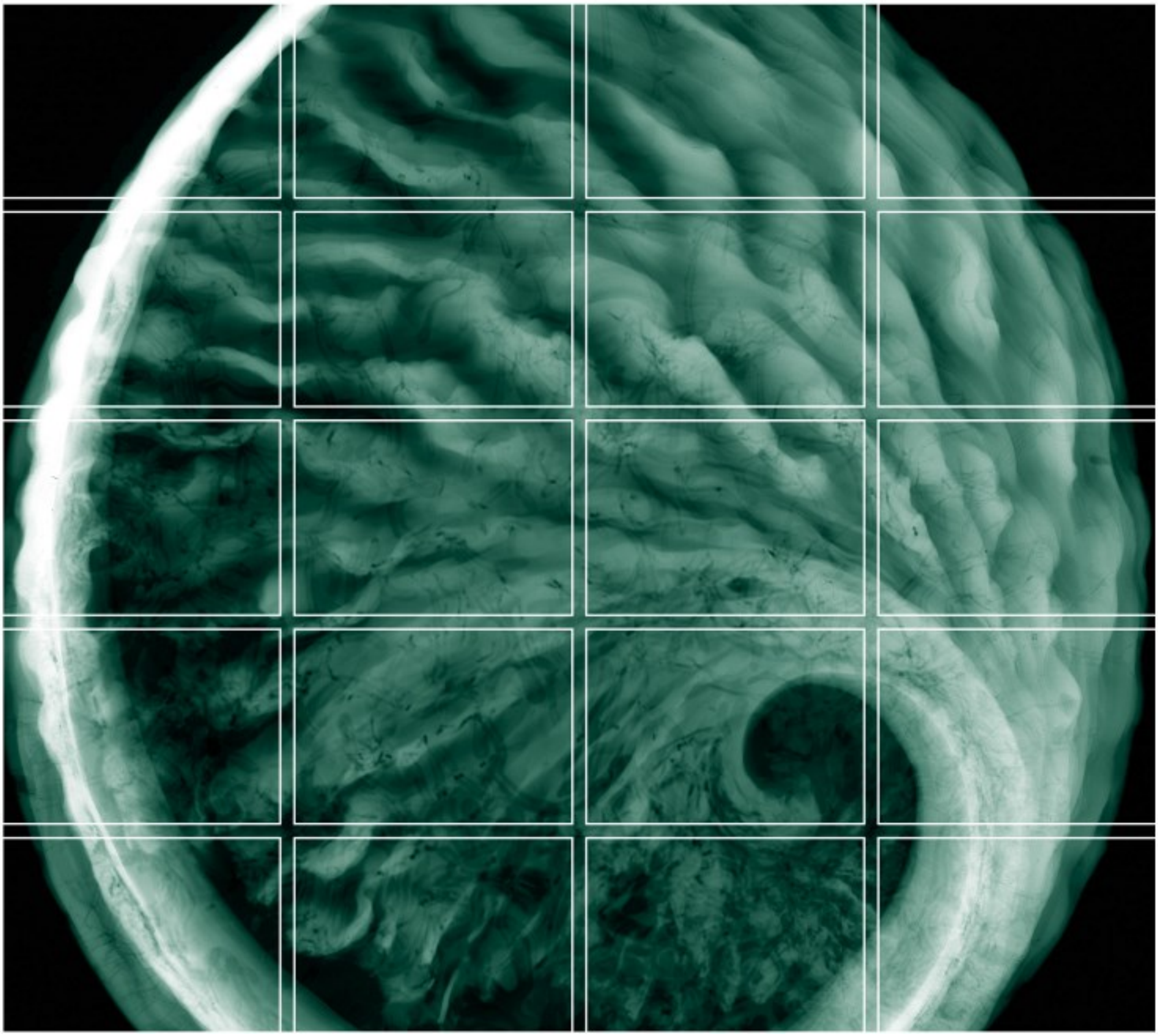

Waste Metal Recovery, Processing and Recycling Facility Expansion - 45 and 23 - 43 Tattersall Road, Kings Park, Blacktown

Air Quality Health Risk Assessment

Sell & Parker Pty Ltd

June 2015

0226308_HRA_Rp01

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Waste Metal Recovery, Processing and Recycling Facility Expansion – 45 and 23-43 Tattersall Road, Kings Park, Blacktown

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Date:	*15 June 2015*

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CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Sell & Parker Pty Ltd (Sell & Parker) to conduct an air quality health risk assessment (HRA) for the waste metal recovery, processing and recycling facility in Kings Park, Blacktown.

Sell & Parker has submitted a Development Application for expansion of its current site at 45 Tattersall Road (Lot 5 /DP 7086) to include the neighbouring site 23-43 Tattersall Road (Lot 2, DP550 522). The DA is being processed as a State Significant Development (ref. SSD-5041), and includes increasing the processing capacity of the site to 350,000 tonnes per annum. The project includes both Lot 5 DP 7086 and Lot 2 DP 550522, which are collectively referred to as 'the site' within this HRA.

The NSW Environmental Protection Authority (NSW EPA) reviewed the Environmental Impact Statement for the development, and in its response (letter dated 22 April 2015 to NSW Department of Planning and Infrastructure) recommended a revised air quality assessment and health risk assessment.

1.2 OBJECTIVES

A revised air dispersion modelling assessment of potential future emissions was completed in June 2015 (ERM, 2015). The objective of this HRA is to assess potential health risks to people living and working within the area of the site from the emissions that the dispersion model predicts. It does not include assessment of risks to Sell & Parker's workforce, which is more appropriately considered as part of an occupation health and safety program.

1.3 THE RISK ASSESSMENT PROCESS

This risk assessment was conducted in accordance with the framework outlined in the National Environment Protection (Assessment of Site Contamination) Measure 1999 (ASC NEPM, 1999) and the *Approved Methods for Modelling and Assessment of Air Pollutants in NSW* ('Approved Methods') (Department of Environment and Conservation, 2005). The risk assessment also considers air quality goals and standards presented in the National Environment Protection (Ambient Air Quality) Measure Variation, 2003. The framework for carrying out a quantitative health risk assessment is outlined in *Appendix 1* of *Schedule B4* of the ASC NEPM (1999).

This report includes the following stages of this framework:

1. Issues Identification (Conceptual Site Model);

2. Data Collection and Evaluation;

3. Exposure Assessment;

4. Toxicity Assessment; and

5. Risk Characterisation.

2 *ISSUES IDENTIFICATION*

2.1 *SITE ACTIVITIES*

As discussed in *Section 1.1*, the main site at 45 Tattersall Road is currently used as a waste metal resource recovery, processing and recycling facility involving the shearing, fragmenting and shredding of industrial scrap metal, demolition material and car bodies. 23 - 43 Tattersall Road is owned by Sell & Parker and currently occupied by Dexion, a manufacturing business, which intends to cease operations at the site and relocate.

The operational process on-site post-upgrade is required to be understood in detail when assessing impacts to air quality. In operations like metals recycling, there are opportunities for particulate and gaseous air pollutants to be emitted including:

- truck delivery/removal of materials;
- truck dumping of materials onto stockpiles;
- material handling (pick up and drop off activities with front-end loaders/mobile material handlers with grapples, conveyor drop points onto stockpiles etc.);
- conveying and conveyor transfer points;
- wet scrubber outlet vents of the hammer mill;
- manual metal cutting; and
- dust from wind erosion off the stockpiles.

2.2 *EMISSIONS OF POTENTIAL CONCERN*

Based on the site activities listed in *Section 2.1*, the emissions relevant to the site activities are as follows:

- total suspended particulates (TSP);
- particulate matter with aerodynamic diameter of 10 µm or less (PM_{10});
- particulate matter with aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$);
- dust deposition;
- toxic air pollutants (metal particles from the hammer mill and metal fumes from oxy-cutting);
- nitrogen oxide (NO_x); and
- odour.

2.3 CLIMATE

The Site is located in a temperate environment, with the local climate generally mild. Overall, the local area is characterised by:

- annual average rainfall of 760.6 mm;
- average maximum daytime temperature of 29.8°C in January;
- average minimum daytime temperature of 5.9°C in July;
- average maximum humidity of 81% in March; and
- average minimum humidity of 42% in both August and September.

2.3.1 *Typical Wind Conditions*

Based on wind roses presented in (ERM, 2015) showing the frequency of strength and direction of winds for the past five years (2008 - 2012 inclusive) at Horsley Park, NSW; the data shows that:

- strong (5.4 – 8.5 m/s) south-easterly winds predominant in the summer and spring months;
- south-westerly winds predominant (15%) in autumn and winter; and
- annually, south-west is the predominant wind direction however the strongest winds originate from the south-east.

2.3.2 *Atmospheric Stability*

Atmospheric stability is one of the key parameters that effects dispersion and dilution of emissions away from source. In essence it describes the degree of thermal and mechanical mixing of the atmosphere that occurs due to wind and thermal heating. Higher stability of the atmosphere typically results in poor dispersion conditions and higher ground level concentrations, whilst unstable atmospheres typically have the opposite impact.

The highest frequency of atmospheric stabilities for the five years of predicted meteorological data indicate that category D (neutral atmosphere typically under cloudy conditions) and F (a very stable atmosphere typically under mostly clear or clear night time conditions with decreasing wind speed) dominate the model domain. This reflects the prevalence of relative neutral daytime conditions followed by clear and calm night time conditions.

2.4 EXISTING AMBIENT AIR QUALITY

Existing ambient air quality provides the basis on to which emissions from the project are projected. It is the cumulative concentration, resulting from existing air quality plus project contribution, which forms the prediction that is screened against the adopted assessment criteria.

2.4.1 PM_{10} Background

The nearest measurements of ambient air quality are undertaken by the Department of Environment and Heritage (DEH)[1] in William Lawson Park, Myrtle Street, Prospect, 5 km south to south-east of the Site. The maximum 24-hour average and the annual average per year for PM_{10} are presented in *Table 2.1*.

Table 2.1 Ambient Background Air Quality PM_{10} Concentrations

Ambient Background Air Quality Concentration (µg/m³)	2008	2009	2010	2011	2012
Maximum 24-hour average	41.8	1680.3	40.1	41.5	38.7
Annual Average	17.8	25.9	15.4	15.8	17.2

2.4.2 TSP Background

Ambient air quality monitoring does not exist for TSP in the local environment, however it is commonly found in the ambient atmosphere. No measurements of existing ambient air quality exist for TSP within the surrounding area. This assessment has taken an average of the 5 years of annual average PM_{10} background concentrations of 18.4 µg/m³ and multiplied by two (2). It is commonly assumed that the particle size distribution ratio between PM_{10} and TSP is 0.5. This provides a typical annual average background concentration for TSP of 36.8 µg/m³.

2.4.3 Nitrogen Dioxide (NO_2) Background

The nearest measurements of NO_2 are undertaken at the Prospect monitoring site by the DEH, 5 km south to south-east of the Site. The maximum 1-hour average and annual average per year for NO_2 are presented in *Table 2.2*.

Table 2.2 Ambient Background Air Quality NO_2 Concentrations

Ambient Background Air Quality Concentration (µg/m³)	2008	2009	2010	2011	2012
Maximum 1-hour average	-	95.9	80.8	73.3	94.0
Annual Average	-	20.7	22.6	18.8	18.8

[1] Data downloaded from http://www.environment.nsw.gov.au/AQMS/search.htm

2.4.4 *Ozone (O_3) Background*

Background levels of ozone (O_3) are needed to calculate the NO_2 conversion from NO_X, based on the O_3 limiting method. Levels of O_3 (O_3 is the oxidant which enables the oxidation of NO_X to NO_2) presents the upper limit of the NO_2 levels in the atmosphere once NO_X is emitted.

The nearest measurements of O_3 are undertaken at the Prospect monitoring site by the DEH, 5 km south to south-east of the Site. The maximum 1-hour average and annual average per year for O_3 is presented in *Table 2.3*.

Table 2.3 Ambient Background Air Quality O_3 Concentrations

Ambient Background Air Quality Concentration (µg/m³)	2008	2009	2010	2011	2012
Maximum 1-hour average	209.7	247.0	203.8	247.0	156.8
Annual Average	27.4	35.3	29.4	29.4	29.4

2.5 ADDITIONAL SOURCE OF EMISSIONS

Additional sources of emitted species within the modelled area include emissions from vehicular traffic and possible sources from other industry in the immediate vicinity of the site. These sources are implicitly included through the use of ambient monitoring to supply background air quality concentrations.

2.6 POTENTIAL EXPOSURE PATHWAYS

The dispersion of emissions from site operations into the surrounding airspace are dependent on the wind direction and speed. Emissions can enter buildings through open doorways and windows or through heating and cooling systems.

2.7 SENSITIVE RECEPTORS

Sensitive receptors are locations where the general population is likely to be exposed to the resultant ground level concentrations from the atmospheric emissions and are defined as:

> *"A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area"* (DEC, 2005).

The site is located within an industrial area. The closest receptors are workers within the industrial area. Residential areas exist adjacent to the industrial area in all directions. A golf course is also adjacent to the industrial area to the southeast. The adjacent industrial workers and nearby residents were considered to be the most sensitive receptors.

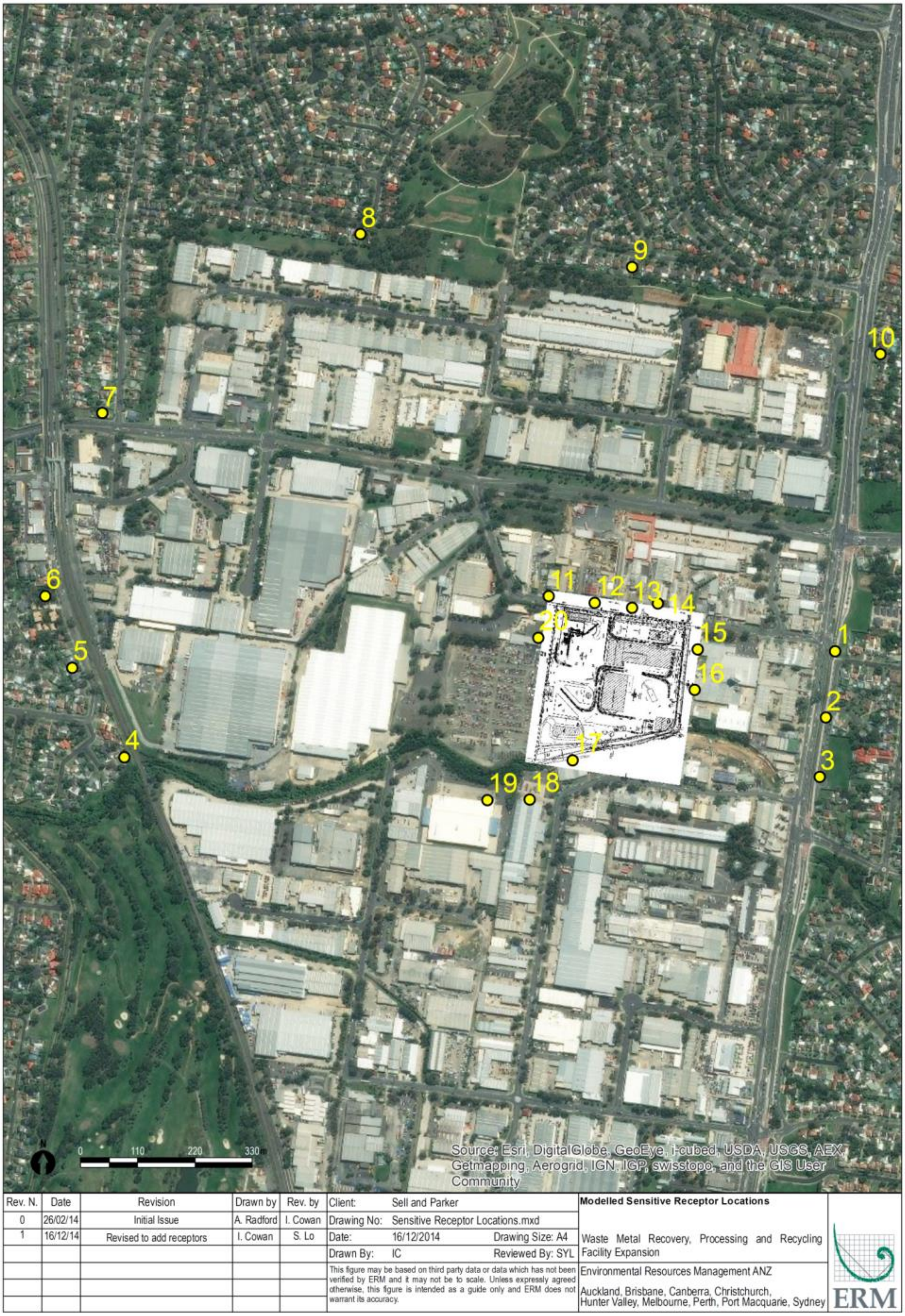
To evaluate the residential receptors, ten (10) sensitive receptors (R1 – R10) in residential areas have been selected on the basis of proximity to Site. These sensitive receptors are intended to be representative of the general residential area. Off-site residents, while not the closest receptors are potentially at home a majority of the time and results in the highest potential exposure time (e.g. 365 days per year). The modelled grid will provide assessment for all other residential addresses not specifically included in the dispersion model. In addition, ten (10) sensitive receptors in the industrial area (R11 – R20) immediately adjacent to the Site and beyond were included in the modelling. Off-site workers are potentially exposed during working hours. It is noted that since the locations of R11 – R20 have been selected to be immediately adjacent to the Site, the modelled results at R11- R20 will also provide the worst-case maximum offsite impacts.

The locations of sensitive receptors included in the model are provided in *Table 2.4* and *Figure 2.1*.

Table 2.4 Locations of Sensitive Receptors

Receptor #	Description	X-coordinate	Y-coordinate
R1	Residence	306993	6263656
R2	Residence	306975	6263528
R3	Residence	306963	6263414
R4	Residence	305627	6263452
R5	Residence	305527	6263624
R6	Residence	305475	6263762
R7	Residence	305584	6264114
R8	Residence	306081	6264458
R9	Residence	306603	6264395
R10	Residence	307080	6264227
R11	Industrial	306442	6263762
R12	Industrial	306531	6263749
R13	Industrial	306602	6263739
R14	Industrial	306653	6263748
R15	Industrial	306728	6263659
R16	Industrial	306723	6263581
R17	Industrial	306489	6263446
R18	Industrial	306406	6263371
R19	Industrial	306325	6263369
R20	Industrial	306423	6263682

Figure 2.1 Modelled sensitive receptor locations



3 AIR MODELLING AND DATA USED

The data used in the HRA were adopted from the results of the air dispersion modelling presented in (ERM, 2015) at sensitive receptors. The total pollutant load in the environment and impacts from new sources of pollutants were added to existing background levels for assessment of compliance at each receptor location.

Part 4: Emission of Air Impurities from Activities and Plant in the Protection of the Environment Operations (Clean Air) Regulation (2002) refers to the Approved Methods (DEC, 2005). The Approved Methods lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the state. Industry has an obligation to ensure compliance with the requirements specified in the Regulation. The description of the data and models used to estimate air concentrations are discussed below.

3.1 MONITORING DATA USED

Concentration data collected by Sell & Parker were used in a model used to model concentrations at identified commercial and residential receptors. The data used in this HRA were obtained from the model at the sensitive receptors.

The most recent five years with available meteorological data at the time of preparing the assessment (2008 - 2012) were selected as the meteorological model years in accordance with international standard practice for dispersion modelling.

3.2 MODEL SELECTION

3.2.1 Dispersion Model

Several different dispersion models are routinely used in Australia for the assessment of air quality impacts from industrial releases. These include:

- AERMOD;
- CALPUFF; and
- Ausplume.

Ausplume is the approved dispersion model for use in most simple, near field applications in NSW. The Approved Methods states, however that Ausplume version 6.0 or later as specifically not approved in the following applications:

- complex terrain, non-steady-state conditions;
- buoyant line plumes;
- coastal effects such as fumigation;
- high frequency of stable calm night-time conditions;
- high frequency of calm conditions; and / or
- inversion break-up fumigation conditions (Department of Environment and Conservation, 2005).

Over the five years of data:

- calm winds (< 0.5 m/sec) occur for approximately 14% of the time; and
- stable night time conditions occur for approximately 35% of all hours.

Consequently, as determined by the Approved Methods, the CALPUFF model has been used for this assessment. CALPUFF was selected as a multi-layer, multi-species non-steady state puff dispersion model that can simulate the effects of time- and space-varying meteorological conditions on pollutant transport, transformation and removal (Scire, et al., 2000). CALPUFF is a United States Environmental Protection Agency (USEPA) regulatory model and is widely used in Australia.

3.2.2 Meteorological Model

Meteorological modelling conducted for this assessment included The Air Pollution Model (TAPM) and CALMET (a three dimensional micro-meteorological model). Insufficient site specific meteorological data was available for the site to adequately describe the local wind flows given the complex nature of the terrain in the model domain. TAPM was selected as an industry standard method able to create a 3-dimensional data file of gridded meteorological parameters by predicting airflow important to local scale air pollution from large scale meteorology provided by synoptic analyses. The TAPM outputs can be converted to file compatible with CALMET using CALTAPM and used as an initial estimated wind field in CALMET.

CALMET is the meteorological pre-processor for the chosen dispersion model and considers the initial estimated wind fields together with any observational data from further afield, terrain and land use information to produce a three-dimensional micro-meteorological model for use in dispersion modelling.

3.3 *ADEQUACY OF MODEL OUTPUTS*

The modelling used is consistent with the Approved Methods. In addition, throughout this assessment, a conservative approach to emission estimation has been taken. For example:

- no emission estimates are available for dust emissions from scrap metal deposition or piles of scrap metal. Windblown emissions and handling emissions of particulate matter have been derived using NPI emission estimates for high moisture content ores from metalliferous mines, these are likely to result in higher emissions estimates than will occur in reality; and

- emissions of dust and odour from the hammermill treatment system have been limited to manufacturer's guarantees. A manufacturer guarantee often overstates the likely actual emissions and consequently odour and particulate matter concentrations are likely to be lower than predicted in this assessment.

4 TIER 1 SCREENING

4.1 GENERAL APPROACH TO THE USE OF DATA

The data used in the HRA were adopted from the air dispersion modelling presented in (ERM, 2015) at sensitive receptors.

The total pollutant load in the environment and impacts from new sources of pollutants were added to existing background levels for assessment of compliance at each receptor location.

4.2 TIER 1 SCREENING CRITERIA

The NSW EPA prescribes impact assessment criteria, which are outlined in the Approved Methods (DEC, 2005). The impact assessment criteria refer to the total pollutant load in the environment and impacts from new sources of these pollutants must be added to existing background levels for assessment of compliance. In accordance with the guidance document, ERM has adopted the assessment criteria shown in *Table 4.1* for particulate matter, nitrogen dioxide (NO_2) and individual toxic air pollutants (metals). It is noted that even though $PM_{2.5}$ are emitted from the Site activities, there are no assessment criteria for $PM_{2.5}$ under the Approved Methods; therefore, no individual impact assessment of $PM_{2.5}$ has been undertaken.

4.2.1 *Aesthetic Consideration*

In addition to health impacts, airborne dust also has the potential to cause nuisance impacts by depositing on surfaces. *Table 4.1* also shows the maximum acceptable increase in dust deposition over the existing dust levels (2 g/m^2/month) and the maximum total deposited dust level (4 g/m^2/month). Given that there are no ambient dust deposition levels for the local area, this assessment will be compared to the maximum increase in deposited dust level. These criteria for dust deposition levels are set to protect against nuisance impacts.

Odour nuisance impact has been included in the impact assessment. The impact assessment criteria for complex mixtures of odours have been designed to take into account the range of sensitivity to odours within the community and to provide additional protection for individuals with a heightened response to odours. This is achieved by using a statistical approach, dependent upon population size.

4.2.2 *Screening Criteria Application*

The assessment criteria for particulate matter (TSP and PM_{10}), NO_2, dust deposition and lead were applied, in accordance with the requirements of the Approved Methods, as follows:

- at the nearest existing or likely future off-site sensitive receptor;
- the incremental impact (predicted impacts from the site alone) for each pollutant must be reported;
- background concentrations must be included; and
- total impact (incremental impact plus background) must be reported as the 100th percentile and compared with the relevant impact assessment criteria.

The assessment criteria for individual toxic air pollutants were sourced from the Approved Methods and the Ontario Ministry of the environment for compounds not covered by the Approved Methods or regulations in any other State or Territory in Australia.

The standards were applied, in accordance with the requirements of the Approved Methods, as follows:

- at and beyond the boundary of the facility;
- the incremental impact (predicted impacts from the site alone) for each pollutant must be reported in concentration units consistent with the criteria (mg/m^3 or ppm), for an averaging period of 1 hour and as the 99.9th percentile of dispersion model predictions for Level 2 (refined dispersion modelling technique using site-specific input data) impact assessments.

The assessment criteria for complex mixtures of odorous air pollutants were applied, in accordance with the requirements of the Approved Methods, as follows:

- at the nearest existing or likely future off-site sensitive receptor;
- the incremental impact (predicted impacts from the site alone) must be reported in units consistent with the impact assessment criteria (odour unit (OU)), as peak concentrations (i.e. approximately 1 second average) in accordance with the requirements of Section 6 of the Approved Methods as the:
- 100th percentile of dispersion model predictions for Level 1 impact assessments; and
- 99th percentile of dispersion model predictions for Level 2 impact assessments.

Table 4.1 *Adopted Assessment Criteria*

Species	Averaging Period	Criteria	Units
Particulate matter, NO_2 and lead			
TSP	Annual mean[1,4]	90	$\mu g/m^3$
PM_{10}	Annual mean[2,4]	30	$\mu g/m^3$
	24-hour maximum[3,4]	50	$\mu g/m^3$
NO_2	1 hour[3,4]	246	$\mu g/m^3$
	Annual mean[3,4]	62	$\mu g/m^3$
Lead	Annual mean[3,4]	0.5	$\mu g/m^3$
Individual toxic air pollutants			
Iron oxide fumes	1 hour[5]	90	$\mu g/m^3$
Manganese and compounds	1 hour[5]	18	$\mu g/m^3$
Copper dusts and mists	1 hour[5]	18	$\mu g/m^3$
Chromium VI compounds	1 hour[5]	0.09	$\mu g/m^3$
Nickel and nickel compounds	1 hour[5]	0.18	$\mu g/m^3$
Iron (metallic)	24-hour[6]	4	$\mu g/m^3$
Titanium	24-hour[6]	120	$\mu g/m^3$
Vanadium	24-hour[6]	2	$\mu g/m^3$
Zinc	24-hour[6]	120	$\mu g/m^3$
Dust deposition			
Maximum increase in deposited dust level	Annual[4]	2	g/m^2/month
Odorous air pollutants (complex mixtures)[4,6]			
Population of affected community	**Impact assessment criteria for complex mixtures of odorous air pollutants (OU) (nose-response-time average, 99th percentile)**		
Urban (≥~2000) and/or schools and hospitals	2.0		

1. National Health and Medical Research Council (National Health and Medical Research Council, 1996)
2. Environment Protection Authority (NSW Environment Protection Authority, 1998)
3. National Environment Protection Council (National Environment Protection Council, 1998)
4. Department of Environment and Conservation Approved Methods (DEC, 2005)
5. Environment Protection Authority (NSW Environment Protection Authority, 2001)
6. Ontario Ministry of the Environment (Ontario Ministry of the Environment, 2012)

4.3 TIER 1 SCREENING RESULTS

A summary of the results of the air quality modelling assessment against the Tier 1 screening criteria is presented in *Table 4.2*.

Table 4.2 Tier 1 Screening Results

Species	Averaging Period	Criteria	Units	Modelled Concentration Range at Sensitive Receptors (June 2015) [1]	Modelled Concentration >Criteria (Yes/No)
		Particulate matter, NO_2 and lead			
TSP	Annual mean	90	µg/m³	36.9 – 46.2	No
PM_{10}	Annual mean	30	µg/m³	15.9 – 30	No
	24-hour maximum	50	µg/m³	39.5 – 1703.1	**Yes – due to background levels**
NO_2	1 hour	246	µg/m³	76 – 156.18	No
	Annual mean	62	µg/m³	18.8 – 20.9	No
Lead	Annual mean	0.5	µg/m³	0.0001 – 0.0017	No
		Individual toxic air pollutants			
Iron oxide fumes	1 hour	90	µg/m³	0.001 – 0.141	No
Manganese and compounds	1 hour	18	µg/m³	0.001 – 0.019	No
Copper dusts and mists	1 hour	18	µg/m³	0.001 – 0.01	No
Chromium VI compounds	1 hour	0.09	µg/m³	0 – 0.004	No
Nickel and nickel compounds	1 hour	0.18	µg/m³	0 – 0.003	No
Iron (metallic)	24-hour	4	µg/m³	0.01 – 0.12	No
Titanium	24-hour	120	µg/m³	0 – 0.0005	No
Vanadium	24-hour	2	µg/m³	0.000001 – 0.000021	No
Zinc	24-hour	120	µg/m³	0 – 0.04	No
		Dust deposition			
Maximum increase in deposited dust level	Annual	2	g/m²/month	0.02 – 1.2	No
		Odorous air pollutants			
Complex mixtures	Not applicable	2	OU	0.1 – 1.7	No

1. Range of results of the sum of the maximum predicted 24-hour average PM_{10} concentration and the maximum measured background concentration.

As presented in *Table 4.2*, the air dispersion modelling results indicated that:

Annual mean concentrations at all sensitive receptors are predicted to be below the assessment criterion contained in DEC (2005) for the following:

- TSP;
- PM_{10};
- NO_2;
- lead; and
- dust deposition.

One-hour 99.9th percentile concentrations at all sensitive receptors are predicted to be below the adopted assessment criterion for the following:

- NO_2;
- iron oxide fumes (iron particulate);
- manganese and compounds (manganese oxide fume plus manganese particulate);
- copper dusts and mists (copper particulate);
- chromium VI compounds (chromium particulate); and
- nickel and nickel compounds (nickel particulate).

Furthermore, the maximum predicted 1-hour average NO_2 concentration together with the maximum measured background concentration results in predicted concentrations below the assessment criteria contained in the Approved Methods at all modelled sensitive receptors.

Twenty four hour 99.9^{th} percentile concentrations at all sensitive receptors are predicted to be below the assessment criterion contained in the Approved Methods for the following:

- iron (metallic);
- titanium particulate;
- vanadium particulate; and
- zinc particulate.

The maximum predicted 24-hour average PM_{10} concentration together with the maximum measured background concentration (Tier 1 assessment) results in levels that exceed the assessment criteria at eight of the modelled sensitive receptors due to the elevated background ambient air quality concentration in this area.

The maximum 24-hour average PM_{10} background concentration for 2009 exceeds the assessment criterion. The highest 24-hour average PM_{10} concentrations at each receptor, together with the maximum 24-hour average background concentration for the relevant year in which the prediction occurred are presented in ERM (2015). While the highest maximum site contribution to 24-hour average PM_{10} concentrations at each of the receptors over the modelled five years are below the assessment criteria, the increment plus background exceeds the assessment criteria at receptors R5, R9, R12, R13, R15, R16, R17 and R20. The exceedances of the standard are the result of maximum measured backgrounds that are either close to or above the assessment criteria.

4.4 *TIER 2 ASSESSMENT FOR 24HR PM_{10}*

ASC NEPM (1999) indicates that further assessment or evaluation is warranted when one or more contaminants at the site are at levels that exceed Tier 1 screening criteria. A Level 2 contemporaneous assessment was carried out (ERM, 2015) in accordance with DEC (2005) guidance. In this risk assessment, further qualitative assessment of the results of the Level 2 modelling, considering potential health risks from exposure to PM_{10} is provided. For the assessment the following were addressed:

- mitigation measures;
- the applicability of the health risk based indicator;
- exposure duration for receptors of potential concern; and
- background influence.

Mitigation Measures

On the basis of the Tier 1 results, Sell & Parker committed to mitigation measures comprising ambient PM_{10} monitoring at two boundary locations, with changes to process activity triggered by high 4-hour rolling average dust levels. Where the downwind monitor measures a rolling four hour average greater than the 24-hour standard during working hours, and the upwind monitor demonstrates compliance with the standard, Sell & Parker will reduce dust generating activities. Where exceedance continues for the next hour, all dust generating activities will cease until the monitors demonstrate a sufficient baseline level that operations may continue.

Level 2 analysis showed that while it is possible for additional exceedances of the maximum 24-hour average PM_{10} increment plus background criteria to occur in future (as discussed in *Section 4.3*), it is unlikely that the maximum 24-hour average PM_{10} increment and the maximum background will occur in the same 24-hour period.

Table 4.3 shows the maximum predicted site contributions to the surrounding sensitive receptors for the five modelled years for the receptors which indicated a potential for exceedance when adding the maximum modelled concentration to the maximum measured background.

These concentrations have been added to the measured background concentrations which occurred on the day of the predicted maximum concentration at each receptor. This analysis indicates that when maximum impacts are likely to occur ambient concentrations are typically sufficiently low to prevent additional exceedances of the standard.

Table 4.4 shows the maximum, non-exceedance background concentrations, together with the date on which they occurred, the predicted site contribution at the sensitive receptors and the cumulative impact of background plus site contribution for receptors which indicated an exceedance in the Tier 1 assessment.

In these analyses, the results indicate that there would be no additional exceedances of the standard. This is due to the commitment to monitoring and the cessation of dust generating activities when the need arises.

Table 4.3 Maximum 24-hour average Site contribution to PM_{10} concentrations at the receptors plus background

Date	Background[1] (µg/m³)	PM_{10} Maximum Predicted 24-hour average Site contribution (µg/m³) Sensitive Receptors								Increment plus Background (µg/m³) Sensitive Receptors							
		5	9	12	13	15	16	17	20	5	9	12	13	15	16	17	20
3/06/2009	21.3	1.1								22.4							
6/07/2012	11.5		1.1								12.6						
14/06/2011	12.3			18.1								30.4					
8/03/2012	5.6				13.4								19.0				
5/06/2009	9.9					10.7								20.6			
8/06/2011	9.7						10.3								20.0		
29/05/2010	8.4							11.2								19.6	
20/03/2011	7.7								21.9								29.6

1. Sourced from the Prospect ambient monitoring station.

Table 4.4 24-hour average Site contribution to PM10 concentrations at the sensitive receptors at the time of the highest non-exceeding background concentrations

Date	Background[1] (µg/m³)	PM_{10} Maximum Predicted 24-hour average Site contribution (µg/m³) Sensitive Receptors								Increment plus Background (µg/m³) Sensitive Receptors							
		5	**9**	**12**	**13**	**15**	**16**	**17**	**20**	**5**	**9**	**12**	**13**	**15**	**16**	**17**	**20**
20/11/2009	48.1	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	48.1	48.1	48.1	48.1	48.1	48.1	48.3	48.1
25/02/2009	44.7	0.00	0.01	0.02	0.87	0.63	0.08	0.00	0.00	44.7	44.7	44.7	45.6	45.3	44.8	44.7	44.7
2/10/2009	42.6	0.00	0.02	1.20	0.80	0.06	0.00	0.00	0.07	42.6	42.6	43.8	43.4	42.7	42.6	42.6	42.7
6/12/2008	41.8	0.00	0.06	0.05	0.94	1.18	1.40	0.00	0.00	41.8	41.9	41.8	42.7	43.0	43.2	41.8	41.8
16/09/2008	41.5	0.00	0.00	0.07	0.26	0.95	0.33	0.00	0.00	41.5	41.5	41.6	41.8	42.5	41.8	41.5	41.5
20/09/2011	41.5	0.00	0.00	0.10	0.37	1.37	1.79	0.46	0.00	41.5	41.5	41.6	41.9	42.9	43.3	42.0	41.5
25/08/2009	40.9	0.00	0.00	0.00	0.00	0.14	1.46	0.00	0.00	40.9	40.9	40.9	40.9	41.0	42.4	40.9	40.9
1/07/2008	40.1	0.00	0.00	0.00	0.01	0.28	1.24	0.91	0.00	40.1	40.1	40.1	40.1	40.4	41.3	41.0	40.1
27/03/2010	40.1	0.00	0.02	1.61	1.43	0.55	0.18	0.00	0.18	40.1	40.1	41.7	41.5	40.7	40.3	40.1	40.3
26/03/2009	39.7	0.00	0.01	0.09	1.28	0.40	1.23	1.21	0.03	39.7	39.7	39.8	41.0	40.1	40.9	40.9	39.7
15/09/2008	39.2	0.00	0.00	0.00	0.00	0.00	0.08	2.43	0.00	39.2	39.2	39.2	39.2	39.2	39.3	41.6	39.2
14/10/2009	38.8	0.00	0.00	0.07	0.29	2.03	3.53	0.47	0.00	38.8	38.8	38.9	39.1	40.8	42.3	39.3	38.8
23/09/2011	38.7	0.00	0.01	1.12	1.85	1.88	1.68	1.28	0.78	38.7	38.7	39.8	40.6	40.6	40.4	40.0	39.5
26/10/2012	38.7	0.00	0.03	1.10	2.46	2.44	1.67	0.01	0.03	38.7	38.7	39.8	41.2	41.1	40.4	38.7	38.7
12/09/2009	38.1	0.00	0.00	0.00	0.00	0.00	0.02	3.93	0.00	38.1	38.1	38.1	38.1	38.1	38.1	42.0	38.1

1. Sourced from the Prospect ambient monitoring station

Applicability of the Health Risk Based Indicator

The Ambient Air NEPM (1998) PM_{10} level is taken from the World Health Organisation (2005) Air Quality Guideline value of 50 µg/m³. The WHO 24-hour guideline value was derived from an upper end estimate of background 24-Hour and is not directly indicative of a potential health risk. The WHO interim target 3 (IT-3) of 75 µg/m³ is the lowest target level developed by the WHO (2005) to be protective of potential contributions to health risk. When excluding the extreme background conditions which result in exceedances of the 24-hour by over a factor of 30 times, all of the predicted 24-hour concentrations are below 75 µg/m³. In addition, when evaluating the guidelines, the WHO recommends the annual average to take precedence over the 24-hour average since, "at low levels, there is less concern about remaining episodic excursions (WHO 2005)." Given that the PM_{10} 24-hour concentrations are below 75 µg/m³ (when excluding an extreme background event) and the annual PM_{10} are below the guideline potential health risks are unlikely.

In addition, the particulate matter- related concentrations of the potential individual metal components were all below the adopted risk-based standards as summarised in *Table 4.2*.

Exposure Duration for Receptors of Potential Concern

All of the locations that modelled 24-hour average PM_{10} concentrations plus background in exceedances of 50 µg/m³ were within the adjacent industrial area and represent potential exposure by off-site workers. The 24-hour standards are based on the potential exposures for over a 24-hour period. The workers receptors of concern would not be exposed to emission sources over a 24-hour period. That is, a typical exposure for a commercial worker is 8 hours per day (ASC NEPM, 1999). Given the frequency, the exposure of commercial workers to PM_{10} emissions (i.e. 1/3 of 24-hour period exposed to the 24-hour concentrations) reduces the potential acute health risks.

Background Influence

A dust storm resulting from strong winds in the inland areas of New South Wales and in South Australia for a sustained period on 22 September 2009 resulted in elevated background PM_{10} concentrations at the Site. The concentrations reported during the dust storm were over 30 times greater than the adopted screening criteria. To account for the influence of this extreme event, the assessment considered the resulting air concentrations using typical background levels excluding this event. The highest maximum 24-hour average PM_{10} concentrations as a result of site operations was extracted at each of the receptors for five years from the model data for receptors that indicated an exceedance in the Tier 1 assessment.

These maximum concentrations at the receptors were matched with the corresponding 24-hour background concentration and added together to provide the increment plus background, when the concentrations at the receptors are at their highest over five years ranged from 12.6 – 30.4 $\mu g/m^3$ and were below the adopted criterion of 50 $\mu g/m^3$.

The 24-hour average Site contribution to PM_{10} concentrations at the sensitive receptors at the time of the highest non-exceeding background concentrations ranged from 48.1 – 48.3 $\mu g/m^3$. This analysis indicates that when maximum impacts are likely to occur ambient concentrations are typically sufficiently low to prevent additional exceedances of the standard. It is concluded therefore, the proposed development will not result in additional exceedances of the PM_{10} 24-hour standard.

5 *SUMMARY AND CONCLUSIONS*

Environmental Resources Management Australia Pty Ltd (ERM) was commissioned by Sell & Parker Pty Ltd (Sell & Parker) to conduct an air quality health risk assessment (HRA) for the waste metal recovery, processing and recycling facility in Kings Park, Blacktown. The HRA is a supplementary report to the Environmental Impact Statement (EIS) for increasing the capacity of the existing waste metal recovery, processing and recycling facility at 45 Tattersall Road (Lot 5 DP 7086), Kings Park, to 350,000 tpa. The development proposal would result in the expansion of the facility to encompass the adjoining lot to the east (Lot 2 DP 550522 or 23-43 Tattersall Road).

An air dispersion modelling assessment of potential future emissions was completed in May 2015 (ERM, 2015). The HRA was conducted to consider whether modelled air concentrations in the surrounding environment could pose an unacceptable health risk.

Based on the site activities listed in *Section 2.1*, the emissions relevant to the site activities are as follows:

- total suspended particulates (TSP);
- particulate matter with aerodynamic diameter of 10 µm or less (PM_{10});
- particulate matter with aerodynamic diameter of 2.5 µm or less ($PM_{2.5}$);
- dust deposition;
- toxic air pollutants (metal particles from the hammer mill and metal fumes from oxy-cutting);
- nitrogen oxide (NO_x); and
- odour.

The site is located within an industrial area. The closest receptors are workers within the industrial area. Residential areas exist adjacent to the industrial area in all directions. A golf course is also adjacent to the industrial area to the southeast. The adjacent industrial workers and nearby residents were considered to be the most sensitive receptors.

The HRA adopted from the results of the air dispersion modelling presented in (ERM, 2015) at sensitive receptors. The total pollutant load in the environment and impacts from new sources of pollutants were added to existing background levels for assessment of compliance at each receptor location. The modelled air concentrations were screened using criteria adopted consistent with the NSW EPA Approved Methods, (DEC, 2005), Ambient Air NEPM (1998), and the ASC NEPM (1999).

The maximum predicted 24-hour average PM_{10} concentration together with the maximum measured background concentration (Tier 1 assessment) resulted in levels that exceeded the assessment criteria at eight of the modelled sensitive receptors (i.e. R5, R9, R12, R13, R15, R16, R17 and R20) due to the elevated background ambient air quality concentration in this area.

The maximum PM_{10} 24-hour concentrations excluding elevated background concentrations from the dust storm on 22 September 2009 are below the WHO interim 24-hour health risk based target of 75 $\mu g/m^3$ and the annual PM_{10} are below the adopted guideline value of 30 $\mu g/m^3$ indicating potential health risks resulting from Site operations are unlikely.

However, given the potential for occasional exceedances due to elevated background PM_{10} concentrations, Sell & Parker has committed to dust mitigation measures to reduce or if necessary cease dust generating activity when monitoring indicates potential exceedance of the standard. Level 2 assessment resulted in no predicted exceedances of the standard other than those driven by the 2009 dust storm.

It is concluded that the site related emissions are unlikely to result in potential for unacceptable health risks.

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7 *STATEMENT OF LIMITATIONS*

This report was prepared in accordance with the scope of work outlined and/or referenced within this report and subject to the applicable cost, time and other constraints. ERM performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental profession. No warranties, expressed or implied, are made.

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