

Zephyr

Environmental

Prestons Waste Treatment Facility

Air Quality Assessment

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1 INTRODUCTION

Hi-Quality Waste Treatment Services Pty Ltd (Hi-Quality) are seeking to construct and operate a Waste Treatment Facility (WTF) located at 9-13 Whyalla Place, Prestons, NSW (Lot 103 DP 866530). The Project proposes to utilise existing buildings and new infrastructure on the Site to provide treatment of soil and liquid waste to a level suitable for reuse, disposal to landfill or disposal to sewer. The Project would process up to 270,000 tonnes of solid and liquid waste per annum, primarily generated from industrial processes and contaminated sites and include treatment of:

- contaminated soils;
- contaminated sludges; and
- liquid wastes

Hi-Quality require an Air Quality Assessment (AQA) to assess the potential impacts at sensitive receptors in the vicinity of the proposed WTF.

Arcadis (on behalf of Hi-Quality) has commissioned Zephyr Environmental (Zephyr) to prepare the air quality assessment for this proposed development. The assessment was prepared in accordance with the NSW EPA “*Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*” (Approved Methods) (EPA, 2022).

Potential air quality impacts from the operation of the WTF were assessed in 2021 (Golder, 2021). The NSW Environment Protection Authority (EPA) provided comments on this assessment and found issues with the methodology and results. These are summarised as follows:

- Assessment of predicted exceedances for arsenic (As) and chromium (Cr)
 - As these are principal air toxics the EPA require that the assessment be revised to demonstrate compliance with arsenic and chromium assessment criteria.
 - This should involve remodelling with the updated ventilation parameters.
- Clarification of ventilation parameters for the emission control system
 - The ventilation flow rates did not match those provided in the accompanying documentation. The EPA requested that further clarification be provided and the assessment revised with correct flow rates.
 - The discharge velocity of 40 m/s was considered to be unusually high and did not correlate with the ventilation flow rate. The EPA requested that these be revised to adopt velocities representative of the proposed ventilation system.
- Demonstration of compliance
 - The assessment should be updated to provide discharge emission concentrations for each point source and compare these concentrations to those prescribed in the *Protection of the Environment (Clean Air) Regulation* (the Regulation).

Liverpool City Council (LCC) provided comments on the Golder AQIA (2021) raised concern that a quantitative assessment was not completed of odour impacts and that consideration should have been given to the *Assessment and Management of Odour from Stationary Sources in NSW* (Department of Environment and Conservation, 2006) and supporting technical notes.

This report contains the information required to meet these EPA and LCC comments and draws, in part, on the information already provided in Golder (2021). The Project itself has not changed, and this assessment addresses the outstanding information and clarifications as described above.

2 PROJECT DESCRIPTION

The Site is situated in an industrial area zoned IN3 Heavy Industrial and bounded by Hoxton Park Road to the north and the M7 Freeway to the south (Figure 2-1).

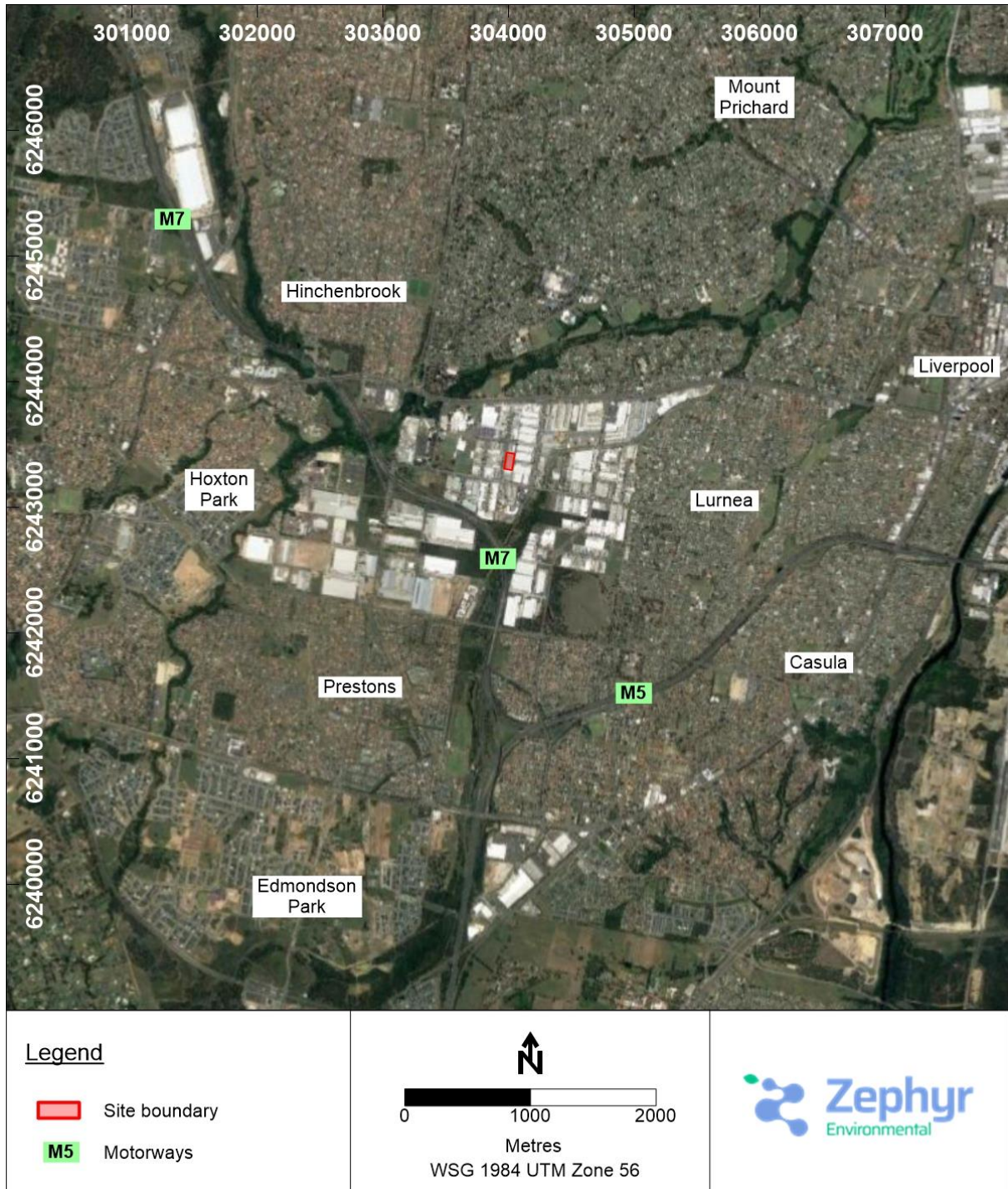


Figure 2-1: Project location

The proposed WTF includes a bulk soil waste treatment facility and bioremediation facility, water treatment facility, storage and consolidation of material and ancillary infrastructure. The WTF is planned to accept approximately 270,000 tonnes per annum (tpa) of waste, including the following:

- Up to 60,000 tpa of packaged waste
- Up to 110,000 tpa of bulk solids with the potential to produce particulate matter (PM), including;
 - Up to 30,000 tpa being potential acid sulfate soils
 - Up to 80,000 tpa (each) of bulk solids or soil that may be contaminated with heavy metals (e.g., arsenic, chromium or lead); or with poly- and perfluoroalkyl substances (PFAS)
- Up to 20,000 tpa of sediment and sludges
- Up to 10,000 tpa of non-contaminated drilling mud
- Up to 70 million litres (ML) of liquid waste with the potential to produce volatile organic compound (VOC) emissions

The Project would receive waste 24 hours a day, while processing and dispatch operations would be undertaken between 7:00 am and 6:00 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays.

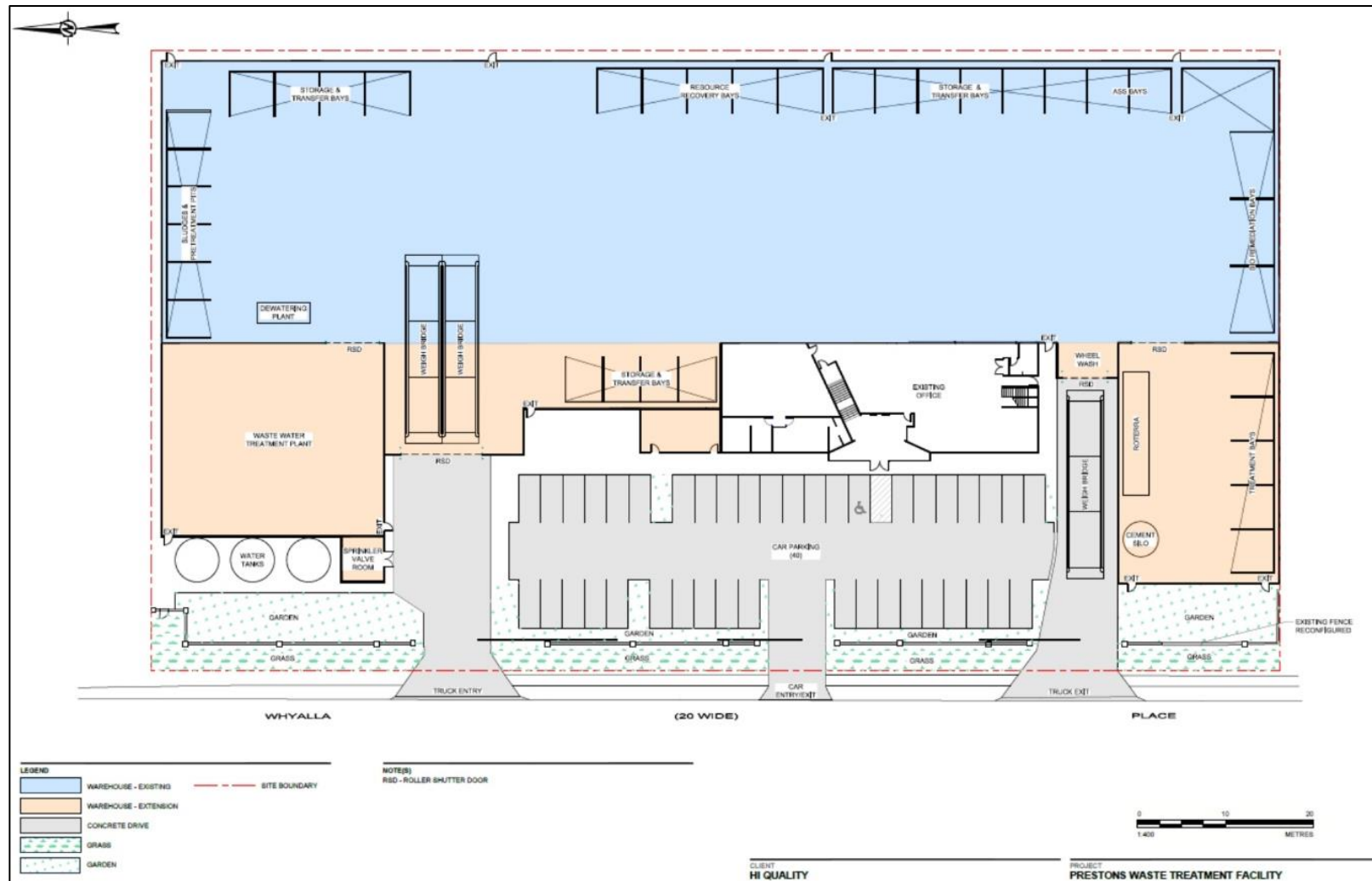
Waste trucks will enter the facility via roll-up doors that will be closed prior to trucks unloading waste material. Solid and liquid waste treatment activities all take place within specific work areas inside the building (Figure 2-2).

To provide a safe work environment, air emissions generated in specific work areas are to be collected by the heating, ventilation and air conditioning (HVAC) system. The HVAC system design is based on:

- the future building configuration;
- the number of air exchanges needed to provide fresh air for comfort heating/cooling; and
- maintaining slight negative pressure inside the building to minimise fugitive air emissions.

Contaminated air collected by the HVAC system is treated prior to discharge to air. The proposed air emissions treatment systems include PM filters and Activated Carbon (AC) filters to remove VOCs and odour.

Air emissions from the facility will be discharged from three vertical strobic fans at 11.7 m above ground level (approximately 3 m above the building roof). The fans will be controlled dynamically, operating at higher flow rates when dusty or volatile materials are being delivered, handled or treated, and operating at lower intensities in the evening or at night, when only waste delivery is scheduled to occur. However, to remain conservative, maximum air exchange rates from the building have been incorporated to account for maximum emissions.



Source: Golder (2021)

Figure 2-2: Proposed site layout

3 AIR QUALITY ASSESSMENT CRITERIA

3.1 Particulate matter and metals

The Approved Methods specifies air quality criteria relevant for assessing impacts from air pollution (EPA, 2017). These criteria are health-based and are presented in Table 3-1 for PM₁₀, PM_{2.5}, As, Cr and Pb.

Table 3-1: NSW EPA impact assessment criteria

Pollutant	Averaging period	Criterion	Metric
Particulate matter with aerodynamic diameter less than 10 micrometres (PM ₁₀)	Annual	25 µg/m ³	Cumulative
	24-hour	50 µg/m ³	Cumulative
Particulate matter with aerodynamic diameter less than 2.5 micrometres (PM _{2.5})	Annual	8 µg/m ³	Cumulative
	24-hour	25 µg/m ³	Cumulative
Arsenic and compounds (As)	1-hour (99.9 th percentile)	0.09 µg/m ³	Incremental
Chromium VI compounds (Cr)	1-hour (99.9 th percentile)	0.09 µg/m ³	Incremental
Lead (Pb)	Annual	0.5 µg/m ³	Incremental

3.2 Odour

Dynamic olfactometry is typically used as the basis of odour management by regulatory authorities as there are not currently any instrument-based methods that can suitably quantify an odour response. This method involves presenting odorous air to a panel of people with decreasing quantities of clean odour-free air, that is, an increasing concentration of odour. The panellists then note when the smell becomes detectable. The correlations between the known dilution ratios and the panellists' responses are then used to calculate the number of dilutions of the original sample required to achieve the odour detection threshold. The units for odour measurement using dynamic olfactometry are odour units (OU) which are dimensionless.

3.2.1 Odour performance criteria

The EPA has developed odour goals and the way in which they should be applied with dispersion models to assess the likelihood of nuisance impact arising from the emission of odour.

There are two factors that need to be considered. Firstly, what is the level of exposure to an odour that would be considered acceptable by the community. That is, what are the appropriate goals or criteria that define acceptable levels within the community. Secondly, how can we use dispersion modelling to determine whether an odour emission meets these goals.

The term *level of exposure* has been used to reflect the fact that odour impacts are determined by several factors the most important of which are the so-called FIDOL factors:

- the Frequency of the exposure;
- the Intensity of the odour;
- the Duration of the odour episodes;
- the Offensiveness of the odour; and
- the Location of the source.

In determining the offensiveness of an odour it needs to be recognised that for most odours the context in which an odour is perceived is also relevant. Some odours, for example the smell of sewage, hydrogen sulfide, butyric acid, landfill gas etc., are likely to be judged offensive regardless of the context in which they occur. Other odours such as the smell of fuel may be acceptable at a petrol station, but not in a house.

In summary, whether or not an individual considers an odour to be a nuisance will depend on the FIDOL factors outlined above and although it is possible to derive formulae for assessing odour annoyance in a community, the response of any individual to an odour is still unpredictable. Odour goals need to take account of these factors.

The EPA Approved Methods include ground-level concentration criteria for complex mixtures of odorous air pollutants. They have been refined by the EPA to take account of population density in the area. [Table 3-2](#) lists the odour thresholds, to be exceeded not more than 1% of the time, for different population densities. The 2 ou criterion, the most stringent, has been adopted to assess the odour impact for this assessment.

The difference between odour goals is based on considerations of risk of odour impact and not differences in odour acceptability between urban and rural areas. For a given odour level there will be a wide range of responses in the population exposed to the odour. In a densely populated area there will therefore be a greater risk that some individuals within the community will find the odour unacceptable than in a sparsely populated area. An important point to note is that the odour assessment criteria are not intended to achieve 'no odour'. They are concerned with controlling odours to ensure offensive odour impacts will be effectively managed.

Table 3-2. Performance criteria for the assessment of odour

Population of affected community	Odour performance criteria (nose response odour units at the 99 th percentile)
Single rural residence ($\leq \sim 2$)	7
~10	6
~ 30	5
~ 125	4
~ 500	3
Urban (~ 2000) and/or schools and hospitals	2

3.2.2 Peak-to-mean ratios

It is a common practice to use dispersion models to determine compliance with odour goals. This introduces a complication because dispersion model predictions are typically valid for averaging periods of one hour and longer. The human nose, however, can respond to odours over periods of the order of one second. Dispersion models therefore need to be supplemented to accurately simulate atmospheric dispersion of odours and the instantaneous perception of odours by the human nose.

The prediction of peak concentrations from modelling estimates can be obtained from a ratio between extreme short-term concentration and longer-term averages. These are known as peak-to-mean ratios. Properly defined peak-to-mean ratios depend upon the type of source, atmospheric stability and distance downwind. [Table 3-3](#) shows the EPA-recommended factors for estimating peak concentrations for different source types, stabilities and distances as developed by Katestone Scientific (1995 and 1998).

For this modelling assessment, the emissions are represented by single wake-affected point sources. A peak-to-mean factor of 2.3 has therefore been used for this assessment and is not dependent on stability class.

Table 3-3. Factors for estimating peak concentration

Source type	Pasquill-Gifford stability class	Near-field P/M60*	Far-field P/M60*
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A-F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A-F	2.3	2.3
Volume	A-F	2.3	2.3

* Ratio of peak 1-second average concentrations to mean 1-hour average concentrations

4 MODELLING METHODOLOGY

4.1 TAPM

The Air Pollution Model (TAPM) is a three dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research. Detailed description of the TAPM model and its performance is provided in *The Air Pollution Model (TAPM) Version 4. Part 1: Technical Description* (Hurley, P, 2008) and *The Air Pollution Model (TAPM) Version 4. Part 2: Summary of Some Verification Studies* (Hurley, Physick, Luhar, & Edwards, 2008).

TAPM solves the fundamental fluid dynamics and scalar transport equations to predict meteorology and pollutant concentrations. It consists of coupled prognostic meteorological and air pollution concentration components. The model predicts airflow important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of larger scale meteorology provided by synoptic analyses.

For this project, TAPM was set up with four domains, composed of 25 grid points along both the X and the Y axes, centred on 300500 m Easting and 6246500 m northing (UTM Zone 56 S). Each nested domain had a grid spacing of 30 km, 10 km, 3 km and 1 km, respectively.

CALTAPM was developed to provide users of the TAPM model the ability to create an hourly, 3-dimensional data file of gridded meteorological parameters, for direct use in the CALMET diagnostic meteorological model. When used in this way the TAPM data can be used in CALMET to determine the initial guess wind field, prior to the weighting of true observations or even to run CALMET in no-observation mode. The TAPM output file (3D.DAT) was used as an initial guess wind field.

4.2 CALMET

CALMET is a meteorological pre-processor that includes a wind field generator containing objective analysis and parameterised treatments of slope flows, terrain effects and terrain blocking effects. The pre-processor produces fields of wind components, air temperature, relative humidity, mixing height and other micro-meteorological variables to produce the three-dimensional meteorological fields that are utilised in the CALPUFF dispersion model (i.e. the CALPUFF dispersion model requires

meteorological data in three dimensions). CALMET uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict gridded meteorological fields for the region.

CALMET was run with a grid domain of 40 km x 40 km, with a 250 m grid resolution. Gridded wind fields generated by TAPM in the form of a three dimensional data file (the 3D.DAT file referred to above) were used as the initial guess field for CALMET. Details on the CALMET settings are provided in [Table 4-1](#) below.

Table 4-1. CALMET meteorological model settings

Parameter	Value
South west corner of CALMET domain	X: 280000 m Y: 6226000 m
Meteorological grid domain	40 km x 40 km (160 x 160 grid points)
Meteorological grid resolution	0.25 km
TERRAD	3 km
Surface station	Bureau of Meteorology (BoM) 067119 Horsley Park BoM 067108 Badgerys Creek BoM 068192 Camden Airport BoM 066161 Holsworthy BoM 066137 Bankstown Department of Planning and Environment (DPE) 171 Liverpool DPE 1148 Bringelly DPE 760 St Marys
NOOBS	1 (Use surface and overwater stations (no upper air observations), use MM4/MM5/3D.DAT for upper air data).

4.3 CALPUFF

CALPUFF is the dispersion module of the CALMET/CALPUFF suite of models. It is a multi-layer, multi-species, non-steady-state puff dispersion model that can simulate the effects of time-varying and space-varying meteorological conditions on pollutant transport, transformation and removal. The model contains algorithms for near-source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, chemical transformation, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources (Scire, Strimaitis, & Yamartino, 2005).

Each stack was represented by a point source situated according to its location. Model predictions were made at 12 discrete sensitive receptors near the facility and also at receptors further removed to understand the dispersion patterns. [Table 4-2](#) lists these 12 sensitive receptors and they are also shown in [Figure 4-1](#).

Table 4-2: Sensitive receptors close to the facility

Sensitive receptor	MGA location (m)	Type	Address
SR1	303614, 6243619	Hotel	Mercure Sydney Liverpool, Hoxton Park Road, Prestons
SR2	304017, 6243869	Residential	315 Hoxton Park Road, Cartwright
SR3	304149, 6243878	Residential	303 Hoxton Park Road, Cartwright
SR4	304244, 6243884	Residential	295 Hoxton Park Road, Cartwright
SR5	304681, 6243910	Residential	255 Hoxton Park Road, Cartwright
SR6	305180, 6243365	School	Lurnea Public School, Lurnea
SR7	305013, 6243011	Residential	42 Jedda Road, Lurnea
SR8	305173, 6242887	Residential	18 Morrison Drive, Lurnea
SR9	305245, 6242806	Residential	8 Wheeler Avenue, Lurnea
SR10	303935, 6243470	Commercial	Starfish Learn to Swim, 26-28 Whyalla Place, Prestons
SR11	304037, 6243744	Place of worship	The Potter's House Christian Church, 1/45-47 Whyalla Place, Prestons
SR12	304290, 6243670	Place of worship	JRM Sydney, 2 Ash Road, Prestons



Figure 4-1: Location of sensitive receptors

5 EXISTING ENVIRONMENT

5.1 Local meteorology

The closest meteorological station to the Site is the Department of Planning and Environment (DPE) Automatic Weather Station (AWS) located at Liverpool, approximately 2 km to the east.

A representative meteorological dataset was chosen by analysing the most recent six years' worth of data from the Liverpool AWS. Annual and seasonal windroses were compiled for six years from 2016 to 2021 and are presented in Figure 5-1. This analysis shows that wind speed and direction are reasonably consistent from year to year, and that 2021 is a representative year. Winds are predominantly light and from the southwestern quadrant, with stronger winds from the western and eastern quadrants.

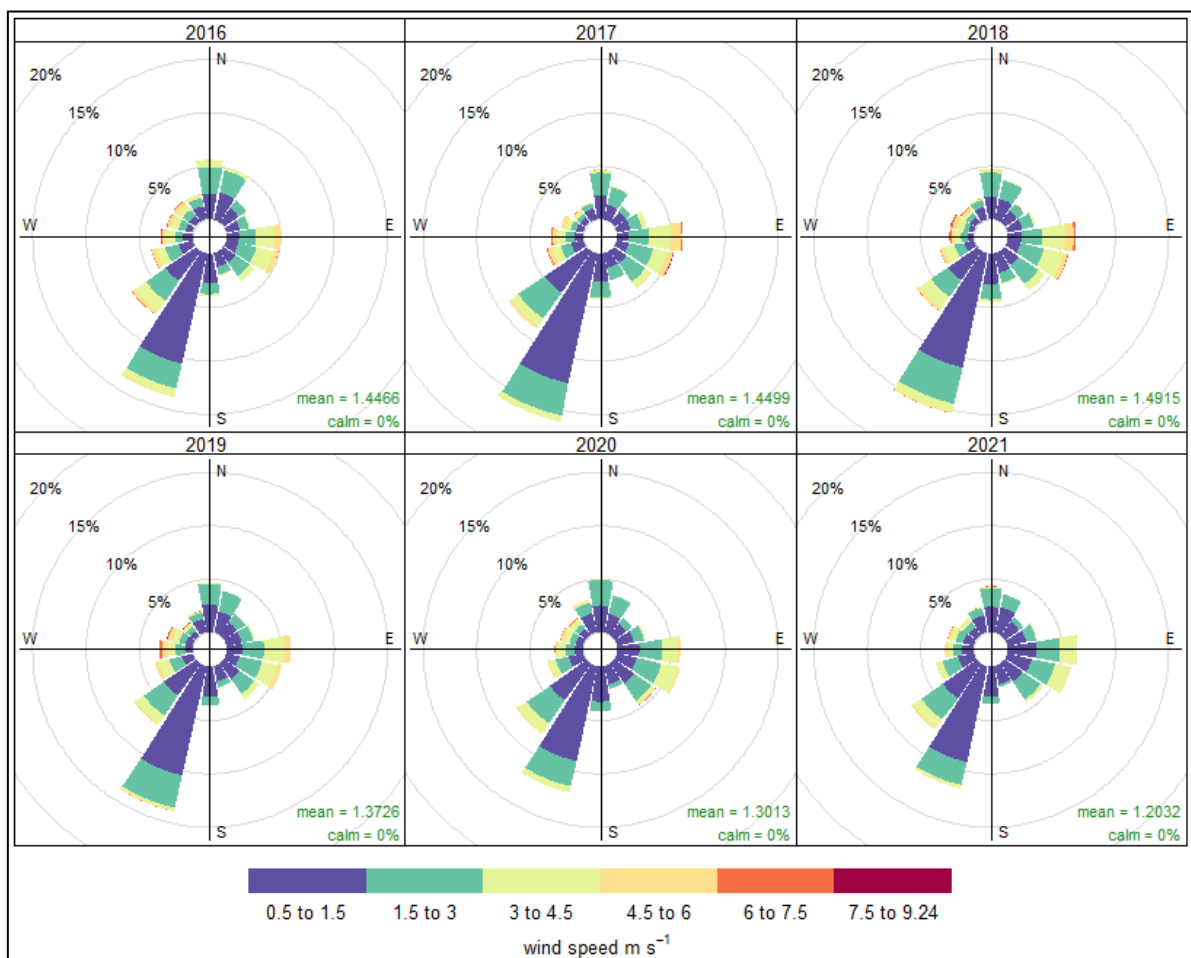


Figure 5-1: Annual windroses for 2016 – 2021 at the Liverpool AWS

Figure 5-2 presents the seasonal variations for 2021. The majority of the stronger winds occur in spring from the west, and some from the southwest during winter. The highest hourly average wind speed for the year was 7.2 m/s, with an annual average of 1.2 m/s.

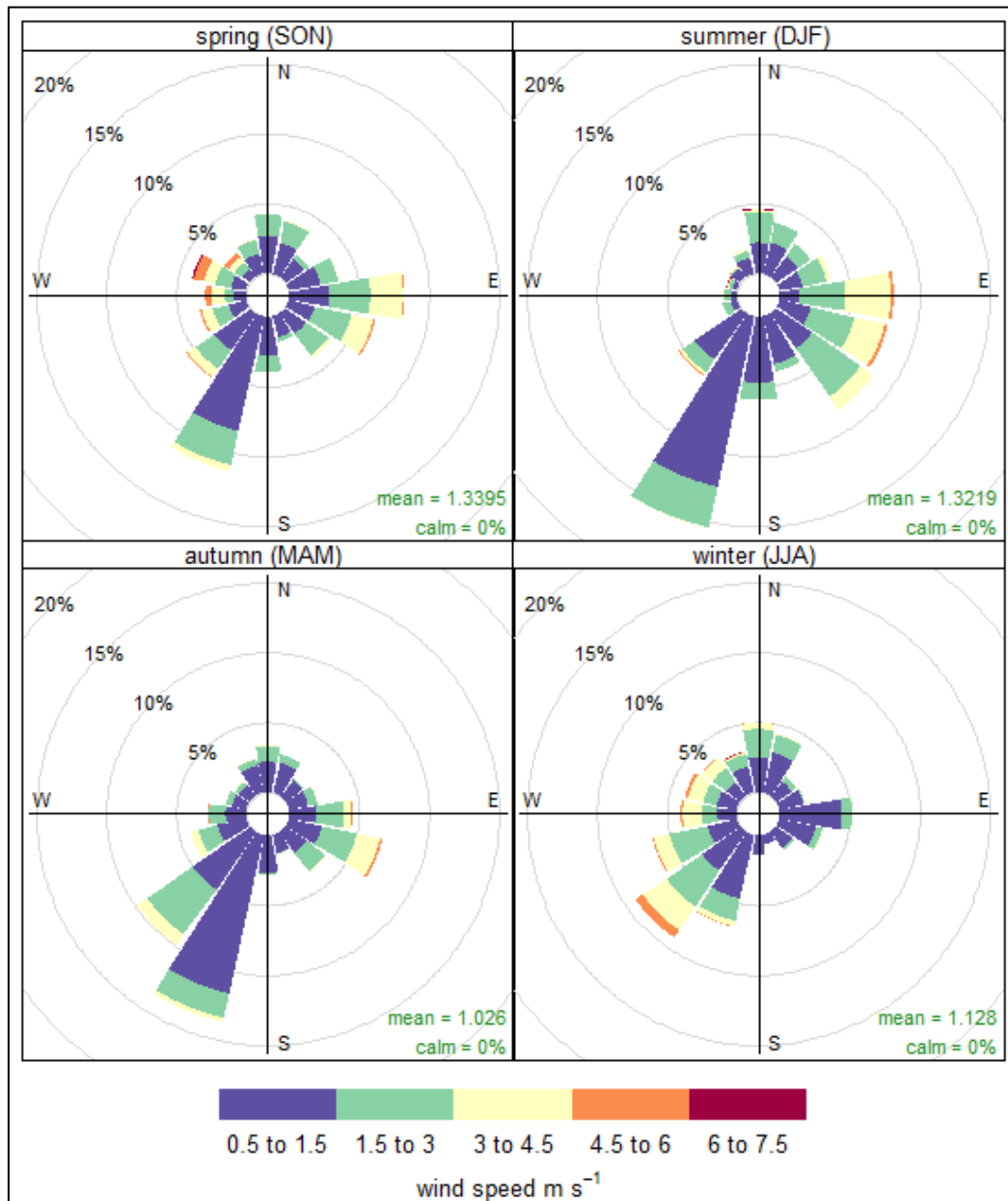


Figure 5-2: Seasonal windroses for the project site – 2021

5.2 Existing air quality

PM₁₀ and PM_{2.5} data is collected at a number of sites in the area as part of the DPE monitoring network in NSW. The most representative of these sites is Liverpool.

Table 5-1 presents the annual average PM₁₀ and PM_{2.5} concentrations at Liverpool from 2016 to 2021. The 2018 and 2019 concentrations are clearly impacted by the state-wide prolonged drought and extreme bushfires across large parts of NSW during this period. These years are not considered representative of general ambient conditions. However, 2021 is considered more representative of these conditions, which aligns with the chosen meteorological year as described in Section 5.

Table 5-1: Measured annual average PM₁₀ and PM_{2.5} concentrations at Liverpool

Year	PM ₁₀	PM _{2.5}
2016	19.5	8.8
2017	20.6	8.9
2018	24.2	10.1
2019	27.7	12.8
2020	20.8	9.1
2021	18.1	7.9

The 24-hour average PM₁₀ and PM_{2.5} concentrations for these sites are presented in Figure 5-3 and Figure 5-4, respectively. The higher frequency of elevated concentrations in 2018 and the extremes in late 2019 and early 2020 are clear from these figures. Concentrations in 2021 are more representative of ambient conditions in the area.

The 24-hour average 2021 dataset for PM₁₀ is presented in Figure 5-5, showing four exceedances of the 50 µg/m³ criterion, predominantly in late April and early May. The highest concentration below this criterion was 44.4 µg/m³, measured on 29 October 2021.

Figure 5-6 presents this same period of data for PM_{2.5}, showing six exceedances of the 25 µg/m³ criterion, also in later April and early May 2021. The highest concentration below this criterion was 24.5 µg/m³, measured on 21 August 2021. It is noted also, that higher PM_{2.5} concentrations generally occur during the winter months indicating there may be a higher component of woodsmoke from home heating.

There are no ambient monitoring data available for arsenic, chromium and lead and so these incremental model predictions have been compared to their relevant criteria.

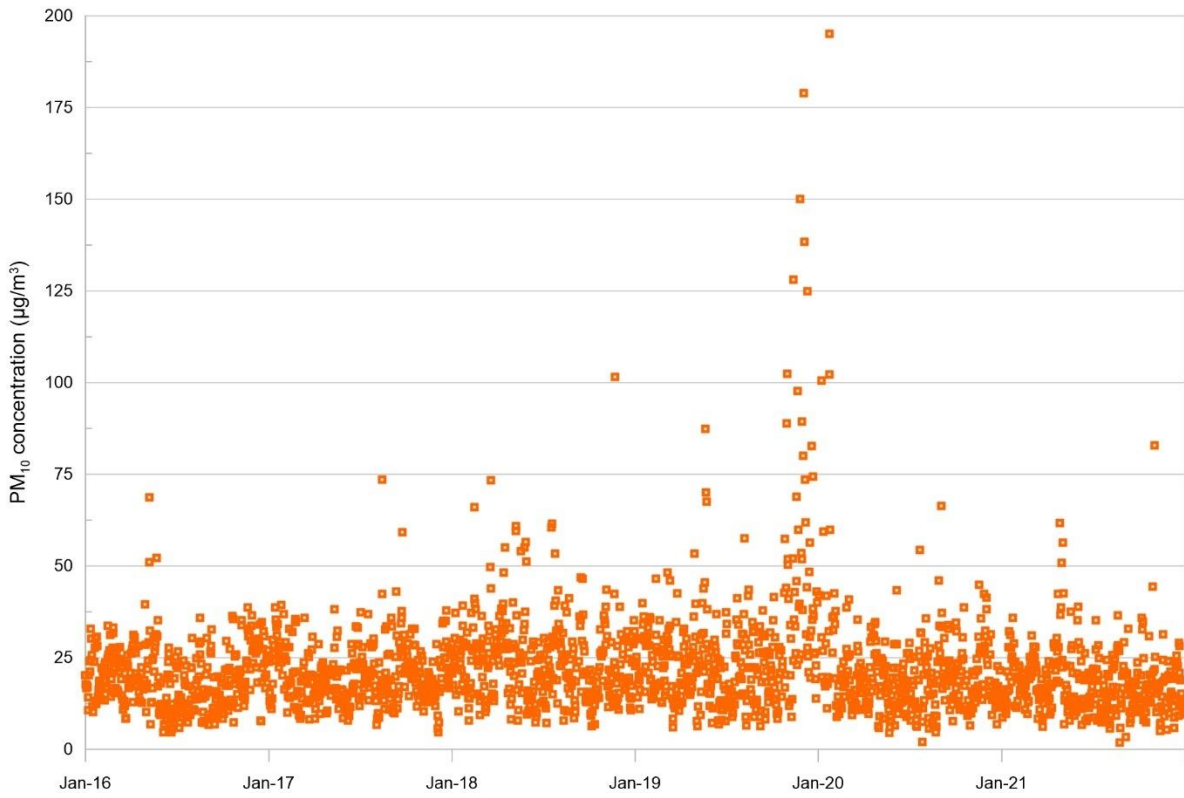


Figure 5-3: 24-hour PM₁₀ concentrations at Liverpool

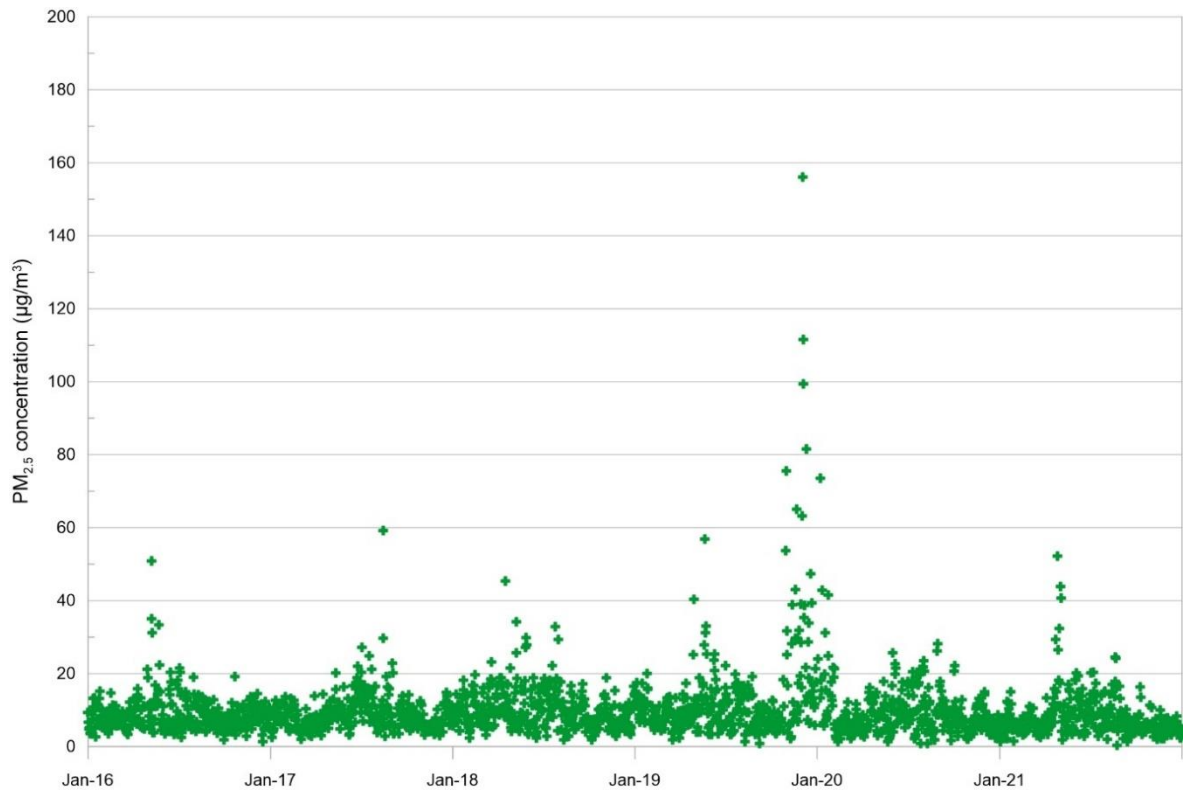


Figure 5-4: 24-hour PM_{2.5} concentrations at Liverpool

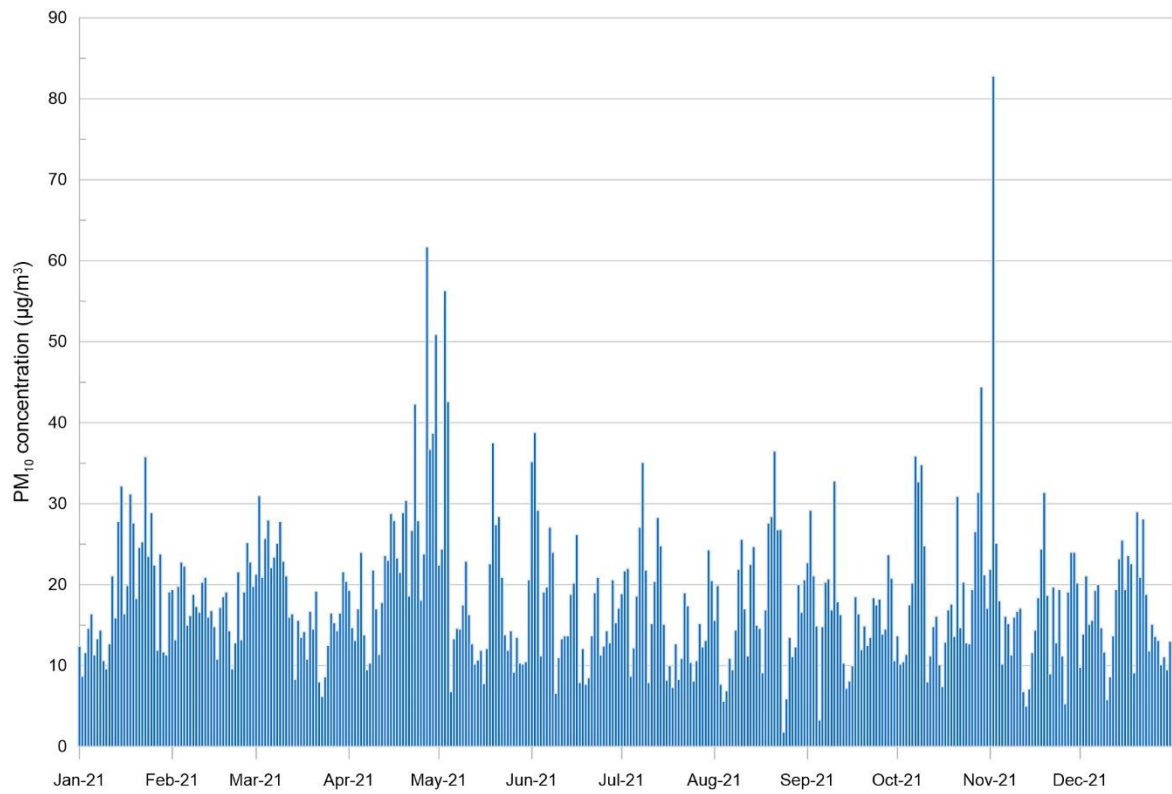


Figure 5-5: Background 24-hour average PM₁₀ concentration – 2021

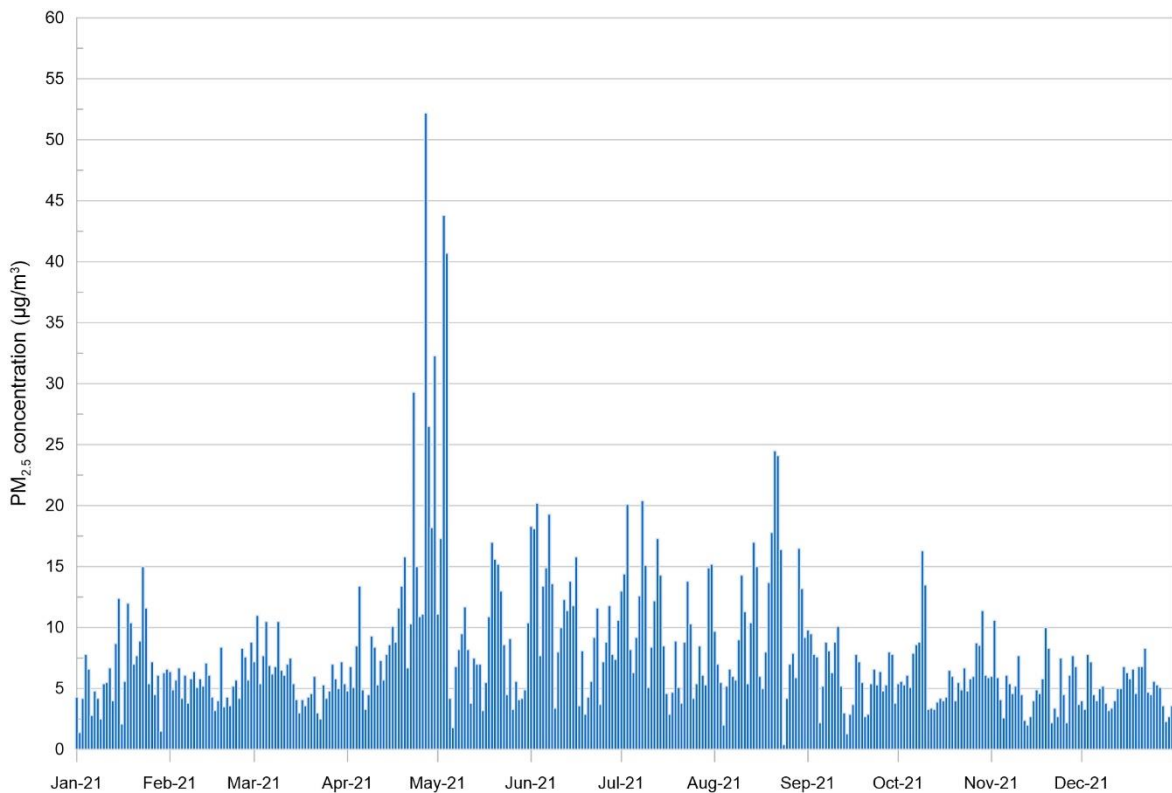


Figure 5-6: Background 24-hour average PM_{2.5} concentration – 2021

6 EMISSIONS TO AIR

All air from inside the WTF building is drawn through the emissions control system. The details around the emissions control system are provided in Golder (2021). In summary, contaminated air is drawn from each area (Compartments 1, 2 and 3) and routed to the common inlet plenum for the HVAC emissions control system. This system includes the following components (in order of exhaust flow):

- Common inlet plenum serving Compartments 1 and 2;
- PM filter box;
- VOC and odour filter box;
- Common outlet plenum; and
- Three (3) strobic exhaust fans operating in parallel.

As noted in the Golder (2021) assessment, the PM filter box will be equipped with a G4-rated, 30/30 Dual 10 high capacity disposable cardboard pre-filter and an F7-rated, Hi-Flo spun glass high-capacity filter. The combined removal efficiencies for the two filters are calculated as 75% for PM_{2.5}, 95% for PM₁₀ and 97.5% for TSP.

Hi-Quality has confirmed that the maximum air exchange through the system will be 52.6 m³/s vented from the building through the three strobic fans. Each fan is associated with an individual stack and therefore the flow rate through each ventilation outlet is 17.5 m³/s.

A stack-tip diameter of 0.95 m equates to a cross-sectional area of 0.709 m². For 17.5 m³/s of air to flow through this area would require an exit velocity of 25 m/s. This is a reasonably high exit velocity but significantly lower than the 40 m/s provided in the previous assessment. Additionally, and as noted above, this is a maximum anticipated flow rate, with lower flow rates occurring in reality during periods of lower activity. These stack parameters are summarised in [Table 6-1](#).

Without direct stack measurements some conservative assumptions have been made regarding the in-stack concentrations of arsenic, chromium and lead. There are workplace exposure standards for these heavy metal contaminants, which have been used to assume the maximum concentrations in the building where workers are operating. This air is then drawn through the control system, passing through PM filters prior to emission to the atmosphere. As noted above, using the same assumptions in Golder (2021) approximately 97.5% of the particulates (and hence metals) in the untreated air are captured by the filters. This is a reasonable assumption and has been retained for this updated modelling assessment. [Table 6-1](#) summarises the emission rates used in the assessment. The assumptions that underpin these emission rates are conservative. For example:

- Pre-filtered concentrations of As, Cr and Pb inside the building are at the maximum allowable workplace limits (Safework Australia, 2019);
- These maximum concentrations occur consistently 24 hours per day;
- Maximum building air exchange of 52.6 m³/s
- No arsenic has been detected at Hi-Quality's Queensland facility at Yatala during the 6-monthly stack tests for the last two years, so the assumed concentrations are anticipated to be highly conservative;
- Stack testing at Yatala has also shown that Cr concentrations are also generally below the level of detection and when they were detected they have been an order of magnitude lower than the concentrations assumed for this assessment; and
- It is assumed that all Cr is the more toxic Cr (VI), which is highly unlikely.

In order to quantitatively assess odour impacts, odour emissions have been estimated using the published technical specifications for odour control units, published by Sydney Water (Sydney Water, 2022). This document outlines the requirements for in-stack concentrations for odour control units, specifically using activated carbon, as used for this Project. It is noted that the in-stack concentration for odour, post-treatment, should not exceed 500 OU. Assuming this applies to the treated air emitted from the WTF, the odour emission rates are shown in [Table 6-1](#).

Table 6-1: Stack and emission parameters for particulate matter and metals

Parameter	Value				
	MGA Stack location (m)	303991 6243376	303991 6243374.5	303991 6243373	
Stack height (m)	11.7				
Exit temperature (K)	298				
Stack tip diameter (m)	0.95				
Stack tip area (m ²)	0.709				
Volumetric flow rate (m ³ /s)	17.5				
Exit velocity (m/s)	25				
	Arsenic	Chromium	Lead	PM₁₀	PM_{2.5}
Concentration in pre-filtered air (mg/m ³)	0.05	0.5 *	0.05	**	**
In-stack concentration post-filtration (mg/m ³)	0.00125 ^	0.0125 ^	0.00125 ^	**	**
Emission rate (g/s)	0.0000219	0.0002192	0.0000219	0.0065	0.0049
	Odour				
In-stack odour concentration post-filtration (OU)	500				
Peak-to-mean factor	2.3				
Emission rate (OU.m ³ /s)	20,163				

* This is the workplace exposure standard for Cr (III) which is higher than for Cr (VI). By assuming the higher emission rates for Cr (III) but comparing model predictions to lower criteria for Cr VI this is a highly conservative assessment.

** These concentrations were not provided in Golder (2021) but the same emission rates have been assumed which is likely to be a conservative estimate as the emission rates are higher than the stack testing results at Yatala.

^ Well below the in-stack concentration limit of 1 mg/m³ for Type 1 and 2 substances listed under Part 7, Schedule 4 of the *Protection of the Environment Operations (Clean Air) Regulation 2021* (the Clean Air Regulation)

7 IMPACT ASSESSMENT

7.1 PM₁₀ and PM_{2.5}

Table 7-1 presents the predictions for each of the 12 specific sensitive receptors, showing the contributions from the facility. Figure 7-1 and Figure 7-2 present the predicted 24-hour PM₁₀ and PM_{2.5} concentrations, respectively. The annual average predictions for PM₁₀ and PM_{2.5} are presented in Figure 7-3 and Figure 7-4.

These results show that the predictions are very low and unlikely to be discernible above background. The contribution from the facility is not predicted to cause any exceedances of the annual criteria or any additional exceedances of the 24-hour criteria when added to the highest (non-exceeding) background concentrations noted in Section 5.2.

Table 7-1: Predicted PM₁₀ and PM_{2.5} concentrations (µg/m³)

Criterion (µg/m ³)	24-hour average		Annual average	
	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
	50	25	25	8
SR1	0.074	0.056	0.010	0.008
SR2	0.096	0.072	0.008	0.006
SR3	0.113	0.085	0.008	0.006
SR4	0.063	0.047	0.007	0.005
SR5	0.058	0.044	0.006	0.004
SR6	0.029	0.022	0.003	0.002
SR7	0.030	0.022	0.003	0.002
SR8	0.032	0.024	0.002	0.002
SR9	0.032	0.024	0.002	0.002
SR10	0.195	0.147	0.037	0.028
SR11	0.130	0.098	0.012	0.009
SR12	0.120	0.091	0.013	0.010

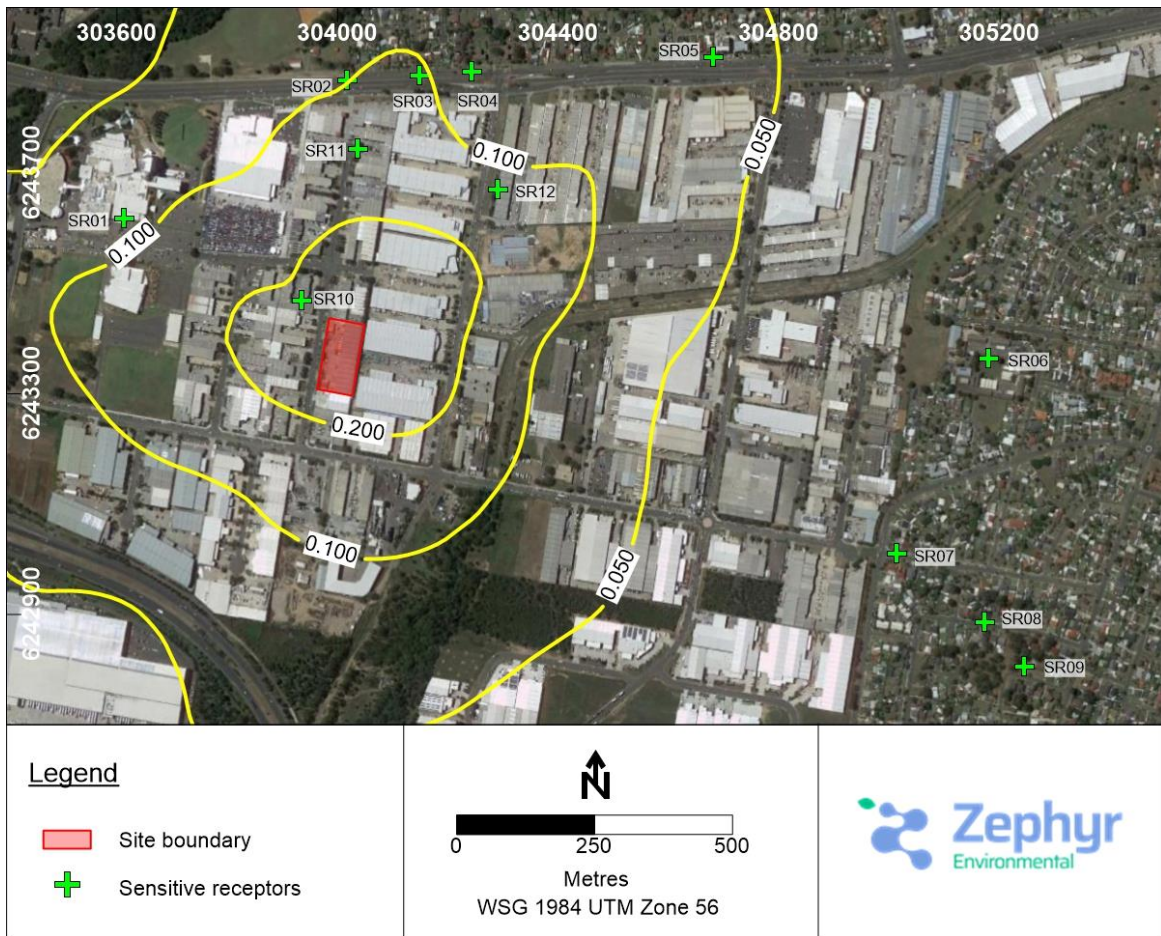


Figure 7-1: Predicted maximum 24-hour average PM₁₀ concentrations due to the proposed WTF (µg/m³)



Figure 7-2: Predicted maximum 24-hour average PM_{2.5} concentrations due to the proposed WTF (µg/m³)



Figure 7-3: Predicted annual average PM₁₀ concentrations due to the proposed WTF (µg/m³)

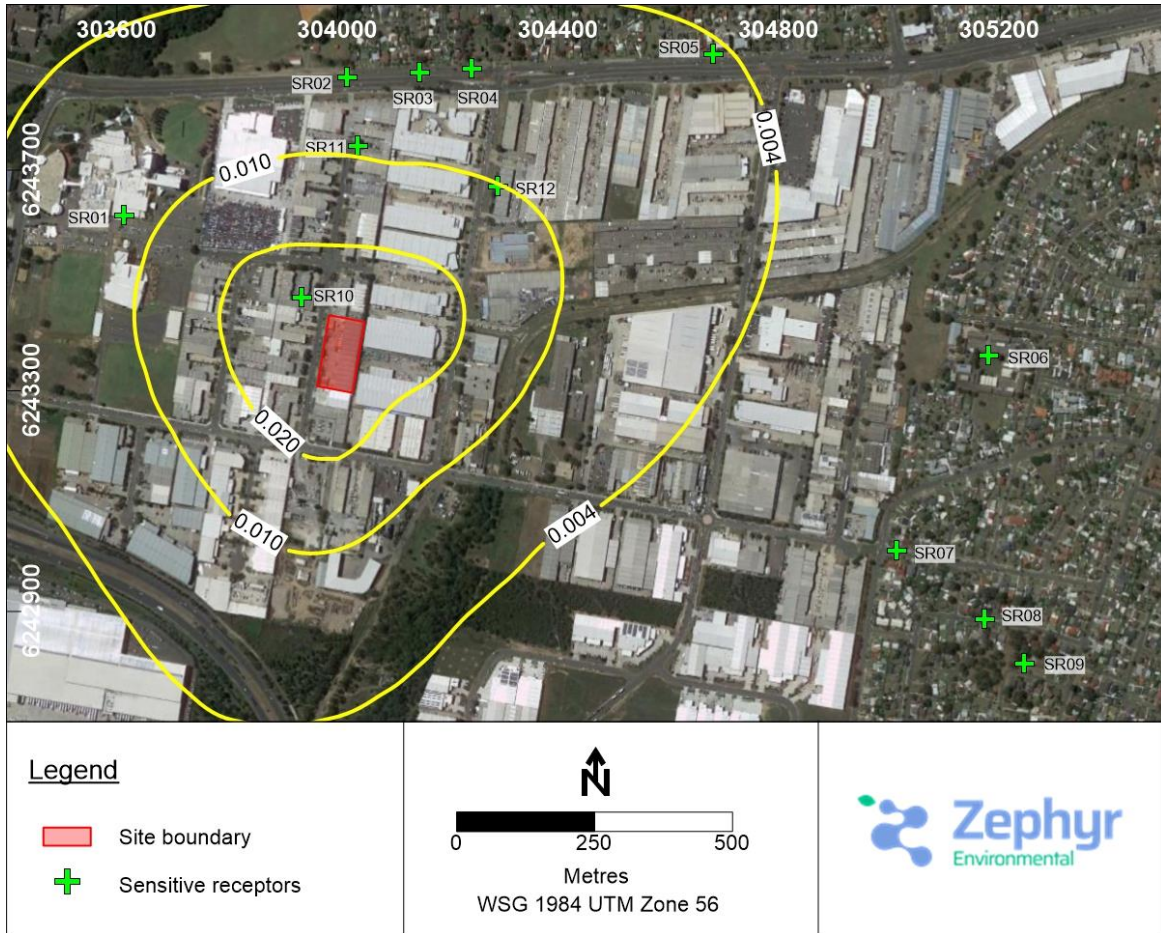


Figure 7-4: Predicted annual average PM_{2.5} concentrations due to the proposed WTF (µg/m³)

7.2 Arsenic, chromium and lead

Table 7-2 presents the heavy metal predictions for each of the 12 specific sensitive receptors, showing the contributions from the facility. Figure 7-5, Figure 7-6 and Figure 7-7 present the predicted concentrations for As, Cr and Pb, respectively.

These results show that the predictions are very low and well below their respective criteria.

Table 7-2: Predicted metal concentrations ($\mu\text{g}/\text{m}^3$)

Criterion ($\mu\text{g}/\text{m}^3$)	1-hour 99.9 th percentile		Annual average
	As	Cr (as Cr VI)	Pb
	0.09	0.09	0.5
SR1	0.00084	0.00843	0.00003
SR2	0.00085	0.00853	0.00003
SR3	0.00090	0.00903	0.00003
SR4	0.00083	0.00831	0.00002
SR5	0.00072	0.00720	0.00002
SR6	0.00070	0.00698	0.00001
SR7	0.00056	0.00562	0.00001
SR8	0.00059	0.00590	0.00001
SR9	0.00055	0.00545	0.00001
SR10	0.00215	0.02150	0.00012
SR11	0.00107	0.01066	0.00004
SR12	0.00111	0.01107	0.00005

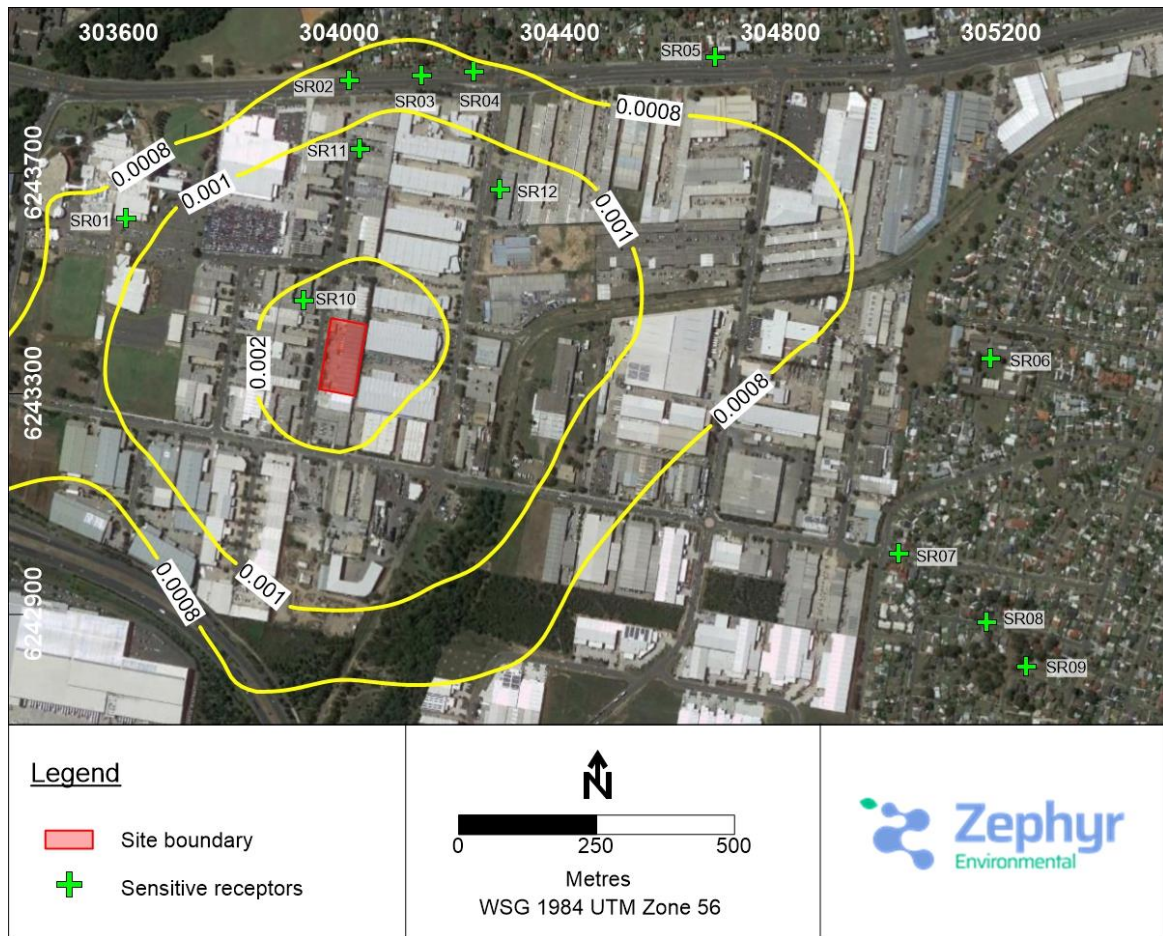


Figure 7-5: Predicted 1-hour average (99.9th percentile) As concentrations due to the proposed WTF ($\mu\text{g}/\text{m}^3$)

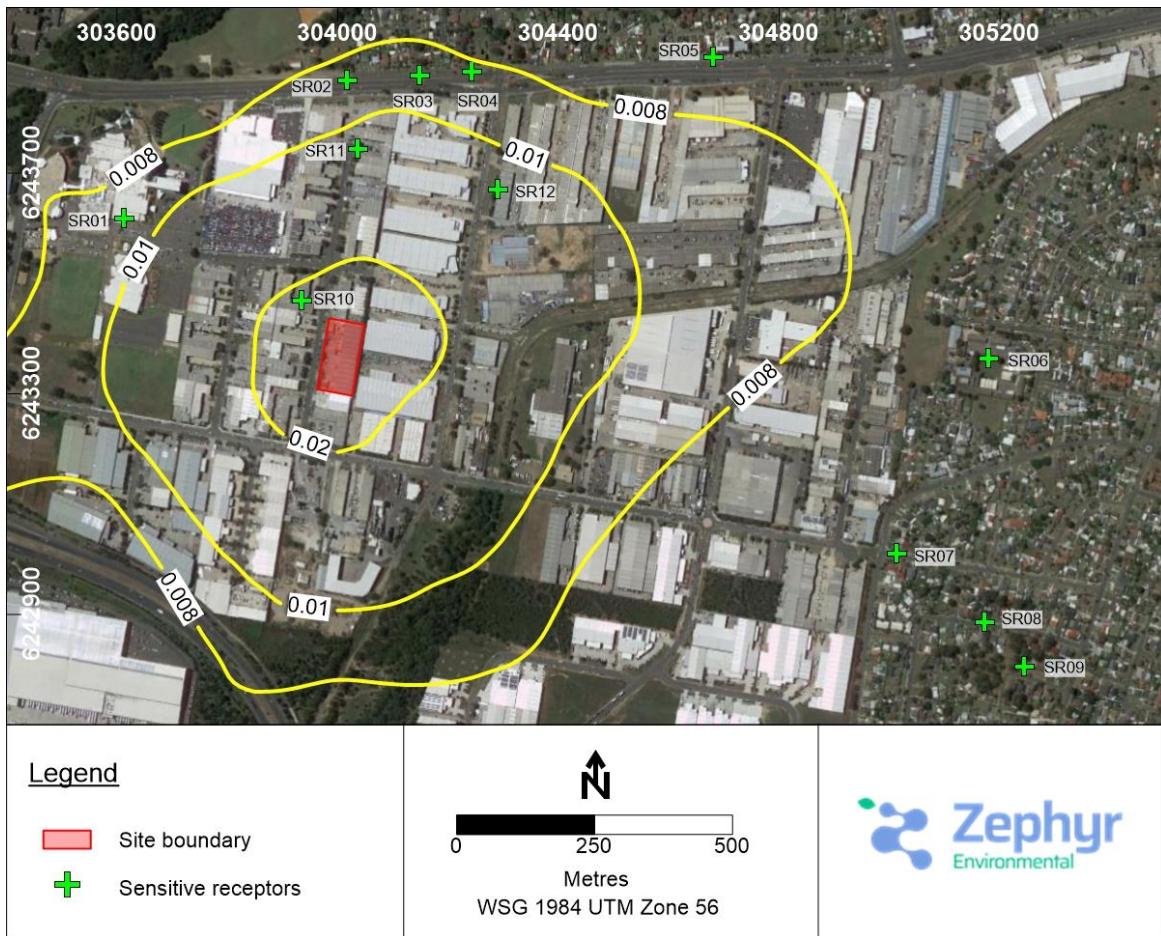


Figure 7-6: Predicted 1-hour average (99.9th percentile) Cr concentrations due to the proposed WTF ($\mu\text{g}/\text{m}^3$)

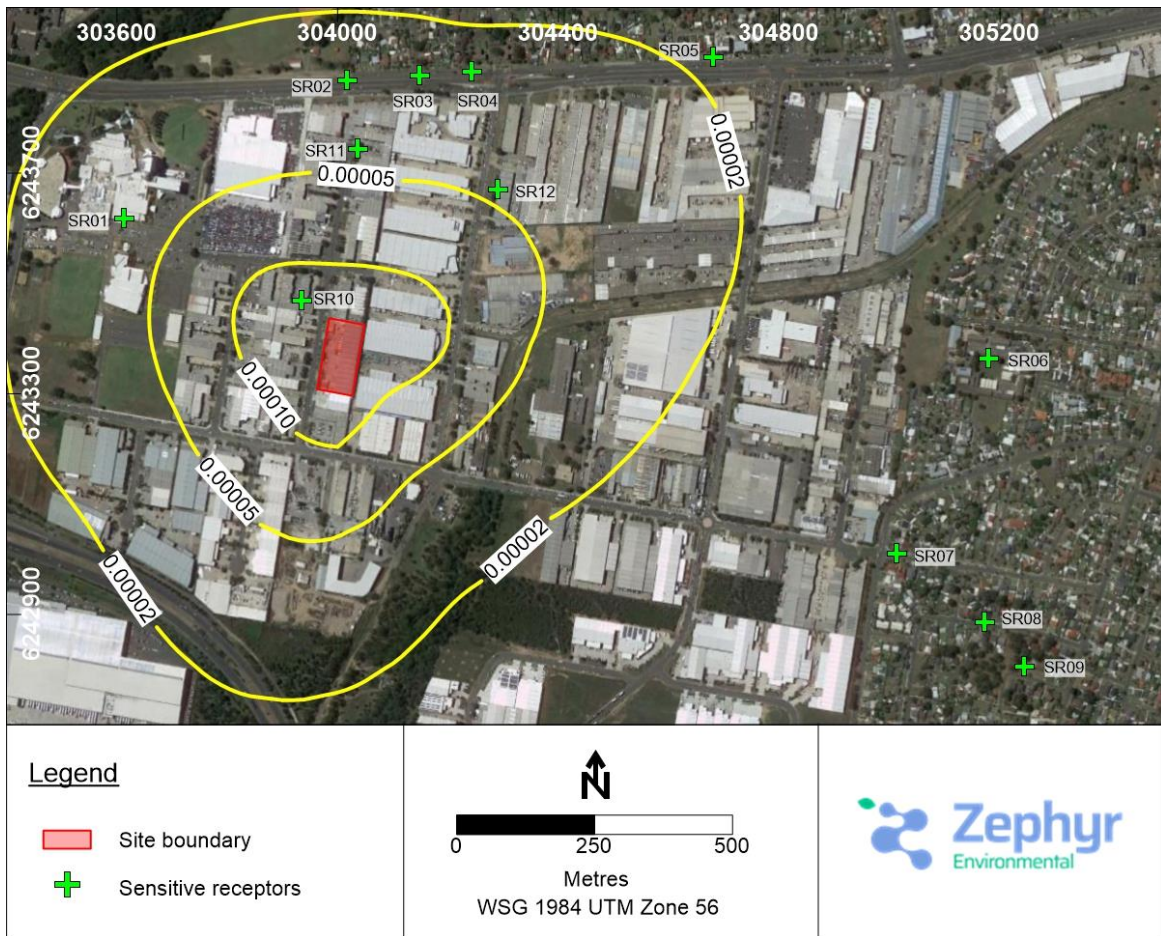


Figure 7-7: Predicted annual average Pb concentrations due to the proposed WTF ($\mu\text{g}/\text{m}^3$)

7.3 Odour

Table 7-3 presents the odour predictions for each of the 12 specific sensitive receptors and Figure 7-1 presents the predicted 1-hour average concentrations (99th percentile).

These results show that the predictions are very low and all below the 2 OU criterion. For the majority of sensitive receptors the predictions are below 1 OU, the theoretical level of detection.

Table 7-3: Predicted 99th percentile, 1-second average odour concentrations (OU)

Sensitive receptor	Odour concentration (OU)
SR1	< 1
SR2	< 1
SR3	< 1
SR4	< 1
SR5	< 1
SR6	< 1
SR7	< 1
SR8	< 1
SR9	< 1
SR10	< 2
SR11	< 1
SR12	< 1

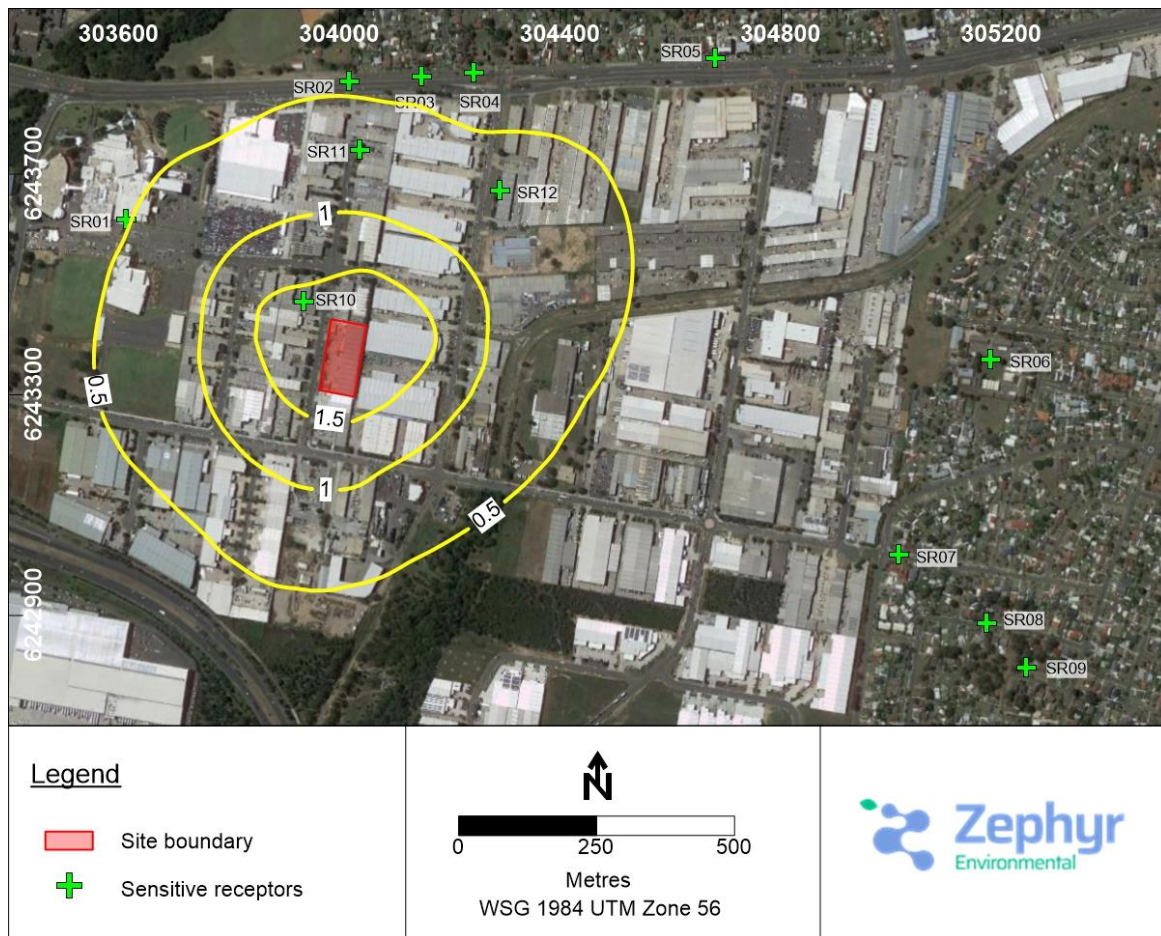


Figure 7-8: Predicted 99th percentile, 1-second average odour concentrations due to the proposed WTF (OU)

8 CONCLUSIONS

Zephyr Environmental has completed an air quality modelling assessment for the proposed WTF at Prestons in southwest Sydney. The work was completed to address concerns raised by the NSW EPA regarding the previous assessment, requiring clarification of emission estimation and modelling results, particularly with regard to metals such as arsenic and chromium. Odour modelling has also been undertaken to address concerns regarding the lack of a quantitative analysis of odour in the previous assessment.

The dispersion modelling accounts for the local meteorology and landuse information and used calculated emission estimates to predict ground level concentrations to compare with relevant EPA assessment criteria. Conservative assumptions were made regarding both emissions estimates and air flow parameters from the ventilation outlets.

The results of the dispersion modelling indicate that the predicted concentrations for PM₁₀, PM_{2.5}, arsenic, chromium, lead and odour at the closest sensitive receptors are all predicted to comply with their relevant air quality criteria.

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