absorbent booms (available on site) to create 'coffer dam' around stormwater outlet to prevent discharge of spilt material; • Environmental Consultant to coordinate a liquid waste tanker to be bought onto site and pump directly from water contained within the impacted area of the constructed coffer dam until visual evidence of spill removed.		
All emergency responses should be followed up with EMP34 Incident Reporting and EMP35 Review.		

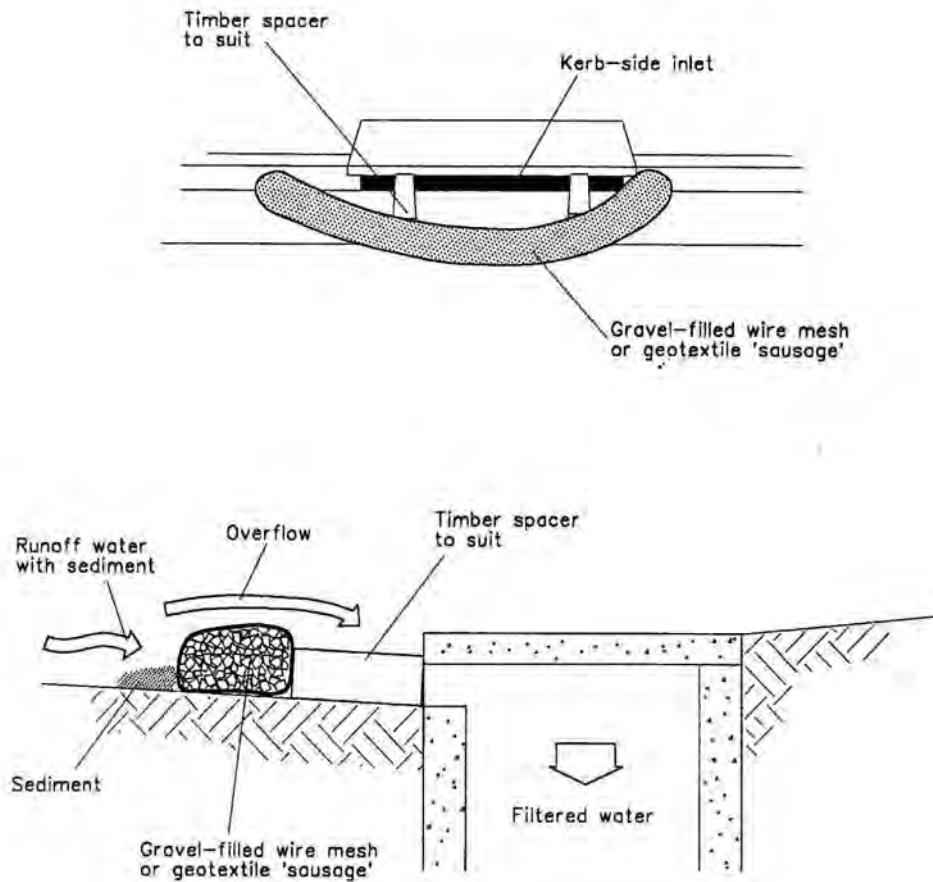
Noise Control		EMP26
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	All site works	
Location:	Treatment area boundaries and nearest off-site receptors	
Objective:	To minimise impacts of noise emissions on adjoining land users	
Procedure		
The following measures shall be employed during the site works to minimise environmental noise emissions in the proximity of occupied areas in the vicinity of the site, including residential areas at the north and east of the site: • Normal hours of work will be between 7.30am and 5.30pm Monday to Friday and 7.30 am to 3.30 pm on Saturdays. No work shall be conducted on Sundays or public holidays or outside the above hours unless approved by RailCorp and deemed to be crucial to the control of potential environmental emissions from the site; • Where possible, all site noise sources will have a maximum operating noise level of 85db(A); • The conditions of exhaust systems on the excavators and other heavy machinery will be assessed to ensure that they are operating efficiently; • Maintenance and repairs being undertaken outside normal working hours provided that it is done as far as away from occupied premises as possible, no heavy machinery is involved and noise generated is inaudible at noise sensitive premises; • A communication and complaints register will be maintained to ensure that any concerns of local residents and members of the public are recorded and addressed as detailed in EMP34 Community Consultation; and • Concerns over noise generation will be communicated to all site personnel and contractors during site inductions. Where the controls provided are insufficient to minimise noise levels to the required level, a noise monitoring program shall be undertaken during the site works. The results of the noise monitoring program shall be used to determine the most effective noise control measures.		

Traffic		EMP27
Responsibility:	Principal Contractor	
Frequency:	Heavy vehicle movements as generated by site works	
Location:	Road network in proximity of treatment area	
Objective:	To minimise impacts on local road network	
Procedure		
Heavy vehicles shall minimise use of local roads in the area. Vehicle movements shall be conducted in accordance with the Traffic management Plan prepared for the project.		

Odour Control		EMP28
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Handling of potentially malodorous / contaminated soils	
Location:	All treatment area	
Objective:	To minimise potential odour impacts	
Procedure		
Potentially malodorous materials will be received at the site for temporary storage and treatment, specifically in the form of coal tar based impact. The measures required to control potential odour generation and odour emissions from the treatment area are detailed as follows. The measures must to be sufficient to prevent exposure to offensive odours at residential properties in the proximity of the site. <u>Control of Malodorous Emissions</u> Malodorous emissions will potentially occur wherever contaminated soils are exposed, including stockpiling of soils and treatment. All works on site should be conducted in accordance with the '<i>Air Quality Management Plan, Former Macdonaldtown Gasworks – Chullora Material Receipt Facility</i>' JBS Environmental Pty Ltd 40913-16613 Rev C, August 2011. The following measures are available to be implemented: • Minimising the extent of exposed coal tar impacted soils to a surface area of 150m². Other coal tar impacted soils stockpiled on the treatment site must be covered to prevent odour emissions. Covering of any stockpiles must occur with impermeable materials such as plastic or tarpaulin covers; and • Reduction in scale of earthworks during non-advantageous meteorological conditions; and <u>Odour Control System</u> An odour control system will be required on the treatment site. Details of the system requirements are provided in the '<i>Air Quality Management Plan, Former Macdonaldtown Gasworks – Chullora Material Receipt Facility</i>' JBS Environmental Pty Ltd 40913-16613 Rev C, August 2011.		

Handling of Contaminated Soil		EMP29
Responsibility:	Principal Contractor	
Frequency:	Handling of contaminated soils, including stockpiled soils and sub-surface contaminated materials	
Location:	Sections of treatment containing contaminated soils	
Objective:	To control potential environmental emissions from contaminated soils	
Procedure Potential hazardous emissions (dust, odour and vapours) may be released during the handling of contaminated materials on the site. Measures shall be put in place to minimise such emissions. These measures shall include: - Measures detailed in EMP23 Dust and Airborne Hazard Control; - Measures detailed in EMP28 Odour Control; - Handling and processing of all contaminated soils as per a materials tracking system developed for the site; and - Transport of all contaminated soils along designated and marked 'contaminated' and 'non-contaminated' haul routes throughout the site. These routes shall be clearly identified on a site plan as posted across the Treatment Area. A heavy vehicle decontamination area shall be clearly marked on this plan. All persons engaged shall be aware of the preferred haulage routes; and - Water used at heavy vehicle wash down points will be treated as contaminated water and decontaminated in the same manner as other contaminated water generated at site prior to discharge.		

Sediment Control		EMP30
Responsibility:	Principal Contractor	
Frequency:	Disturbance of soils or storage of exposed soils	
Location:	Stockpiles and treatment areas	
Objective:	To control potential sediment generation and migration	
Procedure		
<u>Equipment</u>		
The following general equipment may be required to allow construction of sediment control devices:		
• Gravel filter sock; • Sediment fencing; • Stakes / star pickets; and/or • Plastic or other material to cover stockpiles.		
<u>Sediment Control Devices – Stormwater Drains</u>		
Stormwater drains are located along the site boundaries. Figure 29-1 shows the sediment control devices that should be applied to all stormwater drains.		
<u>Sediment Control Devices – Stockpiles</u>		
Where possible, stockpiles will be located away from stormwater inlets and treatment area boundaries.		
Figure 29-2 shows the sediment controls that will be applied to stockpiles placed in the vicinity of the site boundary and/or stormwater drains.		
<u>Stormwater Diversion</u>		
Where stockpiles are required to remain in place for significant durations of time, controls shall be put in place to minimise the contact of stormwater flows with stockpiled materials. This shall include the use of stormwater diversion devices. Stormwater diversion devices that will be used on the project are shown on Figure 29-3 .		
<u>Staging of Works</u>		
Works shall be staged so as to minimise the quantity of exposed stockpiled material at any one time in accordance with EMP27 Handling of Contaminated Soil.		
<u>Covering Stockpiles</u>		
Stockpiles that are left exposed (in accordance with the requirements of EMP27) for a substantial period of time and are generating excessive sediment consequent of rainfall events or otherwise shall be covered.		

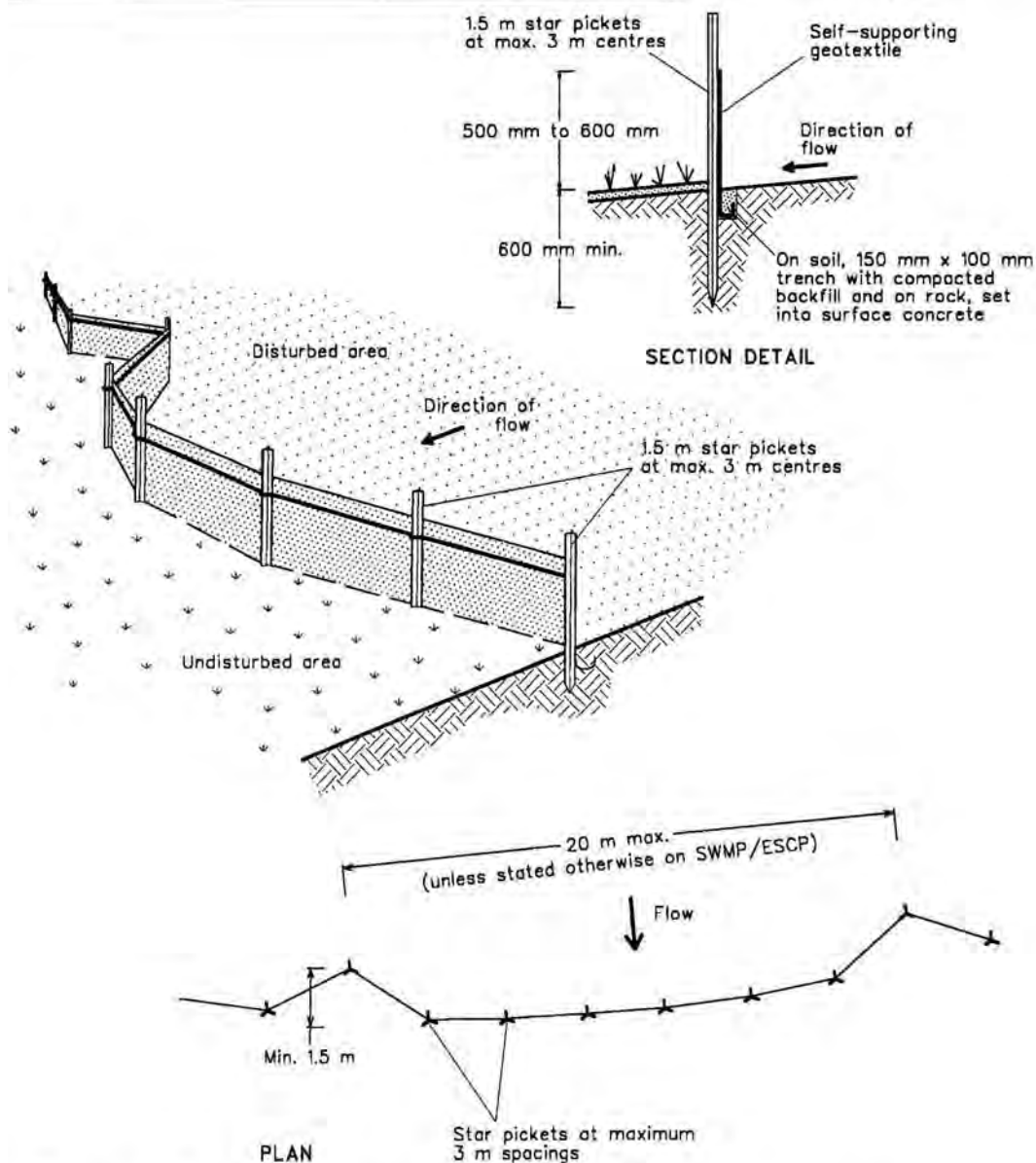
Sediment Control Devices – Stormwater Drains
Fig 30-1


NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

1. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit.
2. Fill the sleeve with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening of the kerb inlet leaving a 100 mm gap at the top to act as an emergency spillway.
5. Maintain the opening with spacer blocks.
6. Form a seal with the kerbing and prevent sediment bypassing the filter.
7. Fit to all kerb inlets at sag points.

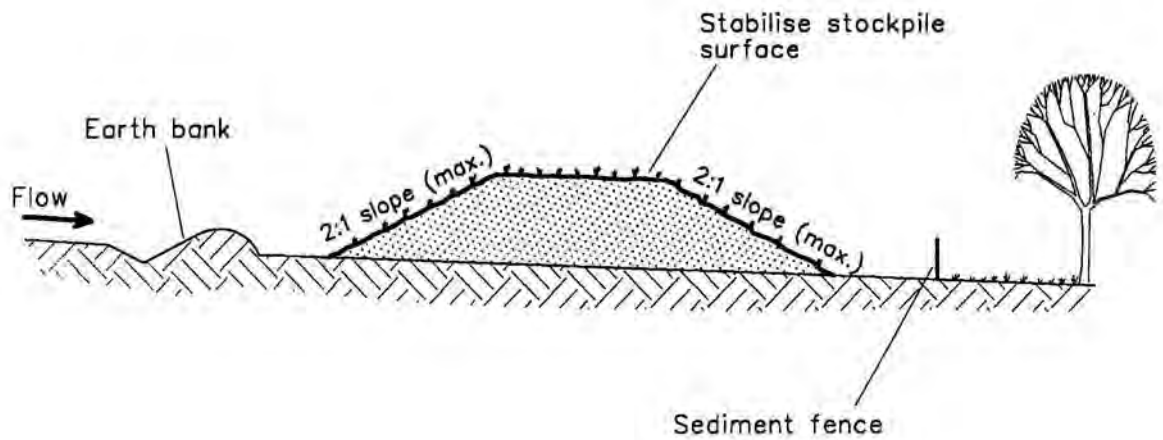
Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'



Construction Notes

1. Construct sediment fence as close as possible to parallel to the contours of the site.
2. Drive 1.5 metre long star pickets into ground, 3 metres apart.
3. Dig a 150 mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
4. Backfill trench over base of fabric.
5. Fix self-supporting geotextile to upslope side of posts with wire ties or as recommended by geotextile manufacturer.
6. Join sections of fabric at a support post with a 150 mm overlap.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'



Construction Notes

1. Locate stockpile at least 5 metres from existing vegetation, concentrated water flows, roads and hazard areas.
2. Construct on the contour as a low, flat, elongated mound.
3. Where there is sufficient area topsoil stockpiles shall be less than 2 metres in height.
4. Rehabilitate in accordance with the SWMP/ESCP.
5. Construct earth bank (Standard Drawing 5-2) on the upslope side to divert run off around the stockpile and a sediment fence (Standard Drawing 6-7) 1 to 2 metres downslope of stockpile.

Source: Landcom (2004) 'The Blue Book - Managing Urban Stormwater (MUS): Soils and Construction'

Operation of Site Office		EMP31
Responsibility:	Principal Contractor	
Frequency:	Duration of works in treatment area	
Location:	Principal Contractor Site Office and Amenities Building	
Objective:	To minimise waste generation from the Site Office	
Procedure Some wastes will be produced by the operation of the treatment area office. These will be reduced and handled by the following measures: • Provide systems in treatment area Office to minimise paper and resource usage. • Provide a front lift bin for office / crib garbage, dispose regularly.		

Decontamination of Heavy Equipment		EMP32
Responsibility:	Principal Contractor	
Frequency:	Heavy equipment demobilisation from the treatment area	
Location:	Heavy equipment decontamination area.	
Objective:	To ensure that contamination does not leave the treatment area	
Procedure		
Heavy earthmoving equipment will come in contact with contaminated soils while engaged in treatment activities on the site. Prior to heavy equipment moving off site decontamination will be required. A heavy vehicle decontamination station shall be provided on the site to this effect. This station shall be provided with the following: • A hardstand base, bunding on perimeters and a sump collection point at the lowest point to prevent contamination of underlying soils; • Storage tanks or appropriate treatment systems for temporary storage and / or treatment of contaminated water / rinse solutions; • Pumps provided within drainage sump for collection of contaminated wash and rinse solutions; • Long handled brushes for general exterior cleaning; • Wash solutions selected to remove and reduce the hazards associated with the contaminants (i.e. DECON 90); • Rinse solutions selected to remove contaminants and contaminated wash solutions; • Pressurised sprayers for washing and rinsing, particularly hard to reach areas; • Long handled brushes, rods and shovels for dislodging contaminants and contaminated soil caught in tyres and the undersides of vehicles and equipment; • Containers to hold contaminants and contaminated soils removed from tyres and the undersides of vehicles and equipment; • Wash and rinse buckets for use in decontamination of operator areas inside vehicles and equipment; and • Containers for storage and disposal of contaminated wash and rinse solutions, damaged or heavily contaminated parts, and equipment to be discarded. Subsequent to heavy equipment moving out of the Decontamination Area for transport off site it shall be inspected by the contractors Health and Safety Representative provided to the site works. Heavy equipment shall be moved out of the Treatment Area subject to authorisation of the Health and Safety Representative that decontamination is complete. Decontamination shall be appropriate for the extent of potential contact with contaminated materials on the site. It is noted that tippers entering the site to deliver or remove contaminated materials will have sufficiently less potential contamination than earthmoving machinery used to handle contaminated materials, and decontamination need not be as comprehensive as described.		

Environmental Monitoring		EMP33
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	Duration of treatment works	
Location:	Treatment area boundaries	
Objective:	To assess compliance with environmental standards for works	
Procedure		
A program of environmental monitoring shall be undertaken at the site. The extent of required monitoring is to be determined as the program of works at the treatment area is developed but should include the following elements: A program of environmental monitoring shall be undertaken at the site. The extent of required monitoring is described following: <u>Noise Monitoring</u> Noise monitoring shall be undertaken throughout the treatment works at the representative receptor locations in the proximity of the site. The requirements of the noise monitoring program including locations and frequency of monitoring, applicable noise criteria, reporting requirements and responsible parties shall be directed by the Acoustic Consultant appointed to the project. <u>Atmospheric Monitoring</u> Dust, asbestos, odour and VOC monitoring will be required for the duration of the remedial works. Requirements for air monitoring are provided in the '<i>Air Quality Management Plan, Former Macdonaldtown Gasworks- Chullora Materials Receipt Facility</i>' JBS Environmental Pty Ltd 40913-16613 Rev C, August 2011.		

Community Consultation		EMP34
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Prior to and throughout treatment	
Location:	Communities in the proximity of treatment area	
Objective:	To ensure the expectations of the community are met in the undertaking of treatment	
Procedure		
Prior to the commencement of the works the local community shall be informed of the scope and nature of the proposed works. This shall comprise at least the following: • Requirement for works; • Proposed scope of works; • Type and source of contamination on site; • Proposed controls to minimise environmental emissions from the site; and • Contact persons and numbers for registering enquiries / complaints about the works.		
<u>Community Complaints</u>		
A Community Complaints hotline shall be maintained throughout the duration of the works. A contact number and person shall be notified by signage provided to the site boundary. The following procedure shall be adhered to in handling community complaints: • Any complaint received by telephone, correspondence or visitation will be registered using the attached Form 34.1 or similar; • The complaint shall be investigated by a representative of the Principal Contractor and Environmental Consultant within 24 hours of the date and time of the complaint; • If justified, a remedial action shall be prepared; • The complaint report, and if required the remedial action report, shall be reviewed and approved by a representative of RailCorp; • If action is required, it shall be implemented immediately if urgent, otherwise within 48 hours of the complaint; • The person who notified the complaint shall be notified of the action taken; and • All complaints shall be tabled and reviewed in respect of the requirements of the EMP. Where EMP changes are required these shall be made in accordance with EMP34 Incident Reporting and EMP35 EMP review.		

Community Complaint Summary**Form 34-1**

COMPLAINT SUMMARY – NATURE OF AND ACTION TAKEN

Complaint No: _____ Date Received: _____

Complaint made by: _____
(telephone, mail, email, other)

Complainant: _____

Nature of Complaint: _____

Action Taken: _____ date of action: _____

Follow up with Complainant: _____ date of follow up: _____

SIGNED: _____ Date: _____

Incident Reporting		EMP35
Responsibility:	Principal Contractor Site Auditor Environmental Consultant	
Frequency:	IMMEDIATELY When environmental incidents occur	
Location:	Areas where incidents have occurred	
Objective:	To provide a reporting and review mechanism for incidents to allow the update of the EMP	
Procedure RailCorp shall be notified immediately of any incidents requiring emergency response that occur. The Principal Contractor shall facilitate the completion of environmental incident forms for any environmental incident that occurs on the site. The Environmental Consultant shall review all incident forms. Incident forms shall include community complaints (as per EMP33 Community Consultation) that require remedial actions. An example of an environmental incident form is provided as Form 35-1 .		

Name	Area/Company	Contact Details
-----	-----	-----
-----	-----	-----
-----	-----	-----

INCIDENT EVALUATION

Section to be completed by the General Manager (Principal Contractor) and relevant personnel concerned with the incident.

Cause(s) and Contributing Factor(s):

List those factors that caused / contributed to the incident.

Controls which could be used:

Consider: Hierarchy of Controls (elimination, substitutionetc.). List all that are appropriate.

-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----
-----	-----

What was the task being performed at the time of the incident? -----

Was the person trained / inducted? -----

Was there adequate Supervision? -----

Was there a risk assessment for the task, were controls implemented? -----

ACTION PLAN (RECTIFICATION / PREVENT RECURRENCE)

General Manager to assess and decide on appropriate actions in response to the incident. Upon completion of recommended action(s), the General Manager is to sign off as confirmation. Completion of the actions shall also act as the close out of the report.

Recommended Action	Target Date	Action By	Task Completed (Initial and Date)
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Agreed Actions Complete and Incident Closed Out

Authorised by General Manager: _____ (Signature and date)

ADMINISTRATION

Improvement Register is to be updated by the General Manager, ensuring confidentiality of persons involved in the incident.

Incident has been added to Improvement Register: # _____

WorkCover or Insurer Notification required: _____ Completed Date: _____

Circulation register to be completed upon receiving and reviewing this report.

CIRCULATION

Name: _____ Signature: _____

Date: _____

(Person Reporting)

Name: _____ Signature: _____

Date: _____

(General Manager)

Name: _____ Signature: _____

Date: _____

(Client – if applicable)

EMP Review		EMP36
Responsibility:	Principal Contractor Site Auditor Environmental Consultant RailCorp	
Frequency:	Subsequent to environment incidents. Subsequent to changes in program of works.	
Location:	Not applicable	
Objective:	To ensure that the EMP is current and appropriate for the site	
Procedure Subsequent to any environmental incidents on the site and/or a significant modification to the implemented scope of works the Environmental Management Plan shall be reviewed by the Environmental Consultant. All new copies of Environmental Management Plans shall be re-distributed to all parties by Environmental Consultant. On finalisation of revision, the Environmental Management Plan shall be provided to Strathfield Council for review / approval. Council shall advise acceptability of revisions (or otherwise) within seven days of receipt.		

Training		EMP37
Responsibility:	Principal Contractor Environmental Consultant	
Frequency:	Throughout implementation of Environmental Management Plan	
Location:	-	
Objective:	To ensure that persons responsible for preparation of the EMP are competent.	
Procedure Any person who is required to be responsible for technical activities in relation to the implementation of the EMP shall: • Be inducted as the requirement and method of the specific activity by the Environmental Consultant or their nominated representative; or • Have undertaken the 24 hour Health and Safety Training for Hazardous Waste / Materials under OSHA 29 CFR 1910:120 or equivalent.		

Appendix D

Air Quality Management Plan

Former Macdonaldtown Gasworks Site – Chullora Materials Receipt Facility

Air Quality Management Plan

Remediation of Former Macdonaldtown
Gasworks – Chullora Material Receipt
Facility

Incoll Management Pty Ltd

On behalf of
Rail Corporation NSW

RailCorp Chullora Workshops
Off Worth St
CHULLORA, NSW

August 2011
JBS40913-16613 Revision C
© JBS Environmental Pty Ltd

Air Quality Management Plan

Remediation of Former Macdonaldtown
Gasworks – Chullora Material Receipt Facility

Incoll Management Pty Ltd

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Off Worth St
CHULLORA, NSW

August 2011
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JBS Environmental Pty Ltd

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Figure 1 – Location of Site

Figure 2 – Site Layout

Figure 3 – Proposed Treatment Area Setup

Appendices

Appendix A – Air Quality Management Procedures

List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

- As Arsenic
- Cd Cadmium
- Cr Chromium
- Cu Copper
- BTEX Benzene, Toluene, Ethylbenzene and Xylenes
- B(a)P Benzo (a) pyrene
- DECCW NSW Department of Environment, Climate Change and Water
- DQO Data Quality Objectives
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- OCP Organochlorine Pesticide
- SAR Site Audit Report
- SAS Site Audit Statement
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- TPH Total Petroleum Hydrocarbons (C₆-C₉ and C₁₀-C₃₆)
- Zn Zinc

1 Introduction

1.1 Introduction and Objectives

JBS Environmental Pty Ltd was engaged by Incoll Management Pty Ltd (Incoll) to prepare an Air Quality Management Plan (AQMP) for the proposed treatment of contaminated soil at a site on the Chullora Railway Workshops (CRW) facility, located off Worth St, Chullora, NSW (**Figure 1**). The contaminated soils under consideration are those to be generated during remediation of the former Macdonaldtown Gasworks site, owned by the Rail Corporation NSW (RailCorp).

This AQMP has been prepared to accompany an Environmental Assessment (EA) for the proposed remediation of the former Macdonaldtown Gasworks site located at Burren St Erskineville NSW, in the event that RailCorp consents to the transfer of contaminated materials to the CRW facility, for treatment prior to reuse at Macdonaldtown or off site disposal. A separate AQMP has been compiled for works proposed at Macdonaldtown in 'Air Quality Management Plan, Remediation of Former Macdonaldtown Gasworks' JBS 40913-15972 – Revision C (JBS 2011).

This AQMP has been based only on the potential air emissions that may be generated from the nominated treatment area on the CRW facility. The AQMP is required to monitor and control potential air emissions from the proposed works. The provisions of the AQMP will be incorporated into the Environmental Management Plan (EMP) prepared for the project.

An Air Quality Impact Assessment¹ (AQIA) has been prepared for the use of a nominated area at CRW for treatment of contaminated soils from the Macdonaldtown site. The AQIA assessed a range of potential sources likely to generate air emissions into the surrounding area. It was assessed that unacceptable levels of air pollutants will not occur at the surrounding areas during the treatment works where a range of control and monitoring provisions are implemented on the site. The AQMP has been prepared to document the recommended control and monitoring works as identified by the AQIA.

1.2 Site Identification

The site is located off Worth St Chullora. The site is located within the RailCorp Chullora Workshops, being present within the north-eastern portion of the site. The site is irregularly shaped, having a longer north-south dimension than east-west, and has an area of approximately 2.3 hectares. The site location is shown in **Figure 1**. The site details are summarised in **Table 2.1** and described in more detail in the following sections.

Table 2.1 Summary Site Details

Lot/DP	Part of Lot 1 in DP 883526
Address	Off Worth St, Chullora
Geographical Coordinates	320681 E 6248891 N
Local Government Authority	Strathfield
Current Use	Railway materials storage

¹ Air Quality Assessment– Remediation of Former Macdonaldtown Gasworks – Chullora material Receipt Facility, NSW JBS Environmental Pty Ltd August 2011 (JBS 2011) – report in draft

Site Area	Approximately 2.3 ha
-----------	----------------------

A site plan is provided as **Figure 2** and proposed setup during the treatment works program is provided as **Figure 3**.

1.3 Current Site Condition

The site is currently cleared, open land, with an area of approximately 2.3 hectares. It is generally flat, with a slight slope to the north, and the surface is gravelled. There is minimal vegetation present, with trees present outside the southern and eastern boundaries. There are three semi-permanent site structures present on the western half of the site. The site is reportedly currently used for the temporary storage of railway materials including sleepers and rails.

1.4 Surrounding Landuse

Surrounding land-uses to the Chullora Railway Workshop facility include:

- North – The railway line lies directly north. Beyond the railway line, Strathfield Golf Course is present. Rookwood Cemetery is present to the northwest;
- East – The railway line lies to the east. The rail line is a service line used as part of the Chullora site operations, beyond which is a steep vegetated embankment. Beyond the eastern boundary of the Chullora Railway Workshop site are 2 to 3 storey medium density residential apartments (located on Marlene Crescent). A number of commercial properties also exist in this area;
- South – the site is bordered by trees to the south, before the service line for Chullora Workshops. Beyond this, the Hume Highway is present, and residential properties are present along the southern side of the highway; and
- West – The Chullora RailCorp Workshops are present to the west and includes some Railcorp industrial lease sites.

1.5 Purpose

This AQMP has been designed to ensure, via the implementation of a number of ongoing monitoring and management measures pertaining to the receipt, handling, treatment and storage of contaminated soil, that the risk to the remediation workforce within the treatment area, to workers on the adjoining railway facility, to users of nearby commercial and residential properties, and to the surrounding environment is acceptable. The measures have also been designed to reduce the potential odour emissions resulting from the works program such that the likelihood of offensive odours impacting likely receptors is minimised.

The AQMP is intended to form part of the EMP being prepared for the site.

1.6 Responsibilities

The treatment works on the site shall be undertaken under the guidance of a principal contractor who is yet to be appointed. The principal contractor will be responsible for the implementation of the majority of procedures provided to the AQMP and EMP. It is noted that where the specific procedures are technical or complex in nature then the Environmental Consultant as appointed to the project shall fulfil the requirements of the procedure, or advise the appropriate implementation of the procedure.

A formal list of procedures is provided to the AQMP based on an assessment of potential environmental emissions from anticipated site works required for the demolition, earthworks and building works. Specific responsibilities are nominated for the implementation of these procedures within the relevant procedure.

1.7 Proposed Works on the Site

The proposed works at the Chullora site which are the subject of this air quality assessment potentially include:

- Receipt of contaminated soils / materials from the Macdonaldtown former gasworks remediation;
- Storage of contaminated soils / materials within stockpiles or similar;
- Treatment of contaminated soils / materials by stabilisation; and
- By review of the remediation works at the Macdonaldtown site, the quantities of contaminated soils which may be treated at Chullora (classified above 'general solid waste' in NSW DECC 2009 Waste Classification Guidelines) are summarised in **Table 1.1**.

Table 1.1: Summary of Remediation Volumes

Description	Volume	Indicative Waste Classification
Soils impacted with PAHs, TPH C _{>10} , heavy metals, asbestos containing materials and demolition wastes	1,900m ³	Restricted Solid
Soils impacted with coal tar. Potentially malodorous.	14,820m ³	Restricted Solid / Hazardous
Tar	420m ³	Hazardous
Tar Impacted water (known).	640m ³	Hazardous liquid waste

Though tar impacted water is present on the Macdonaldtown site, it is considered highly unlikely that transfer of liquid wastes to the Chullora site will be feasible. These have not been considered in this AQMP.

1.8 Identification of Potential Air Emissions

The proposed scope of the treatment works has been reviewed to identify potential sources of air emissions. The following potential air emissions have been identified as summarised in **Table 1.2**.

Table 1.2: Summary of Air Emissions

Stage	Task	Emissions
Preliminary	Project planning and licensing.	-
Site Establishment	Setup of site offices, sediment and erosion	Particulates, Air Toxins, Odours

Stage	Task	Emissions
Treatment	controls Installation of temporary enclosure and associated air extraction/treatment system. Installation of cement stabilisation plant within the enclosure 2A- commission air treatment system 2B – receive materials for treatment. Onsite stockpiling until minimum treatment volume achieved 2C – once minimum volume achieved treatment of soils by cement stabilisation within the enclosure 2D – off-site disposal of treated material to an appropriately licenced landfill	
Disestablishment	Decommissioning of air treatment plants, disestablishment of enclosure and site offices. Post treatment works assessment of in-situ soils remaining on treatment area	-

It is assumed that the plant used for soil treatment will be operated, consistent with best practice techniques and in a manner that prevents the occurrence of any fugitive emissions.

The most significant potential emissions have been identified as occurring from:

- Particulate, chemical and odour emissions from receipt and handling of fill materials; and
- Particulate, chemical and odour emissions from the treatment of fill materials.

1.9 Environmental Procedures

A number of environmental control and monitoring provisions have been recommended in the AQIA's prepared for the remediation program. These have been prepared as outline air quality management procedures, are provided in **Appendix A**, and are summarised in **Table 1.3** following.

Table 1.3: Summary of Air Quality Management Procedures

Procedure No.	Name
01	Odour Prevention and Control
02	Odour Masking
03	Dust and Airborne Hazard Control
04	Handling of Environmentally Impacted Material
05	Air Monitoring – Odours
06	Air Monitoring – Volatile Organic Compounds
07	Air Monitoring – Particulates
08	AQMP Review
09	Training

Implementation of these control measures by the Principal Contractor will effectively mitigate risks associated with air emissions during the treatment works.

2 Limitations

This report has been prepared for use by the client who commissioned the works in accordance with the project brief only and has been based in part on information obtained from other parties. The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS Environmental Pty Ltd accepts no liability for use or interpretation by any person or body other than the client. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS Environmental Pty Ltd, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd reserves the right to review the report in the context of the additional information.

Figures

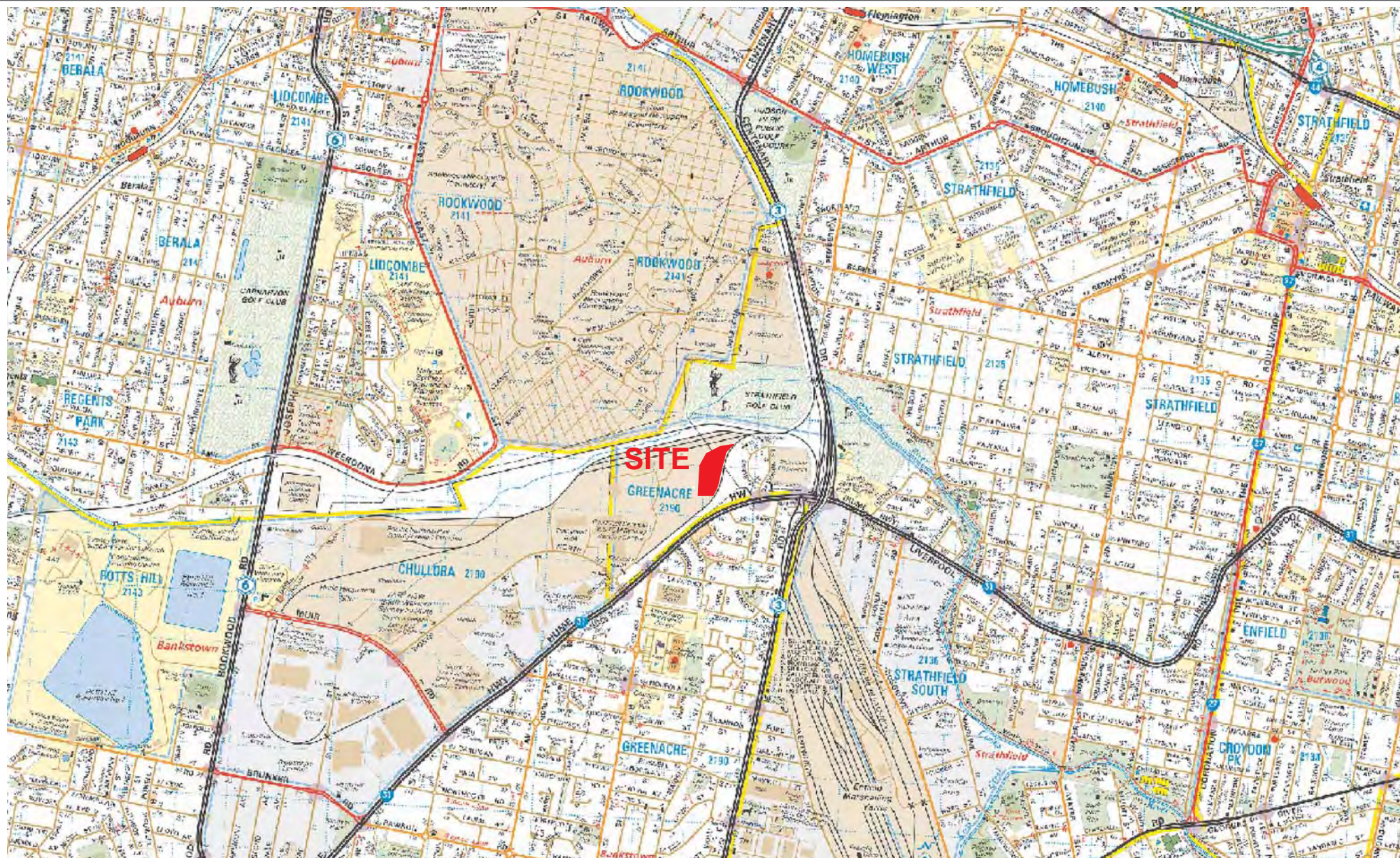


Figure 1 Site Location (Chullora)





LEGEND

 Proposed Site Area Available
for Remediation Works



0 50m
Approximate scale

Figure 2 **Chullora Site Plan**

Department of Lands (2010)
Note- All locations shown are approximate only



Source: Base Image - © 2011 Lynton Surveyors Pty Ltd - 2011C107_DET.dwg

©2011 JBS Environmental Pty Ltd

0	7.5	15	30
m			
Scale: Approximate			
Datum: MGA94 Zone 56 - AHD		Doc. No: Preliminary	
A4			
A	Original Issue -	RF	19-05-2011
Rev	Description	Dm.	Date

Legend:	
--- New Temporary Fence	
■ Air Treatment System	
■ Temporary Enclosure	
■ Area for Stockpiling	
■ Decontamination Area / Wheel Wash	



Figure 3: Proposed Setup of Treatment Area (Chullora)

Client: Incoll Management

Project: RailCorp Macdonaldtown Approvals

Job No: 40913

File Name: 40913_02

Appendix A
Air Quality Management Procedures

Odour Prevention and Control		AQMP01
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Disturbance of potentially malodorous / impacted soils	
Location:	All areas on site	
Objective:	To minimise potential odour impacts	
Procedure		
Malodorous materials will be disturbed during remediation of the site. Coal tar based impact has been identified in soils underlying the majority of the site with the greatest impacts in soil observed in the vicinity of former Northern Gasholder and Retort House. Areas containing free tar (i.e. the former tar wells, pipework etc.) are also likely have the potential to generate offensive odours if exposed and/or disturbed. Extensive measures require to be undertaken to control potential odour generation and odour emissions from the site as detailed below. The measures require to be sufficient to prevent recognition of offensive odours at residential and commercial properties in proximity of the site. The construction and operation of the tented enclosure will be the main method of odour control. Odour control measures shall be employed within the tented enclosure comprising: • Maintenance of the interior of the enclosure at a negative pressure relative to the surrounding environment. Where a negative pressure is able to be effectively maintained there is a reduced importance to the sealing of the enclosure with the surrounding ground level; and • Venting of all emissions from the tented enclosure through a granular activated carbon (GAC) filter.		
Construction of GAC Odour Control Filters		
GAC odour control filters are required as described in EMP11 Tented Enclosure and the water treatment plant as described in EMP17 Groundwater Treatment. GAC filters shall be installed and operated as per the following requirements: • All GAC filters used for odour control shall consist of three distinct units connected in series. The first and second unit shall be identically sized and the third unit must be at least 25% of the capacity of the preceding units; • An air sampling port shall be installed between the first and second filter vessel; and • The sizing of the GAC filters will require to be determined at the commencement of the works. The GAC filters shall be sufficiently sized so that at commissioning stage (under actual project conditions) there is no recognisable odour between the first and second filters. The potential for odour emissions to increase during the works shall be considered (where applicable) and correction factors determined where necessary to ensure appropriate sizing of filters. GAC Filters will become saturated during the source of the works. Monitoring is required to assess when Filter saturation occurs. This shall be undertaken by daily monitoring of the air sampling port between the first and second GAC filter using a PID. Where the PID records a reading above 10ppm, an air sample shall be collected and assessed for a recognisable odour. Where a recognisable odour is detected the filter shall be considered to be saturated and replaced with new GAC media.		
Odour Prevention Measures		
Tented Enclosure of Soil Treatment Works		
Any treatment works relating to cement stabilisation must occur within the enclosure. The tented enclosure shall be designed and operated such that atmospheric emissions comply with those identified in relevant environmental guidelines at all times. These guidelines include: • NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality'; • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'; and • Ambient air criteria provided to US EPA (2004) 'Region IX Preliminary Remediation Goals' for constituents not available in local literature. No recognisable odours shall be discharged from the tented enclosure. The tented enclosure shall be constructed of a metal clad structure sufficiently sized to allow the operation of tippers, excavators and associated equipment required for the excavation, stockpiling and handling of soils and any associated equipment. Openings in the structure shall be minimised so as to reduce ventilation requirements. Tippers and other heavy machinery shall be required to enter and exit the tented enclosure to allow the		

removal of soils. The following must apply to any tipper loads removing malodorous soil or other material from the tented enclosure:

- Tipper speeds when exiting the tented enclosure shall be minimised to the extent possible to prevent wake effects at the rear of the tipper causing uncontrolled release of odours. Where wake effects and associated discharge of recognisable odours are evident at tipper exit from the tented enclosure, then ventilation shall require to be increased;
- Spraying of the exposed malodorous soil surface with an odour sealing solution. A mixture of 'Anotec 0307' (<http://anotec.com.au/prod.htm>), or similar, and water may be suitable to be used for this purpose. Covering of the load to prevent particulate emissions; and
- Continuous monitoring odours in accordance with **AQMP5.0 Odour Monitoring**.

Stockpiling of Soil – Areas external to the Tented Enclosure

Where stockpiles are to be left in place external to the tented enclosure they shall be covered in non-malodorous materials, secured plastic sheeting or low permeability geofabric to prevent odorous emissions. The surface area of uncovered and untreated soil on site will be limited to 150 m² at any one time, and will remain subject to the management requirements of AQMP02 Odour Masking and AQMP03 Dust and Airborne Hazard Control.

Malodorous Materials Movement Scheduling – Areas external to the Tented Enclosure

Malodorous materials from Macdonaldtown will be received at the Chullora site for treatment. Odour control measures may not be able to be maintained when the material is in transit and during unloading.

The Environmental Consultant appointed to the Project shall advise the most appropriate period of each day to undertake these works based on an assessment of meteorological conditions. Results of environmental monitoring as undertaken during these works, including odour and VOC assessment as per AQMP05 Air Monitoring – Odours and AQMP06 Air Monitoring – Volatile Organic Compounds, shall be used to confirm that the advised meteorological conditions are appropriate.

Conditions which maximise separation distances to downwind receptors and increase dispersion of emissions shall be favoured. Receipt/unloading of malodorous materials from site shall be optimised during these periods to the extent possible. It is anticipated that this will typically comprise afternoon periods. The environmental consultant shall be aware that conditions that favour odour dispersion may not favour reduction in dust emissions.

Similarly where the environmental consultant advises that non favourable meteorological conditions are present, movement and handling of potentially malodorous materials outside the area of the tented enclosure will be prevented (where possible).

Handling / exposure of malodorous materials shall not occur during any periods where unacceptable levels of odour or VOC emissions are identified by AQMP05 Air Monitoring – Odours and / or AQMP06 Air Monitoring – Volatile Organic Compounds.

Odour Masking

All measures possible must be undertaken to prevent odour emissions prior to adopting odour masking measures as described in AQMP02 Odour Masking.

Odour Masking		AQMP02
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Disturbance of potentially malodorous / impacted soils	
Location:	All areas on site	
Objective:	To minimise potential odour impacts	
Procedure		
Extensive measures are proposed to control odour emissions. The nature of the available odour controls means that they are not able to be immediately applied to sources of odour emissions. During some periods of the works momentary 'puffs' of odour may occur during the periods where odour controls are being implemented. The degree of recognition of these odours will be able to be reduced by the operation of an odour masking system, however it is noted that the odour masking system shall not be used as a substitute for proper odour control technologies. <u>Odour Masking System</u> An odour masking system will require to be established along all site boundaries prior to the disturbance of potentially malodorous materials. Once established, the odour masking system shall only be implemented where environmental monitoring identifies that all other odour control procedures have failed and odour emissions are unable to be prevented. This system shall comprise the following: • Provision of odour control solution consisting of a mixture of 'Anotec 0307' (http://anotec.com.au/prod.htm) or similar and water. This shall be prepared by the mixing of one 20L drum of Anotec 307 in 1,000L of water (or as per manufacturer's instructions for other products); • Provision of an odour control solution spray system consisting of raised irrigation line (at least 1.5m above ground level) provided with sprinkler heads at a frequency of: - o One head per 5m on the northern, eastern and southern boundaries; and - o One head per 1.5m for the western site boundary; • Sprinkler heads should be capable of delivering a fine mist of odour control solution with no discernible droplets; and • Continuous supply of odour control solution to the raised irrigation line at a sufficient frequency to supply at least 100ml/minute to each sprinkler head included in the irrigation line. Given the proximity of neighbouring residents along the western boundary, installation and operation of the odour masking system must be designed so that the odour masking solution does not affect the adjacent properties. This may require trials prior to the commencement of excavations and/or programming of works such that excavation of malodours soils does not occur during unfavourable conditions. <u>System Operation</u> The odour masking system shall not be used as a substitute for proper odour control technologies. The odour masking system shall only be used during periods where short duration puffs of odour may occur and only where all odour control technologies, as described in AQMP01 Odour Prevention and Control are being implemented. The odour masking system shall operate for a maximum of four hours on any day. The operation of the Odour Masking System shall be recorded on Form AQMP02.1.		

Dust and Airborne Hazard Control		AQMP03
Responsibility:	Head Contractor	
Frequency:	All site works	
Location:	Site Areas External to the Tented Enclosure	
Objective:	To minimise dust emissions from demolition and earthworks.	
Procedure		
<u>Dust and Asbestos Risk</u>		
Excavation and handling of soils has the potential to generate dust emissions. Additionally asbestos containing materials have been found to be potentially present in fill materials located across the Macdonaldtown site in the vicinity of the former Northern Gasholder. Previous environmental assessments have identified that asbestos occurs within the bonded matrix of fibre cement fragments. At the time of assessment of this material no testing was undertaken to identify the presence of free asbestos. Addison et. al. ('The Release of Dispersed Asbestos from Soil', Institute of Occupational Medicine Report No. TM/88/14, September 1988) have found that very high levels of respirable dust must be generated before significant airborne concentrations of asbestos fibres were produced from soils contaminated with respirable asbestos fibres. It is considered that fibre cement sheet fragments must be subjected to intensive mechanical processes to cause the release of asbestos fibres. Asbestos containing fibre cement fragments potentially present in the materials to be received at the treatment site are not considered to pose a risk, as such the measures recommended for control of dust emissions will be sufficient to control potential asbestos emissions.		
<u>Standards</u>		
All operations on site are to be conducted so that concentrations of dust and other hazardous substances satisfy those stipulated in NSW DECCW published and endorsed guidelines. These guidelines include: • NEPC (1998) 'National Environment Protection Measure for Ambient Air Quality' and • Environmental criteria provided to NSW DEC (August 2005) 'Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales'.		
<u>Control</u>		
Measures shall be undertaken to reduce airborne emissions from site activities including: • Water sprays used for dust suppression across unsealed areas of the site, stockpiles and other dust generating areas. All potential dust generating areas (i.e. areas of exposed soils) require to be watered on an hourly basis during periods of site operation or significant dust generation; • Stockpile heights shall be minimised where possible; • Where stockpiles are to be left in place for significant periods of time, they shall be seeded to promote vegetation growth to prevent dust emissions; and • Where unfavourable meteorological conditions exist (i.e. strong winds directed at residential properties) site works shall be restricted to those with low potential for atmospheric emissions. This shall also include consideration of reduced production rates during these periods to minimise dust emissions. Regular maintenance shall be undertaken of sprinkler heads, as used for dust control throughout the site, to prevent clogging. It is noted that additional specific requirements have been developed for soils which are identified as potentially malodorous as detailed in AQMP01 Odour Prevention and Control and AQMP04 Handling of Environmentally Impacted Soil which shall also reduce dust and potential asbestos emissions. The requirements of this procedure should be reviewed in accordance with the additional requirements of these other procedures.		

Handling of Environmentally Impacted Soil		AQMP04
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Handling of environmentally impacted soils, including stockpiled soils and receipt of impacted materials	
Location:	Areas of site containing environmentally impacted soils	
Objective:	To control potential environmental emissions from contaminated soils	
Procedure		
Potential hazardous emissions (dust, odour and vapours) may be released during the handling of environmentally impacted materials on the site. Measures shall be put in place to minimise such emissions. These measures shall include: - Measures detailed in AQMP01 Odour Prevention and Control; - Measures detailed in AQMP02 Odour Masking; - Measures detailed in AQMP03 Dust and Airborne Hazard Control; - Transport of all impacted soils as per designated and marked 'impacted' and 'treated' haul routes throughout the site. These routes shall be clearly identified on a site plan as posted within the Site. A heavy vehicle decontamination area shall be clearly marked on this plan. All persons engaged on the site shall be aware of the preferred haulage routes. The identification of preferred routes will assist in the appropriate placement and ready deployment of odour control methods, and prevent transport of impacted materials along site boundaries (where possible).		
Where air quality management provisions are insufficient to allow monitoring criteria as detailed in AQMP05 Air Monitoring – Odours and/or AQMP06 Air Monitoring – Volatile Organic Compounds and/or AQMP07 Air Monitoring – Particulates and/or AQMP08 Air Monitoring – Asbestos, then the relevant works shall be ceased until more favourable meteorological conditions or more appropriate work methods are available. The Environmental Consultant shall advise more appropriate meteorological conditions.		

Air Monitoring – Odours		AQMP05
Responsibility:	Head Contractor Site Auditor Environmental Consultant	
Frequency:	Handling / excavation of malodorous materials	
Location:	Site boundaries	
Objective:	To assess compliance with environmental standards for works	
Procedure		
A program of atmospheric monitoring shall be undertaken throughout the earth works. The extent of required monitoring is described following: <i>Odour</i> Odour monitoring shall be undertaken by an appropriately qualified consultant at the downwind boundaries of the site. Odour monitoring shall be commenced prior to the receipt of malodorous materials on the site. Odour monitoring shall be undertaken at three locations, as a minimum, spaced no greater than 20m along the downwind boundary at a frequency of twice daily (as a minimum). Odour monitoring shall be undertaken using a 'Nasal Ranger' field olfactometer. A single odour measurement shall be undertaken at each monitoring location. Where an odour strength of 2-4 odour units or greater is recorded, an additional four odour measurements shall undertaken on a 1 minute basis. Odour measurements shall be recorded on Form AQMP05.1 for the relevant monitoring period. Where three (or more) of the total five readings record an odour strength of or in excess of 2-4 odour units (based on coal tar recognition): - the odour masking system as described in AQMP02 Odour Masking shall be activated (where appropriate); - monitoring shall be increased to an hourly frequency until the odour strengths recorded at all locations on the downwind boundary do not exceed 2 – 4 odour units over two consecutive hours. Once achieved the monitoring frequency may be returned to the minimum twice daily requirement; and - the measures prescribed in AQMP01 Odour Prevention and Control shall be reviewed for adequacy in relation to site activities. Improvements or recommendations arising out of the review shall be incorporated into a revised AQMP for the site as per AQMP08 AQMP Review. Personnel who undertake odour monitoring shall be non-smokers and shall be free of any nasal / sinus conditions that may affect the ability to detect / recognise odours.		



Receptor No.	Description	Distance from Site	Easting	Northing
1	29-31 Marlene Cres Greenacre	125m, east	321026	6248922
2	5-9 Marlene Cres Greenacre	160m, east	321084	6249063
3	Strathfield Golf Course, south west corner	160m, north	320795	6249157
4	47 Hume Hwy Chullora	150m, south	320949	6248674
5	Beaufort Pl Chullora	750m, south-west	320208	6248352
6	Chullora Railway Workshop Personnel external to the treatment area	20m east	332101	6248654



Figure 5.1 **Location of Receptors in Proximity of Site for Daily Odour Monitoring**

Department of Lands (2010)
Note- All locations shown are approximate only

Air Monitoring – Odours**Form AQMP05.1**

Date: _____

Downwind Locations (complete as per monitoring periods)

7-8am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

8-9am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

9-10am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

10-11am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

11-12am ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

12am-1pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

1-2pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

2-3pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

3-4pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

4-5pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

5-6pm ◇ No Malodorous Materials Handled

Boundary Assessed: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

Additional Measurements: _____

Static Locations

Time: _____

Wind Direction and Velocity: _____ m/s

Measurements: 1. _____ OU 2. _____ OU 3. _____ OU

4. _____ OU 5. _____ OU 6. _____ OU

Additional Measurements: _____

Completed by: _____

Air Monitoring – Volatile Organic Compounds		AQMP06																																
Responsibility:	Head Contractor Site Auditor Environmental Consultant																																	
Frequency:	Handling / receipt / storage of malodorous materials																																	
Location:	All site works external to the tented enclosure																																	
Objective:	To assess compliance with environmental standards for works																																	
Procedure A program of atmospheric monitoring shall be undertaken at the site throughout the remediation works outside the Soil Enclosure Area. The extent of required monitoring is described following: <i>Volatile Organic Compounds (VOCs) – Photo-Ionisation Detector</i> Assessment for VOCs shall be undertaken using a photo-ionisation detector (PID) provided with a 10.6eV bulb. Prior to use and at least on a daily basis the calibration of the PID shall be checked by comparison to a fresh air and isobutylene standard. The calibration check shall be recorded as per the appropriate PID calibration forms. VOC monitoring shall be undertaken at all times in the proximity of handling of malodorous materials. Contaminants identified on the project site which have potentially significant health impacts are considered to occur within malodorous materials. The identification of malodorous materials is an appropriate measure for the potential presence of significant levels of VOCs. The PID shall be maintained by an attended operator within a distance of approximately 2m during all periods of handling malodorous materials. Where the operator is unable to safely remain within 2m of the works area (consequent of heavy equipment or otherwise) the PID may be affixed to an excavator or similar in proximity of the works. PID measurements shall be undertaken as one hour averages. The action level to assess PID readings requires to be determined on the basis of the separation distance to the nearest potentially exposed receptor. Locations of nearest receptors and separation distances are shown on Figure AQMP6.1 attached. The separation distance to the nearest receptor requires to be calculated by estimating the distance from the area of the malodorous materials to the nearest receptor. This is the sum of the distance from the site boundary to the receptor, and the downwind distance from the malodorous materials to the site boundary. The PID screening criteria are summarised following: <table border="1"> <thead> <tr> <th>Separation Distance (m)</th> <th>PID Screening Criteria (ppm)</th> </tr> </thead> <tbody> <tr><td>50</td><td>0.1</td></tr> <tr><td>100</td><td>0.2</td></tr> <tr><td>150</td><td>0.3</td></tr> <tr><td>200</td><td>0.3</td></tr> <tr><td>250</td><td>0.4</td></tr> <tr><td>300</td><td>0.4</td></tr> <tr><td>350</td><td>0.5</td></tr> <tr><td>400</td><td>0.5</td></tr> <tr><td>450</td><td>0.6</td></tr> <tr><td>500</td><td>0.6</td></tr> <tr><td>600</td><td>0.7</td></tr> <tr><td>700</td><td>0.7</td></tr> <tr><td>800</td><td>0.8</td></tr> <tr><td>900</td><td>0.9</td></tr> <tr><td>1000</td><td>0.9</td></tr> </tbody> </table> Where the screening criteria are exceeded then measures as required by EMP02 Odour Control shall be implemented to reduce VOC emissions. It is noted measures identified as appropriate for odour emissions are also appropriate for control of VOC emissions. Subsequent to implementation of odour control measures, an additional air sample shall be required to be collected using a Draeger Tube. All PID monitoring results require to be recorded on Form AQMP6.1. The recording of repeated elevated reading will require a substantial review of work methods in accordance with AQMP08 review. <i>Volatile Organic Compounds (VOCs) – Draeger Tube</i> Draeger tube samples require to be collected where the PID screening level is exceeded and the maximum PID reading for the day has been recorded. Draeger tube samples require to be specific to benzene.			Separation Distance (m)	PID Screening Criteria (ppm)	50	0.1	100	0.2	150	0.3	200	0.3	250	0.4	300	0.4	350	0.5	400	0.5	450	0.6	500	0.6	600	0.7	700	0.7	800	0.8	900	0.9	1000	0.9
Separation Distance (m)	PID Screening Criteria (ppm)																																	
50	0.1																																	
100	0.2																																	
150	0.3																																	
200	0.3																																	
250	0.4																																	
300	0.4																																	
350	0.5																																	
400	0.5																																	
450	0.6																																	
500	0.6																																	
600	0.7																																	
700	0.7																																	
800	0.8																																	
900	0.9																																	
1000	0.9																																	

Draeger tube ID 81081841 shall be used for sampling. This tube is specific to benzene and has a benzene detection limit of 0.5ppm. Draeger tube samples shall be collected at a height of 1.5m immediately overlying the malodorous materials. Some works may require to be temporarily ceased to allow collection of the sample.

Draeger tubes shall be sampled in strict accordance with the manufacturer specifications. Sampling shall be undertaken using a Draeger Accuro Pump. It shall be ensured that the recommended number of strokes are undertaken with the collection of each sample.

All Draeger tube monitoring results require to be recorded on Form AQMP6.1. The recording of repeated elevated reading will require a substantial review of work methods in accordance with AQMP08 review.

The Draeger tube action level shall be set at a detection of benzene overlying the source (0.5ppm). Where a detection is recorded and odour controls have been implemented, works shall require to be modified. This shall include consideration of:

- Cessation of works until more favourable meteorological conditions are available; and/or
- Reduction in scale of works with VOC impacted / malodorous materials.

LEGEND

- Extent of treatment site
- - - 100m distance contours from treatment site

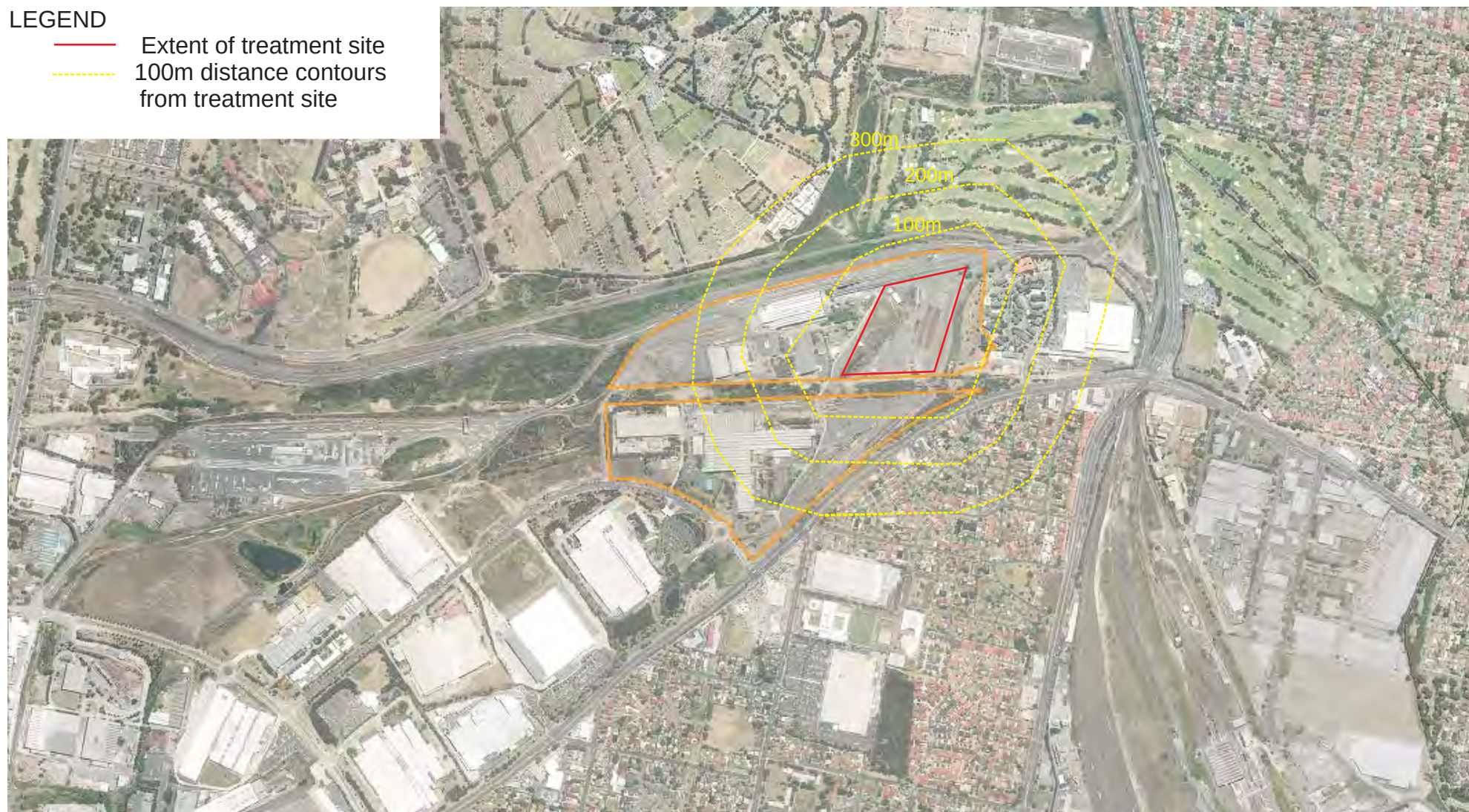


Figure 6.1

Approximate Radial Distances from Treatment Site

Department of Lands (2010)
Note- All locations shown are approximate only

Date: _____

Sampling Locations at 2m Distance Downwind of Work Zone (complete as per monitoring periods)

7-8am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

8-9am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

9-10am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

10-11am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

11-12am ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

12am-1pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

1-2pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

2-3pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

3-4pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

4-5pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

5-6pm ◇ No Malodorous Materials Handled

Wind Direction and Velocity: _____ m/s

Measurements (hourly average): _____ ppm

Drager Tube sample: ◇ No Sample ◇ No Benzene Detection ◇ _____ ppm

Comments:

Completed by: _____

Air Monitoring – Particulates / Dust		AQMP07
Responsibility:	Head Contractor Site Auditor Environmental Consultant	
Frequency:	Duration of treatment works	
Location:	Site boundaries	
Objective:	To assess compliance with environmental standards for works	
Procedure		
A program of atmospheric monitoring shall be undertaken throughout the earth works. The extent of required monitoring is described following: <i>Dusts – Realtime Particulate Monitoring</i> Assessment of realtime levels of dusts shall be undertaken by appropriately qualified personnel observing site boundaries. Where visible dusts are observable on the site boundaries then actual site measurements shall be undertaken by a 'DUSTTRAK' Aerosol Monitor at the downwind site boundary. The averaged level of PM₁₀ (particulate matter less than 10 microns in diameter) over a period of 30s shall be required to be less than 50µg/m³ at the downwind portion of the site boundary. Where the acceptable level of dust is exceeded by real-time aerosol monitoring, then the measures prescribed in AQMP03 Dust and Airborne Hazard Control shall be reviewed for adequacy in relation to site activities. Improvements or recommendations arising out of the review shall be incorporated into a revised AQMP for the site as per AQMP08 AQMP Review. All measurements shall be recorded in Form AQMP07.1. <i>Dusts – Deposition Monitoring</i> Dust deposition monitoring shall be undertaken by dust deposition gauges maintained permanently at three locations identified on Figure AQMP7.1. These locations have been determined on the basis of siting requirements in AS2922-1997 'Ambient Air – Guide for Siting of Sampling Units' to the extent possible. Collection and analysis of samples shall be undertaken in accordance with AS3580.10.1-2003 'Methods for sampling and analysis of ambient air – Determination of particulate matter – Deposited matter – Gravimetric method'. Samples shall be collected and analysed on a monthly basis throughout the works. Where the level of dust deposition exceeds 2g/m²/month the implementation of AQMP03 Dust and Airborne Hazard Control shall be reviewed. <i>Dusts – Laboratory Analysis of Particulates</i> Confirmatory sampling shall be undertaken of the realtime particulate measurements being generated by the monitoring. This shall be undertaken by the fortnightly collection of an ambient air sample by a high volume sampling method. A high volume sampler shall be operated for a minimum period of 8 hours during site operation at a downwind location on the site boundary. Sample collection and analysis shall be in accordance with AS3580.9.6-1990 'Ambient Air – Determination of Suspended Particulate Matter PM₁₀ – High Volume Sampler with Size Selective Inlet Gravimetric Method'. Realtime measurements shall be taken at hourly intervals adjoining the sampler. The laboratory reported result of the high volume sampler shall be compared to the average of the realtime measurements. Where a significant discrepancy is identified (RPD>50% as calculated in accordance with AS4482.1-2005) the calibration of the Dusttrak (dust monitor) shall be confirmed by manufacturer service. Repeated significant discrepancies in measurements will require revision of the AQMP in accordance with AQMP9 Review.		

Air Monitoring – Dusts / Particulates
Form AQMP07.1

Date: _____

Dusts Visible at Site Boundaries?

7-8am	◇ No	◇ Yes	_____
8-9am	◇ No	◇ Yes	_____
9-10am	◇ No	◇ Yes	_____
10-11am	◇ No	◇ Yes	_____
11-12am	◇ No	◇ Yes	_____
12am-1pm	◇ No	◇ Yes	_____
1-2pm	◇ No	◇ Yes	_____
2-3pm	◇ No	◇ Yes	_____
3-4pm	◇ No	◇ Yes	_____
4-5pm	◇ No	◇ Yes	_____
5-6pm	◇ No	◇ Yes	_____

Dust-Trak Measurements

Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s
Time: _____	Wind Direction & Speed: _____ m/s

Completed by: _____

AQMP Review		AQMP8
Responsibility:	Head Contractor Site Auditor Environmental Consultant RailCorp	
Frequency:	Subsequent to environment incidents. Subsequent to changes in program of works.	
Location:	Not applicable	
Objective:	To ensure that the AQMP is current and appropriate for the site	
Procedure The Air Quality Management Plan shall be reviewed by the Environmental Consultant subsequent to either of the following: • any environmental incident on the site; • repeated exceedances of daily monitoring criteria for dust (AQMP 07), VOCs (AQMP 06) and/or odours (AQMP 05); or • a significant modification to the implemented scope of works. All new copies of Air Quality Management Plans shall be re-distributed to all parties by the Environmental Consultant. The Environmental Management Plan will require to be updated with the provisions of the revised Air Quality Management Plan. On finalisation of revision, the Air Quality Management Plan shall be provided to the RailCorp for review / approval. The Authority shall advise acceptability of revisions (or otherwise) within seven days of receipt.		

Training		AQMP9
Responsibility:	Head Contractor Environmental Consultant	
Frequency:	Throughout implementation of Environmental Management Plan and AQMP	
Location:	-	
Objective:	To ensure that persons responsible for preparation of the AQMP are competent.	
Procedure		
Any person who is required to be responsible for technical / monitoring activities in relation to the implementation of the Air Quality Management Plan shall:		
• Be inducted as the requirement and method of the specific activity by the Environmental Consultant or their nominated representative; • Have undertaken the 24 hour Health and Safety Training for Hazardous Waste / Materials under OSHA 29 CFR 1910:120 or equivalent; • Have an adequately acute sense of smell to allow operation of a nasal ranger (as confirmed by ability to detect n-butanol odour at a level of 40ppb by dynamic olfactometry in accordance with AS/NZS 4323.3:2001; CEN EN 13725:2003); and • Have completed a Workcover approved Asbestos Removal Supervisor course or equivalent.		

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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Matt Parkinson/ Sumi Dorairaj		Draft for client review		26/11/2010
B	Sumi Dorairaj				14/12/10
C	Sumi Dorairaj	Matthew Bennett			05/08/11



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Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
4	Sumi Dorairaj	Matthew Bennett	Matthew Bennett		04/08/11
5	Sumi Dorairaj	Matthew Bennett	Matthew Bennett		05/09/2012



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