Macdonaldtown Gasworks Remediation

Preliminary Environmental Assessment

Prepared for
RailCorp

April 2010

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Preliminary Environmental Assessment

PREPARED FOR	**Incoll Pty Ltd**
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Executive Summary

Eco Logical Australia has been contracted by Incoll Management Pty Ltd to prepare a Preliminary Environmental Assessment (PEA) for the remediation of the former Macdonaldtown gasworks site, on behalf of Rail Corporation NSW (RailCorp). The Macdonaldtown site is located on Burren Street in Erskineville, within the City of Sydney Local Government Area.

The site has been assessed by the NSW Department of Environment, Climate Change and Water (DECCW) as posing a Significant Risk of Harm (SRoH) to human health and the environment as defined by the *Contaminated Land Management Act 1997*, due to soil contamination caused by historic use of the site as a gasworks. Proposed remediation works have been declared by the NSW Department of Planning (DoP) to be a Major Project under Part 3A of the *Environmental Planning and Assessment Act 1979* (DoP, 2009).

The proposed works will involve the excavation, treatment and disposal of both contaminated soils and impacted groundwater/surface water from the Macdonaldtown site. A review of treatment methodologies will be undertaken to determine the extent of treatment activities, if any, able to occur at the Macdonaldtown site, due to the sensitivities of surrounding land uses. If required, an alternative site at Chullora (adjacent to the Chullora Railway Workshops) is proposed as the location for the contaminated material treatment. Treated soils may be returned, and used as backfill at the Macdonaldtown site, where appropriate.

An environmental risk analysis has been undertaken for the proposed works, allowing identification of the key environmental issues (listed below) and controls required to safeguard potential receptors:

- Soil Contamination;
- Heritage Management (Archaeological);
- Waste Management;
- Dust, Odour, Vapour and Exposure Management;
- Transport and Traffic Management;
- Dangerous Goods (LPG) Storage at Chullora;
- Surface Water Management;
- Noise and Vibration Management;
- Visual Impacts;
- Destabilisation of Buildings and Infrastructure; and
- Community Consultation.

The Director-General's Environmental Assessment Requirements for these proposed works are sought from the Department of Planning.

1 Introduction

Eco Logical Australia has been contracted by Incoll Management Pty Ltd to prepare a Preliminary Environmental Assessment (PEA) for the remediation of the former Macdonaldtown gasworks site, on behalf of Rail Corporation NSW (RailCorp) (the proponent). The Macdonaldtown site is approximately 7,732 m^2 and is located on Burren Street in Erskineville, within the City of Sydney Local Government Area.

In August 2000, the NSW Environment Protection Authority (now Department of Environment, Climate Change and Water – DECCW) declared that the site posed a Significant Risk of Harm (SRoH) to human health and the environment as defined by the *Contaminated Land Management Act 1997*. The declaration was made following an assessment of the concentrations of contaminants in the soil and groundwater as reported in previous site investigations (CH2M Hill 2000). RailCorp now proposes to remediate the site so as to achieve:

- Removal of potential health risks to future site users;
- Removal of potential risks to environmental receptors; and
- Removal of the SRoH declaration.

Remediation will be undertaken in accordance with the *Draft Remedial Strategy* (JBS Environmental, April 2010) that will form the basis of a Voluntary Management Proposal to be agreed between RailCorp and DECCW.

The proposed remediation works have been declared by the NSW Department of Planning (DoP) to be a Major Project under Part 3A of the *Environmental Planning and Assessment Act 1979*, in their letter dated 30 June 2009 titled *Major Project Request: Macdonaldtown Gasworks Remediation Project,* Ref. Y09/1564 (Appendix A).

Treatment methodologies suitable for use at Macdonaldtown will be considered, but due to the sensitivities of surrounding land uses and the limited space available at this site, it may be necessary to treat contaminated materials (following excavation from Macdonaldtown) at another location. If this is this case, the proposed alternative location for treatment is on RailCorp land at Chullora, adjacent to the Chullora Railway Workshops.

2 Site Location

2.1 MACDONALDTOWN SITE

The Macdonaldtown site is a small triangular shaped land parcel covering 7,732 m2, bounded to the southeast by the Illawarra Rail Corridor, to the west by residential properties fronting Burren Street, Erskineville and to the north by RailCorp land, which is used for train stabling. Macdonaldtown railway station is situated to the north of the site beyond the stabling yard (Figure 1).

2.2 CHULLORA SITE

The Chullora site is located in the north-eastern corner of the Chullora Railway Workshops and Yards, the extent of area available for remediation works would be determined as part of the Environmental Assessment, once the remediation methodology is decided. Residential properties are located further to the east within Marlene Crescent and on the opposite side of the Hume Highway to the south (Figure 2).

Table 1: Site Details

DETAIL	MACDONALDTOWN	CHULLORA
Street Address	Burren Street, Erskineville NSW 2043	RailCorp Estate, Worth Street, Chullora NSW 2190
Lot and DP Number	Part Lot 50 in DP1001467	Lot 1 in DP 883 526
Site Area	7,732 m2	Subject to selected remediation method
Geographical Coordinates	624700N; 343200E	-33.885932,151.062355
Owner	Rail Corporation NSW	
Current/Proposed Land Use	Vacant / Commercial-Industrial (for rail-related operations)	
Local Government Area	City of Sydney	Bankstown City Council
Parish/ County	Petersham - Cumberland	Liberty Plains - Cumberland

2.3 DESIGNATED TRANSPORT ROUTE

A Traffic Management Plan will be prepared to manage all movements of contaminated material between sites and to waste facilities (if required by remediation works). Contaminated soils/ materials would be transported in accordance with Authority requirements. The designated transport route will be developed in consultation with the relevant Authorities.

Figure 1: Macdonaldtown Site Location

Figure 2: Chullora Site Location

2.4 SITE PHOTOGRAPHS

Photograph 1: View of site, looking west.

Photograph 2: View of site, looking east.

Photograph 3: View of site, looking north to adjacent stabling yards.

Photograph 4: Proposed access road along southern site boundary, adjacent railway lines.

Photograph 5: Unsealed surface/ storage at Chullora.

Photograph 6: Unsealed surface at Chullora site.

3 Site Descriptions

3.1 MACDONALDTOWN SITE

3.1.1 Site History

The Macdonaldtown site operated as a gasworks plant between 1892 and 1958. During this time gas was produced from coal and shale. Due to the use of inferior coal in the 1950's the plant was damaged and then ceased manufacturing of gas. The plant was demolished (other than the southern gasholder) in 1958. The site appears to have been in use for gas storage up until the 1970's. After that, the site has been largely unused and vacant other than for occasional storage of railway equipment. An above-ground gasholder structure (southern gasholder) is the most prominent relic that remains extant from previous operations as a gasworks site. The remainder of the site has little infrastructure or vegetation other than some trees along the western boundary between the gasholder and the residential dwellings, and planted trees along the northern boundary.

3.1.2 Description of the Existing Environment

The site layout is shown in Figure 2 (CH2M HILL, 2007). Much of the site surface is compacted gravel with patches of grasses and weeds. Scattered trees border portions of the western and northern boundaries. A retaining wall exists along the northern boundary adjacent stabling yards. The site has a gentle slope to the southeast, except for the western boundary where a steep embankment drops around 4 m towards the ground level of adjacent residential dwellings.

Most above-ground structures have been demolished other than the southern gasholder that stands approximately 12 m high adjacent the western boundary. This gasholder is listed on the State Heritage Register. The northern gasholder and other structures including the Retort House, Administration Buildings, Tar Wells, Condensers and Coal & Shale Storage are no longer visible above the surface, but have underground structures remaining in some locations.

Both a fill layer (comprising ash and coke gravel, rubble, sand, gravel and some reworked clays) and natural soils on the site have been impacted by tar associated with the Gasworks. Groundwater testing found that shallow and deeper groundwater aquifer beneath the site have been impacted by the Gasworks, but the impacted plumes are limited to land owned by RailCorp (CH2M HILL, 2007).

The site is currently accessible via a sealed road through the Macdonaldtown Stabling Yard to Burren Street, and via a sealed service road along the western side of the Erskineville railway lines with an entrance on Swanson Street arterial road. Access during remediation works is proposed to be via Swanson Street.

Land to the north and east of the site is used for rail infrastructure including railway lines, train stabling and train washing. Land to the west is used for residential purposes. South of the site is the Erskineville rail line.

More detailed information is available from previous investigations, listed below. Relevant information from these assessments will be incorporated into the Environmental Assessment to provide a detailed understanding of site conditions:

- Rail Services Australia, *Eveleigh Gasworks - Site History*, November 1999.
- CH2M Hill Australia, *Phase I & II Environmental Site Assessments*, June 2000.

- CH2M Hill Australia, *Vegetable, Soil and Sediment Sampling – Letter Report*, November 2000.
- CH2M HILL Australia, *Soil & Groundwater Investigations of the Former Gasworks Area and Offsite*, December 2001.
- Australian Railway Historical Society, *A Brief History of NSW Railway Gasworks*, June 2003.
- Banksia Heritage & Archaeology, *Macdonaldtown Station Works - Archaeological Assessment*, April 2004.
- GHD, *Macdonaldtown Triangle (Former Cleaning Sheds) - Delineation and Classification Sampling*, September 2005.
- Heritage Concepts, *Archaeological Assessment and Remediation Management Strategy*, November 2006.
- Sinclair Knight Merz, *Macdonaldtown Triangle (Former Gasworks Site) – Human Health and Ecological Risk Assessment*, April 2006.
- HLA Envirosciences, *Site Audit Report – Delineation and Characterisation Sampling and Review of Remedial Options – Former Gasworks Site Burren Street, Erskineville NSW,* September 2007.
- CH2M Hill, *Australia Delineation & Characterisation Sampling and Review of Remedial Options*, March 2007.
- CH2M Hill. *Remedial Action Plan – Former Macdonaldtown Gasworks – Burren Street, Erskineville, NSW.* (Ref No. 359092), 2007.
- Dickson Rothschild, *Macdonaldtown Gasworks Site, Concept Landscape Design Report,* July 2007.
- ENSR, *Site Audit Report Remedial Action Plan – Former Macdonaldtown Gasworks Site, Burren Street, Erskineville NSW*, May 2008.
- JBS Environmental, *Draft Remedial Strategy – Former Macdonaldtown Gasworks, Burren Street, Erskineville NSW*, April 2010.

3.2 CHULLORA SITE

3.2.1 Site History

The site is located within an area formerly used for rail reclamation and recycling activities. Apparently a former swamp, the area was backfilled with boiler ash from steam locomotives in the 1920s. The area has remained relatively inactive, and has primarily been used for the recycling of steel rail lines, including welding, grinding and scraping rail tracks as well as storage of sleepers, rail and spoil (soil and ballast). More detailed information is available within the *Environmental Assessment of Chullora Railway Workshops* (URS 2008).

3.2.2 Description of the Existing Environment

The site is located on RailCorp land adjacent the Chullora Railway Workshops. The site is currently cleared open land, with minimal vegetation and minimal site infrastructure (see Figure 2). RailCorp operations including workshops, rail sidings and storage areas occur to the north, east and west. The southern portion of the site is grassed with some scattered trees.

The site is currently used for the temporary storage of railway materials such as sleepers and rails. The site has a locked gate which separates it from the rest of the Chullora railyards; however a separate fence would be erected around the treatment area, if established.

Note that only a portion of the available cleared land area is proposed for use as a remediation area, given that other RailCorp activities are ongoing.

More detailed information is available from previous investigations, listed below. Relevant information from these assessments would be incorporated into the Environmental Assessment to provide a detailed understanding of site conditions:

- Godden Mackay Pty Ltd, *Chullora Railway Workshops, Heritage Assessment,* June 1990.
- Godden Mackay Pty Ltd, *Chullora Railway Workshops, History and Site Development,* March 1991.
- Godden Mackay Pty Ltd, *Chullora Railway Workshops, Site Recording, A Description of the Building Fabric and Operations,* March 1991.
- URS Australia, *Environmental Assessment of Chullora Railway Workshops*, April 2008.

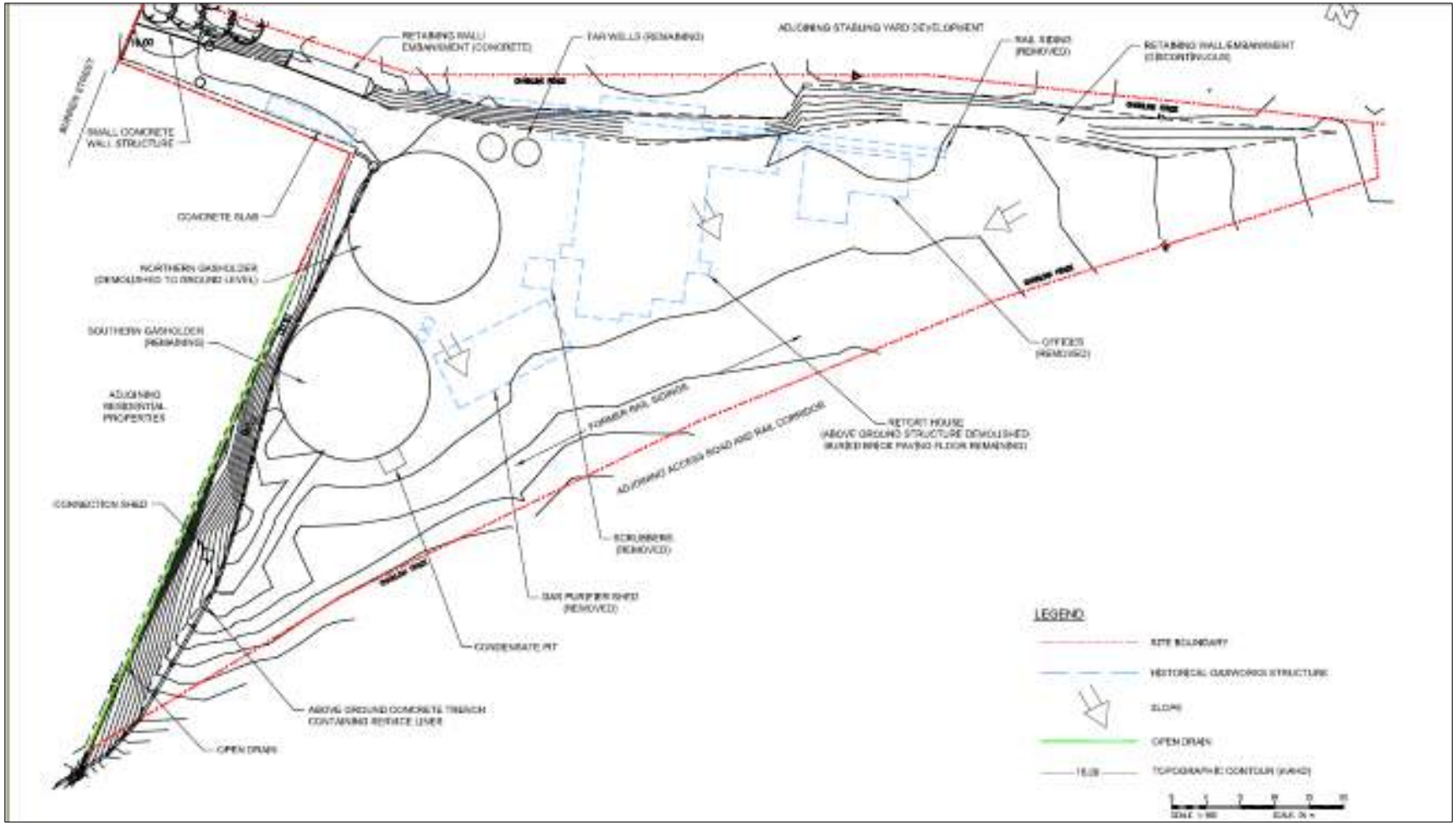

Figure 3: Macdonaldtown Site Layout

Source: CH2M Hill 2007

4 Planning Provisions

4.1 COMMONWEALTH LEGISLATION

The *Environment Protection and Biodiversity Conservation Act 1999* requires approval from the Commonwealth Minister for the Environment for actions which have, may have, or are likely to have a significant impact on Matters of National Environmental Significance (MNES). A search of the EPBC Register revealed no MNES within the site area and therefore referral of the project to the Commonwealth is highly unlikely to be required.

4.2 STATE LEGISLATION AND PLANNING INSTRUMENTS

Whilst the *Environmental Planning and Assessment Act 1979* provides the framework for planning and development approvals in NSW, several other pieces of legislation may also apply to the site. The Environmental Assessment will consider all relevant legislation.

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act 1979 provides the framework for the planning and development approvals system in NSW. Section 75B of the Act defines projects that are subject to Part 3A of the Act which require the consent of the Minister. The Department of Planning has confirmed in a letter dated 30 June 2009, that Part 3A of the Act will apply to the proposal (Appendix A).

The EP&A Act 1979 also provides for State Environmental Planning Policies. Those relevant to the proposal are discussed below.

4.2.2 State Environmental Planning Policy (Major Development) 2005

The Major Development SEPP defines those projects which are of state significance or are proposed on state significant sites and therefore require approval under Part 3A of the EP&A Act 1979.

This project triggers a Part 3A assessment as it is:

- Located within the 'Redfern-Waterloo Authority Site', which is a State Significant Site listed in Schedule 3 of the Major Development SEPP, and the project has an estimated capital investment value of greater than $5 million.

On the 30 June 2009, the Department of Planning (as delegate of the Minister for Planning) formed the opinion that the project is of a kind described by Schedule 3, Part 5, Clause 5 of the Major Projects SEPP (see Appendix A), and is therefore subject to assessment under Part 3A of the EP&A Act 1979.

4.2.3 SEPP 33 Hazardous and Offensive Development

State Environmental Planning Policy No 33—Hazardous and Offensive Development sets the regulatory framework to manage risks associated with development that is classified as potentially 'hazardous' or 'offensive industry'.

Should thermal desorption treatment activities occur at the Chullora site, the project may require the storage of 50 tonnes of Liquefied Petroleum Gas (LPG) at this site. This quantity of LPG would trigger the General Screening Threshold Quantities and the need for preparation of a Preliminary Hazard Analysis (PHA) in accordance with the *Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 –*

Guidelines for Hazard Analysis, Department of Planning, July 2008. The PHA would be prepared as part of the Environmental Assessment documentation.

4.2.4 SEPP 55 Remediation of Land

State Environmental Planning Policy 55 – Remediation of Land sets the regulatory framework for contaminated land and remediation works within NSW. The SEPP ensures certain remediation work (known as Category 1) requires consent. Clause 9 of the SEPP lists the Category 1 works and includes

> *For the purposes of this Policy, a category 1 remediation work is a remediation work (not being a work to which clause 14 (b) applies) that is:*
>
> > *(e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:*
> >
> > > *(ii) conservation or heritage conservation,*

The project site includes the southern gasholder which is listed on the State Heritage Register and is identified as a heritage item under *Sydney Regional Environmental Plan 26*. The Heritage Assessment will identify and assess impacts on heritage matters (see section 7.2.2).

4.2.5 Local Planning Instruments

Under s75R(3) of the EP&A Act 1979, Environmental planning instruments (other than State environmental planning policies) do not apply to or in respect of an approved project. This clause therefore implies that the Sydney LEP 2005 and Sydney REP No 26 – City West do not apply to this proposal. Sydney City Council and/or Redfern Waterloo Authority may, however, be asked to provide recommendations for the Director-General Environmental Assessment Requirements.

4.2.6 Heritage Act 1977

The NSW *Heritage Act 1977* provides protection for natural and cultural heritage by providing for the listing of heritage items or places on the State Heritage Register. The project site contains the southern gasholder which is listed on the State Heritage Register, as part of the Eveleigh Railway Workshops, Listing No. 01140.

However, section 75U of Part 3A of the EP&A Act lists other Acts and their provisions that no longer apply under Part 3A EP&A Act. Included in this list are Part 4 (Effect of Interim Heritage Orders and State Heritage Register) and Division 8 of Part 6 of the *Heritage Act 1977*. Therefore, whilst heritage issues will be considered in the Environmental Assessment, separate approvals under the *Heritage Act 1977* are not required.

4.2.7 Contaminated Land Management Act 1997

The CLM Act 1997 establishes a process for investigating and remediating land areas where contamination presents a significant risk of harm (SRoH) to human health or some other aspect of the environment. The Macdonaldtown site was declared a SRoH by DECCW. Division 3, Section 26 of the CLM Act provides for voluntary remediation proposals by agreement (Voluntary Management Proposal - VMP) with the DECCW. Railcorp has prepared a Remedial Action Plan and is planning to lodge a Voluntary Management Proposal with DECCW.

4.2.8 Protection of the Environment Operations Act 1997

The POEO Act provides for licensing of certain activities that have the potential to cause pollution or contamination. Schedule 1 identifies types of development that require an Environmental Protection License. Clause 15 of Schedule 1 identifies contaminated soil treatment as an activity requiring a

license if it exceeds certain volume thresholds for both on-site and off-site treatment, as well as the licensing arrangements needed to transport the material. The POEO Act also dictates the requirements for lawful disposal of waste materials. See Section 7 for further details.

4.2.9 Occupational Health and Safety Act 2000

The OHS Act sets up the regulatory framework for the storage and handling of dangerous goods in NSW. Should thermal desorption treatment activities occur at the Chullora site, the project may require the storage of 50 tonnes of LPG at this site.

Storage and handling (including location and design of the installation) would meet the requirements of the *Occupational Health and Safety Regulation 2001*, *AS 1596:2008 The storage and handling of LP Gas* and the *Storage and Handling of Dangerous Goods Code of Practice,* NSW WorkCover, 2005.

4.2.10 Threatened Species Conservation Act 1995

The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities listed under the Act. Refer to Section 7 for further details.

5 Project Description

5.1 WORKS PROPOSED

The project involves the excavation, pre-treatment and disposal of contaminated soils located at the Macdonaldtown Gasworks site, to an extent that the site is no longer considered to pose a significant risk of harm to human health and the environment.

Both fill and natural soils on the site have been impacted by tar associated with the Gasworks. Underground pipes and structures in the vicinity of the northern and southern gasholders remain impacted with free tar (sludge). Some portions of the site are affected by previous building demolition and fill, some of which contain asbestos-cement sheeting, as well as inert building rubble.

Any Impacted groundwater and surface water within excavations resulting from the remediation at the Macdonaldtown site may be treated on site, or may be pumped into wastewater vehicles and disposed off site as liquid waste. Contaminated soils and materials will be screened for the removal of oversized materials and may be transported off site for treatment.

The proposed works will involve remediation of approximately 23,000 m^3 of various materials, including soil, fill, clay, gravel sand, tar sludge, demolition wastes, and excluding impacted water (JBS Environmental, April 2010). An unknown quantity of tar and scrap metal within pipework beneath the ground surface is also proposed to be remediated (JBS Environmental, April 2010).

If required a site adjacent to the Chullora Railway Workshops will be utilised for pre-treatment of contaminated soils/ materials. The proposed treatment options may include a combination of chemical mixing/ blending of soil, thermal desorption and stabilisation techniques. Following treatment, the contaminated soils/ materials may be returned to the Macdonaldtown site for beneficial reuse as backfill if geotechnically sound, or transported to appropriate waste facilities for disposal or further treatment.

5.2 COMPONENTS AND STAGES

The project would be undertaken in three stages: pre-remediation, remediation, and post-remediation (Table 2). Chapter 7 of this document identifies the risks associated with each stage.

Table 2: Stages and Components of Macdonaldtown Remediation Project

STAGE	COMPONENTS	MACDONALDTOWN	CHULLORA (If required)
Pre remediation	1. Site establishment.	✓	✓
	2. Geotechnical and archaeological investigations.	✓	
Remediation*	3. Off site disposal.	✓	✓
	4. Thermal Desorption (including LPG storage)		✓
	5. Stabilisation/ Immobilisation.	✓	✓
	6. Bioremediation.	✓	✓

STAGE	COMPONENTS	MACDONALDTOWN	CHULLORA (If required)
	7. Containment and capping.	✓	
Post remediation	8. Site Validation.	✓	✓
	9. Long term Environmental Management Plan (EMP) including a Groundwater Management Plan.	✓	

* Methodology for remediation activities will be refined as part of the Environmental Assessment.

5.3 NEED FOR THE PROJECT

Past use of the site as a gasworks has left a legacy of contamination that has been declared by DECCW to pose a significant risk of harm to human health and the environment. Under the *Contaminated Land Management Act 1997* the landowner (RailCorp) has responsibilities for managing this risk. RailCorp is in the process of entering into a Voluntary Management Proposal with DECCW.

5.4 ALTERNATIVES CONSIDERED

5.4.1 Macdonaldtown site

Options for remediation of the Macdonaldtown site were considered by CH2M Hill as part of preparation of a Remedial Action Plan in 2007 (CH2M Hill, 2007). A review of the proposed treatment methodologies has been undertaken: *Draft Remedial Strategy – Former Macdonaldtown Gasworks, Burren Street, Erskineville NSW* (JBS Environmental, April 2010). The following options were considered:

- No Action;
- Institutional controls i.e. Environmental Management Plan-site access restrictions;
- Containment including capping;
- Off site disposal;
- Thermal desorption;
- Stabilisation/ Immobilisation; and
- Bioremediation.

The options were assessed in terms of their effectiveness, technology risk, timeframe, permissibility, compatibility, health and safety risk, cost and ongoing management. The final methodology will be determined during the Environmental Assessment process.

By treating contaminated materials at the Macdonaldtown site, transportation risks to the environment (e.g. vehicle collision, soil and water pollution and odour emissions) are reduced. However, due to the sensitive site surroundings at Macdonaldtown, treatment on site will only occur if suitable a methodology, technology and space are available.

5.4.2 Chullora site

RailCorp performed a review of its property portfolio to identify potential off-site treatment locations. The criteria included that the site had to be:

- Generally vacant (ie., not leased and not permanently occupied);
- In the Sydney Metro area to reduce transport distances;
- Relatively flat;
- Greater than a few thousand square metres in area; and

- Of an industrial landuse, with minimal sensitive receptors.

The review only found one property which met all of these criteria, which was the Chullora site.

5.5 EMPLOYMENT OPPORTUNITIES

The remediation project is anticipated to employ 10 people.

5.6 CAPITAL INVESTMENT VALUE OF THE PROPOSED WORKS

The capital value investment of the project is estimated to be greater than $5 million.

6 Consultation

6.1 COUNCILS AND AGENCIES

To date, agency consultation has been limited, primarily consisting of discussion and correspondence with the Department of Environment, Climate Change and Water (DECCW) and Department of Planning (ie. on possible approaches to site remediation and Major Project declaration). Agency consultation as part of the Environmental Assessment process is expected to include correspondence and/or meetings with:

- Department of Planning;
- DECCW;
- Heritage Office;
- City of Sydney and Bankstown City Council;
- Redfern and Waterloo Authority; and
- Roads and Transport Authority (RTA).

6.2 COMMUNITY CONSULTATION

RailCorp will develop and deliver a community consultation strategy that will build upon previous engagement with the local Macdonaldtown community regarding other RailCorp projects; such as the Macdonaldtown Turnback and Stabling Facility. Elton Consulting have been engaged to facilitate consultation with the community. The community engagement activities will include:

- Regular project newsletters;
- Establishment of an Information line; and
- Community information sessions at key points in the development of the EA.

7 Key Environmental Issues

7.1 ENVIRONMENTAL RISK ANALYSIS

An environmental risk analysis was undertaken by Eco Logical Australia, using an environmental risk matrix adapted from the *Handbook 203:2006 Environmental Risk Management – Principles and Processes* (Appendix B). The risk analysis was prepared to assess environmental risks associated with the excavation, treatment and transport of contaminated materials and considers both the Macdonaldtown (Appendix C) and Chullora (Appendix D) sites. A summary of potential impacts identified as having an 'extreme' or 'high' risk is provided in Table 3.

Table 3: Summary of Extreme and High Level Risks

STAGE	POTENTIAL IMPACTS
MACDONALDTOWN SITE	
EXTREME RISKS	
Remediation Works	Water/ soil pollution during transport of free tar; contamination of clean aquifer during installation of groundwater monitoring wells; leakage of excessively wet materials during transport; destabilisation of buildings/ infrastructure due to excessive vibration or excessive excavation
HIGH RISKS	
Pre-Remediation Works	Fire/ explosion; damage to underground services; disruption of sewer service; destabilisation to infrastructure or buildings; generation of decontamination wastes; migration of groundwater to underlying clean aquifers; failure to prepare an adequate Environmental Management Plan and sub plans for remediation works
Remediation Works	Disturbance of archaeological resources; noise and vibration nuisance; dust generation and deposition; odour/ vapour/ gaseous emissions; water/ soil pollution; destabilisation of infrastructure/ buildings; loss of visual amenity including vegetation removal; compaction and erosion of soil; fire; community fear/ lack of communication; failure to control asbestos fibre release; tracking of sediment off site by vehicle; traffic incident involving waste vehicle(s); traffic congestion; public exposure to contaminants/ chemicals used; failure of site remediation activities; unmanageable mud and excessive stormwater
Post-Remediation Works	Exposure of site workers or future site users to contaminants; future damage to archaeological resources; failure of remediation works to meet long term groundwater goals.
CHULLORA SITE	
EXTREME RISKS	
Treatment works	Water/ soil pollution during transport and treatment at Chullora
HIGH RISKS	
Pre-treatment works	Failure to assess adequately environmental impacts at the site and to prepare an adequate Environmental Management Plan for the treatment works; vandalism; fire
Treatment works	Major fire/explosion due to storage of LPG; odour/ gaseous/ vapour emissions; water/ soil pollution; tracking of sediments by vehicle; destabilisation of buildings/ infrastructure; compaction and erosion of soil; generation of contaminated wastewater; noise nuisance; loss of visual amenity; failure to control asbestos fibre release; failure to

STAGE	POTENTIAL IMPACTS
	address community complaints; failure of soil treatment methods to remediate soils
Post-treatment works	Water/ soil pollution during transport

The extreme and high level risks (Table 3) were used to inform the identification of key environmental issues for the proposed works as discussed in Section 6.2.

7.2 KEY ENVIRONMENTAL ISSUES

7.2.1 Soil Contamination

The natural soil and a fill layer on the Macdonaldtown site have both been impacted by tar, due to the previous use of the site as a gasworks. The site also contains fill materials including bricks, metal pipes, tiles, fibro-cement sheeting and asbestos-cement sheeting.

The *Draft Remedial Strategy* (JBS Environmental, 2010) will be finalised and will identify:

- The nature and location of contamination;
- The proposed methods for treatment, transport and disposal of contaminated soils;
- Environmental, health and safety precautions for treatment;
- The post-treatment validation of soil condition.

7.2.2 Heritage Management (Archaeological)

The Macdonaldtown site contains a gasholder that is listed on the State Heritage Register, as well as other items of heritage significance.

A Heritage Assessment will be prepared and will include:

- Archaeological test trenching (prior to the remediation works) to confirm the extent and condition of potential buried heritage items, and to facilitate confirmation of appropriate protective measures or removal measures to be used during works;
- The employment of an Archaeological Excavation Director during the remediation works; and
- Preparation of an Interpretation Strategy and protection measures for future site use.

7.2.3 Waste Management

Contaminated soils on the Macdonaldtown site are likely to include hazardous waste, special waste (asbestos) and restricted and general solid waste. Liquid waste will also be extracted, including free tar (sludge), impacted surface water, impacted groundwater and wastewater from decontamination activities on site.

The Environmental Management Plan (EMP) will include:

- A classification of all potential sources of waste, including liquid and non-liquid waste generated on-site; and
- The proposed methods of treatment, storage, transport and off-site disposal of each type of contaminated material.

7.2.4 Air Quality (Dust, Odour, Vapour and Exposure)

Air quality impacts at the Chullora site are expected to be low due to the larger distance to sensitive receivers. At the Macdonaldtown site, excavation activities and heavy vehicle movements have the

potential to generate dust and odours, and there is also potential for vapours to be generated from impacted soil and groundwater. These may be a potential risk to human health if workers or residents are exposed to them at sufficient concentrations over sufficient timeframes.

An Air Quality Impact Assessment will be prepared for both the Macdonaldtown and Chullora sites, and the EMP will identify suitable air quality management measures based on this report including:

- A methodology for management of dust and odours, taking into account community preferences and sensitivities; and
- The proposed methods to manage the potential exposure risk for on-site and off-site workers and residents.

A Preliminary Hazard Analysis (PHA) will be prepared for the Macdonaldtown site to assess risks to human health.

7.2.5 Transport and Traffic

There is potential for soil, water and air pollution to occur during transport of materials and wastes. Designated transport routes will be investigated during the Environmental Assessment phase and only vehicles and contractors that are suitably equipped and licensed will be utilised. Pollution incidents will be reported to DECCW in accordance with the *Protection of the Environment Operations Act 1997.*

A Traffic Management Plan will be prepared, and will include:

- Identification of transport routes and a Designated Transport Routes Map;
- A Pedestrian Management Plan; and
- Consideration of both environmental and safety risks associated with transport of contaminated materials, and proposed approach to manage identified risks.

7.2.6 Chullora Dangerous Goods Assessment

The potential thermal desorption treatment option may require the storage of 50 tonnes of LPG at the Chullora site.

A Preliminary Hazard Analysis (PHA) will be prepared for the Chullora site by a dangerous goods consultant.

7.2.7 Surface Water Management

Surface waters have the potential to migrate off site during and subsequent to the remediation activities. The Environmental Management Plan (EMP) will include:

- Consideration of potential surface water runoff;
- Stormwater management measures proposed to manage surface water runoff.

7.2.8 Noise and Vibration

Excavation, pre-treatment and transport activities have the potential to create nuisance noise and vibration to surrounding residents and neighbours, particularly residents located immediately adjacent to the Macdonaldtown site along Burren Street. These will be discussed with the local community as part of the community consultation process.

Acoustic and Vibration Assessments will be prepared for both sites, and will include:

- Consideration of potential acoustic (noise) impacts on nearby residences and proposed management measures; and

- Vibration impacts and proposed construction management criteria.

7.2.9 Destabilisation of Buildings and Infrastructure

Due to the extent of remediation works required at the Macdonaldtown site, there is a risk of destabilisation of structures on the site, eg. gasholders, adjoining commercial and residential properties and adjacent railway infrastructure. A suitably qualified engineer will be engaged to provide advice regarding the structural stability of adjacent structures and infrastructure prior to the commencement of the remediation. A geotechnical assessment of soils on the Gasworks site will also be performed. RailCorp will include building stability control measures, if required, within the Draft Statement of Commitments to be submitted.

7.2.10 Visual Impacts

At the Macdonaldtown site, some visual impacts may occur to Burren Street residents. Visual impact at the Chullora site is expected to be low, due to the existing industrial land use.

A Visual Impact Assessment will be prepared for both sites, and will include:

- Assessment of the visual impact of the works on nearby residences and other receivers, and proposed management measures.

7.2.11 Flora and Fauna

The Macdonaldtown and Chullora sites have been predominately cleared of vegetation as a result of their prior use for rail infrastructure, and contain limited vegetation. The sites, particularly the Chullora site, are therefore considered unlikely to contain habitat suitable for threatened species, populations or ecological communities.

A Flora and Fauna Assessment of the Macdonaldtown site will be prepared, and will include:

- Potential occurrence and assessment of impact for threatened and migratory flora and fauna listed under State legislation and the Commonwealth EPBC Act.

7.2.12 Community Consultation

There are residences in close proximity to the Macdonaldtown site, and the works have the potential to cause some disruptions to these residences.

A Community Consultation Program is proposed to engage with the community. This will include:

- Information on the proposed remediation provided to local Macdonaldtown residents via letterbox drop;
- Establishment of an information line; and
- Community information sessions to ensure local Macdonaldtown residents are fully aware of the project and have opportunity to submit their opinions.

7.3 PROPOSED ENVIRONMENTAL ASSESSMENT DOCUMENTS

The following studies and documents are proposed to support the Macdonaldtown Gasworks Remediation Environmental Assessment:

- Macdonaldtown Remedial Strategy;
- Macdonaldtown Heritage Assessment;
- Environmental Management Plan (EMP);
- Macdonaldtown and Chullora Air Quality Impact Assessment;

- Macdonaldtown Preliminary Hazard Analysis;
- Traffic Management Plan;
- Chullora Preliminary Hazard Analysis;
- Macdonaldtown and Chullora Acoustic and Vibration Assessment;
- Macdonaldtown and Chullora Visual Impact Assessment;
- Macdonaldtown Flora and Fauna Assessment; and
- Community Consultation Program.

8 Summary and Conclusion

This preliminary environmental assessment has been undertaken for the proposed remediation of the Macdonaldtown gasworks site, including potential transport and treatment of contaminated materials at the Chullora site. The project is to be assessed under Part 3A of the EP&A Act as a major project. A decision is yet to be made as to whether the Chullora site will be required for treatment activities.

The key environmental issues identified for the site include:

- Soil Contamination;
- Heritage Management (Archaeological);
- Waste Management;
- Dust, Odour, Vapour and Exposure Management;
- Transport and Traffic Management;
- Potential of Dangerous Goods (LPG) Storage at Chullora;
- Surface Water Management;
- Noise and Vibration Management;
- Visual Impacts;
- Destabilisation of Buildings and Infrastructure; and
- Community Consultation.

Appendix A: Major Project Determination

NSW GOVERNMENT
Department of Planning

Mr Luke Speechley
Principal Environmental Adviser
RailCorp
PO Box K349
HAYMARKET NSW 1238

Y09/1564

Dear Mr Speechley

Major Project Request: Macdonaldtown Gasworks Remediation Project

Thankyou for your letter dated 15 May 2009, seeking the Minister's opinion as to whether a proposal for the remediation of the former gasworks facility at Macdonaldtown is a Major Project under Part 3A of the *Environmental Planning and Assessment Act 1979*.

As delegate of the Minister for Planning, I have formed the opinion that your proposal is development of a kind described in Schedule 3, Part 5, Clause 5 of the *State Environmental Planning Policy (Major Projects) 2005* and is a Project to which Part 3A of the Act applies.

The Department is currently preparing the Director General's Environmental Assessment Requirements (DGRs) for the proposal and these will be forwarded to you once completed.

If you have any further enquiries about this matter, please do not hesitate to contact Michael Woodland, Director Urban Assessments on 9228 6150 or via email at michael.woodland@planning.nsw.gov.au

Yours sincerely

30/6/09

Richard Pearson
Deputy Director General
Development Assessment & Systems Performance

NSW Department of Planning – Development Assessment & Systems Performance – Urban Assessments
23-33 Bridge Street, Sydney NSW 2000 - GPO Box 39, Sydney NSW 2001
Telephone: (02) 9228 6111 Fax: (02) 9228 6455 www.planning.nsw.gov.au

Appendix B: Risk Matrix

CONSEQUENCE			LIKELIHOOD		
LEVEL	DESCRIPTOR	DESCRIPTION	LEVEL	DESCRIPTOR	DESCRIPTION
1	Insignificant	Low financial loss, negligible environmental impact	A	Almost Certain	The impact is expected to occur in most circumstances
2	Minor	On-site release immediately contained, medium financial loss	B	Likely	The impact will probably occur in most circumstances
3	Severe	On-site release contained with outside assistance, high financial loss	C	Moderate	The impact could occur at some time
4	Major	Off-site release contained with outside assistance and little detrimental impact, major financial loss	D	Unlikely	The impact could occur at some time but is not expected
5	Catastrophic	Death, toxic release off-site with detrimental effect, huge financial loss	E	Rare	The impact occurs only in exceptional circumstances

MATRIX	CONSEQUENCE				
LIKELIHOOD	1	2	3	4	5
A	M	H	E	E	E
B	M	H	H	E	E
C	L	M	H	E	E
D	L	L	M	H	H
E	L	L	M	H	H

LEGEND	RISK LEVEL
E	**Extreme** – Immediate action required
H	**High** – Senior management attention needed
M	**Moderate** – Management responsibility must be specified
L	**Low** – Manage by routine procedures

Adapted from: HB 203:2006 *Environmental risk management – Principles and processes.*

Appendix C: Environmental Risk Macdonaldtown Site

PRE-REMEDIATION WORKS

This table has been prepared to address works that are required prior to the remediation and those works which enable remediation activities to commence. Should remediation occur at the Macdonaldtown site then potential risks identified in the Chullora tables would also apply.

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Establishment of site security (import and erect fencing)	Loss of visual amenity	Security fencing would be fitted with a geotextile fabric to minimise views of the site	1	B	Moderate
	Noise/ vibration nuisance or Traffic nuisance/ congestion	Acoustic and Vibration Assessment and Traffic Management Plan	1	C	Low
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good order	1	A	Moderate
	Vandalism (unlocked gates or forced entry) or damage/robbery of residents	Chain wire mesh fencing of perimeter would be installed/ locked. Fencing to be maintained between the Gasworks site and adjoining residential properties.	2	D	Low
	Fire/ explosion resulting from vandalism (unlocked gates or forced entry)	A security guard would be situated at the Swanson Street entry gate during construction hours	4	E	High
Establish site access on Erskineville Road, including heavy vehicle use of Swanson Street arterial road	Failure to obtain DA approval to reinstate road from construction works in Stabling Yard	Consultation with Council would be undertaken for approval. Access needs to be left in and left out due to presence of median strip in the middle of the narrow road	3	D	Moderate
	Traffic congestion or nuisance to pedestrians at Erskineville shops	Works in accordance with Traffic Management Plan (that includes pedestrian management)	2	C	Moderate
	Safety issues associated with adjacent rail lines	Geotechnical assessment of load limits for access road, Works in accordance with Traffic Management Plan	3	D	Moderate
Grass slashing/ weed removal (tree removal is covered during remediation works table)	Disturbance of flora/ fauna habitat	Due to contamination/ past disturbance of the site, the grass/weeds on site are not considered important habitat for native fauna	1	C	Low

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Locating and protection of underground services	Damage to services existing beneath the site or disturbance to other service users	Underground services would be mapped using existing mapping and survey of excavation areas by a service locater. Consultation to be undertaken with Asset Owners / Managers to determine protection requirements.	4	E	High
	Further contamination of soil or spread of contamination due to burst water/sewer pipe	Services would be marked on site i.e. stakes/ fencing	3	D	Moderate
Property condition surveys	Damage or destabilisation to infrastructure or buildings	Property condition surveys would be undertaken on buildings/ structures/ roads within 50 m of the works and any heritage listed buildings/ structures within 150 m. Surveys will also include an assessment of the adjacent rail tracks	4	E	High
Disturbance of contaminated soil due to geotechnical assessment for soil and infrastructure stability and archaeological test trenches	Generation of contaminated soil waste	Soils disturbed during the geotechnical assessment would be immediately backfilled on site. No treatment or disposal of soils off site is proposed for these pre-remediation works.	1	B	Moderate
	Disturbance of archaeological resource	Works would be planned in consultation with the Archaeology Excavation Director. No archaeological items are to be removed from the site without prior discussions with archaeologists/ heritage consultants. Marker layers would be placed over buried artefacts to avoid disturbance during remediation works	3	D	Moderate
	Public exposure to contaminants	Works per the Air Quality Impact Assessment, public access to the site would be restricted. Note: the site induction would address appropriate personal protective equipment for on site worker health	2	D	Low
	Dust generation and deposition/ Soil erosion and sediment runoff	Per Air Quality Impact Assessment and EMP	2	C	Moderate
Use of heavy machinery/ vehicles	Generation of decontamination wastes	Temporary facilities would be located on site to allow decontamination of heavy vehicles. Wastewater would be captured and disposed off site to a licensed waste transporters/ facilities	2	A	High
	Disturbance of archaeological resource	Works would be planned in consultation with the Archaeology Excavation Director. Location of test trenches and extant archaeology to be retained is to be protected from impact	3	D	Moderate
	Noise nuisance and Traffic congestion	Works per Acoustic and Vibration Assessment and Traffic	2	C	Moderate

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
		Management Plan			
	Atmospheric pollution and depletion of fuels	All plant/ equipment/ vehicles would be maintained in good working order. Items blowing visible smoke would be repaired prior to continued use	1	A	Moderate
Refuelling/ unplanned maintenance of machinery	Soil contamination/ water pollution	Spill/ leaks would be cleaned up immediately and if necessary soils would be disposed off site	2	D	Low
Transport equipment and vehicles to/from and within the site Including excavation equipment for archaeological test trenches	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use Vehicles blowing visible smoke would be repaired prior to continued use	1	A	Moderate
	Traffic congestion and noise and vibration nuisance	Works in accordance with Traffic Management Plan and Acoustic and Vibration Assessment	2	C	Moderate
	Disturbance of archaeological resource	Works would be planned in consultation with the Archaeology Excavation Director. Location of test trenches and extant archaeology to be retained is to be protected from impact. Vehicle routes on site would be clearly marked and communicated to personnel during the site induction	3	E	Moderate
Design and deviation of the western sewer line (if required)	Disruption of sewer service to adjacent property owners	Assess the need for sewer deviation. Potential environmental impacts associated with sewer diversion would be assessed as part of the EA	4	D	High
	Cost/ provision of bond		2	B	High
	Odour emissions		2	D	Low
	Disturbance to flora/ fauna		2	C	Moderate
	Destabilisation of earth/ infrastructure/ buildings		3	C	High
Decommissioning of existing groundwater monitoring wells on site	Migration of contamination into underlying clean aquifer(s)	All existing wells would be decommissioned and deregister by a qualified groundwater consultant in accordance with industry guidelines.	4	D	High
	Failure to deregister wells with Department of		2	D	Low

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Natural Resources				
ENVIRONMENTAL MANAGEMENT PLAN (per Section 8.8 of Remedial Action Plan) An EMP would be prepared to cover both Macdonaldtown and Chullora sites					
Development of a Traffic Management Plan (including pedestrian management)	Traffic nuisance/ congestion/ pollution incidents	Works would be undertaken in accordance with Traffic Management Plan. The plan would address, at a minimum, the requirements of Section 8.5 of the Remedial Action Plan – Traffic, Oversize Vehicles and Construction Works Impacting Transport Routes. Proposed routes between the site, treatment site in Chullora and facilities likely to receive the waste would be addressed (note these will be determined as part of the EA). The plan would address requirements of the RTA and Council in relation to nearby planned major roadworks, if any	2	B	High
Management of Soil and Water	Failure to manage sediment, water and erosion on site; potential impacts to neighbouring sites	Works would be undertaken in accordance with EMP, which addresses Section 8.8.1 of the Remedial Action Plan – Management of Soil and Water	3	C	High
Development of a Acoustic and Vibration Assessment	Failure to maintain noise levels in accordance with construction site levels/ nuisance noise to neighbours	Works would be undertaken in accordance with a Acoustic and Vibration Assessment which addresses Section 8.8.3 of the Remedial Action Plan – Management of Noise and Vibration	3	C	High
	Destabilisation of infrastructure/ buildings		4	D	High
	Nuisance vibration to neighbours		2	B	High
Development of an Air Quality Impact Assessment	Failure to control odour emissions	The plan would address, at a minimum, the requirements of Section 8.8.2 of the Remedial Action Plan	3	C	High
	Failure to control gaseous/ vapour/ dust emissions	– Management of Air Quality (Odour and Vapour Control and Dust Control) via the EMP	3	C	High
Induction of personnel to site issues (pre-remediation works and ongoing through remediation works)	Nuisance noise	Induction to highlight sensitive receivers and key issues within the Acoustic and Vibration Assessment	2	C	Moderate
	Loss of amenity due to bad language	Warnings would be issued for bad language or behaviour	2	C	Moderate
	Traffic congestion - contractor parking	Induction to highlight suitable and restricted parking areas	2	C	Moderate

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Disturbance to archaeological resources	The induction would address potential heritage impacts and would be delivered to all consultants/ personnel. Personnel shall be notified of their responsibilities under the *Heritage Act 1977*	3	D	Moderate
	Failure to communicate key issues and management controls of plans	Induction to highlight key issues and controls of all management plans. Communication would involve maps/ photos	2	C	Moderate

REMEDIATION AND SITE VALIDATION WORKS

This table has been prepared to address works that are required during remediation activities or site validation works.

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Transport/ disposal of contaminated soils and all other items to/from site	Traffic incidents, nuisance and congestion	Works per Traffic Management Plan, including use of designated routes Chullora site and waste facilities	2	B	High
	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate
	Disturbance of archaeological resource	Works planned in consultation with the Archaeology Excavation Director. Location of test trenches and extant archaeology on the site is to be protected from vehicle impact via safety fencing	3	C	High
	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	B	High
	Dust generation and deposition. Odour/ vapour emissions during transport	Per Air Quality Impact Assessment. Specialised haulage trucks may be required to transport contaminated soils	3	B	High
	Water/ soil pollution during transport	See 'extraction and transport of coal tar sludge from tar wells and northern gasholder'	3	C	High
Use of heavy machinery/ equipment on site	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate
	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	B	High
	Dust generation and deposition	Per Air Quality Impact Assessment	3	B	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Disturbance of archaeological resource	Works would be planned in consultation with the Archaeology Excavation Director. Location of test trenches and extant archaeology on the site is to be protected from vehicle impact	3	C	High
	Instability of earth or structures (on or off site)	Works per Acoustic and Vibration Assessment	4	D	High
	Loss of visual amenity	Consultation with land owners/ users, retention of boundary vegetation, geotextile fabric on security fencing and odour tent	3	C	High
	Compaction and erosion of soil	Per EMP	2	B	High
	Loss of containment of fuels. Water or soil pollution due to breakdown/ repair	Storage of fuels on site would occur in a bunded location. Vehicles would be maintained in good condition. Only emergency repairs would be conducted on site	2	D	Low
	Vandalism/ unauthorised destructive use	See 'site security measures' above	3	D	Moderate
	Fire	Chemicals would be locked within site sheds	E	4	High
Removal of trees and/or tree stumps Grass slashing/ weed removal	Inappropriate disposal of tree roots	Waste would be classified and disposed off site appropriately	3	D	Moderate
	Generation and deposition of dust	Per Air Quality Impact Assessment	2	C	Moderate
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	B	High
	Loss of visual amenity	Tree removal would be undertaken in accordance with the Landscape Design Plan	2	B	High
	Disturbance to or removal of fauna habitat	Tree removal would be undertaken in accordance with the Landscape Design Plan. A flora and fauna assessment will be completed as part of the EA. A qualified arborist would be engaged to undertake tree removal works.	3	D	Moderate
	Soil erosion	Works in accordance with EMP. After remediation, tree excavations would be backfilled/ compacted	2	C	Moderate
Excavation and stockpiling of contaminated soil for: • Permanent construction site sheds (including portions of retaining wall and ash/coke fill materials)	Sediment runoff from stockpiled materials/ Soil erosion	Works in accordance with EMP	2	C	Moderate
	Water pollution	Works in accordance with EMP	2	D	Low

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
• Truck routes on site (including a turning circle for heavy vehicles and parking areas)	Dust generation and dust deposition	Per Air Quality Impact Assessment	2	C	Moderate
• Installation and connection of site services	Loss of visual amenity	Visual amenity would be addressed by consultation with land owners/ users, maximum retention of boundary vegetation, geotextile fabric on security fencing and use of odour tent	3	C	High
• Excavation of soils for remediation/ treatment	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
• Over-excavation to accommodate benches to prevent collapse and ramps for vehicles/ machinery	Instability of earth or structures (on or off site), including impacts on railway infrastructure	Geotechnical assessment of site soils. Works per Acoustic and Vibration Assessment	4	D	High
• Sampling for waste classification • Decontamination areas	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order Vehicles blowing visible smoke would be repaired prior to continued use	1	A	Moderate
	Disturbance of unknown soil contaminants or spread of contamination during trenching/ excavations	Works would cease to allow soil sampling and assessment of remedial options to occur, a qualified contaminant consultant would be engaged for this purpose	2	C	Moderate

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Disturbance of archaeological resource	Works would be planned in consultation with the Archaeology Excavation Director and are not to commence until test trenching (pre-remediation works) are complete Location of test trenches and extant archaeology on the site is to be protected from vehicle impact via safety fencing A qualified heritage consultant would regularly monitor excavation and site activities during the remediation works (if required based on test trench outcomes). Heritage assessment to define items to be protected and items to be removed due to presence of significant contamination. Items to be removed will be subject to archival recording prior to removal. In the event that previously unidentified archaeological items are exposed during the works, works would cease immediately and an evaluation of their potential extent and significance should be undertaken per the *Heritage Act 1977*	3	C	High
	Disturbance of Aboriginal artefacts	Cease works immediately and engage an Aboriginal heritage consultant to determine their significance	3	D	Moderate
Excavation and disposal of soils/ waste containing asbestos	Failure to use licensed asbestos contractor and obtain a Work Cover NSW permit for works	An AS-1 licensed contractor would be used for the works	2	D	Low
	Failure to use licensed waste contractors or facility	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	Failure to monitor dust emissions during asbestos excavation and removal works	Air monitoring for airborne asbestos fibres would be undertaken when working in asbestos impacted areas of the site. Monitoring results would be reported daily	3	D	Moderate
	Failure to control fibre release in proximity to residents resulting in actual exposure to airborne fibres	As above	4	E	High
	Failure to restrict site access	See ‘site security and access’ above	3	D	Moderate
	Community fear or lack of communication	Consultation with neighbouring properties would occur prior to asbestos removal works	4	D	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Disturbance of archaeological resource	See 'excavation and stockpiling of contaminated soils'	3	C	High
Shoring, underpinning and piling of excavations	Destabilisation of surrounding building structures and railway infrastructure	Geotechnical assessment of site soils. Works per Acoustic and Vibration Assessment	4	D	High
	Noise and vibration nuisance. Disturbance of archaeological resource	Works per Acoustic and Vibration Assessment. See 'excavation and stockpiling of contaminated materials'	3	C	High
Installation of site services, i.e. water, electricity and communication	Failure to obtain relevant permissions for connections to services	Liaise with relevant agencies for approvals/	2	D	Low
	Failure to use licensed wastewater contractors to transport liquid waste/sewage	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	See 'excavation and stockpiling of contaminated soil' above, including disturbance of heritage items. See 'transport equipment and vehicles to/from and within the site' above				
Establishment and use of temporary or permanent site sheds (including offices, amenities and personnel decontamination units)	Pollution of water via amenities and decontamination units	Licensed waste contractors and receiving waste facilities would be used to pump and dispose of wastewater off site	2	A	High
	Traffic nuisance/ congestion due to import of sheds	Works per Traffic Management Plan	2	C	Moderate
	Loss of visual amenity	Use of odour tent and works and per Visual Impact Assessment	3	C	High
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Disturbance of flora/ fauna habitat	See 'removal of trees and/or tree stumps and grass slashing/ weed removal'	2	D	Low
	Generation and disposal of general solid and recyclable wastes	Works per EMP	1	A	Moderate
	Failure to control wastes, generating litter on and off site	Works per EMP	2	C	Moderate
	Pollution of water or soil contamination due to leakage of stored fuels/ chemicals	Storage of fuels/ chemicals on site would occur in a bunded location	2	D	Low
	Fire/ explosion	See 'site security measures' above	E	4	High
	Vandalism due to uncontrolled access	See 'site security measures' above	3	D	Moderate

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Construction and use of an odour tent	Loss of visual amenity	Per Visual Impact Assessment and community consultation	3	C	High
	Nuisance noise	Works per Acoustic and Vibration Assessment	3	B	High
	Dust, gaseous, vapour and odour emissions	Maintain building/ tent for the life of remediation works	3	C	High
	Water pollution or soil contamination due to odour suppressant chemicals	Chemicals would be stored in a locked and bunded location	2	D	Low
	See 'excavation and stockpiling of contaminated soil' above, including disturbance of heritage items				
Establishment and use of on site water treatment unit (for dewatering excavations, wheel wash and decontamination of underground pipes)	Failure to use licensed wastewater contractors to transport liquid waste off site	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
Including transport of tanks/ equipment to site	Traffic congestion due to oversized transport of tanks	Works in accordance with Traffic Management Plan	2	C	Moderate
	See 'transport equipment and vehicles to/from and within the site' above. See 'excavation and stockpiling of contaminated soil' above, including disturbance of heritage items				
	Water or soil pollution due to leakage of treatment chemicals on site	The unit would be regularly maintained and storage of fuels/ chemicals on site would occur in a bunded location	2	D	Low
	Nuisance noise, odour, gas, vapour emissions	Works per Acoustic and Vibration Assessment and Air Quality Impact Assessment	3	C	High
	Loss of visual amenity	Unit location to minimise impact on views of neighbours and geotextile fabric on security fencing would be used	3	C	High
Disposal of residue activated granulated carbon wastes	Failure to use licensed waste contractor and/or to track waste	Arrangements would be made with the receiving waste facility for immobilisation of waste	3	D	Moderate
Establishment and use of decontamination area for vehicles/ machinery including wheel wash, rumble bar and high pressure wash spray unit	Disturbance to archaeological resource	Location determined in consultation with the Archaeology Excavation Director, and established in an area of no impact	3	D	Moderate
(Personnel decontamination units as part of 'permanent site sheds')	See 'excavation and stockpiling of contaminated soil' above for excavation for wheel wash and rumble bar. See 'transport equipment and vehicles to/from and within the site' above				

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Nuisance noise	Works per Acoustic and Vibration Assessment	3	C	High
	Public exposure to contaminants from spray drift	Area would be positioned such that spray drift could not reach neighbouring properties; if necessary a screen would be provided	3	D	Moderate
	Tracking of sediment off site on tyres – water pollution/ loss of visual amenity	Responsibility for monitoring the effectiveness of the unit would be allocated within the EMP	3	C	High
Dewatering of site structures and/ or excavation pits Including dewatering of impacted waters within the gasholders Including sampling for wastewater classification	Failure to use licensed waste contractor with a specialised vacuum truck or to track waste	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	Traffic incident involving waste vehicle(s)	Works per Traffic Management Plan. Incidents would be reported	5	E	High
	Water pollution due to failure/ corrosion of equipment/ storage vessels	The unit would be regularly maintained. Spills would be cleaned up immediately and reported per the EMP	3	C	High
	Traffic congestion	Works in accordance with Traffic Management Plan	2	D	Low
	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate
	Noise nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Additional costs to transport/ treat off site	Consider options to divert treated wastewater to sewer	3	B	High
Extraction and transport of coal tar sludge from tar wells and northern gasholder	Exposure to odours/ vapours from free tar	Per Macdonaldtown Preliminary Hazard Analysis	3	C	High
	Damage to heritage items	The exact location of the northern gasholder would be marked prior to commencement and protected during works for reconstruction, if the remnant bricks are to be removed. This would be completed in consultation with the Archaeology Excavation Director or City Plan Heritage. Requirements for removal or protection of heritage items to be assessed in Macdonaldtown Heritage Assessment.	3	C	High
	Odour/ vapour emissions during transport	Specialised haulage trucks may be required to transport this material as per Traffic Management Plan	3	C	High
	Water/ soil pollution during transport	Specialised haulage trucks may be required to transport this material as per Traffic Management Plan	4	C	Extreme

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Failure to use licensed waste contractors and facilities	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	2	D	Low
Management of general solid waste and/ or recyclables	Recyclable waste to landfill (e.g. bricks, concrete blocks and metal piping)	Assessment of potential contamination of these materials would be required prior to their disposal to recyclers	2	C	Moderate
	See 'screening and decontamination of oversized materials' below. See 'excavation of asbestos contaminated materials' above				
	Disturbance of archaeological resource	No archaeological items are to be removed from the site without prior discussions with archaeologists/ heritage consultants	3	D	Moderate
Screening and decontamination of oversized materials i.e. pipe work (excluding those impacted by free tar)	Public exposure to contaminants	Use of alternative site due to sensitive residential properties for oversized materials likely to be impacted by free tar	3	C	High
	Disturbance of archaeological resource	Archaeological items to be removed to be determined in Macdonaldtown Heritage Assessment.	3	D	Moderate
	Odour, gaseous and vapour emissions	Works per Air Quality Impact Assessment and EMP	3	C	High
	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
Crushing and transport of decontaminated oversized materials (excluding materials with free tar)	Noise and vibration nuisance. Traffic congestion due to oversized vehicles	Works per Acoustic and Vibration Assessment	2	B	High
	Atmospheric pollution and depletion of fuels	Vehicles in good working order and registered for road use.	1	A	Moderate
Separation and transport of ash and coke surface fill direct to waste facility for immobilisation	Failure to use a licensed waste transporters/ receiving facility	Arrangements would be made with the receiving waste facility for immobilisation of these materials	3	D	Moderate
	See 'transport of contaminated soils' above				
Treatment of residual soil contamination remaining on site Including concentrated liquid injection	Soil/ water contamination due to chemical transport	Licensed vehicles and drivers would be used to transport the chemicals	4	D	High
	Soil/ water contamination due to chemical storage and handling	Chemicals stored within purpose built containers and within a roofed and bunded location on site. Licensed and experienced contractors to work with contamination consultants	3	D	Moderate
	Odour emissions	Per Air Quality Impact Assessment	3	D	Moderate
	Fire/ explosion	Chemicals stored away from incompatible items and controlled to prevent vehicle impact. Licensed/ experienced contractors would	4	E	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
		operate equipment			
Including broad scale mixing of backfill buried at depth	Dust generation and deposition	Per Air Quality Impact Assessment	3	D	Moderate
	Emissions of airborne chemical	Chemical dust managed per the Air Quality Impact Assessment	3	C	High
	Soil/ water contamination due to chemical storage and handling	Chemicals would be stored within purpose built containers and within a roofed and bunded location on site. Licensed and experienced contractors would work with contamination consultants	3	D	Moderate
Installation of marker layers (made from high density polyethylene (HDPE))	Traffic nuisance/ congestion	Works in accordance with Traffic Management Plan	2	C	Moderate
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	D	Low
	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use. Vehicles blowing visible smoke would be repaired prior to continued use	1	A	Moderate
	Future exposure to contaminants due to failure to install marker layer	The marker layer would be installed per the Remedial Action Plan	3	C	High
	Damage to heritage items	Backfilling and marker layers are to installed as per Macdonaldtown Heritage Assessment	3	C	High
Beneficial re-use of excavated materials	Loss of visual amenity	Materials re-used on site would not show visual impacts of tar and would meet the requirements for beneficial re-use of excavated material per Section 9.4 of the Remedial Action Plan	3	C	High
	Odour emissions/ exposure to contaminants	Re-use of materials on site would be supported by sampling and certification of the material for this purpose per the Remedial Action Plan	3	D	Moderate
	Groundwater or surface water contamination	Material re-used on site would need to meet neutral leach criteria per Section 9.4 of the Remedial Action Plan	3	D	Moderate
	Soil contamination spread/ leaching	Material re-used on site would need to meet criteria per Section 9.4 of the Remedial Action Plan	3	D	Moderate
	Future impacts to flora/ fauna	Material re-used on site would need to meet criteria per Section 9.4 of the Remedial Action Plan	2	D	Low

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Deterioration of buried archaeological artefacts	Re-use of materials would be planned in consultation with the Archaeology Excavation Director to determine appropriate locations	3	C	High
	See 'excavation' activities above				
Importation of fill materials	Soil contamination. Groundwater or surface water contamination	Fill materials would be sourced from reputable contractors and would be accompanied by written confirmation that the soils are 'virgin excavated natural materials'	1	D	Low
	Loss of visual amenity. Public exposure to contaminants		3	D	Moderate
	Spread of weeds	Fill materials would be visibly free of vegetation	2	D	Low
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Traffic congestion and nuisance	Works in accordance with Traffic Management Plan	3	C	High
	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate
Backfilling and compaction of excavated areas	Soil instability i.e. future buildings or surrounding properties. Long term soil erosion	Backfilling would occur per Section 9.3.1 of the Remedial Action Plan and would be validated to ensure it meets relevant guidelines	4	D	High
	Disturbance of archaeological resource	Works as per Macdonaldtown Heritage Assessment. Location of test trenches and extant archaeology on the site is to be protected from vehicle impact via safety fencing. Backfilling and marker layers are to installed in consultation with the Archaeology Excavation Director and with City Plan Heritage	3	D	Moderate
	Groundwater contamination. Noise and vibration nuisance	Backfilling would be supervised by the contamination consultant. Works per Acoustic and Vibration Assessment	2	D	Moderate
Survey of new site levels	Failure to comply with approvals and levels	A survey of site levels would be undertaken. These would be required to facilitate engineering/ design drawings for future site layout	2	D	Low
Establishment of new groundwater monitoring wells on site	See 'excavation of contaminated soils' above				
	Contamination of clean aquifer due to incident during installation	Specialist groundwater consultants, with knowledge of the site particulars, would be engaged to install the wells	4	C	Extreme

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Failure to detect potential for exposure in the future	Wells would be installed by a specialist groundwater consultant in accordance with the RAP	3	C	High
	Disturbance of archaeological resource	Works per Macdonaldtown Heritage Assessment	3	D	Moderate
Community complaints	Failure to adequately address community complaints	Complaints would be managed per a procedure in the EMP	3	C	High
Site validation	Residual contamination on site exceeds the requirements of the Remedial Action Plan	The site would be subject to validation soil sampling to demonstrate that soils/ groundwater on site are suitable for land use category	3	C	High
CONTINGENCY/ EMERGENCY EVENTS					
Under estimation of material volumes	Failure to comply with permits/ licences/ approvals	An Environmental Management Plan (EMP) would be prepared for the duration of the remediation works and would include tracking of wastes and quantities extracted	2	C	Moderate
Unexpected finding of free tar materials in southern gasholder	Additional contaminants identified on site. Impact on listed heritage items in order to remediate. Continued source of contamination to groundwater	Consultation would occur between principal contractor, contamination consultant, heritage consultant, RailCorp and other relevant government agencies to determine risks and options to deal with materials	3	C	High
Soil treatment methods are ineffective	Additional materials requiring transport off site. Longer term impacts to community. Failure to reduce source contamination to groundwater	Consultation would occur between principal contractor, contamination consultant, RailCorp and other relevant government agencies to determine risks and options to deal with materials	3	C	High
Unmanageable mud in excavation zone	Failure to remediation site per Remedial Action Plan. Increase pressure on decontamination units on site/ requirements for alternative treatments. Tracking of mud onto adjacent roadways. Damage to heavy machinery, infrastructure or heritage items	Consultation would occur between principal contractor, contamination consultant, heritage consultant, Archaeology Excavation Director, RailCorp and other relevant government agencies to determine risks and options to deal with materials	3	C	High
Excessive stormwater	Increase demand for wastewater removal from the site (increased cost)	Works would cease until appropriate control of stormwater on site could be established	3	C	High
	Flooding of adjacent sites (spread of contamination)				
	Requirements for additional construction of				

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	stormwater controls				
Excessively wet materials	Leakage of contaminants from soil during transport	Specialised haulage trucks suitable for transport of free liquids would be required	4	C	Extreme
Excessive dust	Increased nuisance to neighbours. Increased potential for exposure to contaminants	Works would cease until additional appropriate controls could be determined and implemented	3	C	High
Excessive vibration	Increased potential to instability to infrastructure and buildings	Works would cease until additional appropriate controls could be determined and implemented	4	C	Extreme
	Increased nuisance to neighbours		2	C	Moderate
Excessive noise	Increased nuisance to neighbours	If noise levels fail to meet required construction noise levels then additional noise control measures would be discussed and implemented (via consultation with noise consultant, RailCorp, DECCW and Council)	3	C	High
Excessive time on site (project delays)	Longer term impacts to the community	Consultation would occur to communicate the need for and duration of additional time on site	3	C	High
	Increased project costs	Consideration of contingency items would be factored into the project funding to ensure that delays would not prevent the project from completion	4	D	High
Ineffective odour control	Impacts to persons on neighbouring sites	Consultation would occur with contamination consultants, RailCorp and other government authorities. Methods to reduce or suppress odours would be determined and implemented	3	C	High
Physical storage of segregated oversize materials contained in fill	Loss of visual amenity	Materials would be transported off site as soon as possible for pre-treatment or disposal, storage would be located to minimise impact to neighbouring views of the site	2	D	Low
	Lack of room for temporary storage on site	Materials would be transported off site as soon as possible. In consultation with RailCorp, works may need to cease in order to process oversized materials. For archaeological items, consultation with the Archaeology Excavation Director and City Plan Heritage	3	D	Moderate

POST REMEDIATION WORKS

This table has been prepared to address works that are required for ongoing long term management of the site.

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Disturbance of soil during future redevelopment of the site	Exposure of site workers or future site users to contaminants	An Environmental Management Plan (EMP) prepared to include: • A permit and sign off protocol for any works on site • Subsurface excavation procedure, including identification of contamination marker layers • Site security procedure • Prohibition on construction of basements in future buildings • Prohibition on use of groundwater • Requirement for disposal of groundwater to off site or to sewer (with a trade waste permit)	3	C	High
	Future damage to archaeological resources (in vicinity of the southern gasholder)	EMP prepared to include: • Subsurface excavation procedure, including identification of archaeological marker layers and prohibition of works within a 5 m 'buffer zone' • Signage to notify site users of heritage values • Maintenance of a 5 m 'buffer zone' around the gasholder to minimise potential damage e.g. vehicles (in consultation with City Plan Heritage)	3	C	High
	Future damage to archaeological resources (in vicinity of western embankment)	EMP prepared to include: • Subsurface excavation procedure, including identification of archaeological marker layers (in consultation with City Plan Heritage) • Management of aesthetic impacts (noise and visual) to neighbouring residents from proposed future land use • Maintenance of landscaping (including implementation of a landscape design plan prepared prior to site remediation)	3	C	High
	Failure of remediation works to meet long term groundwater goals	EMP which details: • Long term groundwater goals	3	C	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
		• Time period for monitoring • Methods for monitored natural attenuation (per Remedial Action Plan)			
General Site Maintenance	Loss of visual amenity to train passengers	Maintain hardy vines and creepers installed on the northern side of the Illawarra Noise Wall. Maintain the screen planting installed to reduce the visual bulk of remediation works, along this noise wall. Regular weed control	2	C	Moderate
Interpretation of heritage values on site	Loss of historical importance of the site	Appropriate signage may be installed to interpret heritage values in the vicinity of the southern gasholder (for future site users) in accordance with the Heritage Interpretation Plan for the site	2	C	Moderate

Appendix D: Environmental Risk Chullora Site

PRE-TREATMENT WORKS

This table has been prepared to address works that are required to enable treatment activities to commence.

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Obtain necessary approvals, licences	Failure to obtain necessary approvals	Approvals required per Section 4 Planning Provisions of the PEA would be obtained. A lease between RailCorp and the remediation contractor may be required	2	D	Low
Environmental impact assessment	Failure to assess potential impacts on the environment at alternative site	The site is located adjacent the Chullora Railway Station Workshops and activities on the site have been associated with railway land use Site assessment during the EA would be undertaken to determine the potential for the following: • Air quality impacts (odour/ vapour/ dust) to persons off site • Nuisance noise to nearby sensitive receivers • Loss of visual amenity to neighbouring properties/ community • Traffic impacts for movement of vehicles/plant to/from the site • Vibration impacts buildings/ roads/ infrastructure • Existing soil/ groundwater contamination (baseline assessment) • Disturbance of indigenous heritage items • Disturbance to archaeological heritage items • Impacts to threatened flora, fauna, habitat • Impacts to sensitive environments near the locality A hardstand ground surface may be needed to installed to minimise contaminants entering exposed surfaces on site	3	C	High

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Establishment of site security (import and erect fencing) Including chain wire mesh fencing around perimeter and arrange for a security guard at entry gate	Loss of visual amenity	Security fencing would be fitted with a geotextile fabric to minimise views of the site	1	B	Moderate
	Noise and vibration nuisance. Traffic nuisance/ congestion	Works per Acoustic and Vibration Assessment and Traffic Management Plan	1	C	Low
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
	Vandalism, fire/ explosion due to unlocked gates or forced entry	A chain wire mesh fencing would be installed around the perimeter and the site would be locked outside of construction hours	4	D	High
Locating and protection of underground services	Damage to services existing beneath the site. Disturbance to other service users	Underground services would be mapped using existing mapping and survey of excavation areas by a service locater	3	E	Moderate
	Soil contamination due to burst sewer	Services would be marked on site i.e. stakes/ fencing	3	D	Moderate
Use of heavy machinery/ vehicles	Noise nuisance/ Traffic congestion	Works per Acoustic and Vibration Assessment and Traffic Management Plan	2	C	Moderate
	Atmospheric pollution and depletion of fuels	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
Refuelling/ unplanned maintenance of machinery	Soil contamination/ water pollution	Spill/ leaks would be cleaned up immediately and if necessary soils would be disposed off site	2	D	Low
Transport equipment and vehicles to/from and within the site	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use	1	A	Moderate
	Traffic congestion/ Noise and vibration nuisance	Works in accordance with Traffic Management Plan and Acoustic and Vibration Assessment	2	C	Moderate
Development of an Environmental Management Plan	Soil and Water, Traffic, Air Quality (Odour/ Vapour/ Dust), Noise, Vibration, Visual, Waste, Chemical Storage, Weed and Pest Control	An EMP would be prepared per Section 8.8 Environmental Management of the Remedial Action Plan for both sites.	3	B	High
Induction of personnel to site issues (pre-treatment works and ongoing	Nuisance noise	Induction to highlight sensitive receivers and key issues within the Acoustic and Vibration Assessment	2	C	Moderate

ASPECT	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
through treatment works)					
	Loss of amenity due to bad language	Warnings would be issued for bad language or behaviour	2	C	Moderate
	Traffic congestion due to contractor parking	Induction to highlight suitable and restricted parking areas	2	C	Moderate
	Failure to communicate key issues and management controls of plans	Induction to highlight key issues and controls of all management plans. Communication would involve maps/ photos to ensure personnel understand	2	C	Moderate

TREATMENT WORKS AT ALTERNATIVE SITE

This table has been prepared to address works that are required during treatment works at the alternative site.

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Transport equipment and vehicles to/from and within the site	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate
Including transport/disposal of contaminated soils	Traffic incidents, nuisance and congestion /Noise and vibration nuisance	Works per Traffic Management Plan, including use of designated routes to Macdonaldtown site and waste facilities and Acoustic and Vibration Assessment	2	C	Moderate
	Dust generation and deposition	Per Air Quality Impact Assessment	2	D	Low
	Odour/ vapour emissions during transport	Specialised haulage trucks may be required to transport contaminated soils; these trucks may include a trailer section that can minimise vapour emission during transport	3	B	High
	Water/ soil pollution during transport	See 'extraction and transport of coal tar sludge from tar wells and northern gasholder'	3	C	High
	Tracking of sediments on roads	A decontamination area would be in use on site, see below	3	C	High
Use of heavy machinery/ equipment on site	Atmospheric pollution and depletion of fuels	All vehicles would be maintained in good working order and would be registered for road use.	1	A	Moderate

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Noise and vibration nuisance /Dust generation and deposition	Works per Acoustic and Vibration Assessment /Air Quality Impact Assessment	2	C	Moderate
	Disturbance of archaeological resource or Aboriginal items	Likelihood of disturbance would be determined in EA and works would cease if items were uncovered during works	3	D	Moderate
	Destabilisation of buildings/infrastructure	Works per Acoustic and Vibration Assessment	4	D	High
	Loss of visual amenity	Per Visual Impact Assessment	2	C	Moderate
	Compaction and erosion of soil	Per EMP	2	B	High
	Loss of containment of fuels	Storage of fuels on site would occur in a bunded location	2	D	Low
	Water or soil pollution due to breakdown/ repair	Vehicles would be maintained in good condition Only emergency repairs would be conducted on site	3	D	Moderate
	Vandalism/ unauthorised destructive use	See 'site security measures' above	3	D	Moderate
	Fire	Chemicals would be locked within site sheds, also see 'site security measures' above	E	4	High
Establish site access	Traffic congestion and nuisance to pedestrians	Works in accordance with Traffic Management Plan (that includes pedestrian management)	2	D	Low
Installation of site services, i.e. water, electricity and communication	Failure to obtain relevant permissions for connections to services	Liaise with relevant agencies for approvals	2	D	Low
	Failure to use licensed wastewater contractors to transport liquid waste/sewage	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	See 'use of heavy machinery/ equipment on site'				
	Disturbance of soil contaminants	The EA would determine likely disturbance of contaminated soils	2	C	Moderate
Establishment and use of site sheds Including offices, amenities and personnel decontamination units	Pollution of water via amenities and decontamination units	Licensed waste contractors and receiving waste facilities would be used to pump and dispose of wastewater off site	2	A	High
	Traffic nuisance/ congestion due to import of sheds	Works per Traffic Management Plan	2	D	Low
	Loss of visual amenity	The EA would determine likely loss of amenity and sheds would be positioned on the site to minimise amenity loss	2	C	Moderate

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Disposal of general solid wastes and recyclables	Works per EMP	1	A	Moderate
	Failure to control wastes, e.g. litter	Works per EMP	2	C	Moderate
	Pollution of water or soil contamination	Storage of fuels/ chemicals on site in a bunded location	2	D	Low
	Fire/ explosion	See 'site security measures' above	E	4	High
	Vandalism due to uncontrolled access	See 'site security measures' above	3	D	Moderate
Stockpiling of contaminated excavated material (soil and oversized materials)	Inadequate treatment of stockpiled materials	Stockpiles would be named and marked and separate areas would be clearly delineated onsite e.g. untreated, curing, off site disposal, re-use, additional treatment	2	C	Moderate
	Sediment runoff from stockpiled materials and soil erosion	Works in accordance with EMP	2	C	Moderate
	Water pollution	Works in accordance with EMP	2	D	Low
	Dust generation and dust deposition	Per Air Quality Impact Assessment	2	C	Moderate
	Odour, gaseous/vapour air emissions	Per Air Quality Impact Assessment	3	C	High
	Loss of visual amenity	Per Visual Impact Assessment	2	C	Moderate
	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Destabilisation of buildings/infrastructure	Works per Acoustic and Vibration Assessment	4	D	High
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
	Disturbance of archaeological resource	Likelihood of disturbance would be determined in EA and works would cease if items were uncovered during works	3	D	Moderate
	Disturbance of Aboriginal items	Likelihood of disturbance would be determined in EA and works would cease if items were uncovered during works	3	D	Moderate
Establishment of treatment facility	Loss of visual amenity	The EA would determine loss of amenity and measures to minimise	2	C	Moderate

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Nuisance noise/ Dust, gaseous and vapour and odour emissions	Works per Acoustic and Vibration Assessment	2	C	Moderate
Establishment and use of on site water treatment unit (for wheel wash and decontamination of free tar)	Failure to use licensed wastewater contractors to transport liquid waste off site	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
Including transport of tanks/ equipment to site	Traffic congestion due to oversized transport of tanks	Works in accordance with Traffic Management Plan	2	C	Moderate
	See 'transport equipment and vehicles to/from and within the site' above See 'use of heavy machinery/ equipment on site'				
	Water or soil pollution due to leakage of treatment chemicals on site	The unit would be regularly maintained and storage of fuels/ chemicals on site would occur in a bunded location	2	D	Low
	Nuisance noise/ Odour, gaseous/vapour air emissions/ Loss of visual amenity	Works per Acoustic and Vibration Assessment and Air Quality Impact Assessment/ Unit location to minimise impact on views of neighbours and geotextile fabric on security fencing would be used	2	C	Moderate
Disposal of residue activated granulated carbon wastes	Failure to use licensed waste contractor and/or to track waste	Arrangements would be made with the receiving waste facility for immobilisation of waste	3	D	Moderate
Establishment and use of decontamination area for vehicles/ machinery including wheel wash, rumble bar and high pressure wash spray unit	See 'transport equipment and vehicles to/from and within the site' above See 'use of heavy machinery/ equipment on site'				
(Personnel decontamination units as part of 'permanent site sheds')	Nuisance noise	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Public exposure to contaminants from spray drift	The area would be positioned such that spray drift could not reach neighbouring properties	3	D	Moderate
	Tracking of sediment off site on tyres – water pollution/ loss of visual amenity	Responsibility for monitoring the effectiveness of the unit would be allocated within the EMP	3	C	High
Pre-treatment and transport of soil/ fill or demolition wastes impacted by free tar	Generation of contaminated wastewater in order to lower moisture content in soil for treatment	See 'use of on site water treatment unit' above Where liquid waste cannot be treated by the on site unit, it would be disposed/treated off site at a licensed waste facility	2	A	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
	Noise and vibration nuisance /Odour, gaseous/vapour air emissions	Works per Acoustic and Vibration Assessment and Air Quality Impact Assessment	2	C	Moderate
Crushing of decontaminated oversized materials and transport to landfill or recyclers	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Traffic congestion due to oversized vehicles	Works in accordance with Traffic Management Plan	2	D	Low
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
Pre-treatment of stiff clays to allow sufficient mixing/ blending of material (prior to treatment)	See 'stockpiling of contaminated soils' above				
	Dust, gas, vapour emissions due to mixing and blending activities	Works per Air Quality Impact Assessment	3	C	High
	Noise nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
Treatment and transport of coal tar sludge from tar wells and northern gasholder	Failure to use licensed waste contractors	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	Water/ soil pollution during transport	Specialised haulage trucks suitable for transport of free liquids would be required. Heavy duty plastic would be used to transport oversized items contaminated by free tar	4	C	Extreme
Option: site treatment via thermal desorption (including storage of 50 tonnes of LPG)	Odour emissions /Exposure to contaminants due to gaseous/vapour air emissions	Works per Air Quality Impact Assessment	3	C	High
	Dust generation	Works per Air Quality Impact Assessment	2	C	Moderate
	Loss of visual amenity due to LPG tank, stack and steam	Impacts would be assessed during EA and controls determined	3	C	High
	Major fire/ explosion (including odour emissions due to LPG leak)	Preliminary Hazard Assessment. Works would be undertaken by experienced contractors and procedures incorporated into an EMP and site safety procedures	5	E	High
Option: site treatment via	Odour emissions/ Exposure to contaminants	Works per Air Quality Impact Assessment	3	C	High

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
stabilisation	due to gaseous/vapour air emissions				
	Dust generation	Works per Air Quality Impact Assessment	2	C	Moderate
	Depletion of fuels for transport and atmospheric emissions associated with import of stabilising agent(s) e.g. cement, fly ash	All vehicles would be maintained in good working order and would be registered for road use. Vehicles blowing visible smoke would be repaired prior to continued use	1	A	Moderate
	Traffic nuisance/ congestion due to import of stabilising agents	Works in accordance with Traffic Management Plan	2	D	Low
	Nuisance noise	Works per Acoustic and Vibration Assessment	2	C	Moderate
Management of soils containing asbestos	Failure to use licensed asbestos contractor and obtain a Work Cover NSW permit	An AS-1 licensed contractor would be used for the works	2	D	Low
	Failure to use licensed waste contractors or facility	Waste contractors and receiving waste facilities would be selected based on this requirement and their past performance	3	E	Low
	Failure to monitor dust emissions during asbestos excavation and removal works	Air monitoring for airborne asbestos fibres would be undertaken. Monitoring results would be reported daily	3	D	Moderate
	Failure to control fibre release in proximity to neighbours resulting in actual exposure	As above	4	E	High
	Failure to restrict site access /Community fear or lack of communication	See 'site security and access' above. Community consultation program.	3	D	Moderate
Community complaints	Failure to adequately address community complaints	Complaints would be managed per a procedure in the EMP	3	C	High
CONTINGENCY/ EMERGENCY EVENTS					
Soil treatment methods are ineffective Resulting in additional treatment measures	Additional time and cost required. Additional length of time for community impacts (noise, dust, odour, aesthetics). Potential relocation of materials for treatment elsewhere (re-transport of contaminated materials)	Consultation would occur between principal contractor, contamination consultant, RailCorp and other relevant government agencies to determine risks and options to deal with materials	3	C	High

POST TREATMENT WORKS

This table has been prepared to address works that are required for reinstating the site to its former land use.

ASPECT/ PATHWAY	IMPACT	RISK TREATMENT	C	L	RISK LEVEL
Site validation	Residual contamination on site	The site would be subject to validation soil sampling to demonstrate that soils/ groundwater on site have not been impacted by the treatment works (with reference to the baseline assessment)	3	D	Moderate
Additional site cleanup, if required	Noise and vibration nuisance	Works per Acoustic and Vibration Assessment	2	C	Moderate
	Inadequate management of contaminated soils	Off site disposal to a licensed waste facility via a licensed transporters	3	D	Moderate
	Use of fuels and atmospheric pollution	All plant/ equipment/ vehicles would be maintained in good working order.	1	A	Moderate
	Odour emissions /Gaseous/ vapour emissions	Per Air Quality Impact Assessment	2	C	Moderate
	Water/ soil pollution during transport of soils	Works per Traffic Management Plan	4	D	High

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