

Scope 3 (upstream and downstream)	-
Total	3130

The total estimated greenhouse gas emissions for the treatment works are considered to be relatively minor in comparison to emissions generated in the surrounding area. Nonetheless it is recommended that the selection process for suppliers to the project include assessment of the emissions in cement production, as the calculated values indicate that the bulk of the emissions generated will result from the production of the material to be used for soil treatment. It is however noted that in the absence of measured data, the assessment has used extremely conservative values in the operating efficiency of cement kilns, and it is likely the actual emissions generated will be lower than the above estimate.

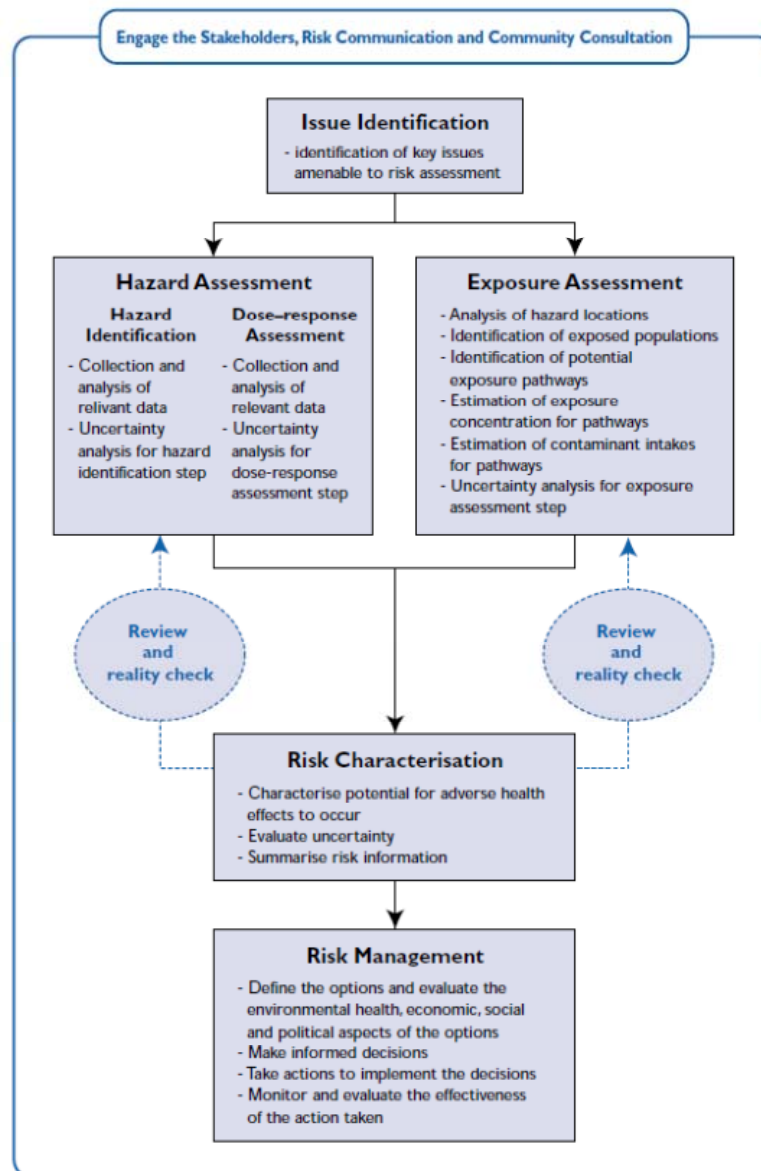
## 9 Health Risk Assessment

A health risk assessment has been additionally undertaken to estimate the potential quantum impact of the potential chemical atmospheric emissions from the material handling works on the Chullora Site on the surrounding population. This has been undertaken by the guidance provided to enHealth (2004) 'Environmental Health Risk Assessment Guidelines for assessing human health risks from environmental hazards'. The HRA has assumed the controls recommended in **Table 7.1** are enforced for the duration of the treatment works at Chullora.

### 9.1 Risk Assessment Process

Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain timeframe. A schematic of the risk assessment process is shown the diagram below (source: enHealth 2004).

- Issue Identification identifies issues amenable to risk assessment and assists in establishing a context for the risk assessment by a process of identifying the problems that the risk assessment needs to address. This includes the selection of Constituents of Potential Concern (COPC's) for the Macdonalldtown Remediation Site and each identified potential exposure population;
- Hazard Assessment including toxicological assessment and dose-response assessment. Toxicological assessment involves determining what types of (adverse) health effects might be caused by the agent; and how quickly the adverse health effects might be experienced and their duration. Dose-response assessment considers both qualitative and quantitative toxicity information to determine 'the incidence of adverse effects occurring in humans at different exposure levels';
- Exposure Assessment involves the determination of the frequency, extent, duration and character of exposures in the past, currently, and in the future. There is also the identification of exposed populations and particularly sensitive sub populations, and potential exposure pathways; and
- Risk Characterisation provides a qualitative and / or quantitative estimate, including attendant uncertainties, of the nature, severity and potential incidence of effects in a given population based on the hazard identification, and exposure assessments.



## 9.2 Issue Identification

Issue identification determines whether risk assessment is useful and establishes a context for the risk assessment by a process of identifying the concerns that the risk assessment needs to address. Issue identification draws on all relevant lines of information.

Issue identification comprises several phases:

1. Identification of environmental health issues (or an individual issue) and determining whether there are hazards amenable to risk assessment. This will involve demarcating 'hazards' from 'issues' and may require environmental sampling;
2. Putting the hazards into their environmental health context (clarification and prioritising of problems and hazards);
3. Identification of potential interactions between agents; and

4. Stating clearly why risk assessment is needed and the scope and objectives of the risk assessment. This will involve identifying problems for which information is, or can be, available to undertake adequate risk assessments and problems which risk assessment cannot assist.

The health risk assessment is required to provide a definitive assessment of the potential health impacts of the air emissions from the works on the Chullora Site to the surrounding potentially exposed community. Several of the potential speciated emissions have known toxicological effects. The most potentially toxic of these have been identified as benzene and benzo(a)pyrene. Risk assessment has considered each of the speciated constituents of benzene and benzo(a)pyrene as identified and quantified by air modelling as being present in the air emissions from the Chullora Site.

### **9.3 Selection of Constituents of Potential Concern**

Constituents of potential concern (COPCs) require to be selected to allow the subsequent risk assessment to be focussed to the most important constituents. This has been undertaken by the air quality assessment identifying benzene and benzo(a)pyrene as the most potentially toxic constituents present in air emissions from the works. Benzene and benzo(a)pyrene have been selected as COPCs for the health risk assessment.

### **9.4 Hazard Assessment**

Enhealth (2002) provides advice as to the quality of toxicological data that is available to be used in risk assessments. Data is categorised as Level 1, 2 or 3 data. Level 1 sources are recommended as the preferred sources of chemical data. Level 1 sources, in the order of preference for which they are recommended to be used, include:

1. National Health and Medical Research Council documents and documents from other joint Commonwealth, State and Territory Health organisations. These may be a source of Australian guidance values. The Australian and New Zealand Environmental and Conservation Council is considered a suitable Commonwealth organisation to be included here;
2. ADI list from the Therapeutic Goods Administration;
3. World Health Organisation (WHO) documents. Australia is a party to the WHO process and has incorporated their material in a variety of environmental health criteria. A range of documents include those from the WHO/ILO/UNEP International Programme on Chemical Safety (IPCS) which produces Environmental Health Criteria monographs and Concise International Chemical Assessment documents (CICADs). Documents detailing international Acceptable Daily Intakes (ADI's), Tolerable Daily Intakes (TDI) or Tolerable Weekly Intakes (TWI) may be found in evaluations by the WHO/FAO Joint Meeting on Pesticide Residues (JMPR) and by the Joint FAO/WHO Expert Committee on Food Additives (JECFA);
4. enHealth Council documents;
5. National Environmental Health Forum documents distributed by the Commonwealth Department of Health and Ageing;
6. International Agency for Research on Cancer (IARC) Monographs;
7. WHO/FAO Joint Meeting on Pesticide Residues (JMPR) Monographs;

8. NICNAS Priority Existing Chemical (PEC) reports;
9. US Agency for Toxic Substances and Disease Registry (ATSDR) documents for general toxicological reviews and Reference Doses;
10. National Toxicology Program (NTP) carcinogenicity appraisals which report in detail the results of carcinogenicity tests on a wide range of chemicals;
11. OECD Standard Information Data Sets (SIDS) and SIDS Initial Assessment Reports (SIAR); and
12. US EPA Reference Doses.

Where a rare substance is being assessed, or insufficient data is available within Level 1 sources, then Level 2 sources may require to be researched. Level 2 sources include:

1. European Centre of Ecotoxicology and Toxicology of Chemicals (ECETOC): Monographs, JACC reports and Technical Reports;
2. Chemical Institute of Toxicology (CIIT) reports; and

Unpublished industry reports submitted for regulatory purposes. These may have restricted availability but information may be available in evaluation reports from regulatory agencies that have reviewed individual reports.

#### 9.4.1 Review of Toxicological Sources

Each of these sources has been reviewed and appropriate toxicological values selected for the potential constituents released from the Chullora Treatment site. These are summarised in **Table 10.1** for non-threshold effects, and **Table 10.2** for threshold effects.

**Table 10.1: Toxicity Criteria for Carcinogenic (Non-Threshold) Endpoints**

Constituent	Inhalation Slope Factor (mg/kg/day) <sup>-1</sup>	Discussion / Comments
Benzene	$2.1 \times 10^{-2}$	Inhalation slope factor based on WHO (2000) 'Air Quality Guidelines for Europe, 2 <sup>nd</sup> Edition' (chapter 5.2) unit risk of $6.0 \times 10^{-6}$ (µg/m <sup>3</sup> ) <sup>-1</sup> .
Benzo(a)pyrene	304	Inhalation slope factor based on WHO (2000) 'Air Quality Guidelines for Europe, 2 <sup>nd</sup> Edition' (chapter 5.9) unit risk of $8.7 \times 10^{-2}$ (µg/m <sup>3</sup> ) <sup>-1</sup> .

**Table 10.2: Toxicity Criteria for Non-Carcinogenic (Threshold) Endpoints**

Constituent	Inhalation ADI, mg/kg/day	Discussion / Comments
Benzene	$2.9 \times 10^{-3}$	Inhalation ADI based on ATSDR (August 2007) 'Toxicological Profile for Benzene' chronic duration inhalation exposure MRL of 10µg/m <sup>3</sup> . More conservative than US EPA IRIS Database (2003) value.

#### 9.5 Exposure Assessment

Potentially exposed populations have been identified by the identification of the discrete receptors in **Table 7.1** and shown on **Figure 4**. This includes properties used for residential, recreational and commercial purposes.

Exposure parameters are required for each of the potentially exposed populations. These are summarised in **Tables 10.3** to **10.6**.

**Table 10.3: Global Parameters –Residential Receptor (Adult & Child) – Nearby Residents**

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	182.5	Assuming treatment works will occur over a 6 month period. Considered upper estimate
Exposure Duration	months	6	Assuming treatment works will occur over a 6 month period. Considered upper estimate
Exposure Time	hours	10	As per duration of excavation activities found to contribute highest levels of COPCs
Body Weight	kg kg kg	13.2 34.5 70	Child 0-5 years, enHealth (2004) Child 6-15 years, Langley & Sobardo (1996) as per NEPC (1999) mean body weight for 10 year old child Adult 16+ years, NEPC (1999)
Averaging Time - non Threshold	years	70	NEPC (1999)
Averaging Time - Threshold	months	12	Minimum duration of threshold toxicological data

**Table 10.4: Global Parameters –Recreational Receptor (Adult & Child) – Strathfield Golf Course**

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	365	enHealth (2004)
Exposure Duration	months	6	Maximum duration of receipt and handling of soils from Macdonaldtown
Exposure Time	hours	2	enHealth (2002)
Body Weight	kg kg kg	13.2 34.5 70	Child 0-5 years, enHealth (2004) Child 6-15 years, Langley & Sobardo (1996) as per NEPC (1999) mean body weight for 10 year old child Adult 16+ years, NEPC (1999)
Averaging Time - non Threshold	years	70	NEPC (1999)
Averaging Time - Threshold	months	12	Minimum duration of threshold toxicological data

**Table 10.5: Global Parameters – Adult Commercial / Industrial Workers**

Exposure Parameter	Units	Factor	Reference
Exposure Frequency	days/year	240	enHealth (2004)
Exposure Duration	months	6	Maximum duration of receipt and handling of soils from Macdonaldtown
Exposure Time	hours	8	enHealth (2004)
Body Weight	kg	70	NEPC (1999)
Averaging Time - non Threshold	years	70	NEPC (1999)
Averaging Time - Threshold	months	12	Minimum duration of threshold toxicological data

**Table 10.6: Inhalation Parameters**

Exposure Parameter	Units	Factor	Reference
Industrial / Commercial Worker (indoors)	m <sup>3</sup> /hour	1.33	Langley & Sobardo (1996) as per NEPC (1999). Based on slow walking and average of males and females.
Adult Residential / Recreational Receptor	m <sup>3</sup> /hour	1.20	enHealth (2004). Average inhalation rate for light activity for an adult male
Child Residential / Recreational Receptor (6-15 years)	m <sup>3</sup> /hour	0.78	enHealth(2004). Average inhalation rate for light activity for 10 year old child.
Child Residential / Recreational Receptor (0-5 years)	m <sup>3</sup> /hour	0.63	Langley & Sobardo (1996). Young children, light activity

Risk modelling has been undertaken as per the guidance in US EPA (1989) 'Risk Assessment Guidance for Superfund, Volume 1 Human Health Evaluation Manual, Part A'. Exposure parameters have been used to estimate adjusted intake concentrations by the use of the following relationship:

$$CDI = (C * IR * ET * EF * ED) / (365 * AT * BW)$$

Where: CDI – chronic daily intake (mg/kg/day);

C – chemical concentration in air (mg/m<sup>3</sup>)

IR – inhalation rate (m<sup>3</sup>/h)

ET – exposure time (h/d)

EF – exposure frequency (day/year)

ED – exposure duration (years)

AT – averaging time (70 years for non threshold, ED for threshold)

BW – body weight (kg)

The modelling has been undertaken by assuming a direct exposure to the worse case 24h concentration of each constituent as base on the mean concentrations, as predicted for each particular receptor, for the complete duration of the works, being six months. This is essentially the assumption that each of the assessed receptors is present downwind of the works for the entire duration of the works.

## **9.6 Risk Characterisation**

### **9.6.1 Risk Measurement**

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen. The slope factor (SF) converts estimated daily intakes averaged over a lifetime of exposure directly to incremental risk of an individual of developing cancer. Because relatively low intakes (compared to those experienced by test animals) occur with exposures on most contaminated sites it can generally be assumed that the dose response relationship is linear in the low-dose portion of the multistage model dose-response curve. Under this assumption the slope factor is constant and risk is directly related to intake. Thus the following linear based carcinogenic risk equation is used:

$$\text{Risk} = \text{CDI} * \text{SF}$$

where: Risk – unitless probability of an individual developing cancer;

CDI – chronic daily intake averaged over 70 years (mg/kg-day); and

SF – slope factor expressed in (mg/kg-day)<sup>-1</sup>.

The slope factor is often an upper 95% percentile confidence limit of the probability of response based on experimental animal data used in the multistage model. Consequently the carcinogenic risk estimate will often be an upper bound estimate (US EPA, 1989).

The measure used to describe the potential for non carcinogenic toxicity to occur in an individual is not expressed as the probability of an individual suffering an adverse effect. Instead the potential for non carcinogenic effects is evaluated by comparing an exposure level over a specific time period with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient and is calculated as:

$$\text{Noncancer hazard quotient} = E / \text{RfD}$$

where: E – exposure level (or intake); and

RfD – reference dose (E and RfD are expressed in the same units (US EPA, 1989).

At most sites the potential health effects of more than one chemical require to be assessed. Potential additive effects of exposure to multiple chemicals require to be considered in risk assessment. US EPA (1989) recommends that carcinogenic risks are added.

To assess the overall potential for non-carcinogenic effects posed by more than one chemical a hazard index approach is used. This is undertaken by summing of all hazard quotients to determine a hazard index.

### 9.6.2 Adopted Risk Criteria

Acceptable risk guidelines are available from a range of national and international environmental agencies. These include:

- US EPA (1991) states that "Where the cumulative site risk to an individual based on an reasonable maximum exposure for both current and future land use is less than  $10^{-4}$ ,.... action is generally not warranted unless there are adverse environmental impacts". Where the level of risk exceeds  $10^{-4}$  it is recommended that remediation goals are developed based on a  $10^{-6}$  cancer risk;
- WHO (1996) 'Guidelines for Drinking Water Quality' are based on a risk of 1 in 100,000 ( $1 \times 10^{-5}$ ); and
- NHMRC/ARMCANZ (1996) 'Australian Drinking Water Guidelines' nominate a negligible level of risk of 1 in 1,000,000 ( $1 \times 10^{-6}$ ).

No formal policy exists for the acceptable level of cancer risk, however it has been the experience of JBS that NSW, ACT and Victorian Environmental Auditors generally consider risks in the range of 1 in 100,000 ( $1 \times 10^{-5}$ ) to be acceptable. This level of acceptable risk will be adopted for the Works.

*For the purposes of this risk assessment an acceptable level of risk is defined as risk less than  $1 \times 10^{-5}$  incremental lifetime risk of cancer.*

### 9.6.3 Risk Estimates

Incremental risks and hazard indexes have been summed for each of the discrete receptors and are summarised in **Table 10.6**. Risk calculations have been undertaken on the basis of the following constituent levels at the receptor locations:

- Benzo(a)pyrene:  $1.22 \times 10^{-3}$  to  $1.7 \times 10^{-2} \mu\text{g}/\text{m}^3$ ; and
- Benzene:  $8.96 \times 10^{-4}$  to  $8.26 \times 10^{-3} \mu\text{g}/\text{m}^3$ .

The concentrations selected were the highest 24 hour averaging time concentrations reported at any receptor location and are based on:

- The 'annual' level of total suspended particulate as predicted for the treatment site with air quality controls applied; and
- All emissions from both soil treatment within the enclosure and stockpiling / handling of soils external to the enclosure (variable and fugitive) for a full six month period.

With respect to exposure frequency and duration, these values were based on a maximum 10 hour working day and the likely duration of 6 months work on the treatment site. The highest concentration reported at each receptor location was used for the combined sources. This is considered to be a conservative assessment of the likely risk noting that while material may be received and stockpile on the site over a six month period, it is likely that treatment works will be restricted to a period of four to six weeks.

Hazard index and risk level calculations based on the highest reported receptor location concentration are provided in **Appendix G** and summarised in **Table 10.7**.



**Table 10.7: Summary of Risk and Hazard Estimates**

Receptor ID	Location	Hazard Index	Risk <sup>1</sup>
1	29-31 Marlene Cres Greenacre	1.58 E-04	3.97 E-06
2	5-9 Marlene Cres Greenacre	1.33 E-04	3.53 E-06
3	Strathfield Golf Course, south west corner	2.36 E-04	8.06 E-06
4	47 Hume Hwy Chullora	1.12 E-04	1.96 E-06
5	Beaufort Pl Chullora	3.69E-05	6.32 E-07
6	Chullora Railway Workshops	4.69 E-04	8.61 E-06

Note: 1 risk as reported for child 0-5 years

Assuming the proposed controls (**Table 8.2**) are maintained each of the predicted levels of hazard and risk levels is well below the adopted criteria.

## 10 Conclusions and Recommendations

An assessment of the potential air quality impacts of material handling works at the eastern portion of the RailCorp Chullora Workshops as associated with the remediation of the Macdonaldtown former gasworks has been undertaken. The objectives of this air quality assessment were to:

- Estimate potential air emissions including particulates, potential chemical constituents and odours from the proposed remediation works;
- Undertake dispersion modelling of air emissions to determine 'worst case' potential impacts to nearby receptors and adjoining properties;
- Identify the requirement and type of air emission controls required on the basis of predicted worse case impacts;
- Assess the effectiveness of proposed air emission controls;
- Undertake a health risk assessment to determine potential health impacts of speciated chemical constituents identified as occurring from the works to nearby receptors and adjoining properties;
- Based on results of air modelling, assess compliance with relevant DECCW and NEPC published criteria; and
- Estimate the greenhouse contribution of the proposed works.

A range of activities that may be undertaken with the material handling works at the Chullora site has been considered in the air quality assessment including:

- Handling and stockpiling of coal tar contaminated soils;
- Movement of site vehicles over non-paved site haulage roads;
- Treatment of coal tar contaminated soils by stabilisation / immobilisation; and/or
- Treatment of coal tar contaminated soils by bioremediation.

The assessment has been completed by undertaking air modelling to determine worst case impacts for a range of representative receptor locations in close proximity of the site. A number of conservative assumptions, including the complete absence of any air quality controls, have been assumed in the air modelling to ensure the reporting of worse case impacts. Modelling results have been compared to DECCW published and endorsed air quality criteria.

Potential exceedances of air quality criteria have been identified by the modelling:

- Exceedances of particulates criteria for receptors in close proximity of the site from dust emissions associated with a haul road that spans the length of the treatment area; and
- Exceedances of odour criteria for all receptors where large quantities of coal tar contaminated soils are stockpiled / handled / bioremediated on the site.

On the basis of the modelling results the following air quality controls require implementation to allow compliance with DECCW air quality criteria:

- Water is regularly applied to haul roads traversing the site at hourly intervals throughout during periods of significant vehicle movement;

- The extent of exposed coal tar impacted soils requires to be minimised to a surface area of 150m<sup>2</sup>. Other coal tar impacted soils stockpiled / bioremediated on the site require to be covered to prevent odour emissions;
- The extent of the area likely to generate cement dust emissions requires to be minimised to a surface area of 150m<sup>2</sup>. Other areas where cement materials are to be stored require to be covered to prevent particulate emissions;
- An odour suppression system is maintained at the entire treatment area boundary throughout the duration of the stockpiling / handling of coal tar contaminated soils on the site;
- An odour suppression agent is applied to exposed surfaces of coal tar impacted soils; and
- An atmospheric monitoring program is undertaken throughout the duration of the material handling works.

Notwithstanding the implementation of these air quality controls, it is considered likely that localised detections of coal tar odours will occur in close proximity of the site for the duration of the works. The level of impact from odours adopting these best practices is not considered to be offensive. The program of odour controls proposed are considered to be best practice, and while they may not be capable of completely eliminating odours, they will be sufficient to reduce the duration of odour releases and provide a framework for monitoring and refining the odour management during remediation. The Human Health Risk Assessment has also shown that the proposed works will not pose an unacceptable risk to the health of nearby receptors.

An Air Quality Management Plan (AQMP) detailing the requirements for the aforementioned controls and monitoring requirements has been prepared for the remediation program. The proposed controls are considered to be best practice for the proposed remediation works. The recommended controls above are identified as having a 'High' relative effectiveness (USEPA, 1991). Enclosures of soil handling works, with collection and treatment of air emissions, has been demonstrated as effective in protecting the surrounding community on other sites heavily impacted with tar (USEPA 1992).

Greenhouse gas emissions associated with the proposed works were assessed. While the proposed remediation strategy will generate some greenhouse gases from standard fuel based emissions, the controls proposed in the Air Quality Management Plan for the project will reduce the magnitude of these emissions and minimise the associated fugitive emissions. The total quantities of emissions were considered to be relatively minor in relation to the roads surrounding the site, however significant reductions in can be achieved by assessing energy efficiency in the production of materials used for stabilisation.

## 11 References

- ASTM (2002) 'Standard Guide for Risk Based Corrective Action Applied at Petroleum Release Sites'
- Australian Oil Industry Environmental Guidelines Working Group (April 1999) 'Guidelines for the Management of Petroleum Hydrocarbon Impacted Land'
- Australian Railway Historical Society (June 2003) 'A Brief History of NSW Railway Gasworks'
- Banksia Heritage & Archaeology 'Macdonaldtown Station Works – Archaeological Assessment'
- CH2M Hill (June 2000) 'Phase I & II Environmental Site Assessments'
- CH2M Hill (November 2000) 'Vegetable, Soil and Sediment Sampling – Letter Report'
- CH2M Hill (December 2001) 'Soil and Groundwater Investigations of the former Gasworks Area and Offsite'
- CH2M Hill (March 2007) 'Delineation & Characterisation Sampling and review of Remedial Options'
- CH2M Hill (December 2007) 'Remedial Action Plan'
- CO2 Solution Inc (2010) Process and a plant for the production of Portland cement clinker, OSDIR patents archive, <http://osdir.com/patents/Compositions-coating/Process-plant-production-Portland-cement.html> (as at 16 August 2010).
- DEC (2005) 'Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW'
- DEC (2006) 'Action for Air – the NSW Government's 25-year Air Quality Management Plan'
- DEC (2006) 'Assessment and management of odour from stationary sources in NSW'
- Department of Climate Change and Energy Efficiency (2010a) *National Greenhouse and Energy Reporting (Measurement) Technical Guidelines June 2010*.
- Department of Climate Change and Energy Efficiency (2010b) *National Greenhouse Accounts (NGA) Factors July 2010*.
- Egis Consulting (July 2001) 'Notice of Intention for Demolition and Earthworks Former Platypus Site Neutral Bay, North Sydney'
- GHD (September 2005) 'Macdonaldtown Triangle (Former Cleaning Sheds) – Delineation and Classification Sampling'
- GRI (1996) 'Management of Manufactured Gas Plant Sites'
- Heritage Concepts (November 2006) 'Archaeological Assessment and Remediation Management Strategy'
- JBS Environmental (February 2010) 'Air Quality Assessment and Management Plan Remediation Works Australia Post Alexandria 26-100 Broadway Sydney NSW'
- NEPC (1998) 'National Environment Protection (Ambient Air Quality) Measure'
- NEPC (1999) 'Emissions Estimation Technique Manual for Aggregated Emissions from Paved and Unpaved Roads'

NEPC (1999) 'Emission Estimation Technique Manual for Fugitive Emissions'

NEPC (1999) 'Emission Estimation Techniques Manual for Railway Yard Operations'

NEPC (2001) 'Emission Estimation Technique Manual for Mining Version 2.3'

NSW EPA (1995) 'Sampling Design Guidelines'

New Zealand Ministry for the Environment (1999) 'Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand'

Rail Services Australia (November 1999) 'Eveleigh Gasworks – Site History';

Sinclair Knight Merz (April 2006) 'Macdonaldtown Triangle (Former Gasworks Site) – Human Health and Ecological Risk Assessment'

USEPA Superfund, Office of Emergency and Remedial Response (1991) '*Engineering Bulletin: Control of Air Emissions From Materials Handling During Remediation*' EPQ/540/2-91/023, October 1991

## 12 Limitations

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

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

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

## Figures



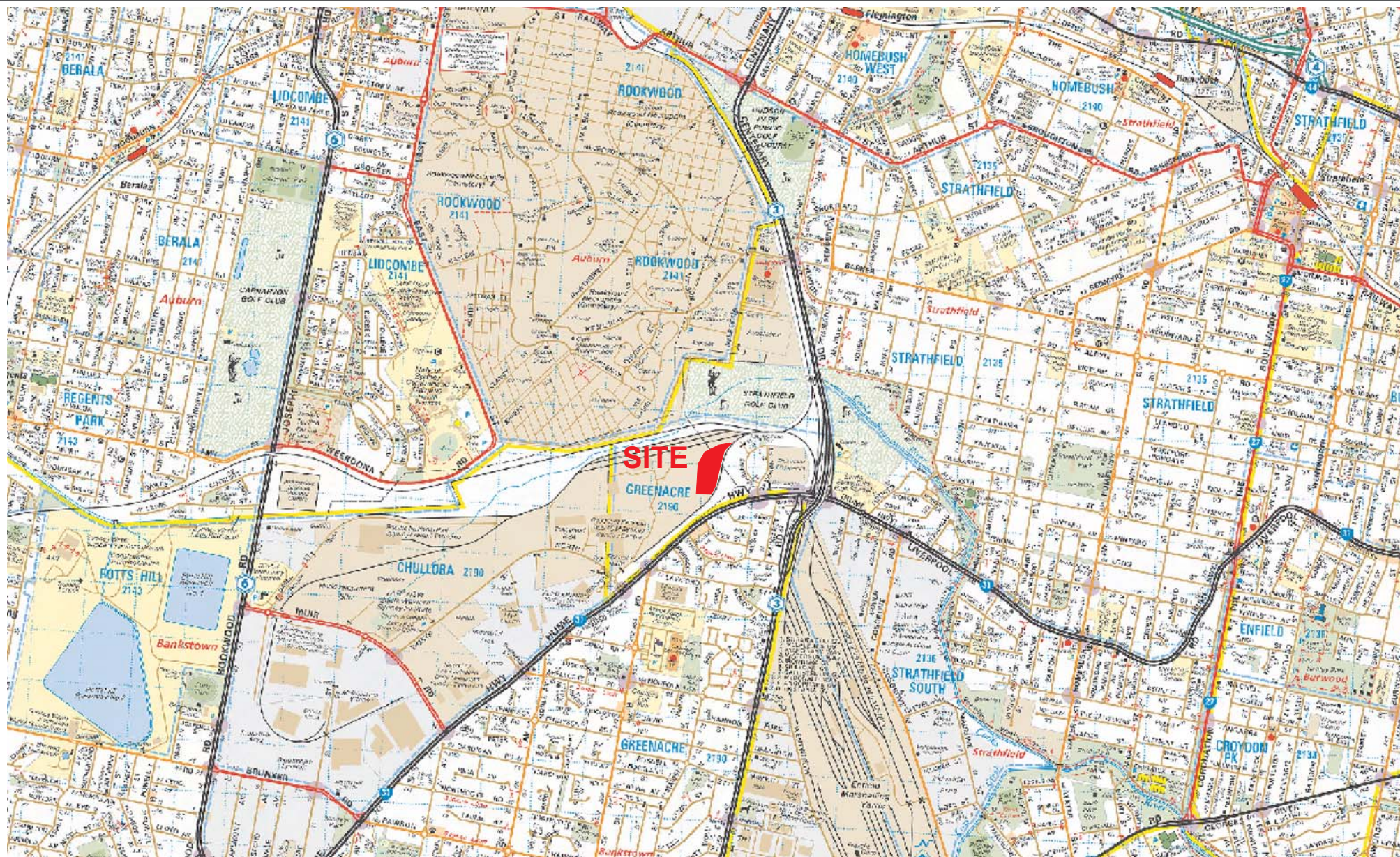


Figure 1 Site Location (Chullora)





0 50m  
Approximate scale

Figure 2 **Chullora Site Plan**

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

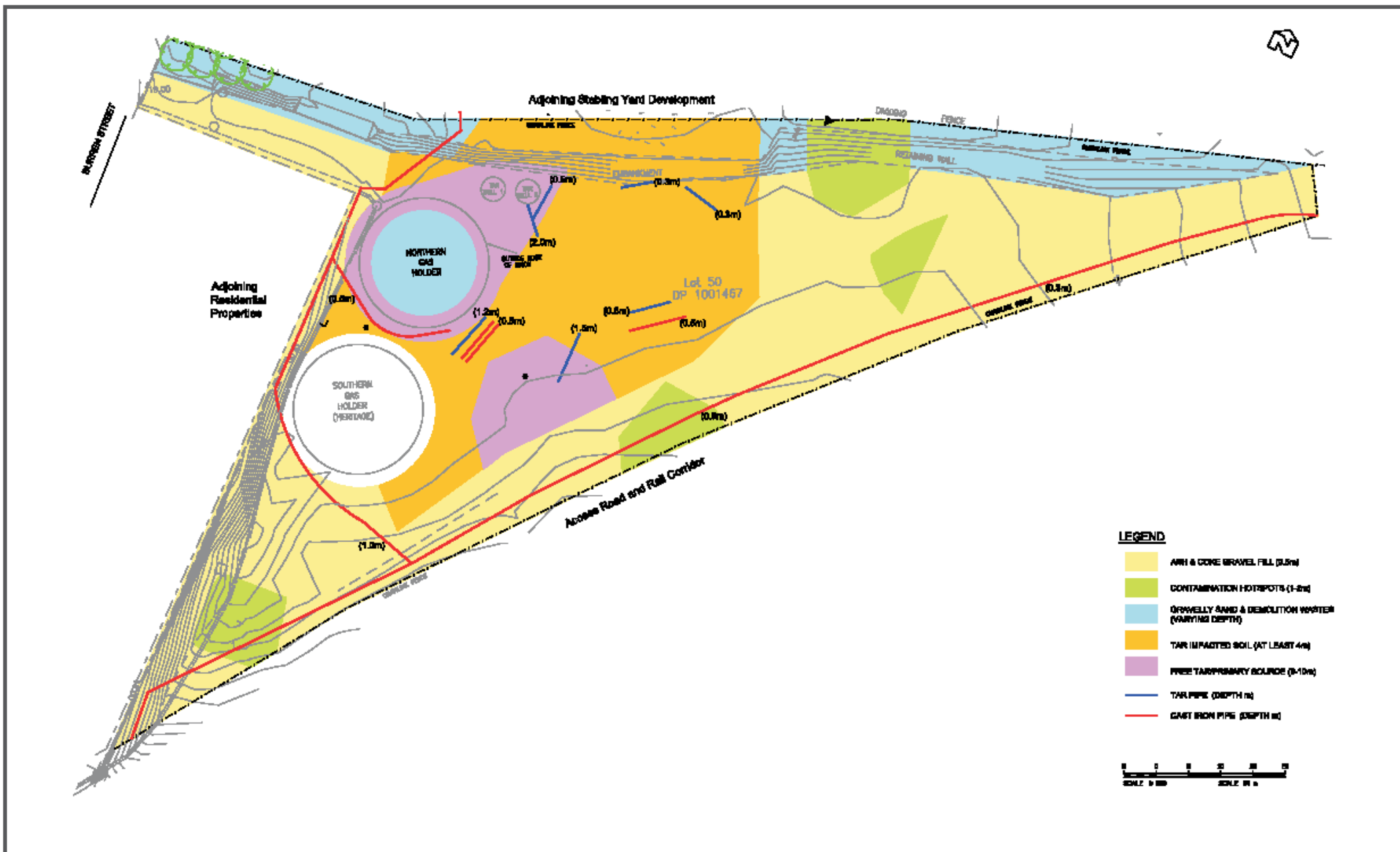


Figure 3 Macdonaldtown Remediation Plan





Source: Base Image - © 2011 Lynton Surveyors Pty Ltd - 2011C107\_DET.dwg

©2011 JBS Environmental Pty Ltd

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

<b>Legend:</b>	
<span style="border-bottom: 1px dashed red;"></span>	New Temporary Fence
<span style="background-color: #90EE90; border: 1px solid black;"></span>	Air Treatment System
<span style="background-color: #ADD8E6; border: 1px solid black;"></span>	Temporary Enclosure
<span style="background-color: #FFDAB9; border: 1px dashed orange;"></span>	Area for Stockpiling
<span style="border: 2px dashed red;"></span>	Decontamination Area / Wheel Wash



**Figure 4: Proposed Chullora Treatment Area Setup**

Client: Incoll Management

Project: RailCorp Macdonaldtown Approvals

Job No: 40913

File Name: 40913\_02

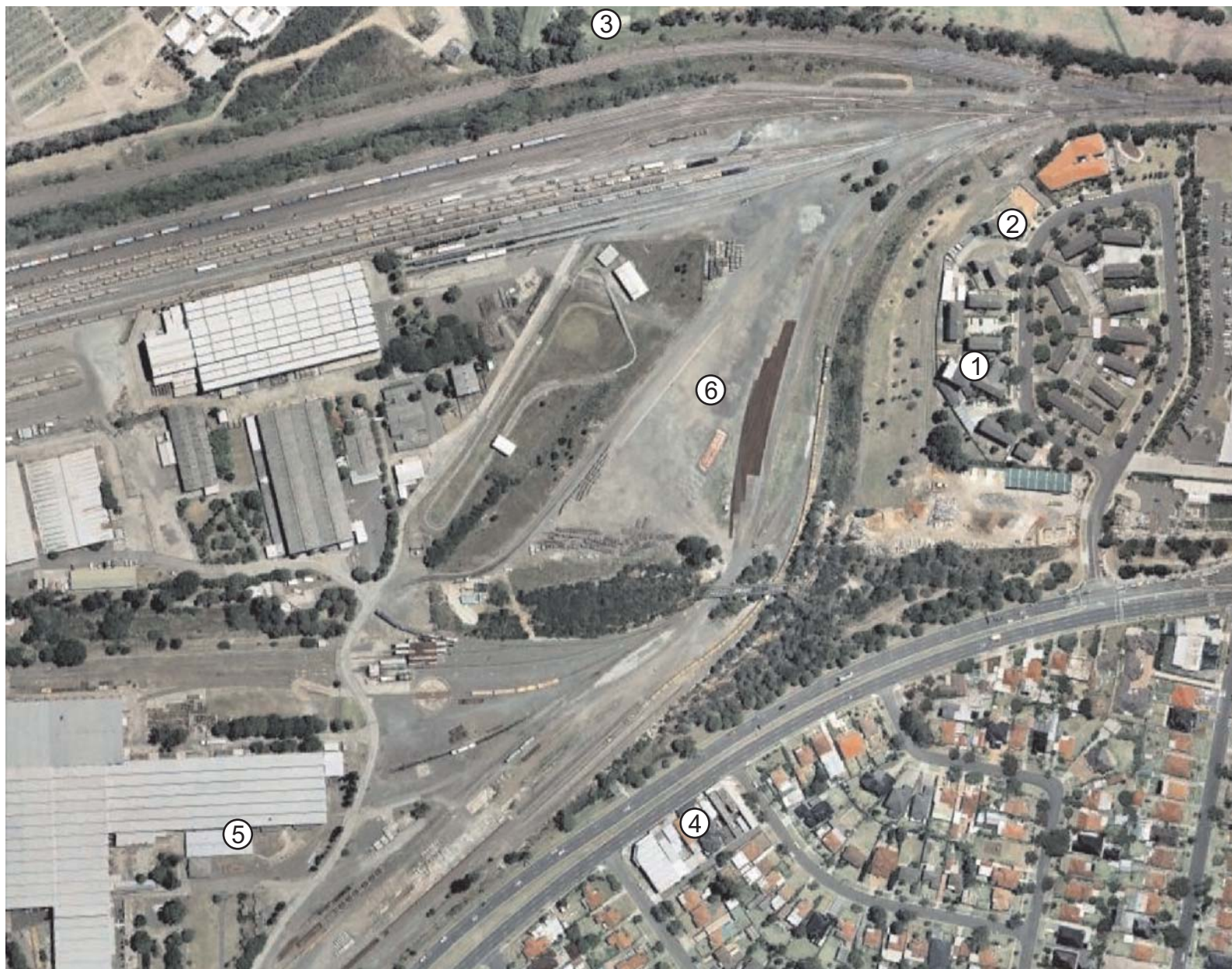
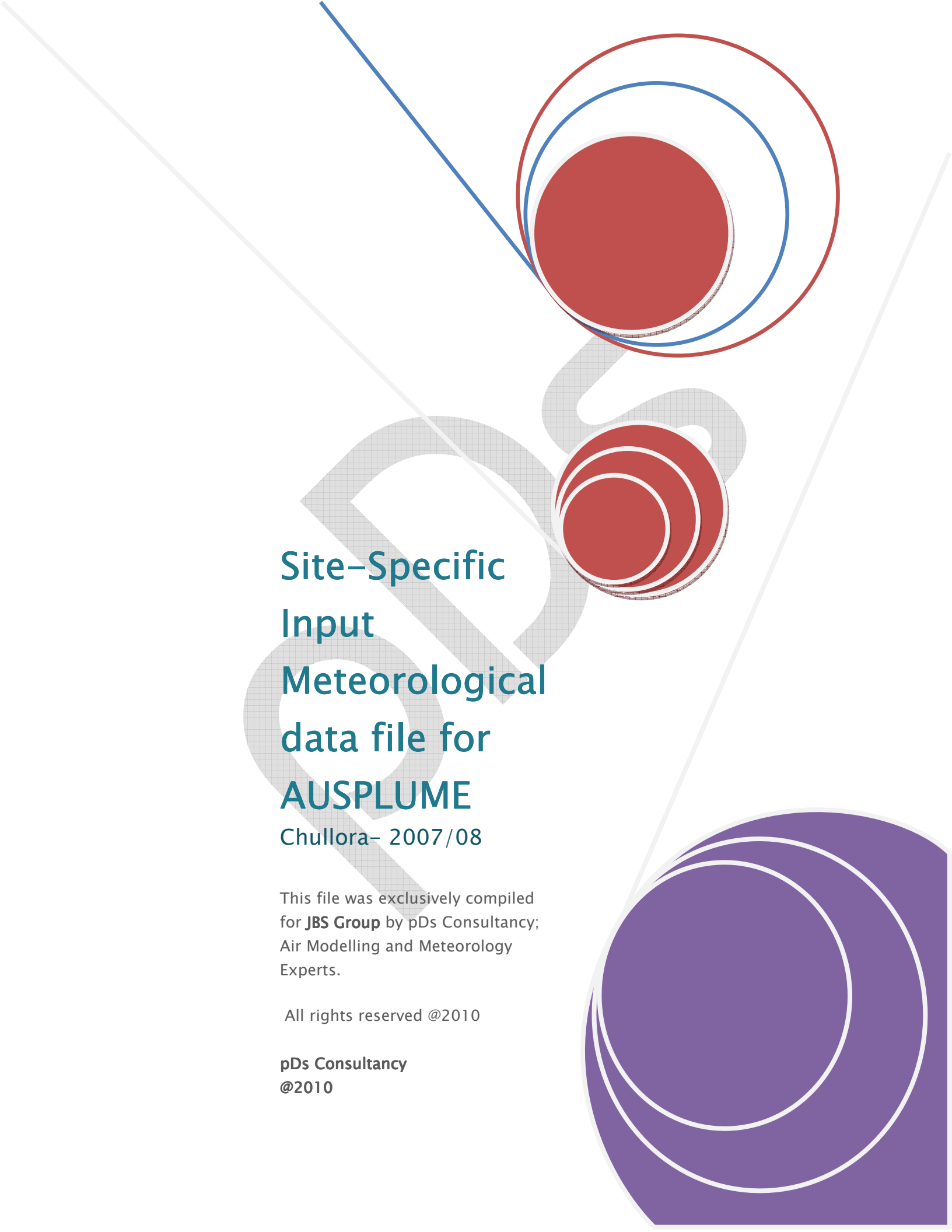


Figure 5 **Location of Receptors in Proximity of Site**



**Appendix A**  
**Report on Meteorological Data**



# Site-Specific Input Meteorological data file for **AUSPLUME**

Chullora– 2007/08

This file was exclusively compiled  
for **JBS Group** by pDs Consultancy;  
Air Modelling and Meteorology  
Experts.

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@2010



# Introduction

Some air quality assessments are demanding site-specific meteorological data to assess the impact using Gaussian plume models. This data should represent the area of concern (near source) and the meteorological parameters should characterise the transport and dispersion conditions.

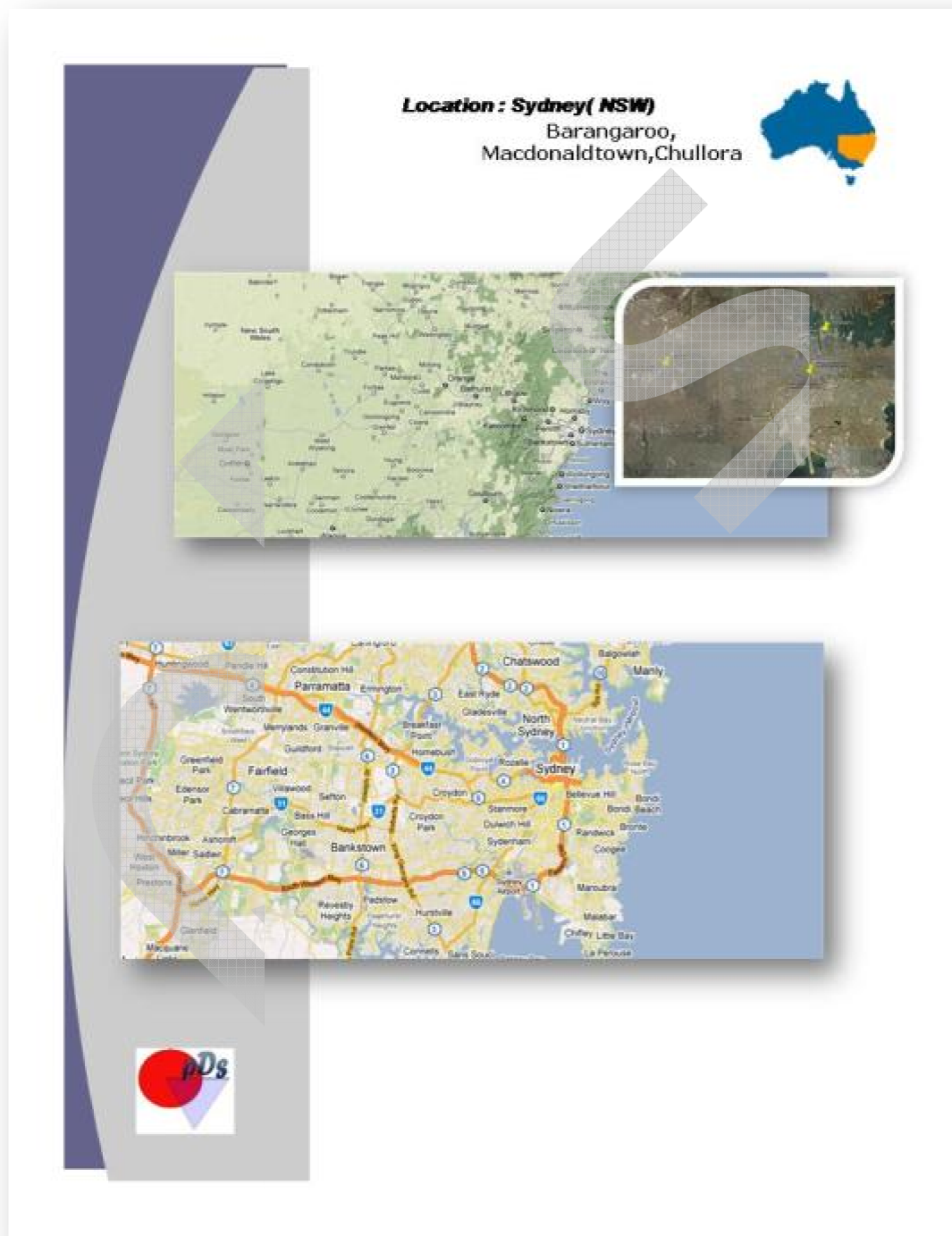
Meteorological input is crucial in Gaussian plume modelling. Therefore compilation of input meteorological data files should be done meeting the procedures and algorithms set by environment regulators. It is always preferred to collect mandatory data such as wind speed, direction, sigamatheta (Calculated from Wind Direction measurements) and ambient temperature onsite. And again instrumentations and siting should meet Australian Standard (AS2923 –ambient air guide for measurement of horizontal wind for air quality applications).

Unfortunately, there were no meteorological data collecting stations in the vicinity of the location **Chullora in NSW**. So it was decided to generate AUSPLUME type meteorological data file running prognostic meteorological module in TAPM (The Air Pollution Model developed by CSIRO, Australia). Two year long data is requested and latest available 2007 and 2008 Synoptic (Source CSIRO/BoM) data were used to initialise the model for simulations.





LOCATION:







The AUSPLUME type meteorological data for **Chullora, NSW** was generated running TAPM in the following manner

- in 3 nested grids, inner most grid with 1000m resolution.
- with high resolution topography (9 second DEM).
- verifying vegetation and soil type match with interested area–**Chullora**.

–Strictly followed DECCW set procedure.

## ANALYSIS

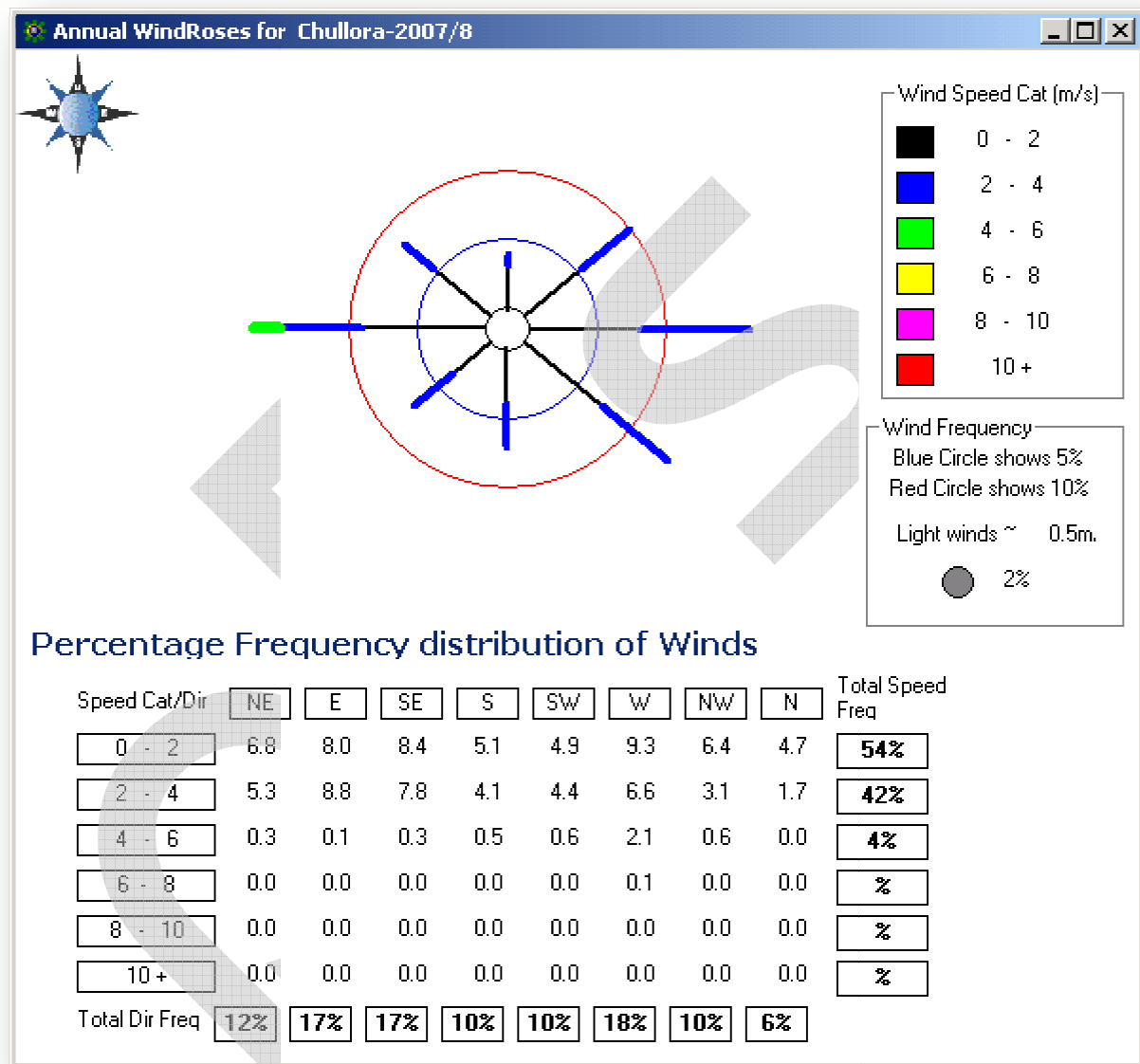
### DATA COVERAGE

Season	No. of Days	Percentage
Summer (181 days)	181	100%
Autumn (184 days)	184	100%
Winter(184 days)	184	100%
Spring (182 days)	182	100%
Annual (365/6 days)	365/366	100%

All seasons are very well represented.

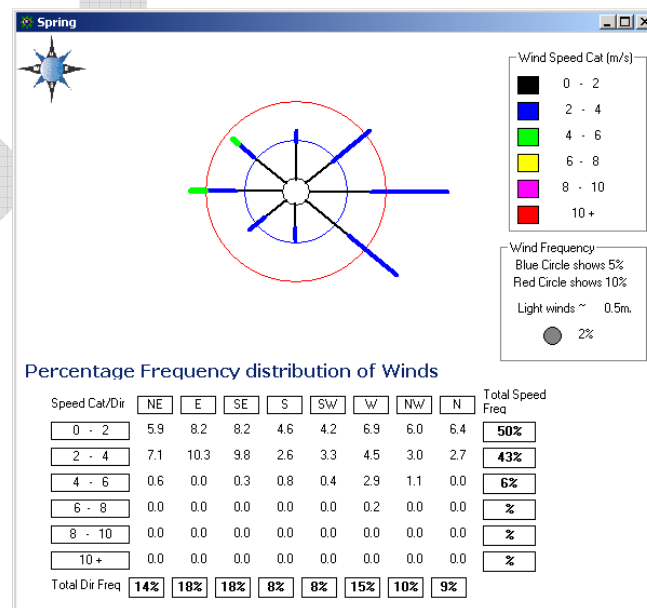
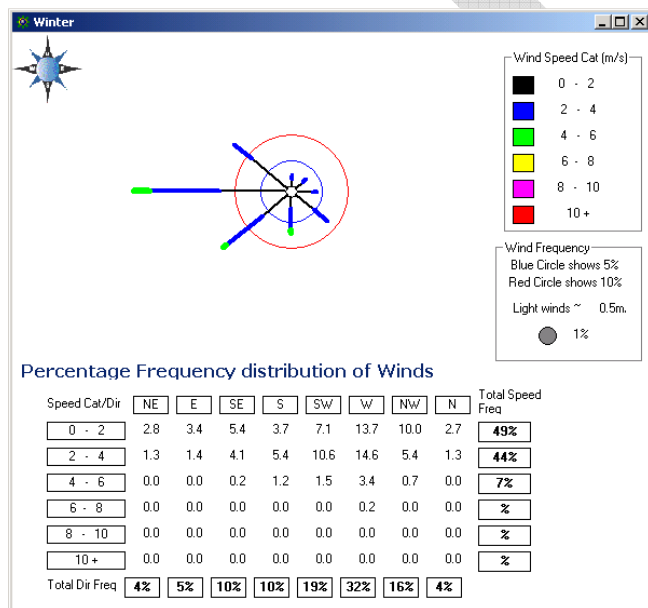
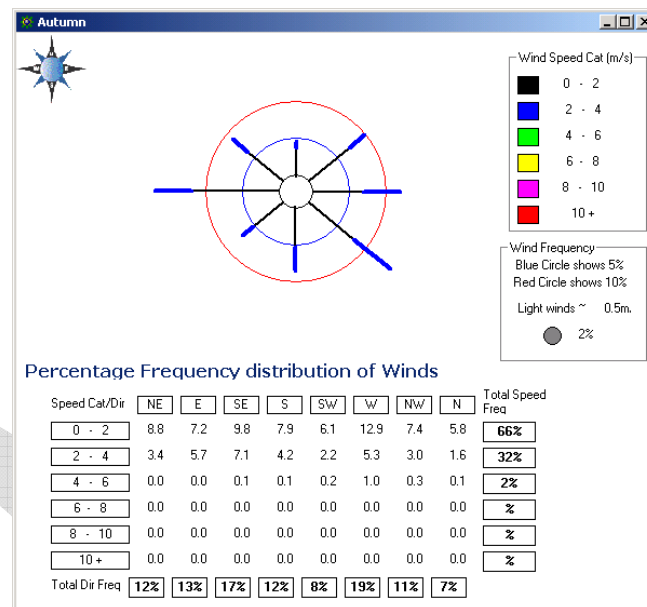
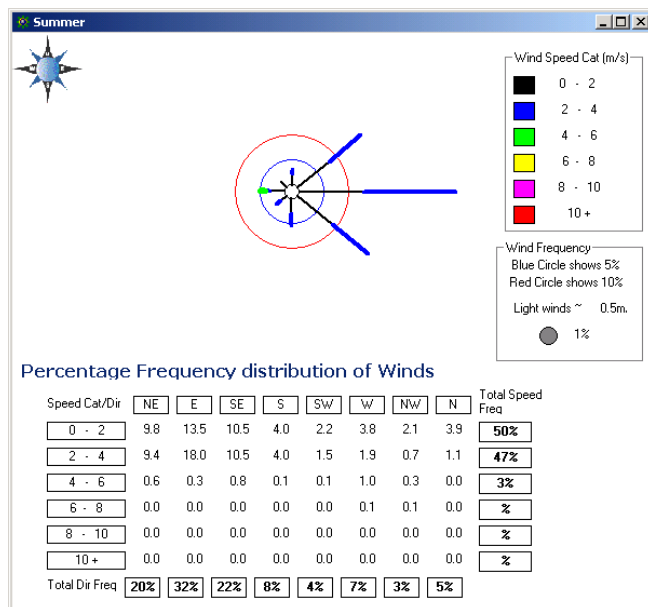


## ANNUAL WINDROSES





## SEASONAL WINDROSES





## ANNUAL STABILITY DISTRIBUTION

<b>Stability Category</b>	<b>% Distribution</b>	<b>Avg Wind Speed</b>	<b>Avg Temperature</b>	<b>Avg Mixing Height</b>
<b>A</b>	14	2.4	22.2	960
<b>B</b>	20	3.	21.2	814
<b>C</b>	16	2.5	18.3	565
<b>D</b>	33	1.5	16.3	246
<b>E</b>	10	1.6	15.7	231
<b>F</b>	8	1.9	18.7	254



STATISTICS OF CHULLORA (NSW) INPUT METEOROLOGICAL DATA FILE-2007/08

STAB Cat	Stat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A	Max of Temp	34.0	31.0	35.0	27.0	27.0	21.0	21.0	26.0	29.0	33.0	32.0	33.0	35.0
	Min of Temp	20.0	18.0	19.0	15.0	13.0	12.0	11.0	12.0	11.0	13.0	18.0	19.0	11.0
	Average of Temp	26.5	26.0	26.2	22.5	20.2	17.1	15.4	17.2	19.6	22.6	24.1	25.7	23.2
	Max of WS	3.4	3.4	3.4	3.4	3.4	1.9	3.4	3.4	3.4	3.4	3.4	3.4	3.4
	Min of WS	0.5	0.8	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.9	0.5	0.5
	Average of WS	2.7	2.7	2.5	1.9	1.6	1.3	1.9	2.1	2.3	2.3	2.6	2.4	2.3
	Max of MixH	2334	1994	2240	1866	1960	1246	1679	1994	2043	2981	2462	2493	2981
	Min of MixH	194	195	208	223	268	324	243	214	206	219	188	222	188
	Average of MixH	819	869	827	949	880	736	968	1074	1093	951	853	927	912
B	Max of Temp	37.0	31.0	34.0	28.0	27.0	22.0	23.0	26.0	32.0	35.0	32.0	33.0	37.0
	Min of Temp	17.0	16.0	15.0	11.0	10.0	10.0	7.0	9.0	12.0	11.0	16.0	16.0	7.0
	Average of Temp	24.8	23.4	23.4	20.6	19.2	16.3	15.1	16.4	18.8	22.0	22.3	23.8	21.0
	Max of WS	4.8	4.4	4.5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
	Min of WS	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.5	0.7	0.5	0.6	0.5	0.5
	Average of WS	3.1	2.7	2.6	2.4	2.3	2.6	2.8	3.0	3.0	3.0	3.1	3.1	2.9
	Max of MixH	2992	1839	2330	1994	1994	1496	1994	2493	2493	2621	2867	2860	2992
	Min of MixH	113	76	102	89	110	121	109	92	110	93	80	98	76
	Average of MixH	710	687	839	794	802	791	917	1040	998	770	723	823	816
C	Max of Temp	36.0	30.0	33.0	28.0	27.0	22.0	22.0	25.0	32.0	35.0	30.0	32.0	36.0
	Min of Temp	15.0	15.0	13.0	9.0	10.0	8.0	6.0	7.0	8.0	9.0	14.0	16.0	6.0
	Average of Temp	21.6	21.3	21.1	18.2	17.7	15.0	13.2	14.2	16.7	18.9	18.9	21.3	18.1
	Max of WS	3.8	3.6	4.0	5.3	5.0	5.5	6.2	5.4	5.9	6.3	6.3	6.4	6.4
	Min of WS	0.5	0.6	0.5	0.5	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.5	0.5
	Average of WS	2.2	2.0	2.0	2.0	1.9	2.4	2.7	2.6	2.6	2.5	2.4	2.6	2.4
	Max of MixH	1968	1440	1856	1994	1496	1496	1994	1994	2493	2992	2441	2992	2992
	Min of MixH	50	50	50	50	50	50	50	50	50	50	50	50	50
	Average of MixH	315	302	362	431	446	478	567	651	633	567	511	488	479
D	Max of Temp	31.0	29.0	32.0	28.0	26.0	22.0	21.0	25.0	31.0	33.0	29.0	29.0	33.0
	Min of Temp	14.0	15.0	12.0	9.0	8.0	7.0	5.0	6.0	7.0	9.0	12.0	14.0	5.0
	Average of Temp	20.4	20.3	19.5	17.2	14.9	13.2	11.0	11.9	14.0	17.0	17.6	19.1	16.2
	Max of WS	4.0	3.1	4.2	3.7	4.5	5.8	6.0	6.4	5.1	5.3	6.0	4.6	6.4
	Min of WS	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Average of WS	1.4	1.2	1.3	1.4	1.3	1.9	1.9	1.8	1.7	1.5	1.4	1.4	1.5
	Max of MixH	1625	1032	1711	1994	1264	1347	1541	1994	2853	2207	2614	2438	2853
	Min of MixH	50	50	50	50	50	50	50	50	50	50	50	50	50
	Average of MixH	217	197	192	182	161	266	272	284	269	223	244	212	225
E	Max of Temp	28.0	25.0	31.0	21.0	22.0	21.0	20.0	19.0	24.0	26.0	24.0	25.0	31.0
	Min of Temp	17.0	16.0	15.0	13.0	11.0	9.0	8.0	8.0	10.0	11.0	13.0	15.0	8.0
	Average of Temp	20.9	19.9	20.6	17.4	15.6	13.3	12.1	12.0	13.8	16.6	18.1	19.4	15.7
	Max of WS	2.8	2.2	2.5	3.4	4.4	5.0	4.7	5.0	4.5	4.3	4.9	4.5	5.0
	Min of WS	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.5	0.8	0.8	0.5
	Average of WS	1.5	1.5	1.5	1.4	1.6	2.3	2.0	2.0	1.6	1.6	1.5	1.7	1.7



## Site-Specific Input Meteorological data file for AUSPLUME

F	Max of MixH	399	314	919	1586	1117	997	1246	1496	1196	997	997	1271	1586
	Min of MixH	50	96	50	50	50	50	50	50	50	50	50	50	50
	Average of MixH	201	167	198	179	197	296	355	281	235	232	219	228	245
	Max of Temp	30.0	24.0	26.0	24.0	23.0	19.0	19.0	22.0	28.0	28.0	26.0	26.0	30.0
	Min of Temp	19.0	20.0	20.0	17.0	14.0	10.0	10.0	10.0	13.0	12.0	17.0	16.0	10.0
	Average of Temp	23.4	21.9	20.9	19.9	17.3	13.9	14.0	15.0	17.6	19.4	20.4	21.1	17.8
	Max of WS	2.7	2.3	2.1	2.9	3.3	3.5	3.5	3.4	3.5	3.1	2.6	3.5	3.5
	Min of WS	1.1	1.6	1.1	1.0	1.2	1.2	1.1	1.0	1.0	1.1	1.5	1.1	1.0
	Average of WS	1.8	1.9	1.6	2.0	2.0	2.3	2.1	2.0	1.9	1.8	2.0	2.1	2.0
	Max of MixH	499	381	199	575	997	1246	1323	1305	1494	781	275	1240	1494
	Min of MixH	50	199	64	50	100	100	99	50	50	50	100	50	50
	Average of MixH	227	263	157	258	368	368	417	321	323	194	196	274	292



## DISCLAIMER

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## **Appendix B**

### **Air Quality Management Plan**





# **Air Quality Management Plan**

Remediation of Former Macdonaldtown  
Gasworks – Chullora Material Receipt  
Facility

Incoll Management Pty Ltd

On behalf of  
Rail Corporation NSW

RailCorp Chullora Workshops  
Off Worth St  
CHULLORA, NSW

August 2011  
JBS40913-16613 Revision C  
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# **Air Quality Management Plan**

Remediation of Former Macdonaldtown  
Gasworks – Chullora Material Receipt Facility

Incoll Management Pty Ltd

On behalf of  
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Figure 1 – Location of Site

Figure 2 – Site Layout

Figure 3 – Proposed Treatment Area Setup

### Appendices

Appendix A – Air Quality Management Procedures

## List of Abbreviations

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

- As Arsenic
- Cd Cadmium
- Cr Chromium
- Cu Copper
- BTEX Benzene, Toluene, Ethylbenzene and Xylenes
- B(a)P Benzo (a) pyrene
- DECCW NSW Department of Environment, Climate Change and Water
- DQO Data Quality Objectives
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- OCP Organochlorine Pesticide
- SAR Site Audit Report
- SAS Site Audit Statement
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- TPH Total Petroleum Hydrocarbons (C<sub>6</sub>-C<sub>9</sub> and C<sub>10</sub>-C<sub>36</sub>)
- Zn Zinc

# 1 Introduction

## 1.1 Introduction and Objectives

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

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

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

An Air Quality Impact Assessment<sup>1</sup> (AQIA) has been prepared for the use of a nominated area at CRW for treatment of contaminated soils from the Macdonaldtown site. The AQIA assessed a range of potential sources likely to generate air emissions into the surrounding area. It was assessed that unacceptable levels of air pollutants will not occur at the surrounding areas during the treatment works where a range of control and monitoring provisions are implemented on the site. The AQMP has been prepared to document the recommended control and monitoring works as identified by the AQIA.

## 1.2 Site Identification

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

**Table 2.1 Summary Site Details**

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

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

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

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

### 1.3 Current Site Condition

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

### 1.4 Surrounding Landuse

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

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

### 1.5 Purpose

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

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

### 1.6 Responsibilities

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

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

## 1.7 Proposed Works on the Site

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

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

**Table 1.1: Summary of Remediation Volumes**

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

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

## 1.8 Identification of Potential Air Emissions

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

**Table 1.2: Summary of Air Emissions**

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

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

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

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

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

## 1.9 Environmental Procedures

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

**Table 1.3: Summary of Air Quality Management Procedures**

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

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



## 2 Limitations

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

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

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

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

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

## Figures



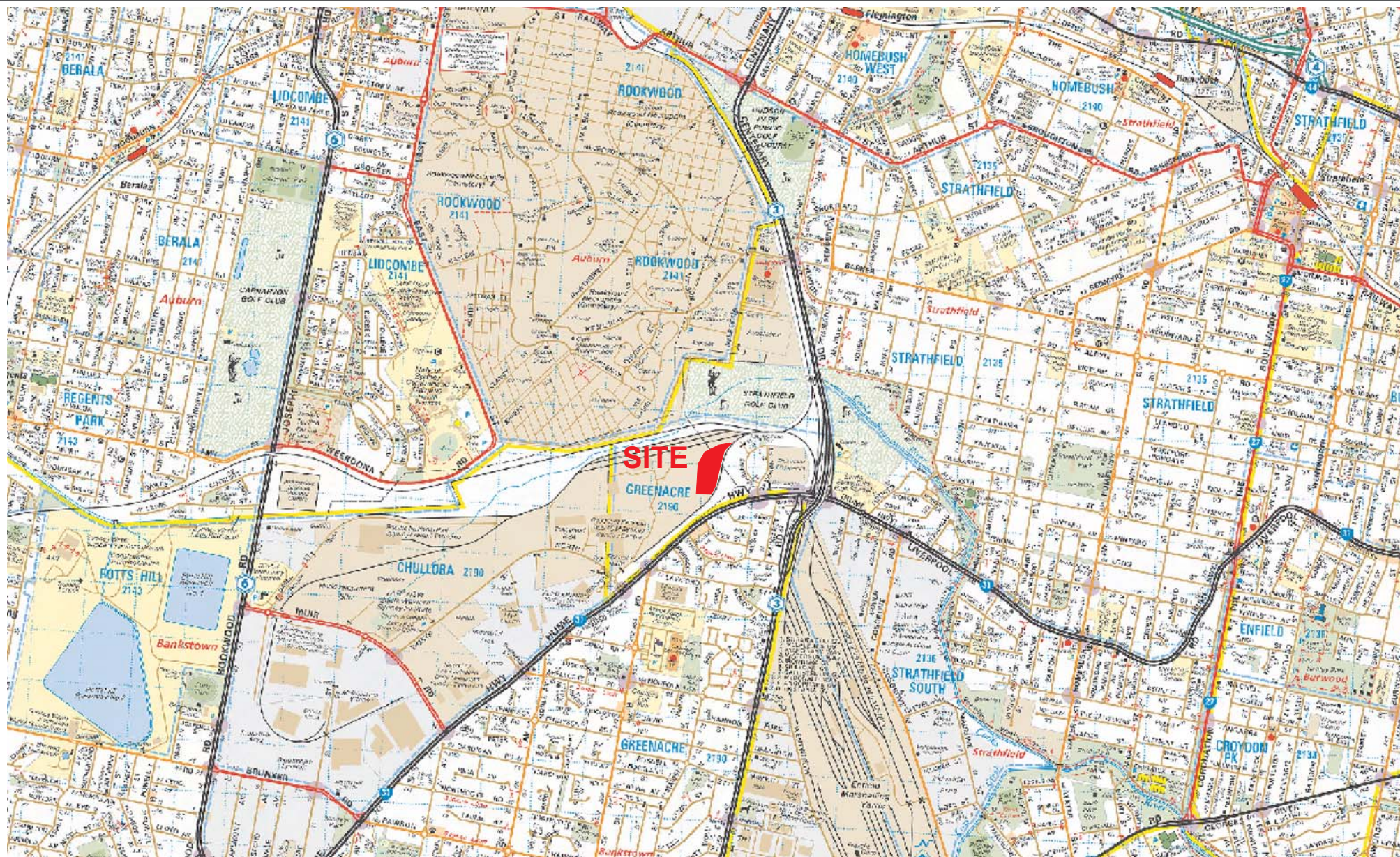



Figure 1 Site Location (Chullora)





## LEGEND

 Proposed Site Area Available  
for Remediation Works



0 50m  
Approximate scale

Figure 2 **Chullora Site Plan**

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



Source: Base Image - © 2011 Lynton Surveyors Pty Ltd - 2011C107\_DET.dwg

©2011 JBS Environmental Pty Ltd

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

<b>Legend:</b>	
<span style="border-bottom: 1px dashed purple;">      </span>	New Temporary Fence
<span style="background-color: #90EE90; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	Air Treatment System
<span style="background-color: #ADD8E6; border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>	Temporary Enclosure
<span style="background-color: #FFDAB9; border: 1px dashed orange; display: inline-block; width: 20px; height: 10px;"></span>	Area for Stockpiling
<span style="background-color: #FFB6C1; border: 1px dashed red; display: inline-block; width: 20px; height: 10px;"></span>	Decontamination Area / Wheel Wash



**Figure 3: Proposed Setup of Treatment Area (Chullora)**

Client: Incoll Management

Project: RailCorp Macdonaldtown Approvals

Job No: 40913

File Name: 40913\_02



**Appendix A**  
**Air Quality Management Procedures**



## **Air Quality Management Plan**

Remediation of Former Macdonaldtown  
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### Appendices

Appendix A – Air Quality Management Procedures

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- B(a)P Benzo (a) pyrene
- DECCW NSW Department of Environment, Climate Change and Water
- DQO Data Quality Objectives
- DP Deposited Plan
- EPA New South Wales Environment Protection Authority
- Hg Mercury
- HIL Health Based Investigation Level
- LOR Limit of Reporting
- MAH Monocyclic Aromatic Hydrocarbon
- Ni Nickel
- OCP Organochlorine Pesticide
- SAR Site Audit Report
- SAS Site Audit Statement
- PAH Polycyclic Aromatic Hydrocarbons
- Pb Lead
- PIL Phytotoxicity Based Investigation Level
- PCB Polychlorinated Biphenyls
- PQL Practical Quantitation Limit
- QA/QC Quality Assurance/Quality Control
- RPD Relative Percentage Difference
- TPH Total Petroleum Hydrocarbons (C<sub>6</sub>-C<sub>9</sub> and C<sub>10</sub>-C<sub>36</sub>)
- Zn Zinc