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REGIONAL JOB PRECINCT  
AIR, NOISE AND ODOUR  
TECHNICAL REPORT - ALBURY

Regional NSW

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# Regional Job Precinct

## Air, Noise and Odour Technical Report

### ALBURY

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## GLOSSARY

Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
Background levels	Existing concentration of pollutants in the ambient air.
Background noise	The underlying level of noise present in ambient noise, generally excluding the noise source under investigation, when extraneous noise is removed. This is described using the $L_{AF90}$ descriptor.
CALPUFF	A multi-layer, multi-species, non-steady state Gaussian puff dispersion model that is able to simulate the effects of time- and space-varying meteorological conditions on pollutant transport.
Decibel (dB)	A measure of sound level. The decibel is a logarithmic way of describing a ratio. The ratio may be power, sound pressure, voltage, intensity or other parameters. In the case of sound pressure, it is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure squared to a reference sound pressure squared.
Diffuse source	Activities that are generally dominated by fugitive area or volume-source emissions, which can be relatively difficult to control.
Dispersion modelling	Modelling by computer to mathematically simulate the effect on plume dispersion under varying atmospheric conditions; used to calculate spatial and temporal fields of concentrations and particle deposition due to emissions from various source types.
EPL	Environmental protection licence
H <sub>2</sub> S	Hydrogen sulfide
Incremental impact	The impact due to an emission source (or group of sources) in isolation, i.e. without including background levels.
µg	Mass in micrograms.
m <sup>3</sup>	Volume in cubic metres.
NO <sub>2</sub>	Nitrogen dioxide.
NO <sub>x</sub>	Oxides of nitrogen, including NO and NO <sub>2</sub> .
PM <sub>10</sub>	Particulate matter less than 10 µm in aerodynamic equivalent diameter.
PM <sub>2.5</sub>	Particulate matter less than 2.5 µm in aerodynamic equivalent diameter.

Point source	Source of emissions, generally a stack. Emissions can generally be relatively easily controlled by using waste reduction, waste minimisation and cleaner production principles or conventional emission control equipment
Sensitive receptor	A location where people are likely to work or reside; this may include a dwelling, school, hospital, office or public recreational area.
SO <sub>2</sub>	Sulfur dioxide
SO <sub>3</sub>	Sulfur trioxide
Stack	A vertical pipe used to vent pollutants from a process
O <sub>3</sub>	Ozone
VOCs	Volatile organic compounds

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## 1 INTRODUCTION

Todoroski Air Sciences has prepared this air, noise and odour technical report for the Department of Regional NSW (DRNSW). The report presents an analysis of the air, noise and odour impacts associated with the Master Plan developed for the Albury Regional Job Precinct (RJP) area located near Albury, New South Wales (NSW).

This technical report incorporates the following aspects:

- ✦ A summary of the baseline air, noise and odour conditions for the RJP;
- ✦ An outline of the methodology proposed to assess air, noise and odour matters associated with the Master Plan of the RJP;
- ✦ Presentation of the predicted results for the analysis of the Master Plan for the RJP; and,
- ✦ A discussion on the key findings and the mitigation and management strategies for the RJP with regard to the air, noise and odour impacts.

### 1.1 Overview

The RJPs are an extension of the Special Activation Precinct (SAP) program, focused on providing planning support to help fast-track approvals to drive growth, investment and development opportunities within regional NSW.

To assist with the strategic planning of the RJPs an air, noise and odour study is required to determine the appropriate planning response in relation to air, noise and odour emission from industry and development within the RJP investigation area to limit land use conflict.

The purpose of this technical report is to present the findings for environmental air, noise and odour matters for the Albury RJP Master Plan to inform development standards and precinct-based planning controls to address air, noise and odour concerns.

### 1.2 Relevant legislation

Air Quality (including odour) and Noise are regulated in NSW under the *Protection of the Environment Operations Act 1997* and subordinate regulations made under the Act. These are the Protection of the Environment Operations (Clean Air) Regulation 2021 and the Protection of the Environment (Noise Control) Regulation 2017.

The Regulation enables the appropriate regulatory authority (the NSW Environment Protection Authority [EPA]) to develop guidelines and policies for managing air quality and odour. The key guidelines applicable for the RJP investigation area include the following:

- ✦ Approved Methods for the Modelling and Assessment of Air Quality in New South Wales (2016) (Approved Methods);
- ✦ NSW Odour Policy, comprised of:
  - Technical Framework – Assessment and Management of odour from stationary sources in NSW (2006a); and,



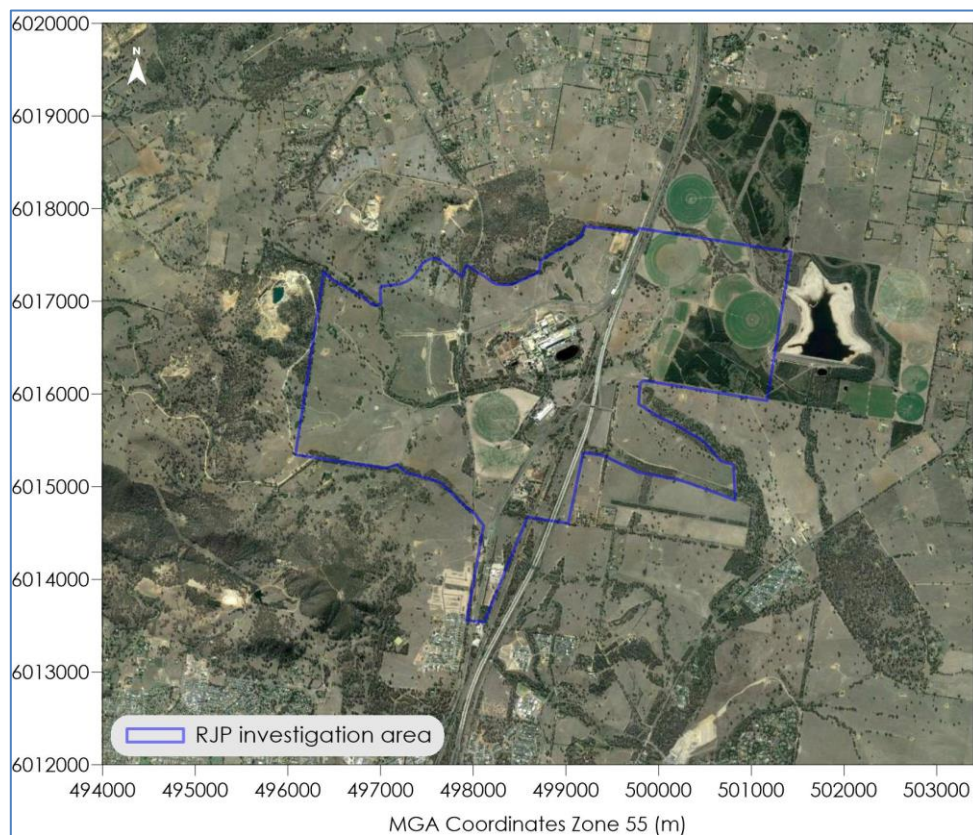
- Technical Notes – Assessment and Management of odour from stationary sources in NSW (2006b).
- ✦ Noise Policy for Industry (2017) (NPfI).

These guidelines set out suitable criteria for air pollutants, odour and noise to prevent adverse impacts on amenity and health for sensitive receptors such as residential areas. In addition to the above, other relevant policies and guidelines include:

- ✦ National Environment Protection Measure (NEPM) Ambient Air Quality (National Environment Protection Council, 2021)
- ✦ NSW Road Noise Policy (DECCW, 2011);
- ✦ Rail Infrastructure Guideline (EPA, 2013);
- ✦ Interim Construction Noise Guideline (NSW DECC, 2009); and,
- ✦ Assessing Vibration: A Technical Guideline (DEC, 2006).

### 1.3 Local setting

The Albury RJP investigation area covers approximately 1,200 hectares (ha) and is strategically located adjacent to the Melbourne-Sydney railway and the Hume Freeway corridor. **Figure 1-1** presents the Albury RJP investigation area.



**Figure 1-1: Local setting**



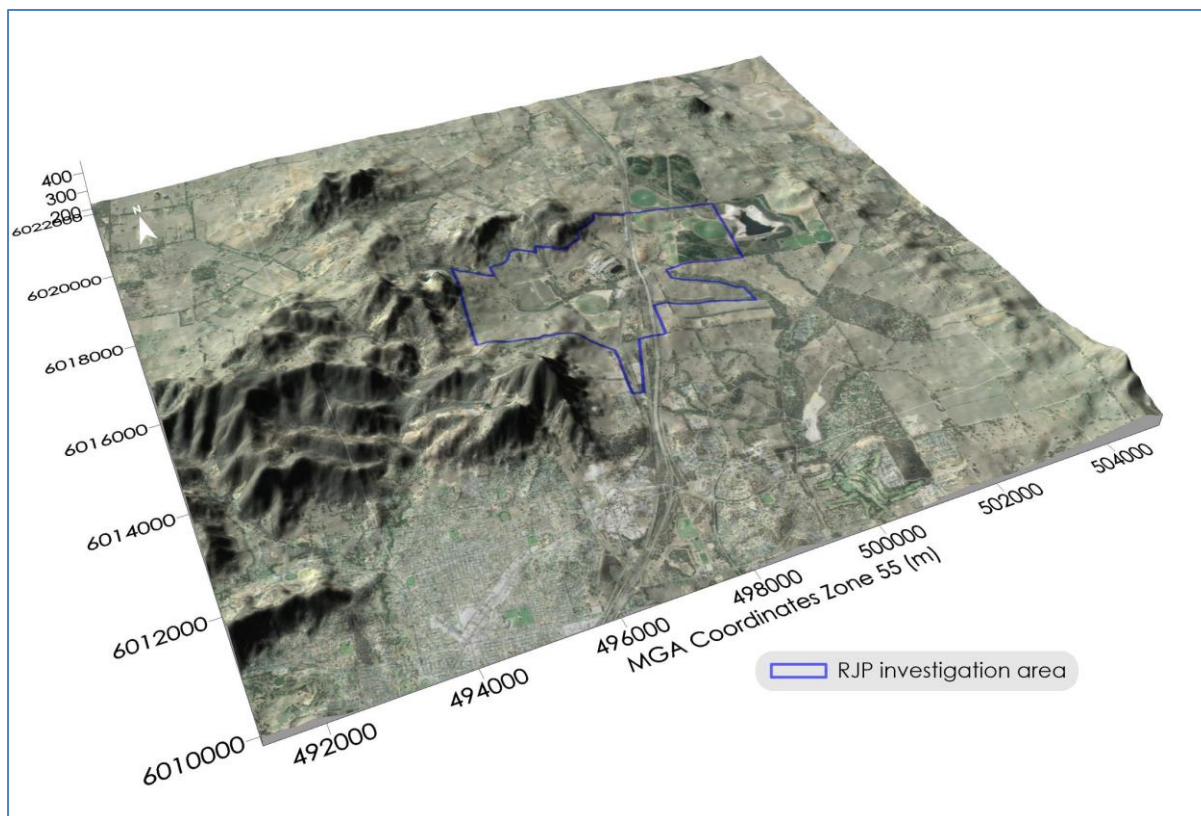
## 1.4 Local topography

**Figure 1-2** presents a representative three-dimensional visualisation of the terrain features surrounding the Albury RJP.

The topography of the central and eastern parts of the RJP investigation area are relatively flat or undulating with increasing elevation to the west. Outside of the RJP investigation area there are elevated ridges to the west, northwest and southwest, forming a crescent or horseshoe shape separating the investigation area from the majority of receptors in Albury located to the south and southwest. To the south and east of the site the terrain remains relatively flat with some slight undulations.

The terrain features of the surrounding area influence the local wind distribution patterns and flows which are important for the dispersion and propagation of air, noise and odour emissions. The elevated terrain toward the west of the RJP would likely cause some katabatic drainage flows which would increase the frequency of calm westerly breezes during cooler months and may influence air quality impacts on receptors to the east of the RJP.

In general, however, the ridges surrounding the western half of the investigation area are considered favourable for mitigating air, noise and odour impacts beyond the ridge line. Conversely if receptors are located on these ridges, this would be unfavourable for future development within the investigation area.



**Figure 1-2: Representative visualisation of local topography surrounding the Albury RJP investigation area**

## 1.5 Albury RJP Vision

The Albury RJP vision statement was developed in consultation with Albury City Council, Department of Regional NSW (DRNSW), Department of Planning and Environment (DPE), Environment Protection Authority (EPA), Transport for New South Wales (TfNSW), Essential; Energy and the consultant project group during stakeholder workshops as part of the master planning process. Technical information on air and noise matters specific to this locality was provided by Todoroski Air Sciences during the master planning process, helping the team accommodate such considerations in the precinct design.

*The Albury Regional Job Precinct will redefine the nature of employment within the Albury-Wodonga region. The Precinct will differentiate itself as an industrial hub for the future, focusing on highly sustainable production, circular economies and value-add industry within a productive and safe ecosystem.*

*The Precinct will be defined by its unique landscape and terrain, utilisation of surrounding amenity and services, and strong transport infrastructure linking to materials and markets in the region, interstate and overseas. The Precinct will not only be a highly desirable destination for businesses but offer a place to connect with nature.*

## 1.6 Albury RJP Master Plan

The Albury RJP Master Plan, developed by Ethos Urban, is shown in **Figure 1-3**. Key features of the Master Plan include:

- ✦ Areas for higher and lower intensity industry within the RJP predominantly on the western portion;
- ✦ Provision of conservation zones for biodiversity and flooding and management of Aboriginal and historic heritage values throughout the RJP;
- ✦ Identification of a residential heritage item toward the centre of the RJP;
- ✦ Productivity support zones to the south and northeast to improve flexibility and suitability for low impact industrial, warehouse or services uses; and,
- ✦ An existing intermodal adjacent to the northern boundary of the RJP along the Hume Freeway corridor.



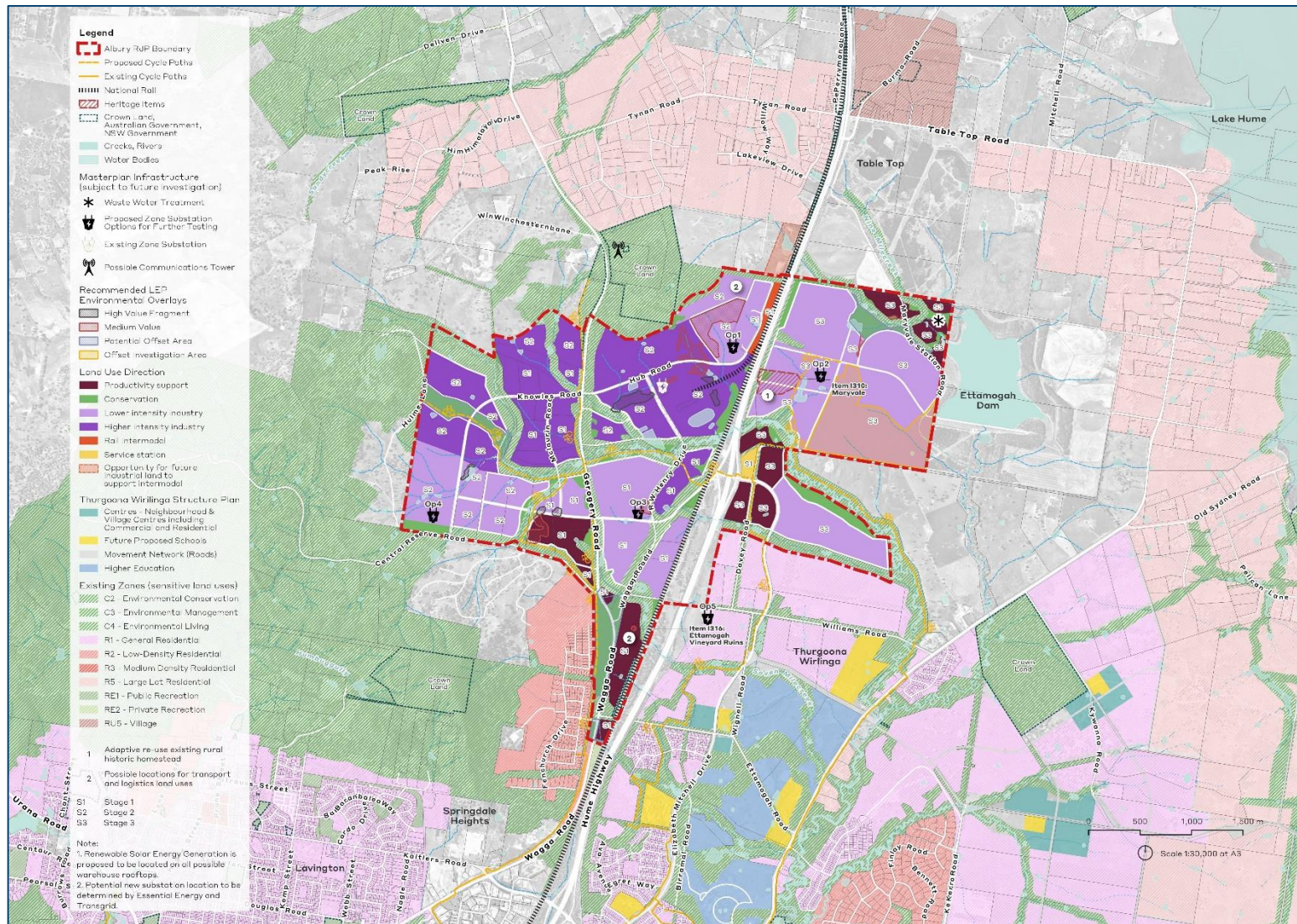


Figure 1-3: Master Plan for Albury RJP

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## 2 BASELINE ANALYSIS

### 2.1 Existing conditions

In general, the local topography in the western part of the Albury RJP investigation area is favourable for containing noise emissions. The crescent shaped ridges to the north, west and south of this part of the RJP investigation area offer shielding for noise for receptors beyond the ridges. This topographical feature appears to have potential to also limit dispersion of near-ground air and odour emissions, noting that the local winds in the surrounding area are predominantly from the north-western quadrant, however the model results do not indicate a significant bias in downwind impacts for fugitive ground level sources. The terrain in this part of the RJP indicates that stack sources have high potential to impact upon the ridgelines, as might be expected.

The closest air quality monitor to the RJP investigation area that can be used to quantify local background air quality data is at the Albury NSW Department of Planning and Environment (DPE) monitoring site. This station has data available for PM<sub>10</sub> and PM<sub>2.5</sub> only, hence other stations located within 400km of the site are used to provide approximate data for the remaining pollutants. The data indicates that elevated particulate levels may arise in the general area, and short-term (24-hour average) particulate levels above the EPA criteria are most likely to be associated with wider regional influences that affect the wider NSW region such as the state of ground cover (this is affected by rain/ drought conditions and agricultural activities), bushfire and hazard reduction burns. The annual average background dust levels are typically below the NSW EPA criteria for PM<sub>10</sub>, however can be above for PM<sub>2.5</sub> due to the bushfires affecting air quality in late 2019 and early 2020.

Other pollutants such as NO<sub>2</sub>, SO<sub>2</sub>, CO and O<sub>3</sub> may exceed the NSW EPA criteria on rare occasions and such effects could be attributed to the phenomena like the 2019 and 2020 bushfires. The atmospheric levels of NO<sub>x</sub> and VOCs in the atmosphere lead to the formation of O<sub>3</sub> and continuing growth in the sources of NO<sub>x</sub> and VOCs will exacerbate this. The majority of these emissions originate from combustion.

For noise, the results are generally consistent with expected noise levels in proximity to an industrial area, when considering the local environment and proximity to sources. The baseline noise levels are not crucial inputs to the design of the RJP investigation area as the known criteria would be set (assuming all facilities operate) to indicate any existing issues with existing noise sources and where any new sources can be accommodated without leading to unacceptable cumulative impacts.

### 2.2 Existing industries

The existing industrial/ commercial operations that can generate some form of air, noise or odour emissions identified within and surrounding the Albury RJP investigation area are set out in **Table 2-1** and **Figure 2-1**.

These operations include a mix of industries such as waste management and recycling, paper milling, metal forging, quarrying and other operations. The key substance (either air, noise or odour) for each of the operations is shown with an assigned amenity classification based on the scale of the operation and the likely potential to cause environmental air, noise or odour impacts.

Table 2-1: Existing Industries

Company	Description	Map identification number	Key substance emitted
Ettamogah Rail Hub	Transport	1	Noise
Norske Skog Albury Papermill (VISY)	Pulp, Paper and Paperboard Manufacturing	2	Air & Noise
Overall Forge site	Iron and Steel Forging	3	Air
Circular Plastics Australia PET	Manufacturing	4	Air
Twin Cities Model Aero Club	Professionals	5	Noise
Burgess Quarry	Mining	6	Air
Albury Wodonga Clay Target Club	Arts and Recreation Services	7	Noise
Delaney "Rockwood" Quarry Pit 1	Mining	8	Air
Delaney "Rockwood" Quarry Pit 2	Mining	9	Air

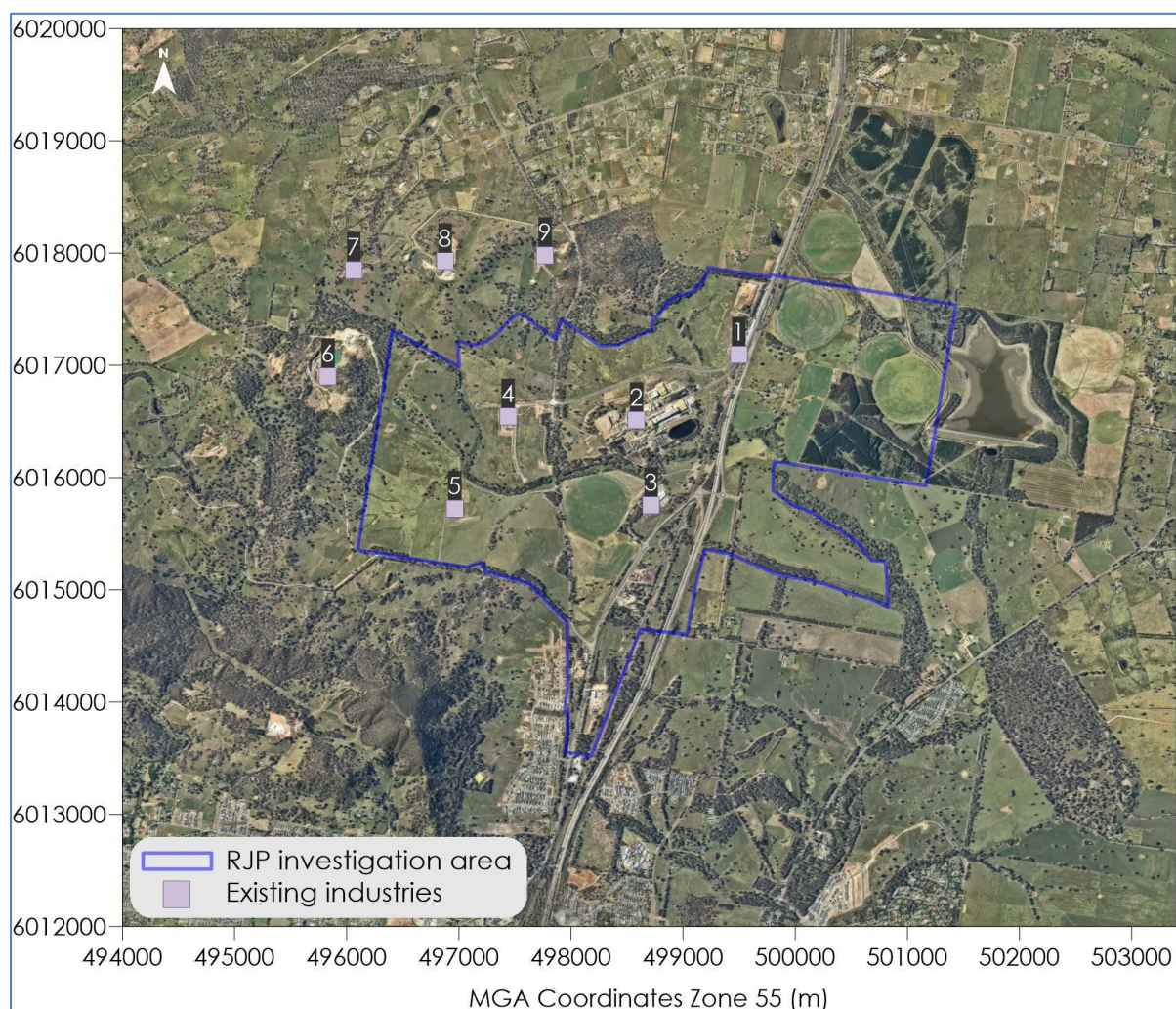
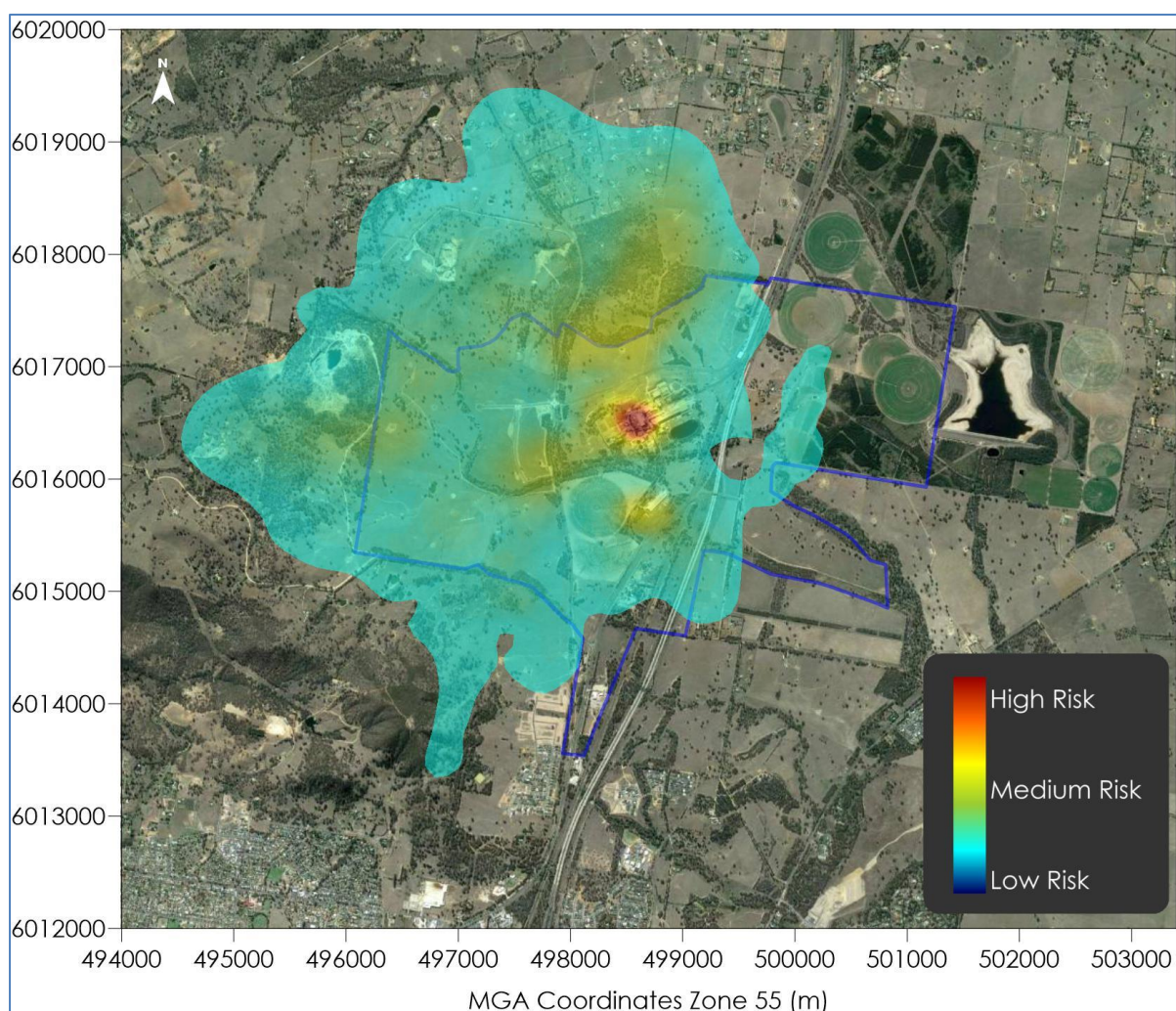


Figure 2-1: Existing industries

### 2.3 Analysis of modelling predictions for existing industries

Modelling predictions are presented based on a risk scale in terms of impact. The risk scale is provided to show the effect of dispersion/ emission from the existing sources due to the existing local terrain and winds, rather than to indicate compliance/ non-compliance of the existing industries with the relevant criteria. The shape of the modelling results is used to inform the shape of the buffers required and the risk profile of the land within the industrial area to be zoned and where like industries are best allocated.

The predicted maximum 1-hour average impacts for the modelled existing point sources are presented in **Figure 2-2**. The results indicate that high risk impacts generally occur close to the source and are biased significantly towards the areas of elevated terrain, generally in the western half of the RJP investigation area and more so for the northern part of the elevated terrain.

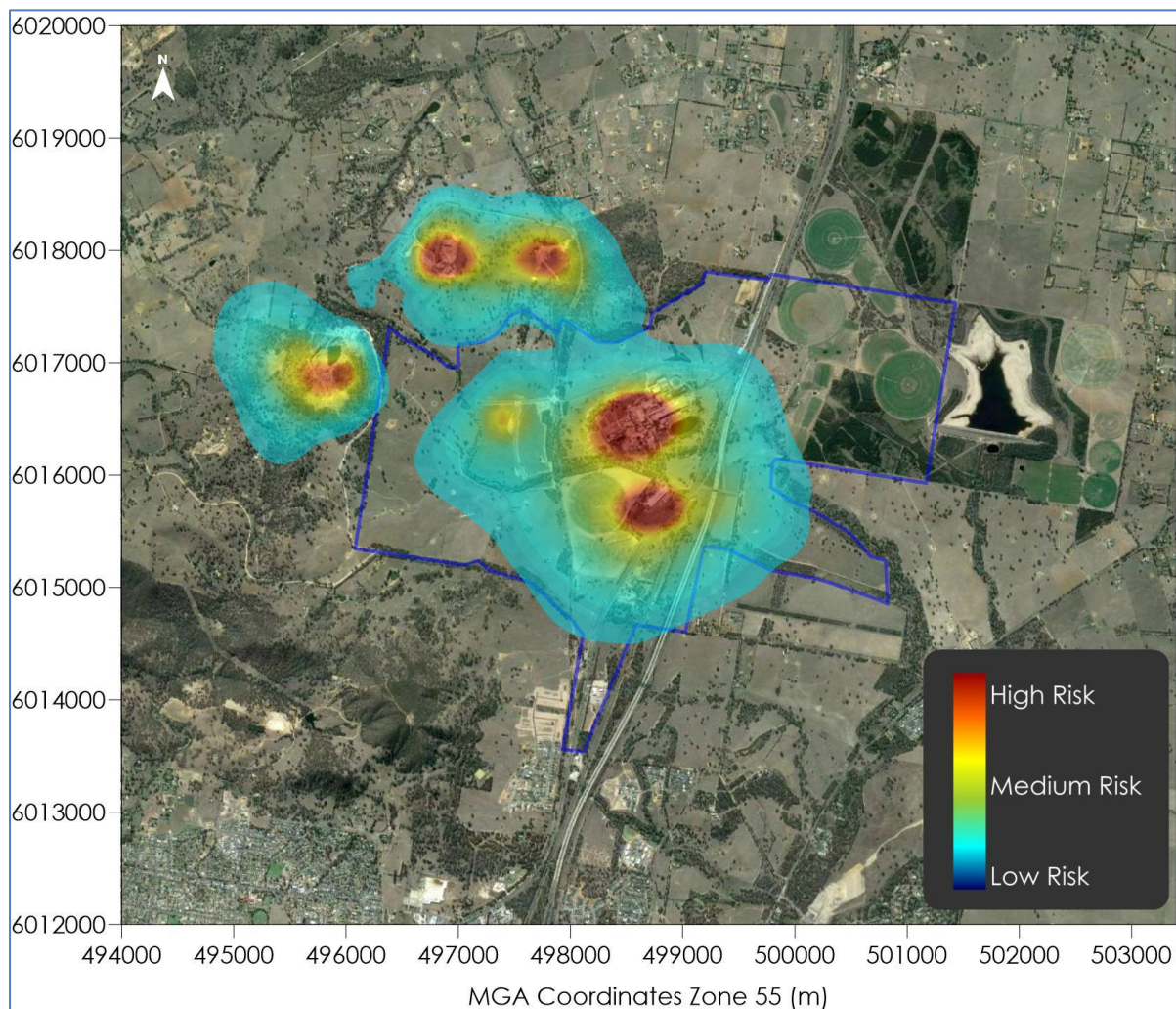


**Figure 2-2: Predicted maximum 1-hour average impacts – Point (stack) sources**

**Figure 2-3** presents the predicted 99<sup>th</sup> percentile 1-hour impacts for the modelled fugitive sources which are representative of potential odour impacts. Similar to the results for point sources, high risk impacts are typically close to the source and decrease with distance. The modelled sources include the paper mill facility, hard rock quarries outside of the RJP investigation area identified further north and

west, the overall forge operations to the south of the papermill, and the plastics recycling facility west of the paper mill.

The modelling indicates a minor bias in impact towards the southeast quadrant, far less than might be expected based on the wind rose patterns. The indications are that impacts from ground-based air and odour sources are likely to be relatively uniform in all directions, with some small bias towards higher impacts in the south-eastern quadrant. Overall, this is more favourable than expected given the large bias in winds towards the southeast quadrant.



**Figure 2-3: Predicted 99<sup>th</sup> percentile 1-hour average impacts – fugitive sources**

**Figure 2-4** presents the predicted worst-case 15-minute period noise levels for the modelled sources. The high-risk noise areas are predicted to arise close to noise sources (as would be expected) in the elevated terrain and also in the southeast quadrant. The propagation of noise towards the higher terrain and the southeast quadrant appears to be notably influenced by the local terrain features and winds in the area. This extends the potential for noise impacts towards the residential areas to the (middle) south of the RJP investigation area.

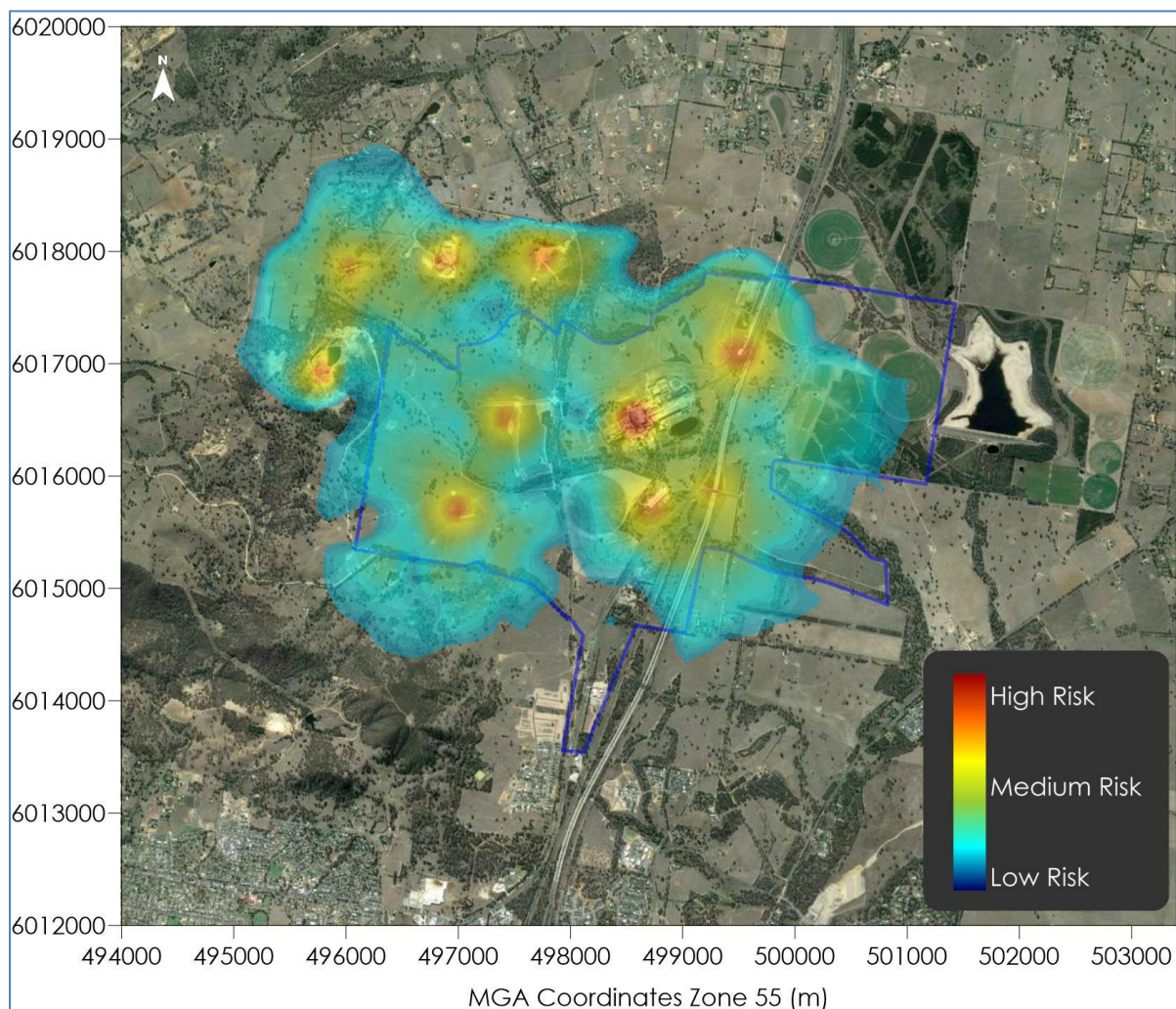


Figure 2-4: Predicted worst-case 15-minute period noise levels

## 2.4 Constraints and Opportunities

### 2.4.1 Constraints

The analysis shows a likely medium risk level of impact between existing industries and receptors. The impact, or land use conflict, arises due to the relatively close proximity of these existing receptors to existing industrial activities.

Overall, the following can be determined:

- ✦ The highest risks of impacts arise due to emissions from stacks upon elevated terrain around the RJP, or from noise or odour or dust emitted near ground level. Potentially they may be existing air quality, noise or odour impacts or levels near to criteria at some nearby residential receptors or the currently under construction residential areas to the (middle) south of the RJP investigation area.
- ✦ To minimise or prevent future impacts arising, the next stage of the technical work process will define appropriate setback or buffer areas around the existing sources of emissions in the RJP investigation area. This work would also define an appropriate allowance of air emissions for



industries within the RJP investigation area required to meet the relevant air quality criteria at these locations (or other suitable measures for use in planning instruments).

- ✦ Impacts from the existing volume sources, such as ponds, land surfaces and fugitive emissions from yards and buildings, predominantly relate to odour emissions. Emissions from stacks include odour, but also toxic air pollutants. The volume sources tend to cause impacts near to the source and tend to concentrate in low-lying areas. These sources have potential to impact in areas in the south-eastern quadrant, and care should be taken to minimise residential development in that area.
- ✦ The stack (or point) sources tend to impinge upon the surrounding high points of the landscape, and residential development in these elevated areas would be undesirable.

#### 2.4.2 Opportunities

The following opportunities aim to manage potential land use conflicts and enable industries to operate without undue compliance burden while at the same time provide residents with adequate amenity and health protection.

- ✦ Co-location of high impact industrial uses to minimise buffer requirements. This should extend to clustering such uses with an industrial area. Generally, one should locate such high impacting industry clusters furthest from residential areas, but it is best to use the air dispersion modelling results to identify the locations affording the most scope for emissions to occur without undue impacts arising.
- ✦ Delineating a suitable buffer between existing and future residences and any major new industrial developments.
- ✦ The future residences or sensitive receptors within the RJP investigation area would limit the potential for major industrial development nearby, especially due to the dominant south-easterly and westerly wind flows. However, the necessary buffer can be determined via the modelling to be conducted in the next stage of the technical work. A likely strategy for this area may be via staged planning approaches for progressively expanding development within the RJP investigation area to defer or allow time to deal with this constraint.
- ✦ Introduce vegetation bands within the industrial area. Buffers nominally 50-100 metres (m) wide which consist of dense, tall vegetation will add dispersion and dilution of fugitive or volume emissions, however this strategy may not assist greatly if new sources are predominantly from stacks. This strategy is best compatible with minimising visual impacts, which in-turn assists to minimise community perception of any potential odour impacts.

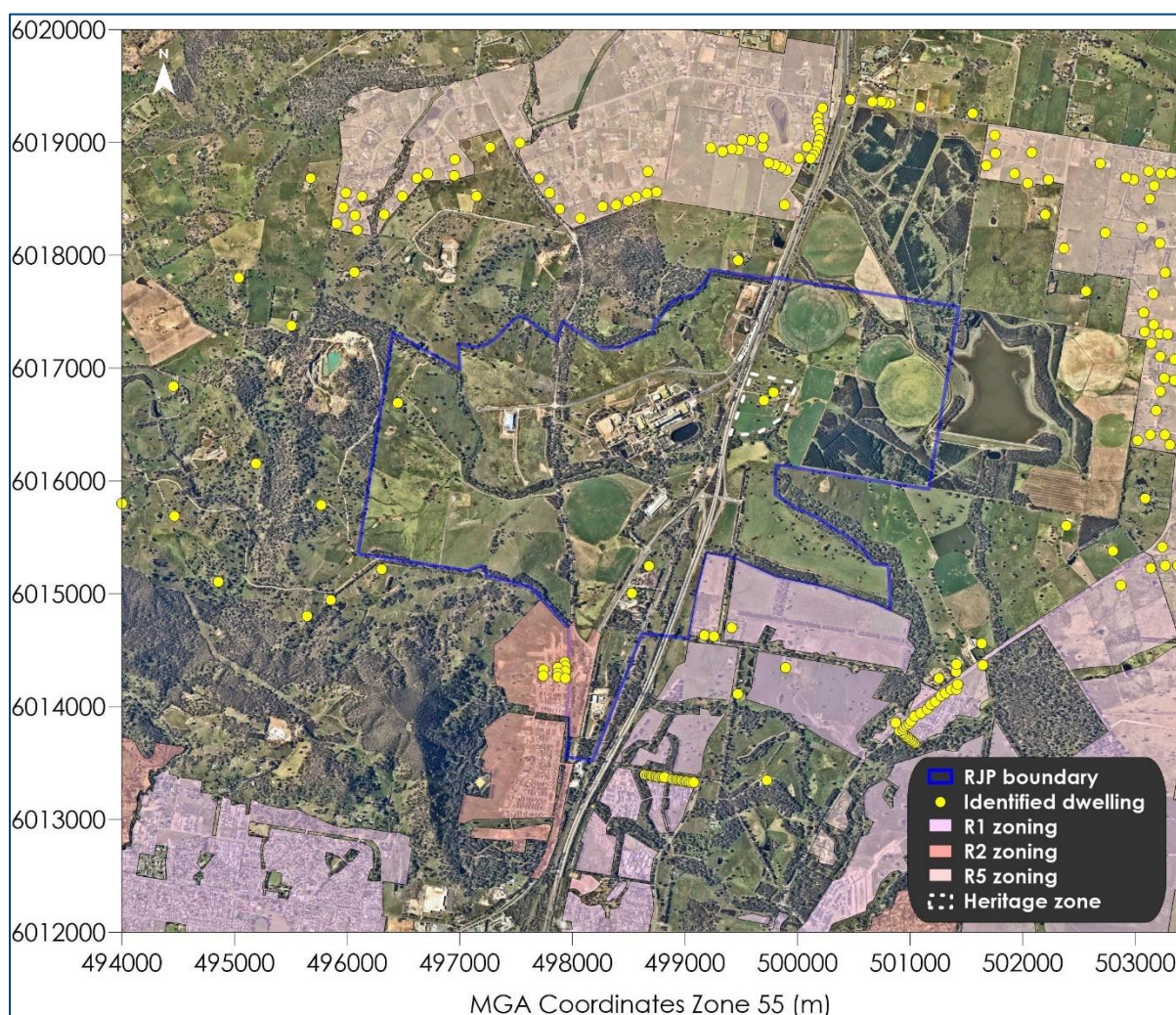
### 2.5 Existing and potential future residential development

The existing and potential future residential development surrounding the Albury RJP investigation area is an important consideration to minimise potential future land use conflict. **Figure 2-5** presents the Albury RJP investigation area with the identified existing residential dwellings (based on available satellite imagery) and current residential land zonings.



It is important to note that there are several existing residential dwellings located within the Albury RJP investigation area, including two dwellings identified as heritage items.

The current R1 and R2 zonings are identified along the southern boundary of the Albury RJP investigation area with R5 zonings located further afield to the north and east. These zonings have the potential for future residential development. All dwellings inside the Albury RJP boundary (blue line) are considered not-sensitive receptors (as detailed later in this report it is necessary they become zoned for industrial or non-residential uses, and be used for that purpose). All dwellings outside of the boundary are treated as sensitive receptors in the assessment. As detailed later in this report, the assessment includes consideration of the potential emissions from industrial uses and any impacts upon any sensitive receptors, including any new activities within the RJP, where effects are controlled by the uses permitted in the RJP and their internal separation. Refer to **Figure 3-4** for additional details.



**Figure 2-5: Existing and potential future residential development**

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## 3 MODELLING ASSESSMENT METHODOLOGY

### 3.1 Introduction

The relationship between the permissible level of air pollution emissions from any source (e.g. Regulatory limit) and the permissible level at receptor (i.e. ground level or ambient air quality criteria set out in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA, 2016)*) was analysed to determine the limiting pollutants that will govern the findings of the air quality assessment. The limiting pollutants are those with the smallest ratio between the level that could be emitted (at the source) and the level permitted in the ambient air (at the receiver). This is the limiting pollutant ratio, as set in the applicable criteria.

For noise, we determined the difference between the sound energy released at the source and the applicable noise criteria at the receiver. This is the noise residual. The sound energy is derived for a typical array of noise sources in an industrial area, and the applicable night-time criteria (assuming 24/7 operations) will govern the noise residual (limiting case). For a 24/7 operation, it is taken that the sound energy from the source is the same, but the criteria are less stringent. Thus, when the night-time criteria are met, the evening and daytime criteria are also met. It is noted that even if there happens to be more noise energy released from the source in the evening or daytime, the less stringent criteria almost always adequately compensates for this.

The air pollutant levels (for any air pollutant) at the source are related to the level at the receiver by the degree of air dispersion or dilution of the pollutant as it travels from the source to the receptor. In a similar way, for noise, the sound energy at the source is related to the noise level at the receiver by the degree of noise attenuation between the source and receiver. Thus, for air pollution we apply a ratio, division or multiplication calculations, and for noise we use subtraction or addition calculations, but otherwise the same big picture principles apply.

Air dispersion modelling was used to determine the dilution ratio between all potential sources and all receptors (the modelling method is detailed later). At any receptor where the air dilution ratio approaches the limiting pollutant ratio, there is a high risk of exceeding the criteria for the limiting pollutant i.e., a high risk of air quality impacts arising. Medium and low risks are also defined according to the range of source emissions that can be expected to arise from industrial sources, and/or for other pollutants.

Similarly, noise modelling was used to determine the noise attenuation between all potential sources and all receivers (the modelling is detailed later). Risks were assigned on the same basis as air, i.e. per the limiting criteria at the receiver. Thus, at any receiver where the noise attenuation approaches the noise residual, there is a high risk of exceeding the criteria and a high risk of noise impacts arising.

The modelled outputs are therefore presented as risk levels to allow the risks from several pollutants, which may be dispersed differently (see later), but also noise to be compared on a like-for-like basis. The ability to make a valid comparison between all types of industries, air pollutants and noise pollutants is crucial for making good planning decisions.

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The *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA, 2016)* define a range of criteria for many air pollutants. However, the pollutants can be categorised in simple terms according to how they are released. In general:

- ✦ Stacks will release; air toxics (such as metals, dioxins etc.) after capture and treatment, and common criteria pollutants (such as SO<sub>2</sub>, NO<sub>2</sub> and fine particles) from a combustion process or a material handling process.
- ✦ The key fugitive emissions are dust and odour. These emissions may arise from wind erosion of an exposed site (dust), a pond (sewage, or process water odours), the openings of a building (paint fumes, dust, welding fumes etc.), or a land surface (manure, compost etc.).

How the pollutant is released is the key factor in determining the type of industry, and also the degree of dispersion between source and receiver.

In general, fugitive emissions result in most impact nearest the source and at ground level nearby, with less and less impacts as one moves further away. The spatial extent of the impact is usually governed by low wind conditions and inversions with the greatest impacts tend to be confined in a valley.

Noise, and especially noise at night-time, is most affected by inversions and gradient winds and is most similar to the fugitive sources. However, noise propagation is significantly affected by barriers, thus the terrain is a key factor. Similar to the fugitive sources, noise impacts can be confined within a valley (if the source is in the central part of the valley and the valley terrain is significant).

Unlike fugitive sources and noise, stacks are designed to disperse pollutant away from the ground. Emissions released from stack will have their highest impacts on the surrounding elevated terrain, and often somewhat away from the source. Placing stacks at the bottom of a valley is generally counterproductive as taller, more costly stacks will be needed to prevent impacts. On the other hand, whilst stack sources would ideally be placed atop ridges and hills, the types of industries that have stacks are generally large, and visually such industries can be an imposing eyesore (in the view of many).

Knowing the above, the air dispersion modelling between source and receiver could be limited to stacks and fugitive sources. The limiting pollutant was determined to be air toxics ratio for stack emissions, and odour for fugitive sources.

The air and noise modelling factors in the prevailing weather and terrain conditions for the specific locality.

For both the air and noise modelling, the modelling was “reverse engineered” such that the same risk profile could be applied to the sources as well as the receivers/ receptors. This was done so that it is possible to tell which sources cause the impact at receptors. Only high risk sources can cause high risk impacts. Removing either the high risk source or high risk impacted receptor (or both) eliminates the risk of impacts arising.

The modelling was then set up to allow this to be done quickly and to iteratively arrive at an optimal separation between source and receptor that would minimise impacts. Further refinement of the modelling was made to factor in low, medium and high amenity sectors to be developed, according to the types of industry that would emit low, medium or high levels of air pollution or noise.

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Technical details of the modelling are set out in the next section.

## 3.2 Technical detail of air dispersion and noise modelling methodology

The following sections are included to provide the reader with an understanding of the model and modelling approach.

The air dispersion modelling was undertaken using a combination of The Air Pollution Model (TAPM) and the CALPUFF Modelling System which include three main components: CALMET, CALPUFF and CALPOST. TAPM is a prognostic air model used to simulate the upper air data for CALMET input. CALMET is the meteorological component for use in the CALPUFF dispersion model. CALPOST is a post processor used to process the output of the CALPUFF model and produce tabulations that summarise the results of the simulation.

CALPUFF is an air dispersion model approved by NSW EPA for use in air quality impact assessments. The model setup used is in general accordance with methods provided in the NSW EPA document *Generic Guidance and Optimum Model Setting for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia'* (TRC Environmental Corporation (TRC), 2011).

The noise modelling uses the Environmental Noise Model (ENM) which is compatible with the NPfl.

## 3.3 Meteorological modelling

The meteorological modelling methodology applied a 'hybrid' approach which includes a combination of prognostic model data from TAPM with surface observations.

The TAPM model was applied to the available data to generate a three-dimensional upper air data file for use in CALMET. The centre of analysis for the TAPM modelling used is 35°59' south and 146°58' east. The simulation involved an outer grid of 30km, with three nested grids of 10km, 3km and 1km with 35 vertical grid levels.

The CALMET initial domain was run on a 10 x 10km with a 0.1km grid resolution for the 2017 modelled year. The available meteorological data for January 2017 to December 2017 from the Albury Airport AWS station were included in the simulation. The 2017 calendar year was selected as the period for modelling based on an analysis of six consecutive years as outlined in **Appendix A**.

### 3.3.1 Meteorological modelling evaluation

The outputs of the CALMET modelling are evaluated using visual analysis of the wind fields and extract data. **Figure 3-1** presents a visualisation of the wind field generated by CALMET for a single hour of the modelling period (i.e., example only). The wind fields follow the terrain well and indicate the simulation produces realistic fine scale flow fields (such as terrain forced flows) in surrounding areas.



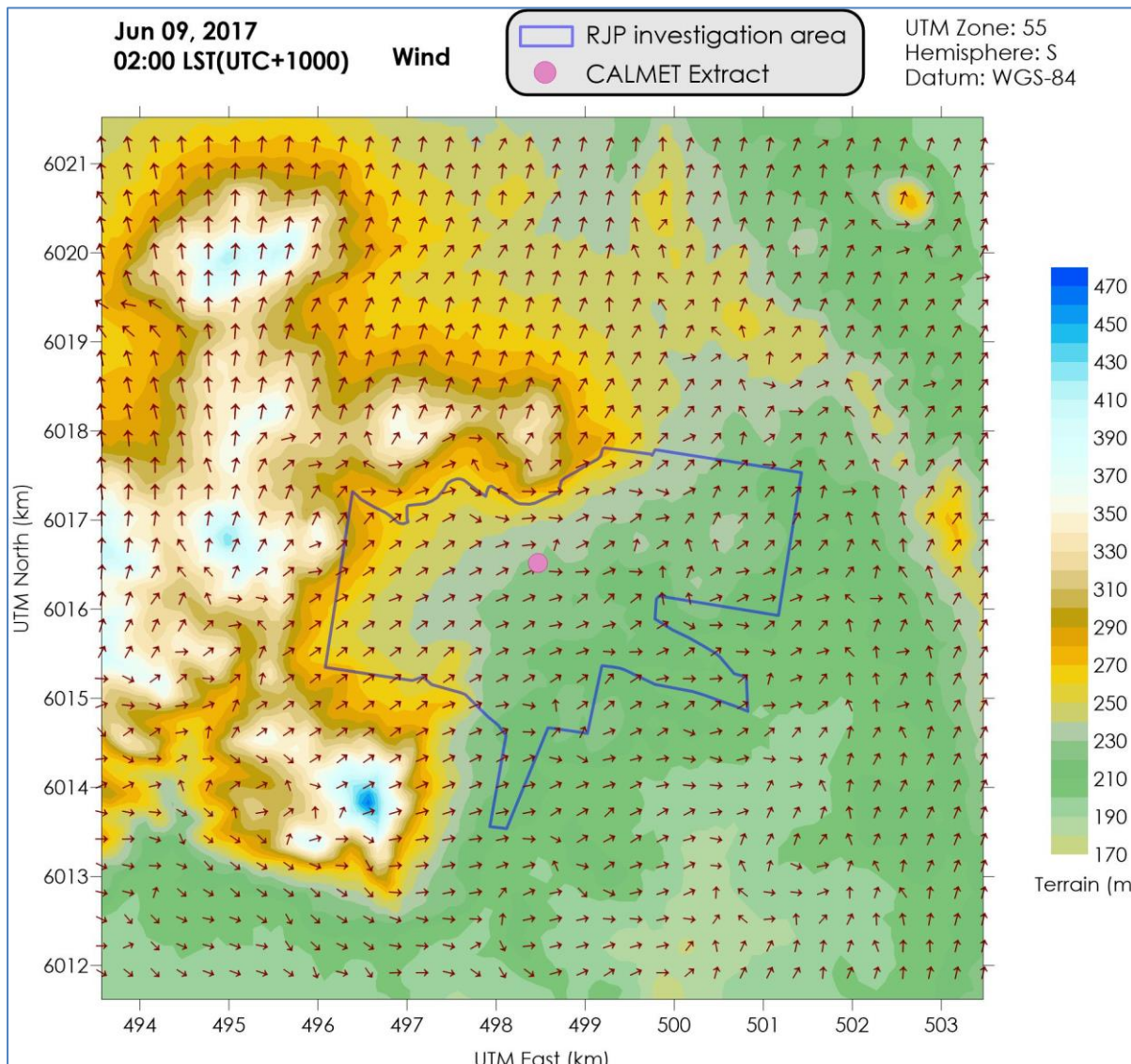


Figure 3-1: Representative 1-hour snapshot of wind field

CALMET generated meteorological data were extracted from a point within the CALMET domain and are graphically represented in **Figure 3-2** and **Figure 3-3**.

**Figure 3-2** presents the annual and seasonal windroses from the CALMET data. Overall, the windroses generated in the CALMET modelling reflect the expected wind distribution patterns of the area as determined based on the available measured data and the expected terrain effects on the prevailing winds.

**Figure 3-3** includes graphs of the temperature, wind speed, mixing height and stability classification over the modelling period for the modelled year and shows sensible trends considered to be representative of the area.



Figure 3-2: Annual and seasonal windroses from CALMET

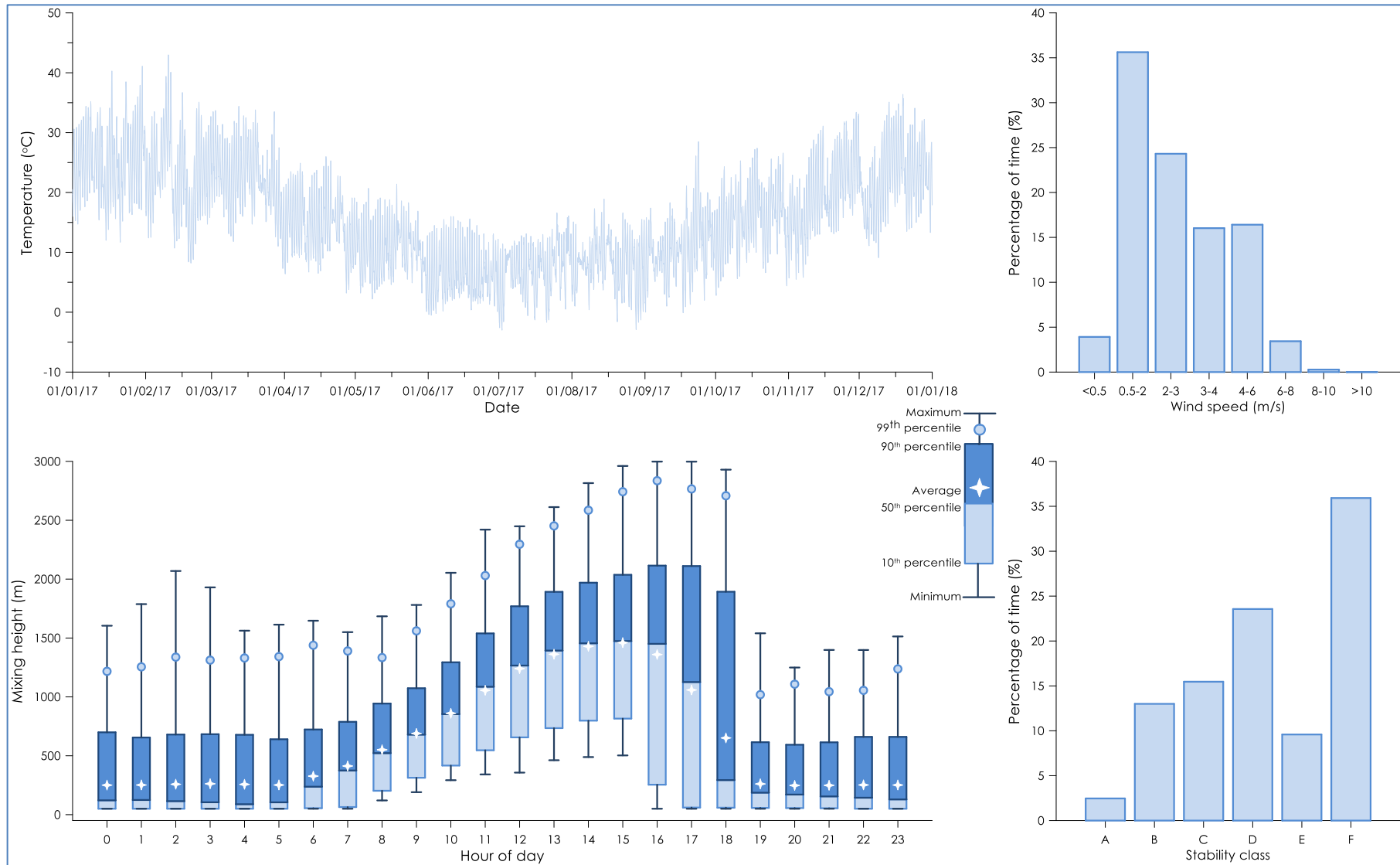


Figure 3-3: Meteorological analysis of CALMET



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### 3.4 Air and odour modelling

The CALPUFF dispersion modelling is based on the emission of pollutants from sources within the meteorological modelling domain. The model was setup to include all potential future source locations arranged in a grid within the Albury RJP investigation area.

The sources represent any location within the Albury RJP investigation area where potential air emissions can occur. Each source was modelled separately as both a point (stack) source and as a fugitive (volume) source with emission release parameters that would represent relatively standard sources associated with the industrial activities and the assigned amenity classification. The point sources were setup to represent emissions from a stack with generalised flow parameters (e.g., exit velocity, temperature) and an emission point which is elevated above the ground. The volume sources represent diffuse, fugitive ground based sources which commonly include dust and odour emitting sources.

These sources were modelled over the entire year and are assumed to emit air emissions continuously using a unit emission rate. The emissions were modelled for only the key pollutants with scope to exceed EPA criteria. The different rates of emission of various key pollutants were accounted for, allowing source or receptors impact risk to be shown on a like-for-like basis, irrespective of the pollutant emitted.

### 3.5 Noise modelling

Noise emissions were modelled in a similar manner to the air emissions with all potential future industrial source locations arranged in a grid within the Albury RJP investigation area.

Industrial movement and handling of freight has been accounted for in each industry as part of the different industrial uses, however the movement of vehicles (such as via rail or road) along roads and highways are not specifically included. The movement of these vehicles are assessed differently to the industrial sources under different guidelines which are more conservative.

Noise sources were modelled using the ENM noise model under strong inversion conditions and generalised noise emissions profiles typical of the different industrial activities.

### 3.6 Modelled receptor locations

**Figure 3-4** identifies the modelled receptor boundary for the Albury RJP investigation area where potential air, noise and odour impacts are assessed. The modelled receptor boundary accounts for the nearest existing residential dwelling or potential future dwellings based on current land zonings surrounding the Albury RJP investigation area.

All existing dwellings located within the Albury RJP investigation area boundary, including the heritage items, are not included as sensitive receptors in future. This is because the land (or heritage items) will be used and zoned for other purposes that are insensitive to air and noise effects. .

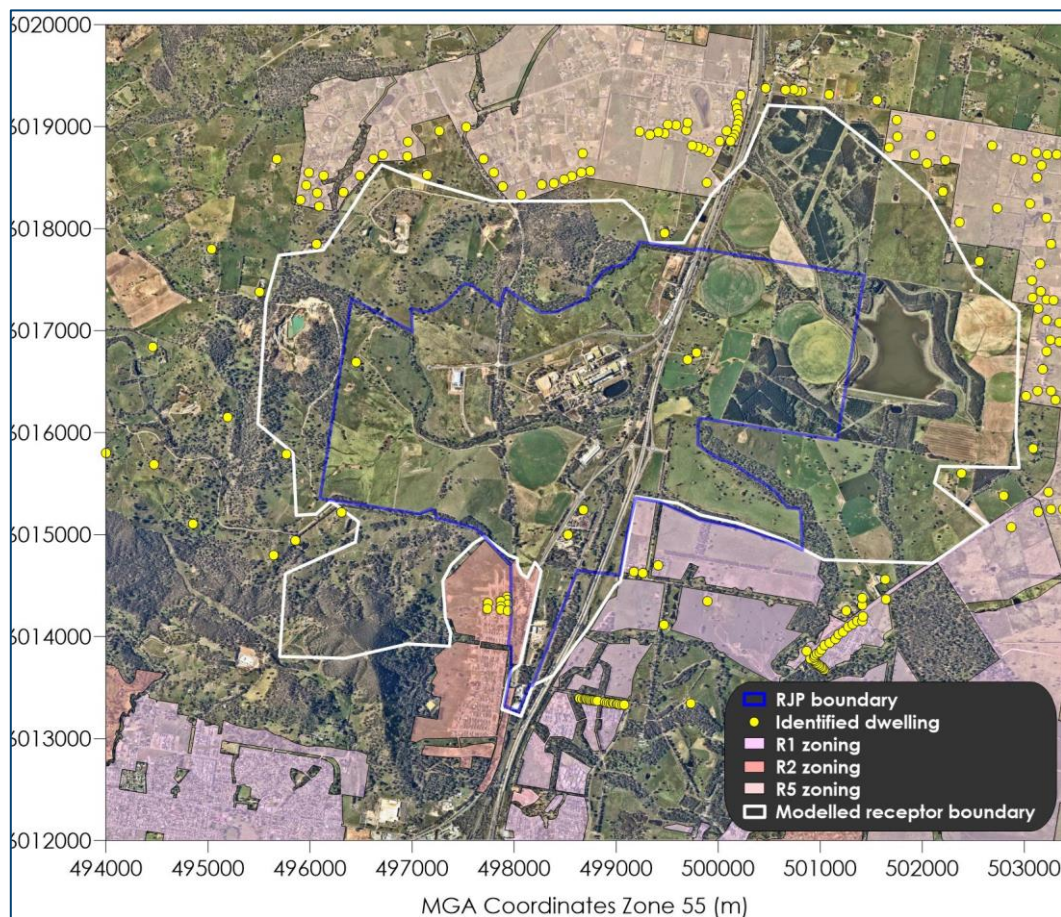


Figure 3-4: Modelled receptor boundary

### 3.7 Modelling assumptions and limitations

The assumptions and limitations include:

- ✦ Existing vacant land beyond the Albury RJP investigation area boundary is treated as a buffer, based on its current zoning and potential to provide sufficient protection for all existing sensitive receptors and existing and future industrial activities. Refer to land located between blue boundary and white boundary in **Figure 3-4**. It is assumed that appropriate planning mechanisms would be applied to this land to prevent residential encroachment or other sensitive uses which can lead to future land use conflict.
- ✦ Sources were assumed to be high/medium/low amenity based on the potential future land use and their likelihood to emit low, medium or high levels of air and odour pollution. For example, a low emitting industry in a high amenity area may include warehousing and distribution with only trucks and forklifts as the main air pollution sources. A high emitting industry in a low amenity area may include industrial manufacturing or waste processing with fixed air pollution sources.
- ✦ Sources were modelled over the entire year and are assumed to emit air emissions continuously using a unit emission rate over the entire area. For this assessment it has been assumed that all sources operate 24/7.

- ✦ Industrial movement has been accounted for within each amenity area, however the movement of vehicles (such as via road) into and out of the RJP are not specifically included. These are seen as transient sources and are assessed differently to fixed industrial sources.
- ✦ There is also no distinction between scheduled and non-scheduled activities in the modelling.

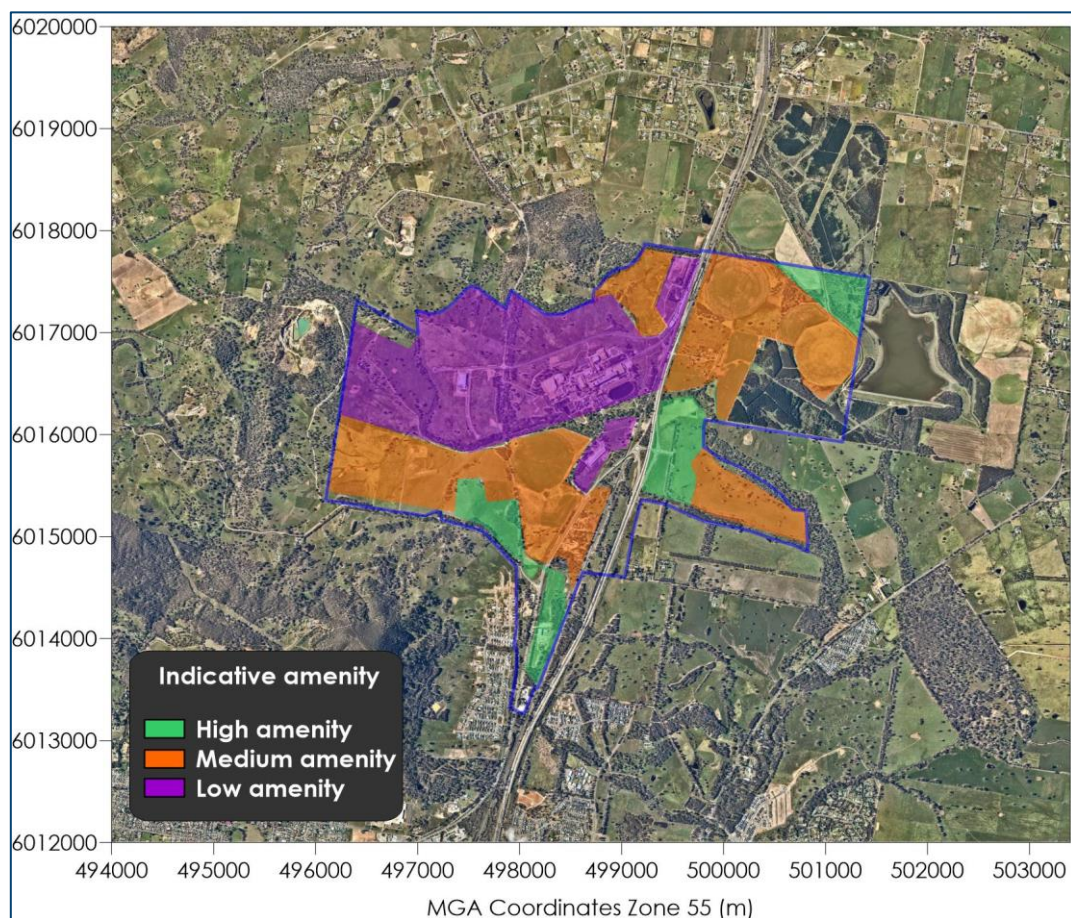
### 3.8 Master Plan testing

The Master Plan described in **Section 1.6** was tested using the approach outlined previously to identify the areas at risk of potential impact upon existing or potential future receptors and associated land use conflict.

The dispersion risk results for air quality include both volume sources and stack sources combined showing a single prediction for each of the scenarios. The combined result shows the maximum risk of either air quality or odour issues arising at the receptor locations.

Different amenity areas are assigned to the proposed land uses in the Master Plan and represent low, medium or high potential for air, noise and odour emissions and factor in the types of industry and activities that may occur in these areas.

The amenity areas assigned for the Master Plan are presented in **Figure 3-5**.



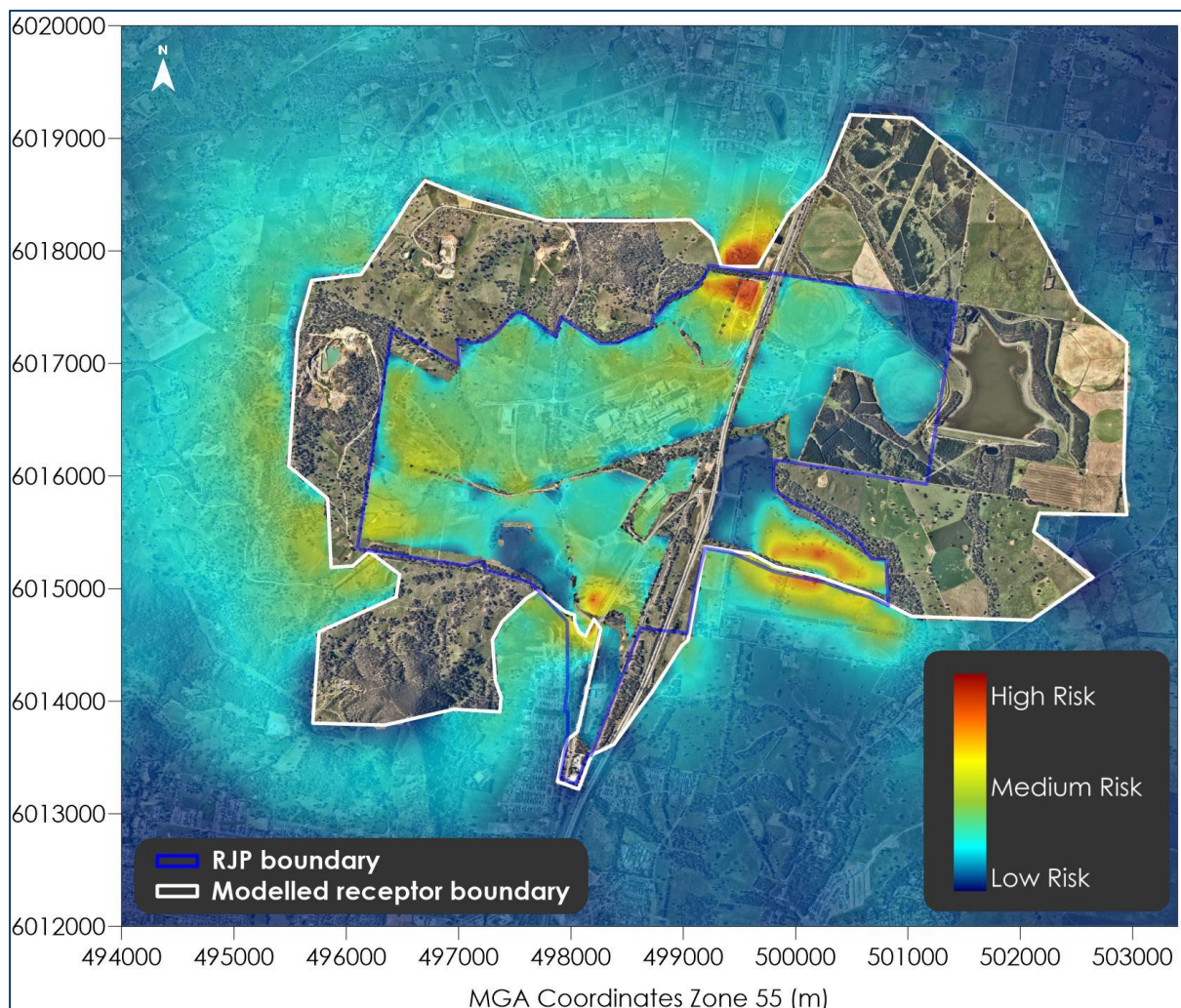
**Figure 3-5: Master Plan - indicative amenity areas**

## 4 ANALYSIS OF MODELLING RESULTS

**Figure 4-1** presents the potential constraints due to air and odour emissions at the receptors and source locations, respectively, for the Master Plan. The risk classifications for the figures in this section are used to highlight potential risk areas that need to be addressed when refining the Master Plan.<sup>1</sup>

**Figure 4-1** shows that potential high-risk areas are identified at the interface of the RJP boundary and the modelled receptor boundary. These occur in the southwest corner of the RJP boundary and to the north where there are individual residential dwellings (refer to **Figure 3-4**).

Other high-risk areas are located to the south where the current R1 and R2 zonings are adjacent to the RJP boundary. The risk is lower on the western side of the Hume Freeway corridor where a lower amenity is assigned for the Productivity support zone compared to the eastern side of the Hume Freeway corridor where a medium amenity is assigned to the lower intensity industrial zone (see **Figure 1-3**).

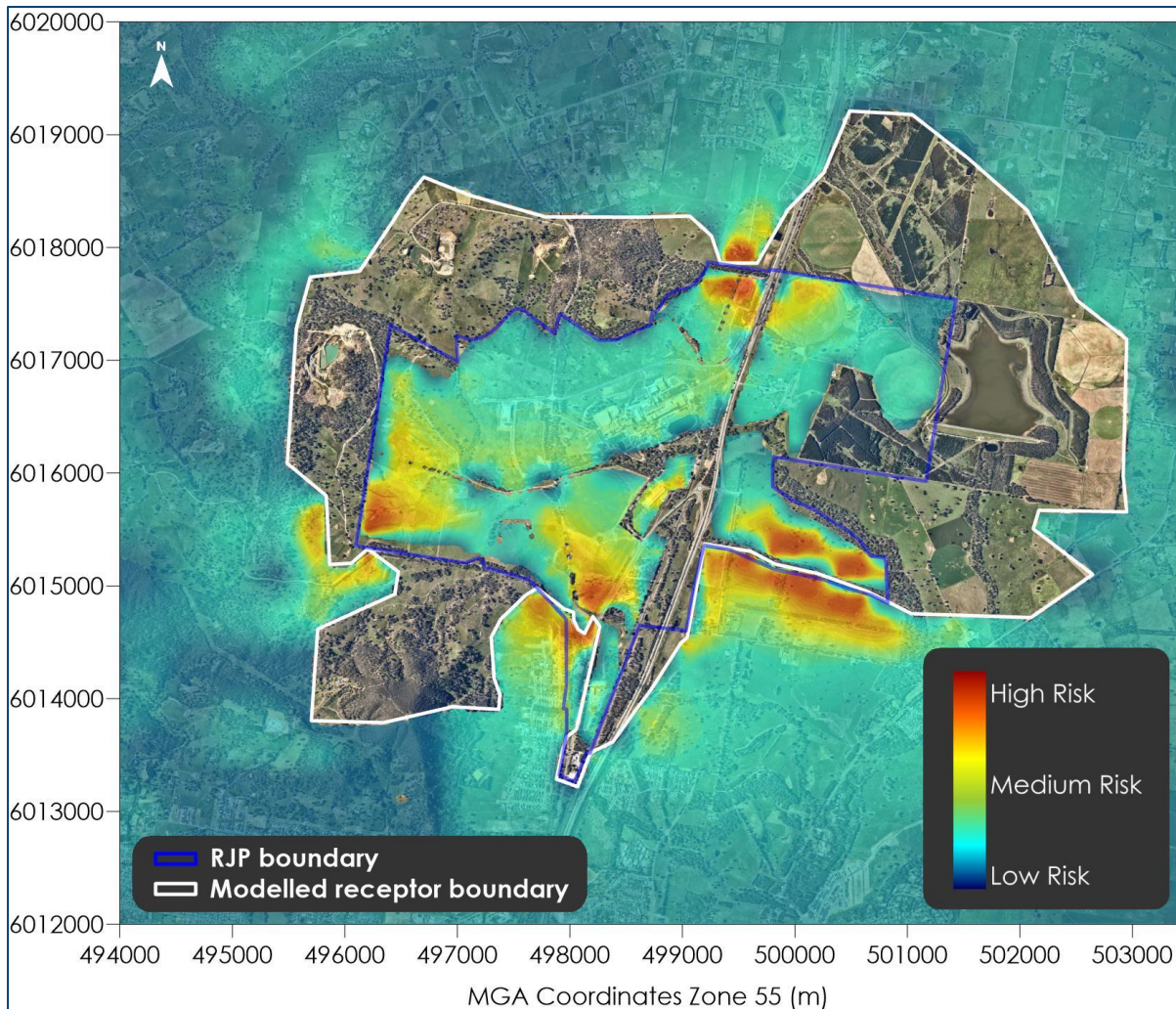


**Figure 4-1: Air and odour modelling results for the Master Plan**

<sup>1</sup> The numerical basis for the potential impact/ risk is shown in the figures in the next section, however it is for the final master plan, that has been refined in response to the initial modelling shown here.

**Figure 4-2** presents the potential constraints due to noise emissions at the receptors and source locations, respectively, for the Master Plan.

The predicted high-risk areas are largely similar to the air and odour modelling results occurring to the southwest, north and south.



**Figure 4-2: Noise modelling results for the Master Plan**

## 5 ALLOCATIONS FOR AIR, ODOUR AND NOISE

Planning considerations to minimise or control land use conflicts for air, odour and noise are set out in this section.

The approach provides numerical criteria applicable to the land. This is only possible for noise and odour given that there is a limiting criterion for an emission (noise or odour), whereas for air, there are many criteria for many pollutants which apply at various locations and averaging periods. As such, only preferences or guidance can be provided for air emissions.

The key consideration in making the assessment is that there are no sensitive receptors within the precinct boundary, meaning that any existing receptors within the precinct boundary may become part of the buffer zone or may otherwise be re-zoned.

The objective of the modelling and assessment task is to define the maximum extent of emissions from within the industrial area that do not cause impacts, in this case outside of the precinct boundary. The corresponding noise and odour emissions from any part of the industrial area are also identified.

For air, only general good practice guidance can be provided.

### 5.1 Noise

**Figure 5-1** shows the results for noise. The left hand side of the figure shows sound power levels as 2dB contour lines up to 100dbA/ha and 1db thereafter within the RJP investigation area. The right hand side shows the noise level outside of the RJP investigation area.

The contour lines within the industrial area represent the maximum attenuated sound power level per hectare (i.e. noise that can leave the site, per hectare).

The following formula can be used to convert the contour line value crossing the middle of a specific lot into that lot's permitted sound power level based on the lot size. Per the formula, bigger lots get more sound power, smaller lots get less.

**Equation 1:**  $PWL(\text{lot}) = PWL(\text{ha}) + 10 \log(A/10,000)$ , where:

PWL(lot)	= Allowed attenuated sound power level per lot, dB(A)
PWL(ha)	= Sound power level of contour line crossing middle of the lot (OK to use a decimal if between lines);
A	= Lot area in square metres

Upon subdivision, this sound power (PWL(lot)) can be set as a property right for the lot, perhaps as part of a Section 10.7 Notice attached to the property, and/ or as part of the total tally of lot sound power within a database or electronic register/ tool for managing the approval of developments in the industrial area.

From a regulatory view point, measuring PWL(lot) at the site is more swift, direct and reliable than measuring the intrusive noise level at receivers, especially for a lot within a large industrial area where it can be very hard to determine which source/ lot/ operation is causing the noise at the receiver.

From an application/ assessments/ approval point of view, this pre-set allowance for the lot's sound power level reduces the work a noise consultant may need to do, saving time and money. It may prompt some operators to design the plant to pollute up to the limit so to speak. However, in this approach the PWL(lot) is easily measurable and so potential transgressions can be swiftly and efficiently regulated.

Should a lot be found to exceed its allocation, the degree of sound abatement needed would immediately be known, and the normal (existing) process to ameliorate the noise can commence immediately (and be validated more swiftly and cheaply). In this regard, the approach provides scope for a potential future noise trading scheme or noise management precinct, which can minimise noise abatement costs. For example, rather than paying to further abate noise from its activity, the lot owner may be able to acquire some or all of the unused noise allocation from another lot. Whilst this is not proposed here, it is something that can potentially be set up if desired at a later time.

The right hand side of **Figure 5-1**, shows the sound pressure levels outside of the RJP investigation area.

As per the Noise Policy for Industry (**NSW EPA, 2017**), the limiting criterion is the amenity criterion of 40dB(A) which is a 9-hour average noise level over the night time period (10pm to 7am) and applies to the cumulative noise of all industrial noise sources, whereas the intrusive criteria is 35dB(A) and applies to each individual site. As the noise sources in the industrial area will be a mix of constant sources (e.g. fan or transformer which is always on) and intermittently noisy sources such as vehicles and mobile plant, and other batch activities, many sources will only make noise intermittently over 9 hours. Therefore, the measured cumulative 9-hour noise level will be less than the maximum measured 15-minute level (from all sources) in that same 9-hour period.

The sound power limits above correspond with all lots operating at the individual intrusive noise limit for each lot which is set at 35dB, LAeq(15min) to protect the amenity of the nearest receptor outside of the RJP investigation boundary, and both limits are commensurate with the industrial area meeting the cumulative noise amenity level of 40dB, LAeq(9hr).

The pink line in **Figure 5-1** represents the required buffer area which is both the 35dB, LAeq(15min) individual site intrusive criteria compliance boundary line (or the location of the nearest sensitive receptors at which the intrusive criteria apply) and also the cumulative noise amenity level extent for 40dB, LAeq(9hr).

The land within the buffer line is not suitable for residential use. It is recommended that suitable strategies to prevent any new residential use and ideally to also progressively reduce any existing residential use in the buffer area over time should be developed.

The data indicates that all likely industrial noise sources can fit within the specified sound power level allowances in the industrial area.

## 5.2 Noise mitigation options

As for any operation in NSW, as a minimum, general or commonly used noise mitigation is expected for industries in the industrial area that have potential to release noise emissions.

The RJP investigation area and buffer is designed such that industries incorporating general levels of control should be able to operate within the industrial precinct without causing impacts. But there are limitations, for example a facility that would have high levels of noise emissions may need to have extra

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noise mitigation if it chooses to locate close to the edge of the estate near receptors. Such a location is better suited to an operation which has noise emissions within the specified allowance as it is unlikely to need extra abatement.

The left hand side of **Figure 5-1** provides an allowance per hectare for potential noise emissions. This can be used as part of the approvals process, where a proposed development with less emissions per hectare than the allowance for the proposed lot would be suitable. The figure also serves to help potential new industries to identify the more suitable lots where, depending on their emissions, the facility can reasonably expect to be able to operate without causing impacts (outside of the precinct boundary) or to require extra noise controls.

General mitigation options for industries to manage noise emissions would vary depending on the nature of the source and the effectiveness of potential mitigation options need to be considered in each case. Some examples of general noise mitigation measures include:

- ✦ Mitigation at the source;
  - Selection of equipment – select equipment with low sound power levels when purchasing new equipment or substituting equipment.
  - Modifying equipment – silencers, mufflers and dampeners may be retrofitted to existing equipment to reduce noise emissions.
  - Operational time – consider adjusting operating times for when equipment is in use.
  - Implementing quiet work practices – using equipment in ways to minimise noise, this includes reducing throttle setting and turning off equipment when not being used.
  - Maintain equipment – regularly inspect and maintain equipment to ensure it is in good working order.
  - Limit equipment use – reduce the amount of equipment operating simultaneously, avoid clustering of equipment.
- ✦ Mitigation along the path between source and receiver;
  - Barriers – construct barriers between source and receiver.
  - Direction – orient noise emissions away from receiver.
  - Distance – provide as much distance as possible between source and receiver.
- ✦ Mitigation at the receiver;
  - Barriers – construct barriers at the receiver.
  - Architectural treatments – treatment options will vary depending on the level of noise at the receiver.

As outlined in the previous section, a noise management precinct can be developed if desired in future.



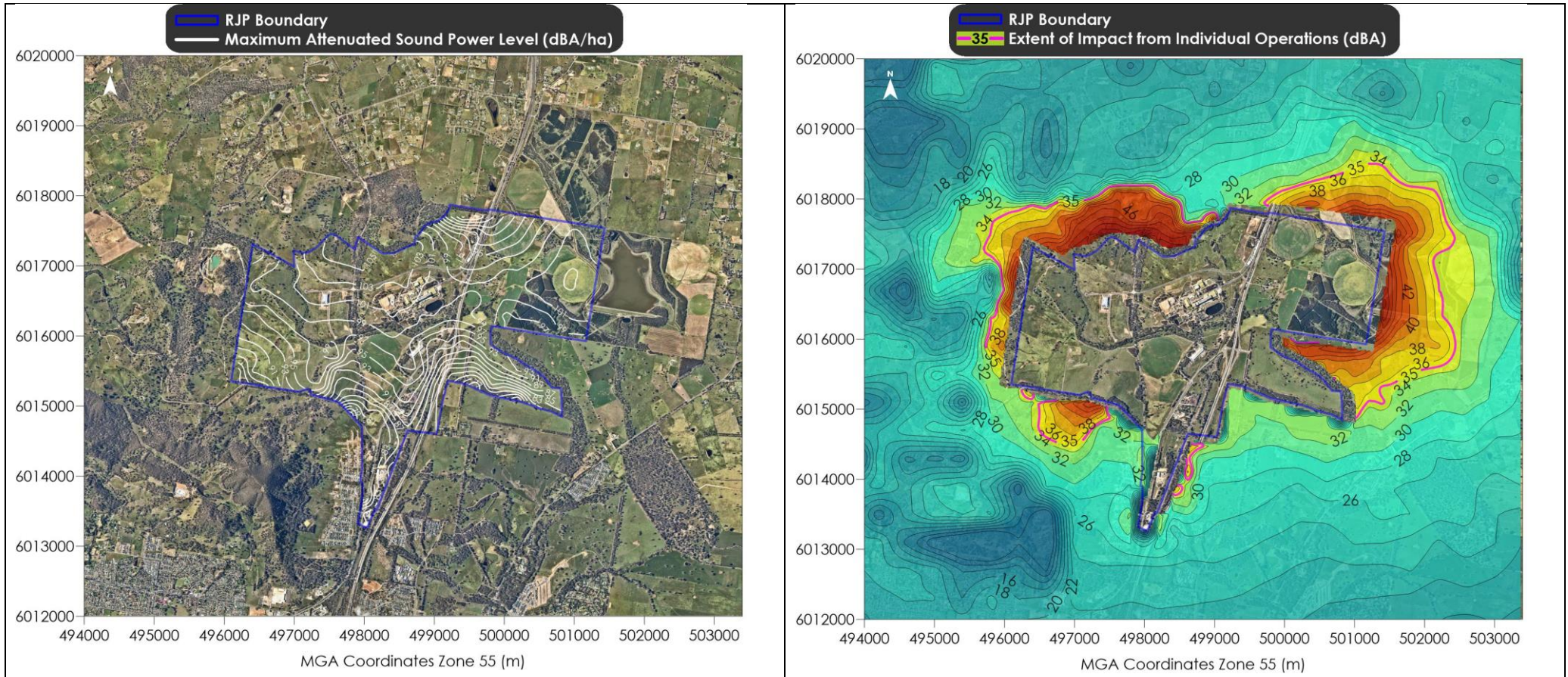


Figure 5-1: Source sound power level per Ha (left) and received sound pressure level (right) due to noise emissions from the RJP investigation area

### 5.3 Odour

As per the NSW EPA document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2016)* the most stringent 2 Odour Unit (OU) NSW criteria applicable to densely populated urban areas has been applied. A level of 1 OU can be described as the concentration of an odour at which it is detected.

The NSW odour goals are based on the risk of odour impact within the general population of a given area. Thus, in sparsely populated areas the criteria assume there is a lower risk that some individuals within the community would find the odour unacceptable, hence higher criteria apply. An odour criterion of 2 OU is used in this study at the assessed sensitive receptors.

**Figure 5-2** presents the results for odour. The left hand side of the figure shows the odour emission rate per hectare for sources of odour in the RJP investigation area and the right hand side shows the received odour level outside of the RJP investigation area. The north-western portion of the RJP investigation area indicates the highest attenuated odour emission rate and would be well suited for an odour generating industry.

Referring to the left hand side of **Figure 5-2**, the contour lines within the RJP investigation area represent the maximum attenuated odour emission rate ( $\text{OU}\cdot\text{m}^3/\text{s}/\text{ha}$ ) (i.e., rate of release of odour that can leave the site, per second per hectare). The maximum attenuated odour emission rate for an industry can be estimated from odour measurements taken at the source of an existing/ similar facility and from odour measurements presented in available literature studies. This converts linearly to any lot's odour emission allowance. For example, if the lot is half a hectare, it can emit odour at half the rate of the contour line level passing through the middle of the lot. If the lot area is two hectares, it can emit double the contour line level.

Like noise, this odour emission rate allowance can be set as a property right for the lot, perhaps as part of any Section 10.7 Notice attached to the property. Referring to the right hand side of **Figure 5-2**, the pink line represents the 2 OU criteria boundary line. This is the area outside of which any receptors/sensitive receivers would not experience unacceptable odour levels above the criteria.

Also, like noise, should a lot be found to exceed its allocation, the degree of odour abatement needed would immediately be known, and the normal (existing) process to ameliorate the odour can commence immediately (and be validated more swiftly and cheaply than via a process of measuring odour at the receiver can achieve). In this regard, the approach provides scope for a potential future odour trading scheme, which can minimise abatement costs. For example, rather than paying to further abate odour from its activity, the lot owner may be able to acquire some or all of the unused odour allocation from another lot. Whilst this is not proposed here, it is something that can potentially be set up if desired at a later time.

### 5.4 Odour mitigation options

As for any operation in NSW, as a minimum, general or commonly used pollution controls are expected for industries in the industrial area which have potential to release air emissions.

The RJP investigation area and buffer is designed such that industries incorporating general levels of control should be able to operate within the industrial precinct without causing impacts. However, there are limitations, for example a facility that would have high levels of odour emissions may need to have

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extra odour mitigation if it chooses to locate close to the edge of the estate near receptors. Such a location is better suited to an operation which has odour emissions within the specified allowance as it is unlikely to need extra abatement.

The left hand side of **Figure 5-2** provides an allowance per hectare for potential odour emissions. This can be used as part of the approvals process where a proposed development with less emissions per hectare than the allowance for the proposed lot would be suitable. The figure also serves to help potential new industries to identify the more suitable lots where, depending on their emissions, the facility can reasonably expect to be able to operate without causing impacts (outside of the precinct boundary) or to require extra pollution controls.

General mitigation options for industries to manage odour emissions would vary depending on the nature of the source, and the effectiveness of potential mitigation options need to be considered in each case. Some examples of general odour mitigation options include:

- ✦ Mitigation at the source;
  - Handling of malodorous material within enclosed building or within a closed system. Aim to minimise exposure of material and prevent odour emissions into the environment.
  - Capture and ventilation of odour emissions at the source (e.g., hooding and extraction, negative pressure enclosures, etc.).
  - Exhaust odour emissions via a stack to allow for adequate dispersion.
  - Treatment of odour emissions before release (e.g., biofilter, carbon filter, thermal oxidiser, ozone reactors, etc.).
  - Regular cleaning of work space, clean up any spills.
  - Routine preventative maintenance on equipment.
  - Regular inspection of work place areas to identify odour.
  - Build continuous dense landscaping (bunds and vegetation) along odour source boundaries to assist in odour dispersion from the odour source. Provide guidance and training to on-site personnel to assist in identification of problematic odour sources at the site and taking proactive action.
  - Position the most odorous sources as far away as possible from receivers (the odour allowance will be higher there also).
  - Establish incident or complaint management system to assist with identifying odour sources and take preventative measures.
- ✦ Mitigation at the receiver may only provide small benefits but is appropriate for new dwellings outside of the receptor boundary;
  - Orientate buildings to provide adequate air flow around the building and design buildings to encourage air flow in a particular direction. This can be aided by block size and shapes

and understanding of prevailing wind flows. Avoid construction of dead end courtyards or long narrow spaces perpendicular to the prevailing winds where air can lay dormant and stagnate.

- Design buildings so living spaces do not face odorous sources and position any air conditioning and ventilation intakes away from the odour source.



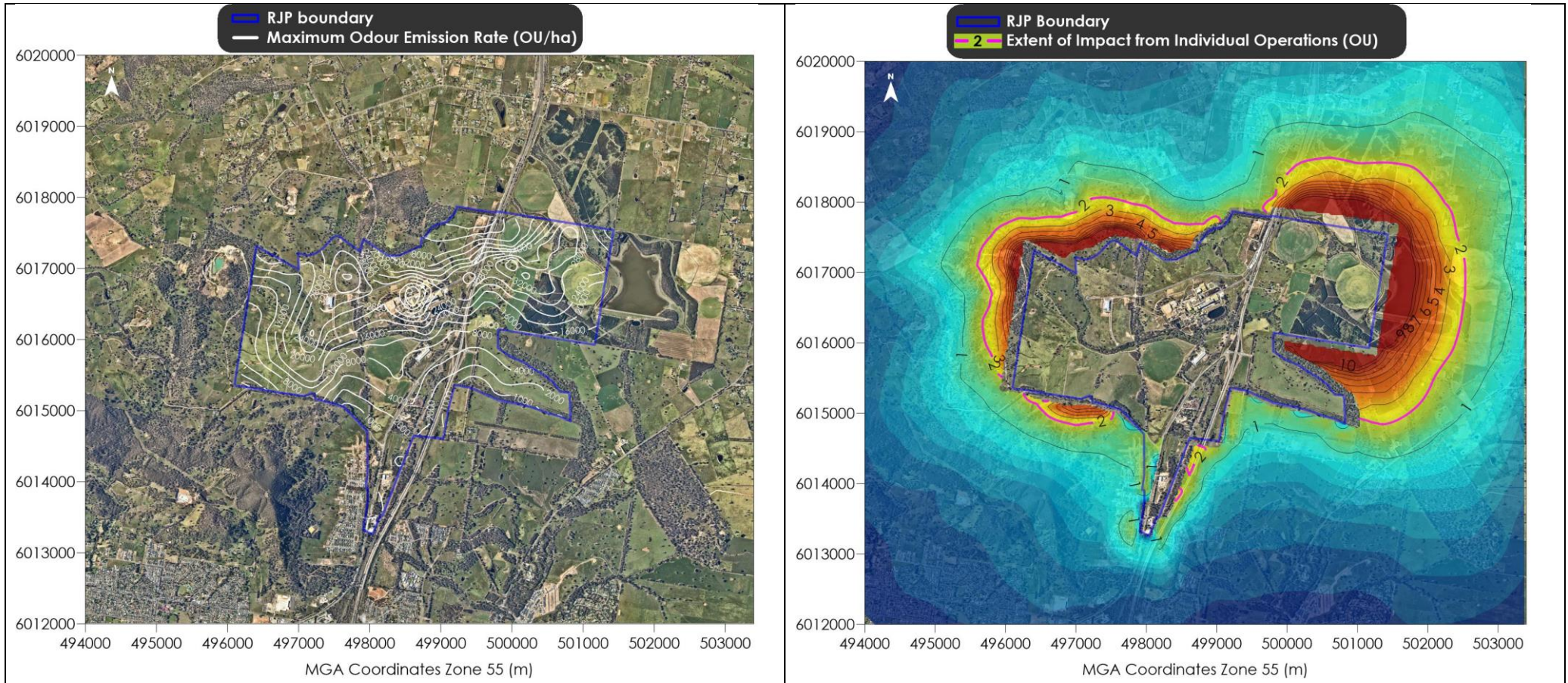


Figure 5-2: Source odour emissions rate per Ha (left) and received odour (right) due to odour emissions from the RJP investigation area

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## 5.5 Air

For air emissions, it is not possible to ascribe a maximum quantity of emissions per hectare, given that there may be hundreds of different types of air emissions each with differing criteria averaging periods or locations for compliance.

For air, the approach taken is to accept that all air toxic emissions must be minimised to the maximum practicable extent, as set out in Section 7.2.1 of the NSW EPA Approved Methods (2016). Previous work identified that for fugitive air emissions, odour is the most limiting emission affecting potential compliance. As fugitive emissions will arise from area or volume sources, their zone of potential impact is considered as part of the odour assessment. Thus stack emissions are considered in more detail here.

Stacks have the potential to cause most impact at locations where the dispelled plume may reach the ground. For stacks, this is most likely to arise in elevated locations in the surrounding terrain but may also occur nearby due to plume down wash effects. As the earlier work has shown, it is preferable to locate stacks in more elevated areas. This however is not mandatory as it is feasible for an applicant to simply specify a taller, higher velocity or higher temperature stack that has better dispersion and can perform equally well in a low lying area than a less highly performing stack in an elevated area.

**Figure 5-3** shows the results for a generic source of air emissions represented by a typical industrial boiler stack. The figure shows no constraints beyond those for noise and odour.

The left side of **Figure 5-3** shows the concentration of NO<sub>x</sub> emissions within the RJP investigation area which can be emitted from the stack (mg/m<sup>3</sup>) that would meet an NO<sub>2</sub> concentration at receivers of 95 µg/m<sup>3</sup>, which when combined with an assumed background level of 85 µg/m<sup>3</sup> at 100% conversion of NO<sub>x</sub> to NO<sub>2</sub>, is well below the NSW EPA impact assessment criterion for 1-hour average NO<sub>2</sub> and a little above the proposed new NEPM limit for 1-hour average NO<sub>2</sub>. This concentration is also shown in the left hand side of the figure as the pink buffer line.

Note that there are two equally applicable limits/ criteria for a stack; the emissions concentration limits which apply to emissions in the stack (as set out in the POEO Clean Air Regulation); and, the ambient or ground level concentration limits which apply at a receptor (as set out in (EPA, 2016)). Hence where the level shown in the industrial area is greater than POEO Regulation limit for a stack, this means more emissions than are lawful for the stack would need to be emitted in order to exceed the criteria at a receptor. It does not mean that more than the lawful level of stack emissions are proposed in this industrial area.

The right hand side of **Figure 5-3** shows generalised guidance for locating industries with stacks. The general preferences shown cannot be used in planning documents other than for general guidance. The figures aim to assist applicants to identify locations within the industrial area where installing a stack will be less costly (preferred locations) and also guide approval bodies as to the level of scrutiny warranted for applications with a stack. For example, a stack with higher specifications may be needed in the zone between the "preferred" and "no stacks preferred" areas for stacks and a high level of regulatory scrutiny would be needed for approval of stack applications in the "no stacks preferred" areas.

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## 5.6 Air mitigation options

As for any operation in NSW, as a minimum, general or commonly used pollution controls and mitigation is expected for industries in the industrial area which have potential to release air emissions.

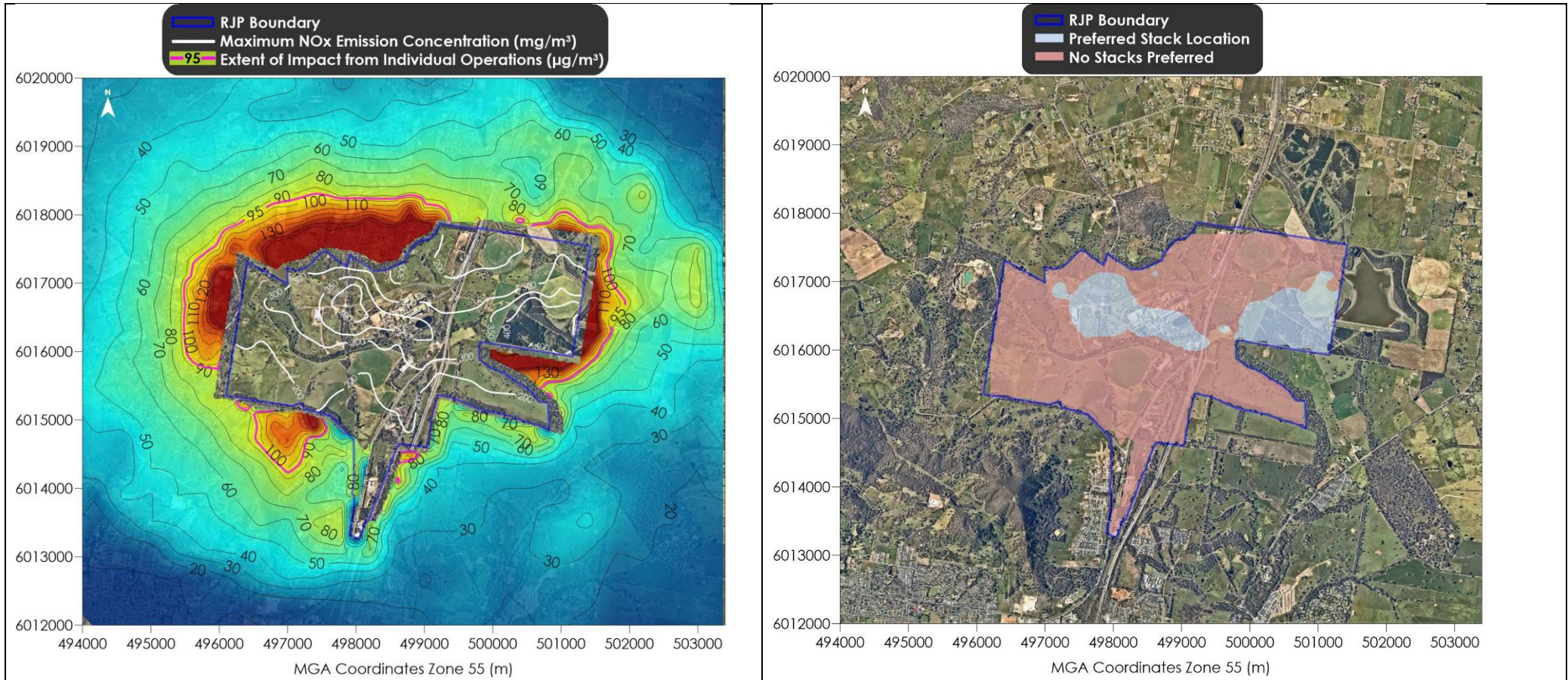
The RJP investigation area and buffer is designed such that industries incorporating general levels of control should be able to operate within the industrial area without causing impacts. But there are limitations, for example a facility that would have high levels of air emissions may need to have extra pollution controls if it chooses to locate close to the edge of the estate near receptors. Such a location is better suited to an operation that does not require a stack to manage pollution.

The right hand side of **Figure 5-3** provides a guide for new industries to help identify the more suitable lots where, depending on the type of industry and emissions, the facility can reasonably expect to be able to operate without causing impacts (outside of the precinct boundary) or requiring extra pollution controls.

Specific stack parameters will be tailored to the requirements of the industry it services and should be designed with consideration of good engineering practice.

General mitigation options for industries to manage air emissions from stacks include:

- ✦ Mitigation at the source;
- ✦ Increase stack height to allow for additional dilution.
- ✦ Increase stack velocity to promote dispersion.
- ✦ Increase stack temperature to promote dispersion of exhaust gases.
- ✦ Treatment of air emissions before release (e.g., carbon filter, thermal oxidiser, Bag filter etc.).
- ✦ Maintain equipment – regularly inspect and maintain equipment to ensure it is in good working order.



**Figure 5-3: Example of Air emissions rate per stack and received air pollutant concentrations due to NO<sub>x</sub> emissions from the RJP investigation area (left) and generalised guidance for locating industries with stacks within the RJP investigation area (right)**



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## 6 CONCLUSIONS AND RECOMMENDATIONS

The modelling indicates that the general Master Plan layout is relatively well suited to the situation.

The key areas of potential constraint are those shaded in red in **Figure 4-1** and **Figure 4-2**, both internally and externally to the RJP investigation area. These figures identify the areas within the RJP investigation area where there would need to be relatively strict controls on air, odour or noise emissions from industry, and where, (without such mitigation) there may be impacts at receptor areas outside of the RJP.

The figures in **Section 5** quantify the degree of mitigation needed within the RJP investigation area, or in other words the emissions per unit of land that may potentially be emitted without causing impacts outside of the pink criteria line (noting that presently there are no sensitive receptors within the pink line). These figures are useful to evaluate the likely buffer around the RJP needed to prevent land use conflicts if fully developing the RJP (i.e., the pink line). They also assist to identify the relative scale of potential emissions from any part of the RJP area; these are the white lines within the RJP area, or the preferred stack zones.

The white lines indicate that the parts of the RJP where the greatest emissions may be released without impact appear to be similar for odour and noise (i.e., in the north-western "corner" of the RJP). But for stack sources, the location most favourable for emissions is more centrally located within the RJP (away from nearby elevated terrain). Overall, the results show that large areas of low sloping land are suitable for industrial use, and importantly this covers most of the existing industries (but not all, see further below).

It is important to note that the modelling assumes the criteria are to be met at all sensitive receptors, (i.e., the pink criteria line is always adjacent to any potentially impacted existing or likely future receptor). In some cases, it may not be feasible to meet criteria at the existing receptor. For example, by looking at the red areas inside the RJP per the figures in **Section 4** or the relative emissions values per the white lines on the figures in **Section 5**, we can see that the results are heavily influenced by the close proximity of a limited number of receptors. These include (anticlockwise); the receptor to the north of the intermodal terminal, the receptor in elevated terrain near the southwestern corner of the RJP investigation area, and the areas of new and proposed receptors in the south and south-eastern areas.

The close proximity of these receptors to the RJP land significantly limits the scale of air and noise emissions that can be emitted within the RJP.

It is notable that the intermodal terminal appears to be relatively constrained due to the potential for noise impacts at the receptor to the north, and it would be prudent to conducting some further investigations prior to increasing industrial development in this location. Whilst it is likely that traffic noise from the Hume Highway at this receptor would elevate the noise criteria above the most stringent possible criteria applied in this study, the exact acoustic environment is not presently known.

Adding new receptors within the pink criteria line shown in the figures would further limit the capacity of industry to operate in the RJP (or conversely put receptors in areas of potential impact from industry).

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## 7 REFERENCES

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## **Appendix A**

### ***Selection of meteorological year***



### Selection of meteorological year

A statistical analysis of the latest six contiguous years of meteorological data from the nearest BoM weather station with suitable available data, Albury Airport AWS weather station, is presented in **Table A-1**.

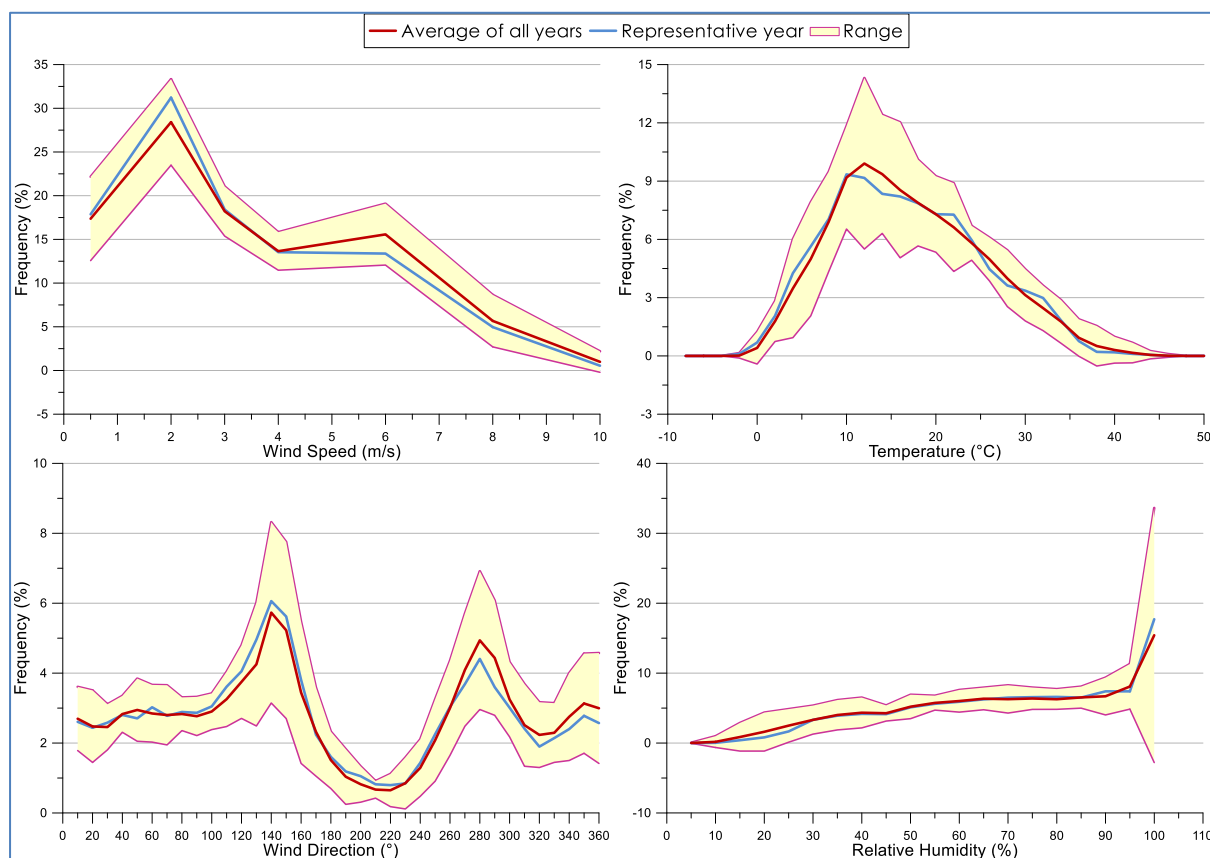
The standard deviation of the latest five years of meteorological data spanning 2015 to 2020 was analysed against the available measured wind speed, temperature and relative humidity data. The analysis indicates that 2018 dataset is closest to the mean for wind speed, 2020 is closest for temperature and 2017 is closest to long term relative humidity.

On the basis of a score weighting analysis, the 2017 year was found to be most representative.

**Table A-1: Statistical analysis results for Albury Airport AWS**

Year	Wind speed	Temperature	Relative humidity	Score
2015	0.3	1.1	3.4	5.2
2016	0.3	0.9	3.5	5.1
2017	0.3	0.9	2.6	4.1
2018	0.3	1.1	3.8	5.4
2019	0.3	1.1	3.6	5.3
2020	0.3	0.8	5.2	6.6

**Figure A-1** shows the frequency distributions for wind speed, wind direction, temperature and relative humidity for the 2017 year compared with the mean of the 2015 to 2020 data set. The 2017 year data appear to be reasonably well aligned with the mean data.



**Figure A-1: Frequency distributions for wind speed, wind direction, temperature and relative humidity**