Ballarat North

Adverse Amenity Impact Assessment

Victorian Planning Authority

28 May 2024

→ The Power of Commitment

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Executive summary

GHD was engaged by the Victorian Planning Authority (VPA) to prepare an Adverse Amenity Impact Assessment (AAIA) for the Ballarat North Precinct Structure Plan (PSP) and Development Contributions Plan (DCP) to guide the future development of Ballarat North PSP.

Key focus areas of the AAIA assessment include the following:

– Identify industries within the Precinct and within a 2 km catchment area which attract a buffer and/or be a potential air/noise/vibration source which may affect future development of the land.
– Consideration of both Core and Expanded Areas (GHD notes at the time of the assessment, the proposed Precinct boundary has not been decided upon. GHD has considered both areas separately within the assessment).

Air Quality:

– Utilise EPA recommended separation distance guideline (Publication 1949 and Publication 1518) to determine site specific separation distances (buffers) for any industries identified to have potential air quality impacts.
– Undertake a Level 2 Source-Pathway-Receptor risk assessment in accordance with EPA Publication 1883 Guidance for Assessing Odour and EPA Publication 1943 Guidance for Assessing Nuisance Dust for any industries with separation distances that extend to the Precinct boundary.

Noise/Vibration

– Undertake a review of potential impacts associated with the identified noise and vibration sources.
– Provide general recommendations in relation to noise and vibration to assist with planning, use, design and development of the Precinct.

Mitigation

– Assess which adverse amenity impacts can be mitigated through design and built form interventions.
– Provide high level recommendations on how these can be translated into land use and built form planning controls for the Precinct.

Key findings

Key findings of this report are summarised below.

Air Quality

From the results of the separation distance assessment, five constraints to the proposed Ballarat North Core Area and one key constraint for the Ballarat North Expanded Area were identified. Namely:

Core Area

– Haymes Paint, 500 m separation distance (odour)
– Western Victoria Asphalt, 500 m separation distance (odour)
– Orora, 500 m separation distance (odour)
– McCain Foods, 500 m separation distance (odour)
– Central Highlands Region Water Corporation, ESO4 (odour)

Expanded Area

– CVLX, 2000 m separation distance (odour)

Based on the outcomes of a level 2 risk assessment, Haymes Paint, Western Victoria Asphalt, Orora and McCain Foods have been assigned a “low risk” odour rating through a Level 2 Assessment.

Ballarat North WRP has been assigned a “high risk” odour rating and CVLX has been assigned a “medium risk” odour rating.

Traffic Emissions

The EPA has identified motor vehicles as being a major source of urban air pollution. It is widely recognised that traffic pollutants reduce as distance from the road kerb increases. The following road sources were identified.

Noise/Vibration

The following activities and industries may have the potential to impact the Ballarat North PSP:

– Noise from industries and businesses operated within the Precinct or close to the boundaries (asphalt plant, WRP)
– Noise from industries and businesses that are close to the Precinct boundaries (dominantly south eastern and south western areas)
– Noise from arterial and busy roads at the Precinct boundaries (Western freeway, Ballarat- Maryborough Rd, Midland Highway)
– Aircraft noise from Ballarat Aerodrome

Recommendations

The following recommendations are provided within this report:

– For the “medium risk” and “high risk” sites, namely CVLX and Ballarat North WRP constraining sites further assessment can be undertaken in the form of a level 3 odour assessment in line with EPA Publication 1883. GHD notes that as Ballarat North WRP has already had previous odour dispersion modelling undertaken which would form part of a Level 3 assessment. The outcome from the odour dispersion modelling indicates that the odour impact aligns with the ESO4 therefore it is unlikely for this ESO4 buffer to be modified and remain at high risk. Similarly, it is unlikely for further assessment to change the CVLX separation distance. Therefore VPA should avoid proposing sensitive receptors within the separation distances. GHD does not recommend any further assessment for air quality.
– Careful strategic planning of land uses to:
    - Plan where different types of land uses can be located using a setback strategy (separation distances) noting the planning principles outlined in the Municipal Planning Strategy.
    - Manage and minimise noise impact from sensitive and non-sensitive land use interfaces including but not limited to consideration of in-principle noise mitigation strategies outlined in this report.
    - Locate complimentary commercial and other business uses within the specified buffer distances to industrial developments and adjacent to arterial roads (interface land uses). The commercial and business land uses would act as a physical buffer between industrial activities and more sensitive land uses.
– The implementation of design controls within the Ballarat Planning Scheme (the planning scheme) and where appropriate development approval process to:
    - Implement application requirements into the planning scheme to appropriately facilitate sensitive uses within the separation distances and manage the risk of adverse amenity (i.e. an application requirement to undertake an odour/dust risk assessment).
    - Where appropriate place specific planning requirements as part of planning scheme amendments or planning permit conditions (i.e. control of air quality and noise emission) on proposed sensitive land use and developments in particular areas and implementing separation distance areas.
    - Require any proposed sensitive land uses to undertake external noise intrusion assessment to demonstrate that the development is designed and constructed to achieve recommended noise amenity targets outlined in VPP Clause 58.04-3 and sleep disturbance criteria as defined by World Health Organisation from external noise sources.

- Require developments with potential to generate noise to undertake further acoustic assessment to demonstrate that the development is designed and constructed to comply with the Noise Protocol requirements at surrounding sensitive uses (including within the Precinct).
- Confirm future scenarios for Ballarat Aerodrome operations and findings in the draft aircraft noise assessment. If predicted noise impact for future scenarios exceeds recommended values for part of the precinct, noise sensitive developments may not be allowed in there or noise impact control measures must be incorporated into the buildings design.

– It is recommended to perform noise monitoring to:
  - Estimate existing background levels within the PSP area and classify background in accordance with the Noise Protocol
  - Characterise ambient noise from existing transport and industrial noise sources, especially at the southern boundaries of the precinct
  - Estimate typical noise levels from aircraft flyovers since the Precinct is close to Ballarat Aerodrome
  - Identify risks of excessive impact based on observation of existing noise sources in the area

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.3 and the assumptions and qualifications contained throughout the Report.

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1. Introduction

The Victorian Planning Authority's (VPA) Regional Victoria group delivers spatial planning solutions for housing and jobs to manage growth in Victoria's key regional cities and rapidly growing towns within Melbourne's peri-urban area. As of 31 August 2022, VPA was appointed as Planning Authority for the Ballarat North Precinct Structure Plan (PSP) and Development Contributions Plan (DCP) to guide the future development of Ballarat North PSP. As part of the proposed PSP, GHD was engaged by the VPA to conduct an Adverse Amenity Impact Assessment (AAIA) which will inform the preparation of the Ballarat North PSP and DCP.

GHD has prepared this report assessing potential sources of adverse amenity impacts including noise, dust, odour and air emissions against relevant regulations to assist VPA in their decision making regarding land use and built form requirements under the proposed structure plan.

The AAIA has taken into consideration the existing land uses within the surrounding areas, including the Ballarat North Water Reclamation Plant (WRP), Ballarat Aerodrome, the Equine Precinct, Ballarat North Industrial Precinct, Asphalt plant, Ballarat McCains Foods Factory, former Wendouree Tip Site, and the Western Freeway.

As part of the AAIA, GHD has undertaken a separation (buffer) assessment with respect to air quality. The purpose of an air quality buffer assessment is to provide sufficient separation between sensitive land uses (such as residences) and industries that have the potential to generate emissions of dust and/or odour so that on the occasion of an emission event, the off-site dis-amenity is minimised.

This report also includes a desktop noise and vibration impact review of potential noise and vibration sources that may affect development within the Precinct. General advice on mitigation considerations prior to construction is also provided to aid in the development design to mitigate these impacts through the proposed built form.

The report draws upon Clause 53:10 (Uses with Adverse Amenity Potential) and EPA Victoria Publication 1518. GHD notes that EPA Publication 1518 is soon to be replaced by the Draft EPA Publication 1949 Separation Distance Guideline, which provides a methodology for assessing the applicability and suitability of separation distances. GHD has utilised both Publications in this assessment.

GHD notes that the at the time of writing this report, the proposed boundary of the PSP is yet to be determined. The proposed area to be approximately 832 hectares that consists of two areas (core and expanded areas) and GHD has undertaken the assessment as two discrete areas within the overall precinct.

1.1 Purpose of this report

The purpose of this report is to assess the potential for adverse amenity impact from noise, dust, odour and air emissions to new sensitive receptors that may be planned for within the Precinct. The assessment in this report has been conducted in accordance with the scope of works presented in Section 2 of this report.

The findings, conclusions and recommendations of this assessment should be read in conjunction with the limitations and assumptions presented in Section 2 and Section 1.4 of this report.

1.2 Scope of works

This assessment was prepared in accordance with the following scope of works:

General

1. An inception meeting was held with the VPA and Council to clarify and confirm objectives, reporting, program and discuss any outstanding issues of queries.
2. A site visit was undertaken to inspect the Precinct and identify potential industries within the Precinct and within a 2 km catchment area (surrounding area) which may attract a buffer and/or be a potential noise source which may have the potential to result in adverse amenity impact at the Precinct. The site visit was also supplemented by desktop searches including using National Pollution Inventory (NPI) website and the EPA website.

3. Review and identify existing land uses that have the potential to cause an adverse amenity impact (through odour, dust, air or noise) and then create an existing uses table categorising business/land use name, operational overview and operating hours.
4. Review legislative and planning requirements to assess any potential limitations that may apply to the precinct. Legislative and planning requirements to include EP Act obligations, Environment Reference Standard, Victorian Noise Protocol, Victorian Planning Policy, Planning Scheme.

Air Quality

1. Assess and scribe the separation (buffer) distance for each of the sources identified
2. Provide conclusions as to any buffer constraints that may impact the Precinct
3. For any buffer that extends to the PSP area GHD will undertake a Level 2 Source-Pathway-Receptor risk assessment in accordance with EPA Publication 1883 Guidance for Assessing Odour and EPA Publication 1943 Guidance for Assessing Nuisance Dust
4. Identify the requirements for further assessment work at the Precinct with regards to air quality

Noise and vibration

1. Undertake a review of the relevant noise and vibration guidelines and standards applicable to the Precinct and 2 km catchment
2. Undertake a review of potential impacts associated with the identified noise and vibration sources
3. Provide general recommendations in relation to noise and vibration to assist with planning, use, design and development of the Precinct
4. Identify the requirements for further assessment work at the Precinct with regards to noise

Mitigation

1. Assess which adverse amenity impacts can be mitigated through design and built form interventions
2. Provide high level recommendations on how these can be translated into land use and built form planning controls for the Precinct

Reporting

1. Present the findings of the AAIA

Provisional Items

1. Provisional Item 1: Where there is insufficient information regarding the PSP and surrounding areas and industries, or further risk assessment is required in line with a Level 3 assessment in EPA Publication 1883, field surveys may be required to be undertaken
2. Provisional Item 2: Attendance and participation at co-design workshops may be requested, subject to need

1.3 Limitations

This report has been prepared by GHD for Victorian Planning Authority and may only be used and relied on by Victorian Planning Authority for the purpose agreed between GHD and Victorian Planning Authority as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Victorian Planning Authority arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Assumptions

The following assumptions have been used in this report:

– The most site representative available meteorological data is from the Bureau of Meteorology BoM operated automatic weather station (AWS) located at Ballarat Aerodrome.
– Where throughputs or capacity of industries within the Precinct are unknown, GHD has taken a conservative approach.
– The surrounding industries site boundaries are based off publicly available information provided by the Department of Transport and Planning (DTP).
– Information on the operations and throughput of the identified industries are from publicly available information, site visits, planning permit data (where available) and not through direct contact with local industry or industry bodies except for Central Highlands Region Water Corporation (CHW) who provided GHD data regarding the Ballarat North WRP.

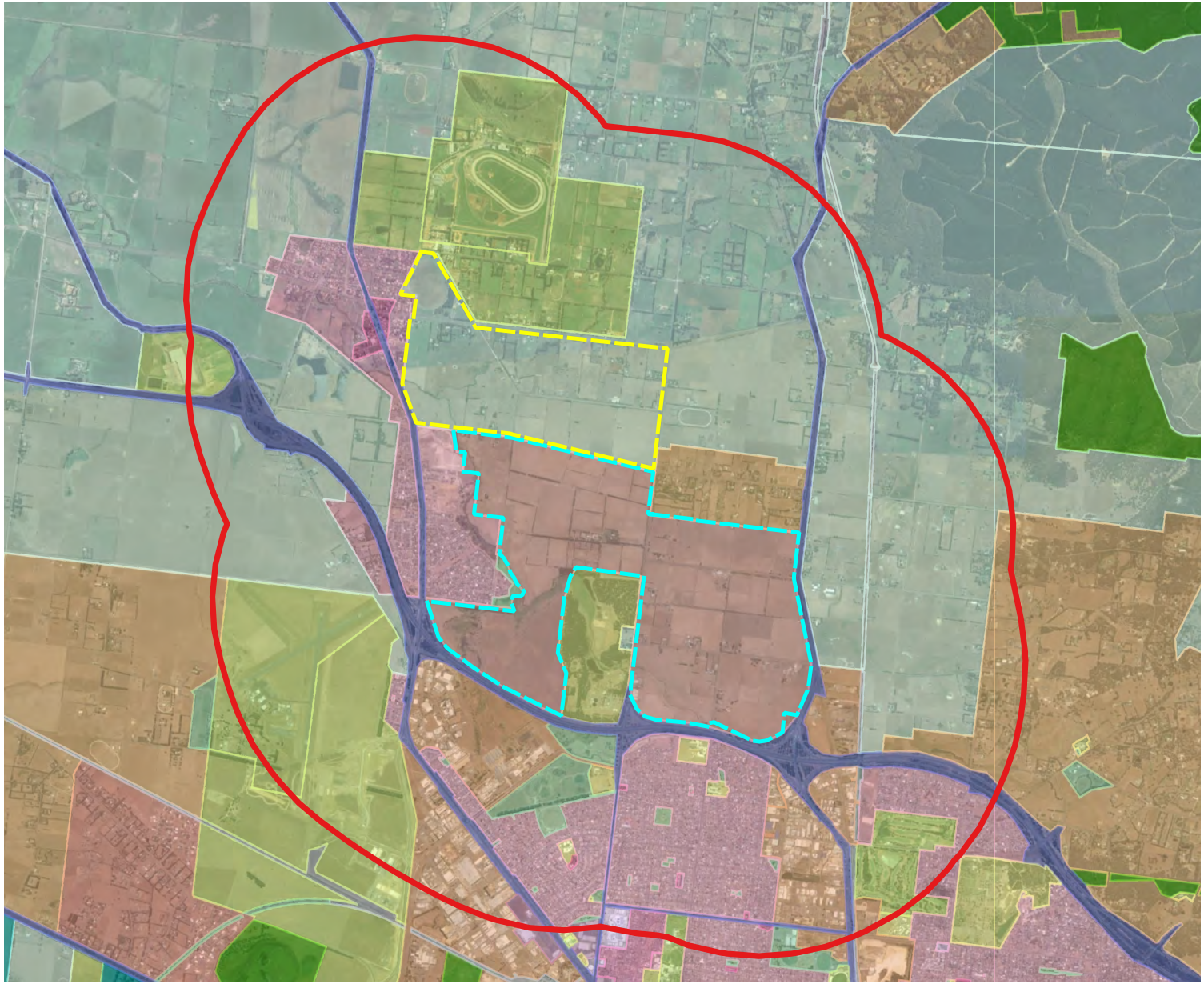
2. Site overview

2.1 Site location and planning

The total study area for the proposed Ballarat North PSP totals 832 hectares of land and is situated approximately 8 kilometres north of Ballarat's central business district. At the time of writing this report, the study area for the proposed Ballarat North PSP has been separated into two areas (Core and Expanded areas). For the purpose of this report, both areas have been assessed separately, however GHD notes that the expanded area boundary is still to be decided upon by VPA.

The core area of the precinct is zoned under Urban Growth Zone (UGZ) while the expanded area is zoned under Farming Zone (FZ).

The precinct is anticipated to primarily consist of residential premises, with other non-residential components such as school and parks. The total area consists of a 'core' area and an 'expanded' area. The planning zone and 2 km catchment area is displayed in Figure 1.



Legend

- Core Area
- Expanded Area (inclusion TBC)
- 2Km PSP Buffer

Planning Zone

- COMMERCIAL 1 ZONE
- COMMERCIAL 2 ZONE
- FARMING ZONE
- GENERAL RESIDENTIAL ZONE - SCHEDULE 1
- INDUSTRIAL 1 ZONE
- INDUSTRIAL 3 ZONE
- MIXED USE ZONE
- PUBLIC PARK AND RECREATION ZONE
- PUBLIC USE ZONE - EDUCATION
- PUBLIC USE ZONE - LOCAL GOVERNMENT
- PUBLIC USE ZONE - OTHER PUBLIC USE
- PUBLIC USE ZONE - SERVICE AND UTILITY
- RESIDENTIAL GROWTH ZONE - SCHEDULE 1
- RURAL LIVING ZONE
- SPECIAL USE ZONE - SCHEDULE 10
- SPECIAL USE ZONE - SCHEDULE 13
- SPECIAL USE ZONE - SCHEDULE 14
- SPECIAL USE ZONE - SCHEDULE 15
- SPECIAL USE ZONE - SCHEDULE 5
- SPECIAL USE ZONE - SCHEDULE 6
- SPECIAL USE ZONE - SCHEDULE 7
- TRANSPORT ZONE 1 - STATE TRANSPORT INFRASTRUCTURE
- TRANSPORT ZONE 2 - PRINCIPAL ROAD NETWORK

Paper Size ISO A4

0 1 2 km

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Site Planning and Location

Project No. **12619620**
Revision No. **-**
Date. **09/11/2023**

FIGURE 1

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Print Date: 09/11/2023

Data Source:Google Earth Imagery 2023.
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2.2 Surrounding land use

The PSP is surrounded by Mitchel Park to the west, Miners Rest from the west to north, Invermay to the east and Wendouree to the south. Land immediately surrounding the precinct is zoned as a mixture as Industrial 1 Zone (IN1Z), Rural Living Zone (RLZ), Public Use Zone 1 (PUZ1), General Residential Zone 1 (GRZ1), Special Use Zone 13 (SUZ13), Public Park and Recreation Zone (PPRZ) ad Public Use Zone 2 (PUZ2).

Miners Rest is largely residential zones to the west and special use zones to the north (Equine precinct). Invermay is largely zoned under farming zones and rural living zones. Wendouree consists of industrial zones, residential zones, public use zones and special use zones.

GHD notes that Ballarat North Water Reclamation Plant is located directly south of the PSP and zoned under Public Use Zone – Service and Utility.

2.3 Sensitive receptors

The definition of a sensitive receptor or sensitive land use is defined by EPA[1] (2022, p. 46) as:

'Any land use that requires a focus on protecting human health and wellbeing, local amenity and aesthetic enjoyment." Examples of such sensitive land uses include but not limited to, '*dwellings, hospitals, aged care facilities, education centres, childcare centres, places of worship, corrective institutions'.*

A sensitive land use is further defined in Publication 1961 (EPA Victoria 2021, p. 8) as:[2]

"A land use where is it plausible for humans to be exposed over durations greater than 24 hours, such as residential premises, education and childcare facilities, nursing homes, retirement villages, hospitals."

Environment Protection Regulations 2021 defines a noise sensitive area as:

a) That part of the land within the boundary of a parcel of land that is:

- *within 10 metres of the outside of the external walls of any of the following buildings*
  - *a dwelling (including a residential care facility but not including a caretaker's house)*
  - *a residential building*
  - *a noise sensitive residential use; or*
- *within 10 metres of the outside of the external walls of any dormitory, ward, bedroom or living room of one or more of the following buildings*
  - *a caretaker's house*
  - *a hospital*
  - *a hotel*
  - *a residential hotel*
  - *a motel*
  - *a specialist disability accommodation*
  - *a corrective institution*
  - *a tourist establishment*
  - *a retirement village*
  - *a residential village; or*

[1] EPA Publication 1949, Separation distance guideline (2022)
[2] The definition provided in the Consultation Draft version of EPA Publication 1961 may change in the final revision of the guideline, however any changes are not expected to affect the outcomes of this assessment.

- *within 10 metres of the outside of the external walls of a classroom or any room in which learning occurs in the following buildings (during their operating hours):*
  - *a child care centre*
  - *a kindergarten*
  - *a primary school*
  - *a secondary school; or*

b) subject to paragraph (c), in the case of a rural area only, that part of the land within the boundary of
- *a tourist establishment; or*
- *a campground; or*
- *a caravan park; or*

c) despite paragraph (b), in the case of a rural area only, where an outdoor entertainment event or outdoor entertainment venue is being operated, that part of the land within the boundary of the following are not noise sensitive areas for the purposes of that event or venue
- *a tourist establishment*
- *a campground*
- *a caravan park*

Thus, the definition of sensitive receptor or sensitive land use is considered to be that identified by EPA for the purposes of this assessment.

2.3.1 Within the precinct

A number of residential receptors were identified within the precinct area. In the core area, all residential receptors are zoned under UGZ while all residential receptors in the expanded areas are zoned under FZ1. One educational facility (Ballarat Grammar – Mt Rowan Campus) was identified within the core area. GHD notes that the Expanded Area is predominantly a residential PSP. The only confirmed non-residential receptors are Mt Rowan, Ballarat Town Commons and a reserve located at the northern edge of the Expanded Area.

2.3.2 Within catchment area of the precinct

Within 2 km of the core area of the precinct a number of sensitive receptors (including dwellings) have been identified. These have been summarised in Sections 2.3.2.1 and 2.3.2.2. All identified receptors have been displayed in Figure 2.

2.3.2.1 Core area

A total of 21 sensitive receptors were identified within 2 km of the core area, these receptors include schools, medical centres, childcare centres, aged care centres and community centres. The closest receptor identified is located 140 m south of the PSP boundary. Receptors identified have been summarised in Table 1, rural and general residential zones have also been identified and displayed in Figure 3.

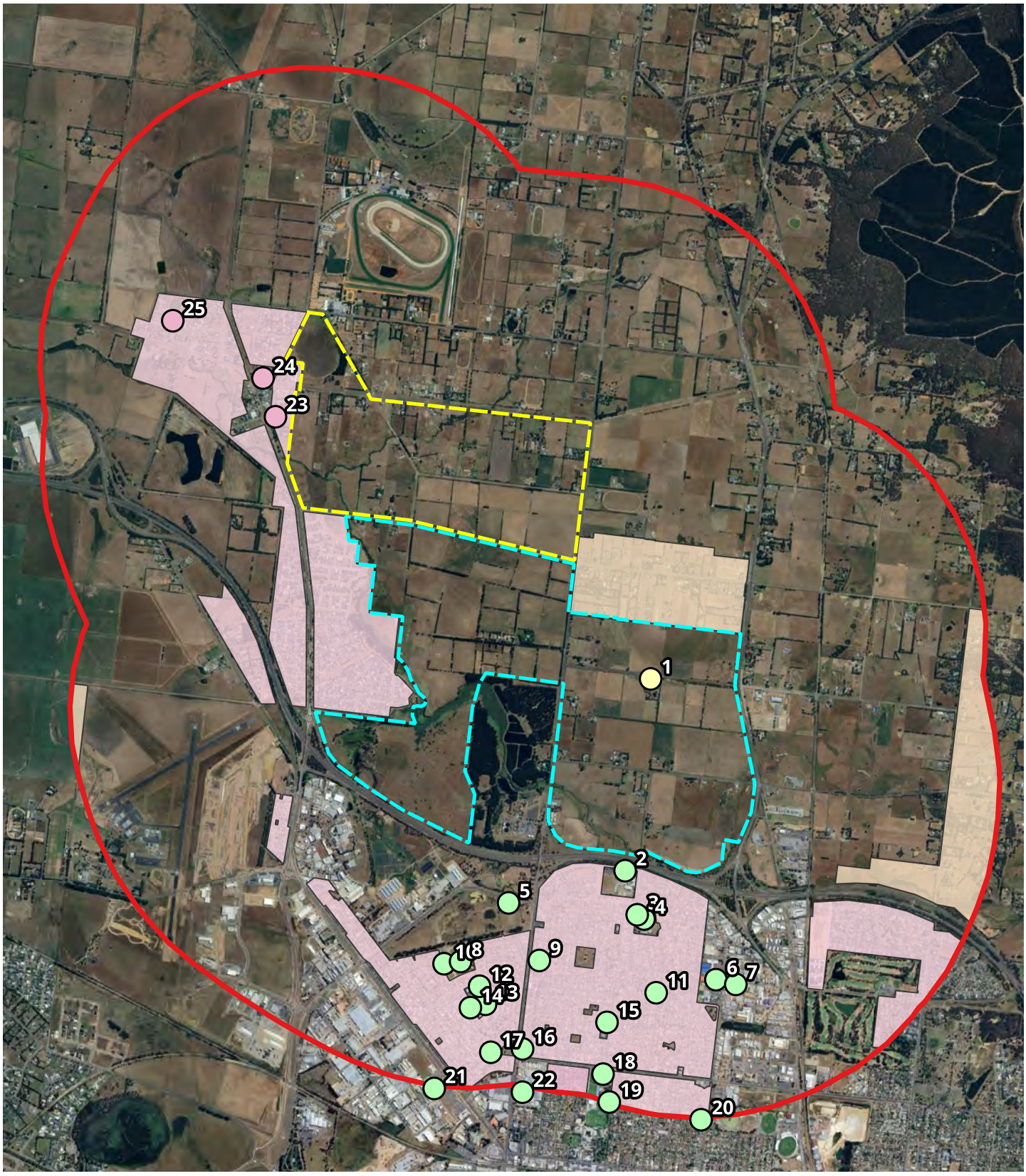
2.3.2.2 Expanded area

A total of three receptors were identified within 2 km of the expanded area within the main township zone of Miners Rest. These included two schools and one community centre. The closest receptor identified is located 140 m west of the PSP boundary. Receptors identified have been summarised in Table 1 and displayed in Figure 3.

Table 1 Closest Sensitive Receptors

ID	X	Y	Site ID	Address	Direction from site (m)
Within the Precinct					
1	220406.4	5844435	Ballarat Grammar Mt Rowan Campus	Sims Rd, Mount Rowan VIC 3352	0
Outside the Precinct					
Within 2 Km of Core Area					
2	220198.2	5842871	Mount Rowan Secondary College	453-457 Forest St, Wendouree VIC 3355	140
3	220296.6	5842511	Rowan View Preschool	402 Forest St, Wendouree VIC 3355	480
4	220352.7	5842477	Forest Street Primary School	400B Forest St, Wendouree VIC 3355	503
5	219247.7	5842608	Yuille Primary School	1 McKenzie Dr, Wendouree VIC 3355	586
6	220938.5	5841982	Hollioake Park Sports Complex	497 Dowling St, Wendouree VIC 3355	889
7	221101.0	5841944	Caring Hands Healthcare	Unit 1/18 Coronet St, Wendouree VIC 3355	959
8	218856.3	5842130	Wendouree West Reserve	1 Kurrajong Rd, Wendouree VIC 3355	970
9	219498.5	5842139	Our Lady Help of Christians Primary School	480A Gillies St N, Wendouree VIC 3355	971
10	218721.4	5842112	Wendouree Neighbourhood Centre Inc.	14 Violet Grove, Wendouree VIC 3355	1006
11	220451.2	5841875	Dulili Learning Haven Wendouree	1018-1022 Grevillea Rd, Wendouree VIC 3355	1022
12	219011.4	5841928	Yuille Park P-8 Community College	Violet Grove, Wendouree VIC 3355	1172
13	219059.6	5841781	The Y Youth Hub & ReCranked	35 Violet Grove, Wendouree VIC 3355	1323
14	218936.3	5841754	Hazel Road Preschool Centre	8 Hazel Rd Wendouree, VIC, 3355	1343
15	220050.4	5841634	Ballarat Functional Medicine Centre	37 Harold St, Wendouree VIC 3355	1383
16	219361.8	5841418	Wendouree Children's Centre	Corner of Gilles and, Hastings St, Wendouree VIC 3355	1702
17	219102.8	5841390	Green Leaves Early Learning Wendouree	1212/1216 Norman St, Wendouree VIC 3355	1717
18	220018.0	5841212	Ballarat Grammar School	201 Forest St, Wendouree VIC 3355	1790
19	220068.8	5840984	Centre For Early Education	201 Forest St, Wendouree VIC 3355	1986
20	220817.8	5840840	Mulvra Aged & Disability Care	231 & 235 Dowling St, Wendouree VIC 3355	2016
21	218641.1	5841095	Aurrum Kids Childcare Ballarat	21-53 Learmonth Rd, Wendouree VIC 3355	2023
22	219361.3	5841064	Wendouree Library	Gillies St N, Wendouree VIC 3355	2045

ID	X	Y	Site ID	Address	Direction from site (m)
Within 2 Km of Expanded Area					
23	219361.3	5841064	Mini Miners Early Learning Centre	2 Raglan St, Miners Rest VIC 3352	140
24	217346.6	5846573	Miners Rest Community Hall	Market St, Miners Rest VIC 3352	227
25	217244.7	5846889	Miners Rest Primary School	2-12 Dundas St, Miners Rest VIC 3352	974
Rural Living Zones			NA	NA	Refer to Figure 3
General Residential Zones			NA	NA	Refer to Figure 3
Residential Growth Zones			NA	NA	Refer to Figure 3



Legend

Site Layers
- Core Area
- Expanded Area (Inclusion TBC)
- 2Km Buffered Area

Sensitive Receptors
- Core Area Receptors
- Expanded Area Receptors
- Precinct Area Receptors

Plan Zone Label
- General Residential Zone - Schedule 1
- Residential Growth Zone - Schedule 1
- Rural Living Zone

Paper Size ISO A4

0 0.75 1.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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All Sensitive Receptors

Project No. **12619620**
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FIGURE 2

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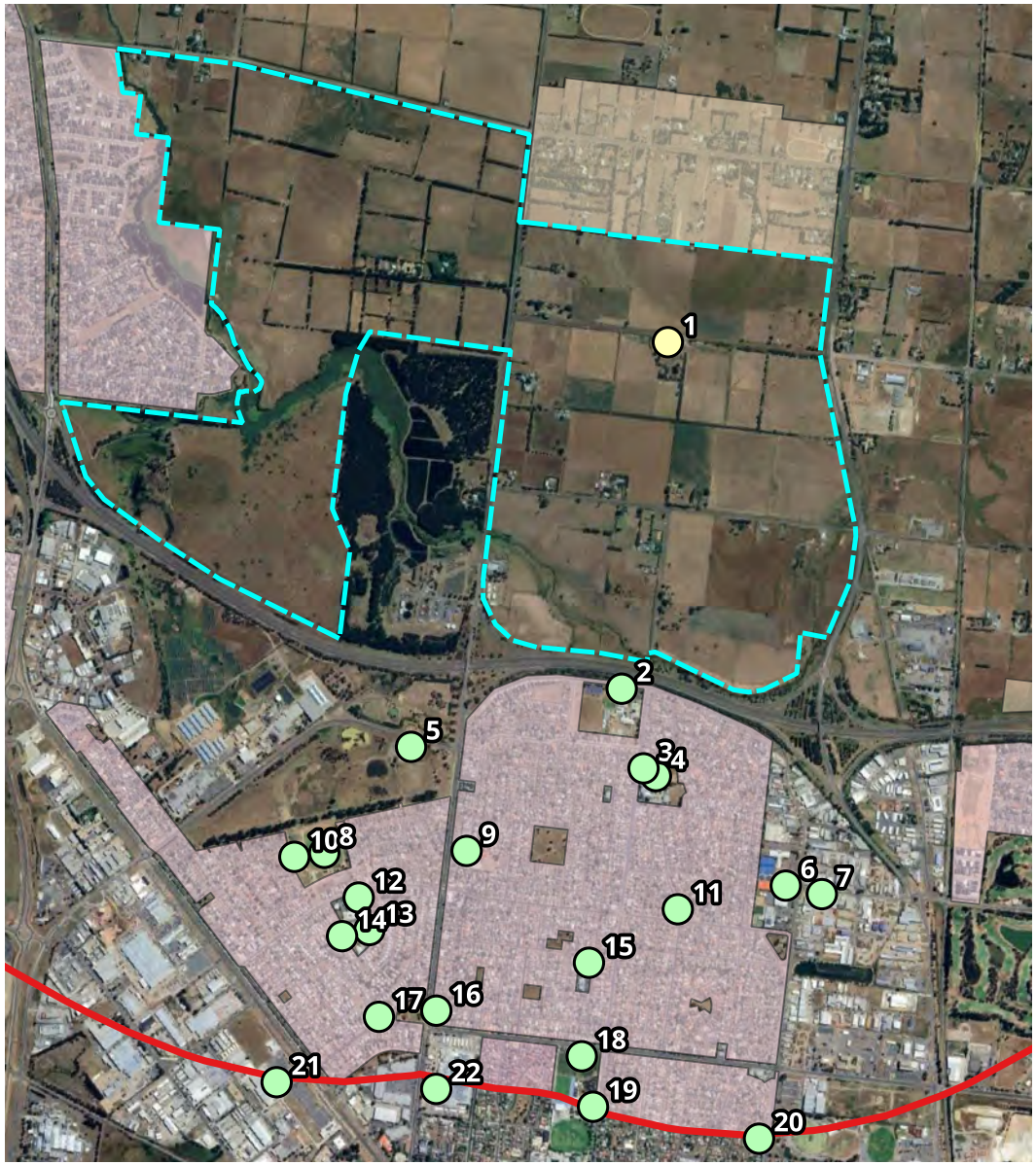
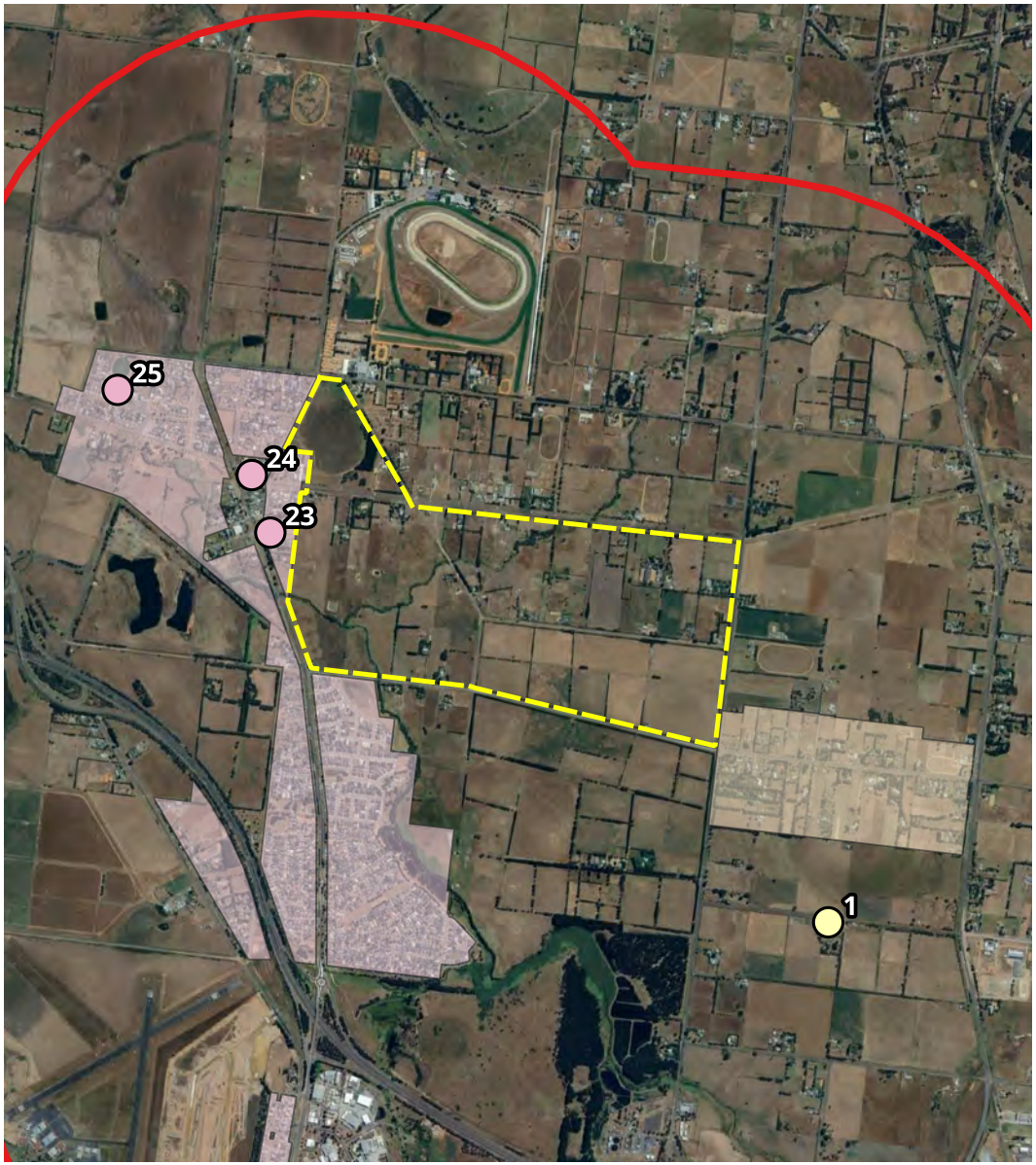


Core Area



Expanded Area

Legend

Site Layers
- Core Area
- Expanded Area (Inclusion TBC)
- 2Km Buffered Area

Sensitive Receptors
- Core Area Receptors
- Expanded Area Receptors
- Precinct Area Receptors

Plan Zone Label
- General Residential Zone - Schedule 1
- Residential Growth Zone - Schedule 1
- Rural Living Zone

Paper Size ISO A4

0 0.5 1 km

Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Core and Expanded Area Sensitive Receptors

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FIGURE 3

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2.4 Meteorology

The characterisation of local wind pattern requires accurate site-representative hourly recordings of wind speed and direction over a period of at least 12 months. Meteorological data from the Bureau of Meteorology (BoM) operated automatic weather station (AWS) at Ballarat Aerodrome[3] (1.5 km southwest of the site[4]) is considered representative of the area due to the similar topography.

GHD has access to meteorological data (five years at one hour intervals, between 1 January 2018 and 31 December 2022) from the Ballarat Aerodrome AWS to understand the meteorology and the implications for dispersion of odour and dust.

2.4.1 Wind pattern

The local meteorology largely determines the pattern of off-site dust and odour impact. The effect of wind on dispersion patterns can be examined using the general wind climate and atmospheric stability class distributions. The general wind climate at a site is most readily displayed by means of wind rose plots, giving the incidence of winds from different directions for various wind speed ranges. The features of particular interest in this assessment are: (i) prevailing wind directions, (ii) the relative incidence of more stable light wind conditions, and (iii) good dispersion conditions with winds over 5 m/s. Directional frequencies of the annual and seasonal wind roses for the Project site are presented in Appendix for reference.

Lond term pattern in wind

Figure 4 presents the five-year wind rose and shows the following features:

- The average measured wind speed 5.46 m/s.
- High wind speed (wind speeds greater than 5 m/s) occurs 54% of the time, predominantly from the north.
- Calm winds comprised 1.5% of the time.
- The predominant wind direction is from the north and occur 17% of the time. The predominant wind direction also consists of the highest frequency of winds greater than 5 m/s, occurring at 17% of the time.
- Easterly winds were less frequent than other wind directions, occurring approximately less than 1% of the time.
- Low wind speeds (less than 2 m/s) occur 6% of the time, predominantly from the east to southeast.

[3] BoM site 89002
[4] This is within the 25km radius identified in EPA Publication 1550 Guidelines for input meteorological data for AERMOD (September 2014)

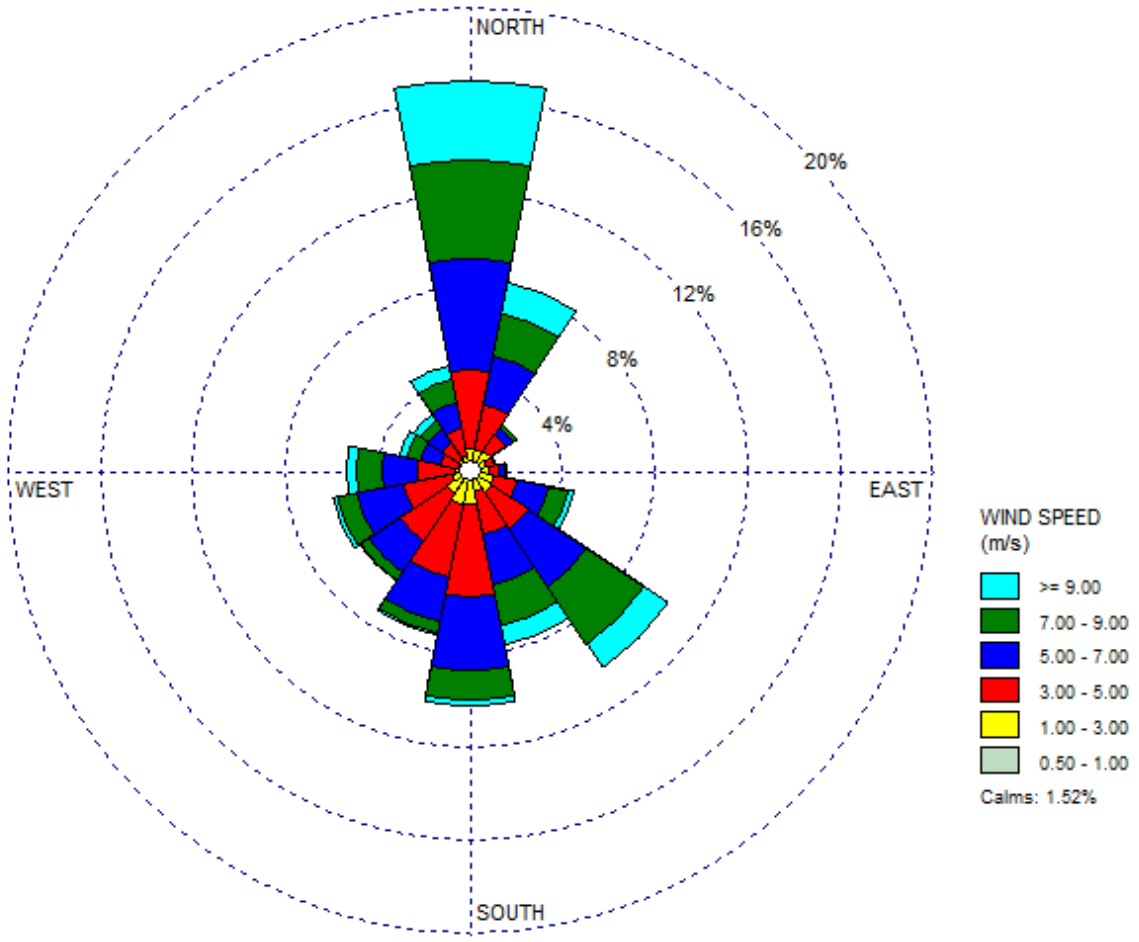


Figure 4 *Wind rose for the Ballarat Aerodrome (1 Jan 2018 – 31/12/2022)*

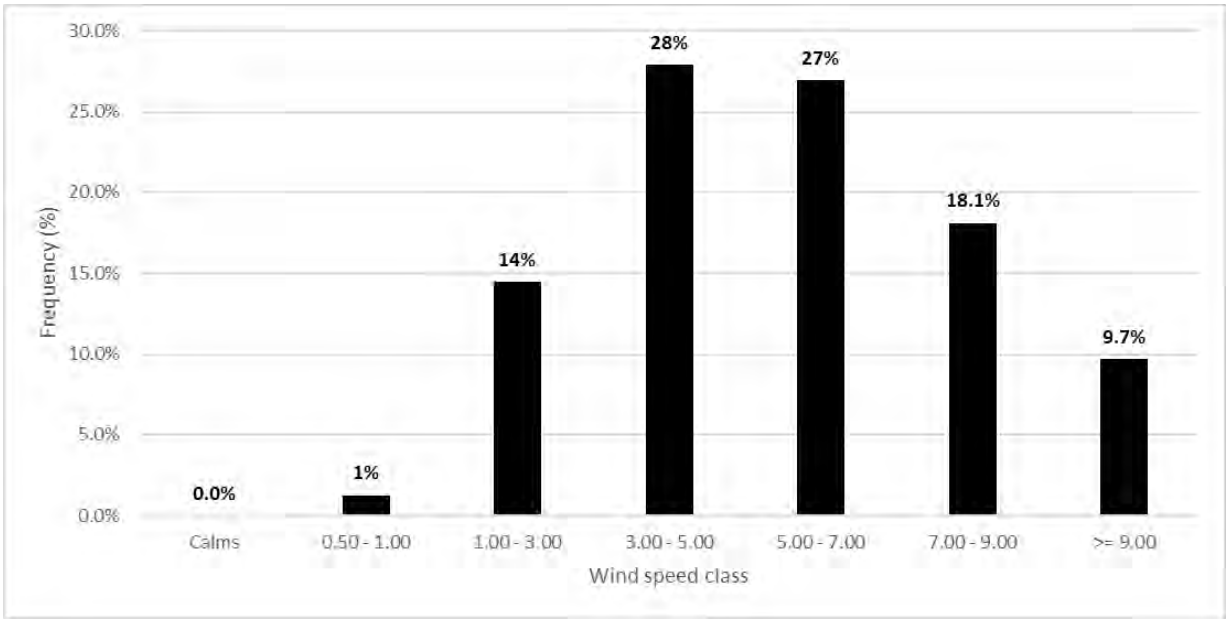


Figure 5 *Frequency Analysis for Ballarat Aerodrome*

Seasonal variation in wind pattern

The seasonal wind roses for the same period are presented in Figure 6. Figure 6 shows that:

- During the summer, the predominant wind direction is from the southeast, which comprises 19% of the total winds.
- During winter, northerly sector winds are the most dominant due to pre-frontal northerlies and cool air drainage from the hills and mountains. Northerly component winds comprise ~28% of all incident winds.
- Autumn and spring are transitional periods. During these months both summer and winter patterns are observed. In this case, both autumn and spring wind patterns are characteristically similar to winter, generally consisting of high frequencies of northerly component winds.
- The seasonal incidence of light (< 2 m/s) wind speeds are greatest in winter, comprising 25% of incident winds in winter.
- The seasonal incidence of high (> 5 m/s) wind speeds are greatest in spring, comprising 40% of incident winds in summer.
- As with the annual wind rose for years between 2018 – 2022, there is a lack of easterly component winds in all observed seasons.

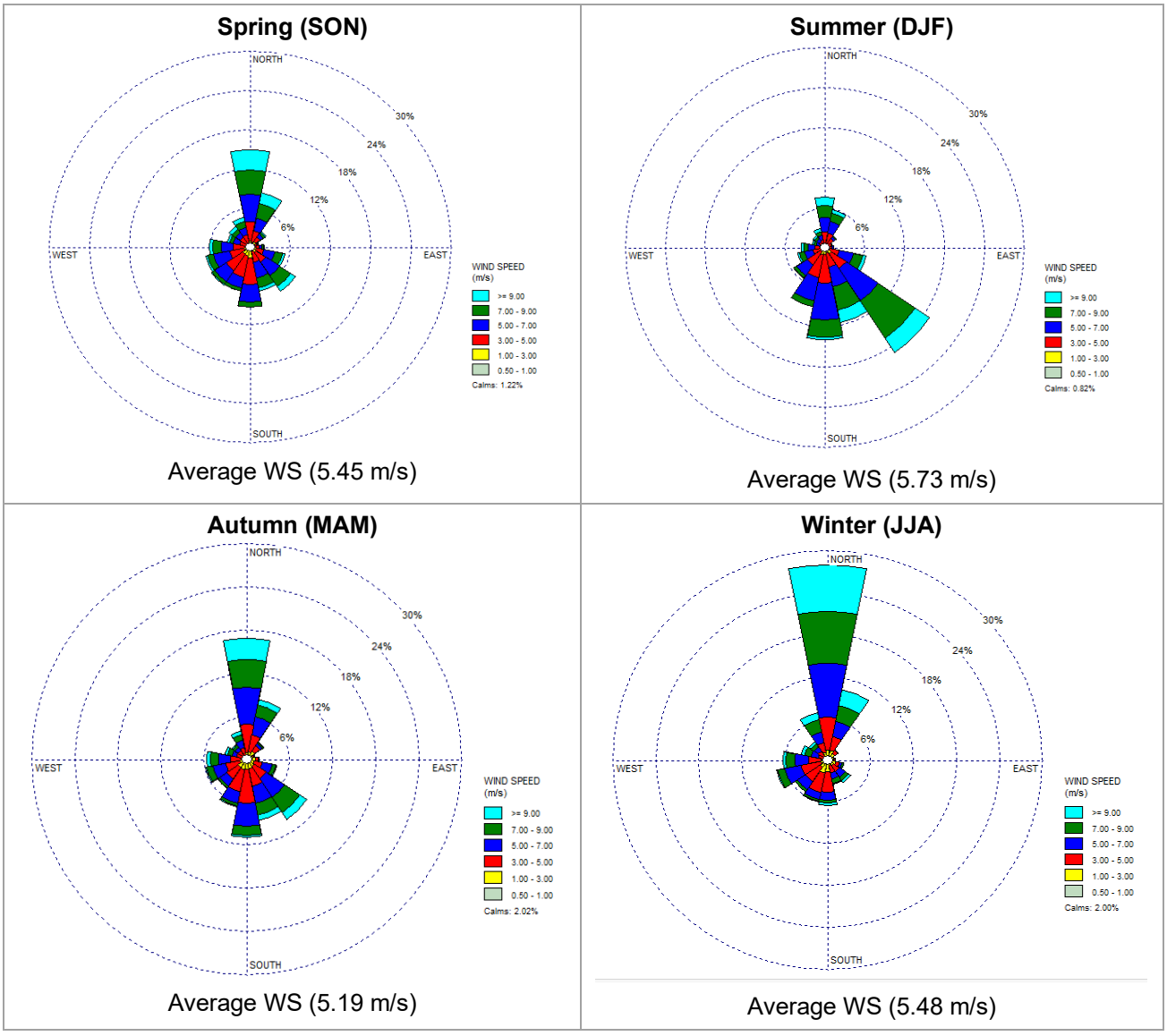


Figure 6 *Seasonal windrose between 1 January 2018 and 31 December 2022*

3. Existing planning and land use context

3.1 Environment Reference Standard

The EP Act's environment protection framework includes the Environment Reference Standard (ERS). This identifies environmental values, air indicators and objectives that set the benchmark for the quality of the air environment needed to protect environmental values. The environmental values identified include:

- Life, health and wellbeing of humans
- Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity
- Local amenity and aesthetic enjoyment
- Visibility
- The useful life and aesthetic appearance of buildings, structures, property and materials
- Climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity

The ERS is a reference standard, not a 'compliance standard' for businesses i.e. it relates to ambient air and not any individual facility. The ERS replaces SEPP (AQM) and generally adopts the objectives in the National Environment Protection Measure (Ambient Air Quality) (NEPM AAQ) with some modifications.

3.2 Planning policy framework

The Planning Policy Framework (PPF) includes a number of references to planning for the location of potentially conflicting land uses and their relationship to each other. The following clauses are relevant to this study.

3.2.1 Clause 11 Settlement

Clause 11 seeks to anticipate and respond to the needs of existing and future communities through appropriately zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities and infrastructure.

Clause 11.01-1S identifies the need to focus investment and growth in places of state significance, and to capitalise on development opportunities around planned transport infrastructure. This Clause also highlights the opportunity for urban renewal and infill redevelopment to provide for the needs of a growing Victoria.

Clause 11.02-2S encourages the orderly development of urban areas through the preparation of relevant plans, including structure plans. These plans should support land use and development which considers the strategic and physical context of a location and facilitate both the provision of new infrastructure and continued use of established infrastructure and services as required within a given area.

3.2.2 Clause 13 Environmental Risks and Amenity

Clause 13 considers environmental risks including reference to land use separation and protection of sensitive uses from adverse impacts caused by other land uses. Policies under this Clause which are of particular relevance to the assessment of adverse amenity impacts are underlined below.

Clause 13.05-1S Noise Guidelines seeks to ensure that development is not prejudiced, and community amenity is not reduced by noise emissions, using a range of building designs, urban designs and land use separation techniques as appropriate to the land use functions and character of the area. The policy considers the following policy guidelines (considered relevant to this study).

- The noise requirements in accordance with the Environment Protection Regulations under the Environment Protection Act 2017
- Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Publication 1826.2, Environment Protection Authority, March 2021) (the Noise Protocol, now superseded by version 1826.4, May 2021)

Clause 13.06-1S Air Emissions Guidelines relates to air quality management and aims to assist in the protection and improvement of air quality. This clause seeks to ensure, wherever possible, that there is suitable separation between land uses that reduce amenity and sensitive land uses. The policy considers the following policy guidelines (as considered relevant to this study).

– Recommended Separation distances for industrial residual air emissions (Publication 1518, Environment Protection Authority, March 2013)

Clause 13.07-1S Land Use Compatibility seeks to safeguard community amenity while facilitating appropriate commercial, industrial, or other uses with potential off-site effects.

This can be achieved by ensuring the compatibility of a use or development as appropriate to the land use functions and character of the area by:

– Directing land uses to appropriate locations
– Using a range of building design, urban design, operational and land use separation measures

Clause 13.07-2S seeks to minimise the potential for human and property exposure to risk from incidents that may occur at major hazard facilities.

3.2.3 Clause 17 Economic Development

Clause 17 aims to provide for a strong and innovative economy by supporting economic growth and development. This is to be achieved by providing land, facilitating decision-making and resolving land use conflicts, so that each district may build on its strengths and economic potential.

Clause 17.03-1S seeks to ensure the adequate supply of land for industry in appropriate locations. This can be achieved by protecting existing industrial areas to, where possible, facilitate further industrial development; and to avoid locating non-industrial land uses in locations identified for future industrial use. The policy considers the following guidelines:

– *Recommended separation distances for industrial residual air emissions – EPA Publication Number 1518 March 2013.*

Clause 17.03-2S refers to the siting of industrial development. It encourages the sustainable development and operation of industry by protecting industrial activity in industrial zones from encroachment of commercial, residential, and other sensitive uses that would adversely affect industry viability. This can be achieved by the provision of adequate separation and buffer areas between sensitive uses and offensive and dangerous industries to ensure existing or future residents are not affected by adverse environmental effects, nuisance or exposure to hazards.

3.2.4 Clause 18 Transport

Clause 18 seeks to achieve an integrated and sustainable transport system which facilitates economic prosperity, contributes to environmental sustainability, and is accessible and safe.

3.2.5 Clause 19 Infrastructure

Clause 19 considers the efficient and adequate provision of infrastructure to support the growth and redevelopment of settlements.

Clause 19.03-5S seeks to reduce waste and maximise resource recovery so as to reduce reliance on landfills and minimise environmental, community amenity and public health impacts. In relation to planning for urban renewal Precincts, the policy encourages future waste and resource recovery infrastructure needs to be identified and planned for, to safely and sustainably manage all waste and maximise opportunities for resource recovery.

Buffers should be implemented to protect any existing or planned waste and resource recovery infrastructure from encroachment from incompatible land uses, and waste and resource recovery facilities should be sited, designed, and operated to minimise impacts on surrounding communities.

3.3 Local planning policy framework

Relevant provisions of the Municipal Strategic Statement (MSS) and Local Planning Policy Framework (LPPF) to this study are summarised below.

3.3.1 Municipal Strategic Statement

The MSS has been developed for the strategic vision for planning at the local level. The clauses of the MSS outlines

- Clause 21.01: Provides an overview of the City
- Clause 21.02: Identifies the key influences for land use and development
- Clause 21.03: Provides overview of the vision for the City based on Ballarat's Council Plan 2009-2013 and Strategic Framework Plan
- Clause 21.04: Outlines land use objectives, strategies and implementation
- Clause 21.05: Outlines the Council's built form and amenity objectives, strategies and implementation
- Clause 21.06: Outlines the Council's environment objectives, strategies and implementation
- Clause 21.07: Outlines the Council's infrastructure objectives, strategies and implementation
- Clause 21.08: Outlines the Council's local areas objectives, strategies and implementation
- Clause 21.09: Identifies further strategic work to be undertaken by Council

3.3.2 Local Planning Policies

Clause 13 of the Ballarat Planning Scheme contains three local planning policies that are relevant to land in the study area:

- Clause 13.05 (Noise) To assist the management of noise effects on sensitive land uses. With strategy to ensure that development is not prejudiced, and community amenity and human health is not adversely impacted by noise emissions. Minimise the impact on human health from noise exposure to occupants of sensitive land uses (residential use, child care centre, school, education centre, residential aged care centre or hospital) near the transport system and other noise emission sources through suitable building siting and design (including orientation and internal layout), urban design and land use separation techniques as appropriate to the land use functions and character of the area. Relevant polices identified the noise requirements in accordance with the Environment Protection Regulations under the Environment Protection Act 2017.
- Clause 13.06 (Air Quality) To assist the protection and improvement of air quality. With strategy to ensure, wherever possible, that there is suitable separation between land uses that pose a human health risk or reduce amenity due to air pollutants, and sensitive land uses (residential use, child care centre, school, education centre, residential aged care centre or hospital). Relevant polices identified include EPA Publication 1518 and the ERS.
- Clause 13.07 (amenity, human health, and safety) To protect community amenity, human health and safety while facilitating appropriate commercial, industrial, infrastructure or other uses with potential adverse off-site impacts. With strategy to ensure that use or development of land is compatible with adjoining and nearby land uses. Avoid locating incompatible uses in areas that may be impacted by adverse off-site impacts from commercial, industrial, and other uses. Avoid or otherwise minimise adverse off-site impacts from commercial, industrial, and other uses through land use separation, siting, building design and operational measures. Protect commercial, industrial, and other employment generating uses from encroachment by use or development that would compromise the ability of those uses to function safely and effectively. Relevant policy identified include EPA Publication 1518.

3.3.3 Clause 53.10

Clause 53.10 sets out distances that apply to land uses with potential off-site impacts.

These distances are based on the potential adverse impacts of each land use or activity. They represent a threshold distance within which further detailed assessment is needed. This is to determine whether the proposed use or activity is appropriate.

3.3.4 Clause 44.08

The Buffer Area Overlay (BAO) clause 44.08, can be used to prevent incompatible use and development. It can apply to areas affected by the potential off-site impacts of industry, warehouse, infrastructure, or other uses.

The BAO supports the objectives in clause 13.07-1S. The BAO also complements clause 53.10 by ensuring that land use and development around existing industry is appropriate.

Proponents must meet criteria and provide supporting information to apply the BAO. Issues of land use conflict and compatibility may still exist in areas not covered by the BAO.

Planning Practice Note 92 explains the criteria and information required to apply the BAO.

3.4 Strategies and plans

3.4.1 The Ballarat Strategy (2015)

The Ballarat Planning Scheme under amendment C194 has implemented the recommendations of the Ballarat Strategy (2015) under Clause 21.10. The Ballarat Strategy 2015 outlines a plan to guide the forecasted growth and development in Ballarat. It identifies the opportunities to develop Ballarat to be “greener more vibrate and connected” with inclusion of framework that would encourage urban renewal to create a variety of housing types with access to public transport, commercial uses and communities.

3.4.2 Ballarat Planning Scheme

Clause 21 of the Ballarat Planning Scheme contains two key matters relevant to land in the study area:

– Clause 21.01-4 (Settlement and Housing) - key issues relating to the development of settlement and housing are outlined as follows:
  - *Accommodating a projected population of about 160,000 people by 2040.*
  - *Maintaining a compact settlement form as part of Ballarat’s ‘10 Minute City’.*
  - *Encouraging greater densities along key transport corridors.*
  - *Facilitating urban renewal in areas with potential for higher density development.*
  - *Identifying and protecting long-term growth opportunities.*
  - *Encouraging a variety of housing opportunities to respond to diverse community needs and aspirations for housing.*
  - *Providing quality open space as essential for community health.*
– Clause 21.02-1 (Urban Growth) - with the forecast population growth, the increased population is planned to be accommodation through infill in establish areas. Relevant objectives the North GIA is as follows:
  - Objective 1: *Support a pattern of growth which reinforces the ‘10 Minute City’.*
    – *1.1: Encourage significant new mixed use development in the CBD which supports knowledge sector and retail employment opportunities, more inner city living and street level and out of hours activation.*
    – *1.2: Facilitate higher density infill housing in areas of convenience living, urban renewal precincts and the Ballarat CBD.*
    – *1.3: Facilitate laneway housing where laneways already exist in the urban fabric of residential areas.*

  - *1.4: Discourage increased development density in fringe areas, particularly those that are more than walking distance from activity centres.*
- Objective 4: *To ensure that greenfield development is connected to the existing urban area.*
  - *4.1: Discourage rezoning of additional greenfield land, which would compete with Ballarat West, until the market requires additional supply*.
  - *4.2: Ensure that future greenfield development is focused within roughly an 8km arc from the centre of Ballarat.*
  - *4.3: Avoid ad-hoc and unplanned greenfield development.*
  - *4.4: Discourage disconnected or 'leap frog' development.*
  - *4.5: Minimise the impacts of development on Ballarat's historic urban landscape, the environment and Ballarat's natural resource base.*
  - *4.6: Ensure the need for buffers to protect major water and sewerage assets and treatment plants from encroachment by sensitive land uses is taken into account as part of any greenfield investigation.*

4. Identified industries and existing uses

A review of industries surrounding the project site with an EPA Victoria licence and of the National Pollutant Inventory (NPI) was undertaken. Eight industries are listed on the NPI to be located within 2 km of the precinct. Seventeen industries are listed to hold an EPA licence within 2 km of the site.

National Pollutant Inventory (NPI)

- Boral Asphalt is located at Old Midland Highway, Ballarat is classed under “Petroleum and Coal Product Manufacturing” with the listed main activities of asphalt production. In the reporting year of 2021/2022, ABMT highest emissions reported to NPI included carbon monoxide, oxides of nitrogen, PM_{10} and Total Volatile Organic Compounds which recorded amounts of 8,600 kg, 1,400 kg, 2,000 kg and 450 kg respectively.
- Elgas is located at 2 Coronet Street, Ballarat. It is listed under “Petroleum Product Wholesaling” with its main activities listed as the import, handling, and distribution of LPG. In the reporting year of 2021/2022 Elgas reported emissions of Total Volatile Organic Compounds which recorded amounts of 120 kg.
- McCain Foods (Aust) Pty Ltd is located at 1059 Ring Road, Wendouree. It is liked under “Other Food Product Manufacturing” with its main activities listed as food manufacturing. In the reporting year of 2021/2022, McCain’s highest emissions included Ammonia (total), carbon monoxide, oxides of nitrogen, PM_{10}, $PM_{2.5}$ and total volatile organic compounds.
- Ballarat North WRP is located at 29 Gilles Street and classed under “Sewerage and Drainage Services” with the main activities listed as the treatment of wastewater and discharge of treated wastewater to creek. Some pollution control devices to be utilised on site include the fabric filter/baghouse, cyclone/multiclone and biofilter. In the reporting year of 2021/2022, Ballarat North WRP highest emission included Ammonia (total), carbon monoxide, oxides of nitrogen, and total phosphorus.
- Haymes Paint is located at 1 Waringa Drive and classed under “Paint and Coatings Manufacturing” with its main activities listed as the manufacture of surface coating products. Some pollution control devices to be utilised on site include the fabric filter/baghouse and cyclone/multiclone. In the reporting year of 2021/2022, Haymes Paint only reported emissions for Total Volatile Organic Compounds.
- Laminex is located at 22 Trewin street and classed under “Reconstituted Wood Product Manufacturing” with its main activities listed as paper impregnation and board pressing. Some pollution control devices to be utilised on site include the fabric filter/baghouse and cyclone/multiclone. In the reporting year of 2021/2022, Laminex’s highest emission included carbon monoxide, oxides of nitrogen, and total volatile organic compounds.
- MaxiTRANS is located at 233-234 Learmonth Road and categorised under “other Transport Equipment Manufacturing” with its main activities listed as the manufacturing of semi-trailers. For the 2021/2022 reporting year MaxiTRANS reported emissions for only acetone and total volatile organic compounds.
- Air BP has a facility at the Ballarat Airport which is subject to a ground lease with City of Ballarat. It is classed under “Petroleum Product Wholesaling” with emission reporting of Toluene and total volatile organic compounds for the reporting year of 2021/2022.

EPA Victoria Licence

EPA Licenced facilities – The following industries currently have an active EPA development licence, operating licence, permit, or registration and can be found within the Precinct and surrounding 2 km catchment area. These industries may have potential to emit odour, dust or noise.

Table 2 EPA Victoria Licences

Industry Name	Address	Licence Number	Licence Type	Activity
Selkirk Pty Ltd	630 Howitt St, Ballarat North, VIC, 3350, AU	OL000046184	Operating Licence	H03 (Ceramics) A05a (Landfills - excluding municipal landfills servicing <5000 people) C01 (Extractive industry and mining)
Central Highlands Region Water Corporation	Gillies Rd, Ballarat North, VIC, 3350, AU	OL000071980	Operating Licence	A03 (Sewage treatment)
		P000208995	Permit	A14 (Wastewater supply or use)
Veolia Water Services (ANZ) Pty Ltd	Gillies Rd, BALLARAT NORTH, VIC, 3352, AU	P000088997	Permit	A15 (Biosolids supply or use)
Veolia Recycling & Recovery Pty Ltd	Dowling Street, Wendouree, Victoria, 3355, Australia	R000301242	Permit	A13c (Waste and resource recovery - small)
RLX Operating Company Pty Ltd	139 Sunraysia Hwy Miners Rest VIC 3352 AU	P000244209	Permit	A14 (Wastewater supply or use)
Darren Pollard	3 Grand Junction Drive, Miners Rest, Victoria, 3352, Australia	R000305200	Registration	A13c (Waste and resource recovery - small)
Western Victoria Asphalt Pty Ltd	5 Yarramie Ct Mitchell Park VIC 3355 AU	DL000107264	Development Licence	H02 (Bitumen or asphalt batching)
McCain Foods (AUST) Pty Ltd	1059 Ring Road Mitchell Park 3355	P000111697 P000112660	Permit	A14 (Wastewater supply or use)
Mccallum Disability Services Inc	4-6 Neerim Crescent Mitchell Park 3355	R000307408 R000307413	Registration	A13c (Waste and resource recovery - small)
InfraBuild Recycling	5 Coronet Street Wendouree 3355	R000300667 R000301319	Registration	A13c (Waste and resource recovery - small)
Hanson Construction Materials Pty Ltd	262 Ring Rd, Wendouree VIC 3355	R000301181	Registration	A13c (Waste and resource recovery - small)
Wheelie Waste Pty Ltd	2 Hammer Court Wendouree 3355	R000301528 R000306483	Registration	A13c (Waste and resource recovery - small)

Industry Name	Address	Licence Number	Licence Type	Activity
Vic Waste Solution Pty Ltd	3 Hammer Ct, Wendouree, Victoria, 3355, Australia	R000301827 R000307211	Registration	A13c (Waste and resource recovery - small) A09b (Waste tyre storage - small)
Joshua Kostecki	201-215 Learmonth Road, Wendouree, Victoria, 3355, Australia	R000302802 R000302800	Registration	A13c (Waste and resource recovery - small) A02c (Other waste treatment – e-waste 500 tonnes or less)
Steve Thompson		R000306909	Registration	A13c (Waste and resource recovery - small)
David White		R000303936	Registration	A13c (Waste and resource recovery - small)
Boral Resources (VIC) Pty Ltd	67 Old Midland Highway Mount Rowan 3352	R000302506	Registration	A13c (Waste and resource recovery - small)

GHD's site visit

From GHD's site visit conducted on 17 October 2023, the following industries listed in Table 3 were identified to have the potential to emit odour, dust, noise, or vibration, within a 2 km radius of the PSP Precinct. A 2 km radius was chosen as only two categories in Publication 1518 and Draft publication 1949 require a buffer distance of greater than 2 km, namely "paper and paper pulp manufacture by other methods" which requires a separation distance of 5 km and a large dairy stock feedlot that requires a separation distance of 5 km. As no industries which fall under these categories are located in this area, a 2 km radius will identify all relevant industries.

For each identified industry, Table 3 shows the company, type of operation, street address, potential sources, primary concern (dust, odour, noise and/or vibration), and location of the industry with respect to the Precinct. Refer to Figure 7 to Figure 11 for locations of the industries that have been identified. These industries will then be assessed to determine whether they require buffer distances for air in Section 0, or noise mitigation in Section 5.6.

Service stations, general factories and warehouses have not been included, as they do not attract an odour/dust buffer under the EPA separation distance guidelines, hence likely to be a low risk to air quality and not considered further in the air quality assessment.

It should be noted that depending on the type of activities and distance to the subject site, these could result in potential low to medium noise impact on the subject site.

Table 3 Identified industry and existing uses details

Receptor ID	Company	Address	Operations	Operating hours	Potential sources of amenity impact	Primary concern
Within Precinct						
1	Smith Wil Asphalt	46 Gillies Rd, Mount Rowan VIC 3352	Asphalt contractor	Typical operating hours between 7:30 am to 4:30 pm on weekdays	Asphalt production	Odour, dust
2	Ballarat Caravan & Trailer Repairs	15 Olliers Rd, Mount Rowan VIC 3352	RV Repair Shop	Typical operating hours between 8 am to 5 pm on weekdays	Spray painting	Odour
Outside Precinct within Core 2km catchment area						
Non-metallic Mineral Products						
3	Boral Asphalt	67 Old Midland Highway Mount Rowan 3352	Asphalt contractor	8 am to 3 pm on weekdays	Asphalt production	Odour, dust
4	Western Victoria Asphalt Pty Ltd	5 Yarramie Ct Mitchell Park VIC 3355 AU	Hot mix asphalt batching plant	NA	Asphalt production	Odour, dust
5	Hanson Construction Materials Pty Ltd	262 Ring Rd, Wendouree VIC 3355	Waste acceptance	NA	Storage of concrete	Dust
6	Ballarat Powder Coating & Sandblasting	410 Dowling St, Wendouree VIC 3355	Powder Coating	7 am to 3:30 pm on weekdays	Powder coating and sandblasting	Odour, Dust
7	Sovereign Concrete Products	192 Ring Rd, Wendouree VIC 3355	Concrete	7:30 am to 4 pm on weekdays	Concrete production	Dust
8	Northway Sandblasting	3350/5 Old Creswick Rd, Wendouree VIC 3355	Sandblasting	8 am to 4 pm on weekdays	Sandblasting, Spray painting	Odour, dust
9	Selkirk Pty Ltd	630 Howitt St, Ballarat North, VIC, 3350, AU	Brick Manufacturing	8 am to 4 pm on weekdays	Brick production	Odour, dust
Automotive services/manufacturing						
10	Albins	5 Daveyduke Dr, Mitchell Park VIC 3355	Car part manufacturer	NA	Metal works	Dust
11	West Exhaust Ballarat	2 Caravan St, Wendouree VIC 3355	Machine shop	9 am to 5 pm on weekdays	Spray paint	Odour
12	AutoMekanika Service Centre	2/28 Selkirk Dr, Wendouree VIC 3355	Mechanic	NA	Spray paint	Odour

Receptor ID	Company	Address	Operations	Operating hours	Potential sources of amenity impact	Primary concern
13	Axis Engineering	504 Dowling St, Wendouree VIC 3355	Mechanic	9 am to 5 pm on weekdays	Spray paint	Odour
14	Berklee Limited	261-263 Learmonth Rd, Mitchell Park VIC 3355	Automotive parts manufacturer	6:45 am to 5 pm on weekdays	Metal works, spray paint	Odour, dust
15	Goldenacres	1-5 Morang Cres, Mitchell Park VIC 3355	Agricultural chemical spray equipment manufacturing	8 am to 5 pm on weekdays	Spray paint, metal works	Odour, dust
16	Jason Clark Automotive	11 Old Creswick Rd, Wendouree VIC 3355	Mechanic	NA	Spray paint	Odour
17	Learmonth Road Smash Repair	362 Dowling Street, Wendouree VIC 3355	Mechanic	8:30 am to 5 pm on weekdays	Spray paint, metal works	Odour, dust
18	Motacare Auto Service Centre	287-289 Learmonth Rd, Wendouree VIC 3350	Mechanic	8 am to 5 pm on weekdays	Spray paint	Odour
19	MaxiTRANS Ballarat Manufacturing and Head Office	233 Learmonth Rd, Wendouree VIC 3355	Trailer manufacturer	8 am to 4 pm on weekdays	Spray paint, metal works	Odour, dust
20	SEM Fire and Rescue	17 Trewin St, Wendouree VIC 3355	Automotive manufacturer	8 am to 4 pm on weekdays	Spray paint, metal works	Odour, dust
21	Sovereign Caravans	813 Creswick Rd, Wendouree VIC 3355	Trailer manufacturer	8 am to 5 pm on weekdays	Spray paint	Odour
22	Paul Wren Diesel Mechanics PTY LTD	18 Neerim Cres, Mitchell Park VIC 3355	Truck repair shop	8:30 am to 5:30 pm on weekdays	Spray paint	Odour
Food Manufacturer						
23	Karon Farm Coffee Roasters	Shed 5/10 Builders Cl, Wendouree VIC 3355	Coffee roasters	9 am to 3 pm on weekdays	Coffee roasting	Odour
24	Hakubaku Australia PTY Ltd.	7 Waringa Dr, Mitchell Park VIC 3355	Food Manufacturer	NA	Food manufacturing	Odour
25	Sensate	20 Neerim Cres, Mitchell Park VIC 3355	Food Manufacturer	NA	Food Manufacturer	Odour
26	Tiptop Bakery	5 Old Creswick Rd, Wendouree VIC 3355	Bakery	NA	Food Manufacturer	Odour
27	Mccain Foods	1059 Ring Road Mitchell Park 3355	Food manufacturing	24 hours	Food manufacturing	Odour

Receptor ID	Company	Address	Operations	Operating hours	Potential sources of amenity impact	Primary concern
Chemical Processes						
28	Sovereign Press Pty Ltd	3 Old Creswick Rd, Wendouree VIC 3355	Print shop	9 am to 5 pm on weekdays	Printing	Odour
29	Haymes Painting	1 Waringa Dr, Mitchell Park VIC 3355	Paint manufacturing	7:30 am to 5 pm on weekdays	Paint manufacturing	Odour
30	Bulace Dyeing	505 Dowling Street, Wendouree VIC 3355	Fabric Dyeing	8:30am to 4:30 pm on weekdays	Dyeing	Odour
31	Coppens Signs	21 Old Creswick Rd, Wendouree VIC 3355	Signwriters	8 am to 5 pm on weekdays	Printing	Odour
Waste facility						
32	Darren Pollard	3 Grand Junction Drive, Miners Rest, Victoria, 3352, Australia	Acceptance of end-of-life vehicles	NA	Storage of scrap metal	Dust
33	Mccallum Disability Services Inc	4-6 Neerim Crescent Mitchell Park 3355	Waste acceptance	NA	Storage of scrap aluminium, glass, liquid paperboard, plastics	Dust
34	InfraBuild Recycling	5 Coronet Street Wendouree 3355	Waste acceptance	NA	Storage of end-of-life vehicles and non-ferrous metals	Dust
35	Suez Recycling & Recovery Pty Ltd	358 Dowling St, Wendouree VIC 3355	Waste acceptance	8 am to 5 pm on weekdays	Storage of cardboard and e-waste	Dust
36	Vic Waste Solution Pty Ltd	3 Hammer Ct, Wendouree, Victoria, 3355, Australia	Waste acceptance	8 am to 5 pm on weekdays	Storage of variety of material	Dust
37	Wheelie Waste Pty Ltd	2 Hammer Ct, Wendouree, Victoria, 3355, Australia	Waste acceptance	9 am to 5 pm on weekdays	Storage of steel, cardboard, glass, industrial waste	Dust
38	King Marine Scrap Metal	5 Hammer Ct, Wendouree, Victoria, 3355, Australia	Waste acceptance	NA	Storage of scrap metal waste	Dust
Other Services						
39	Orora	1 Bowral Pl, Mitchell Park VIC 3355	Packaging company	8 am to 5 pm on weekdays	Glass, aluminium bottle manufacturing	Dust
40	Mentay	257 Ring Rd, Mitchell Park VIC 3355	Steel fabricator	8 am to 5 pm on weekdays	Metal works	Dust

Receptor ID	Company	Address	Operations	Operating hours	Potential sources of amenity impact	Primary concern
41	HTW Welding	7 Neerim Cres, Mitchell Park VIC 3352	Welder	8:30 am to 5 pm on weekdays	Aluminium, Mild steel and Stainless Steel Welding	Dust
42	Laminex Australia	22 Trewin St, Wendouree VIC 3355	Laminate manufacturer	7 am to 6 pm on weekdays	Laminate manufacturing	Dust
43	Petra Minerals	817-827 Creswick Road, Wendouree Victoria 3355	Mineral works	9 am to 4 pm on weekdays	Stockpiles	Dust
44	Gekko Systems	321 Learmonth Rd, Mitchell Park VIC 3350	Mining manufacturer	9 am to 5 pm on weekdays	Metal works	Dust
45	Hasco Foundry	12 Old Creswick Rd, Ballarat Central VIC 3350	Foundry	7 am to 3:30 pm on weekdays	Metal works	Dust
46	Ballarat Sand and Soil	240-256 Ring Rd, Wendouree VIC 3355	Sand and soil retailer	7:30 am to 5 pm on weekdays	Storage of aggregates	Dust
Wastewater Treatment Plant						
47	Central Highlands Region Water Corporation	Gillies Rd, Ballarat North, VIC, 3350, AU	Water Treatment Plant	24 hours	Water treatment	Odour
Outside Precinct within Expanded 2km catchment area						
48	Central Victoria Livestock Exchange - CVLX	139 Sunraysia Hwy Miners Rest VIC 3352 AU	Livestock exchange yard	8:30 am to 5 pm on weekdays	Livestock	Odour, dust

4.1 Identified industry and existing land use operations

A brief company overview and description of the manufacturing process for the above identified industries is provided below.

The following descriptions are based on GHD's understanding of the process at each industry from a typical industry of the type identified, planning permits, an examination of the facilities' website where available, a roadside site inspection and not through direct contact with local industry or industry bodies.

4.1.1 Inside Precinct

Smith Wil Asphalt

Smith Will Asphalt is located at 46 Gillies Road within the southern portion of the Core Area of the PSP. Smith Wil Asphalt provides personalized asphalting services including asphalting, flocon works, spray sealing, road profiling, cement/lime road stabilising, line marking, crack sealing etc. From the site visit undertaken by GHD on 17 October 2023, no asphalt production appeared to be undertaken on site with no visible stacks from the facility.

Ballarat Caravan & Trailer Repairs

Ballarat Caravan & Trailer Repairs is located on 15 Olliers Road on the Eastern Border of the Core Area of the PSP. From the site visit undertaken by GHD on 17 October 2023, Ballarat Caravan & Trailer Repairs appeared to be a relatively small business with no odour or dust observed at the time of the site visit. There were no emission points such as a stack observed. It is likely for small scale repairs to be undertaken at the site.

4.1.2 Outside Precinct within 2 km of Core Area

Non-metallic mineral products

Boral Asphalt

Boral Asphalt produces asphalt for road construction and maintenance projects. A typical asphalt plant contains silos, storage bins, truck parking area and raw feed stockpiles. Typical operations for an asphalt plant include sand and aggregate are transferred by truck from the on-site stockpiles or bins. Transfer from the bins are typically dried to remove moisture, mixed with the desired aggregate sizes, and stored in hot bins until ready to use. Onsite emission controls include the use of fabric filters and baghouses.

Boral Asphalt reports to the NPI and also holds a registration licence for a waste and recovery facility. During GHD's site visit, emissions from a stack was observed from the Boral Asphalt facility.

Western Victoria Asphalt Pty Ltd

Western Victoria Asphalt (WVA) holds a Works Approval (ID107264) for "Bitumen Asphalt Batching Works". Issued in September 2014, WVA are licenced for the installation of "hot mix asphalt batching plant with production capacity 60 tonnes per hour." A review of the most recent aerial imagery shows that no plant has been built at the proposed site listed in the works approval document, however GHD has considered the site within this assessment. Conditions related to air quality is as follows:

Table 4 WVA Air Quality conditions (EPA Works Approval 107264)

Condition	Address
WA_W8	You must install to the satisfaction of EPA: (a) on the asphalt plant dryer exhaust, a baghouse that meets the specifications supplied on 19 August 2014 and 21 August 2014; (b) a canister filled with activated carbon to prevent the discharge of odorous compounds from each bitumen storage tank vent; (c) an enclosed conveyor for asphalt product loading into the storage silo; (d) a system that will reuse for site dust control the stormwater that has been captured in the bunds specified in condition WA_W13; (e) a system that will capture and treat stormwater from non-bunded parts of the site prior to off-site discharge; and (f) raw material storage bins that are fitted with walls and covers to minimise wind-blown dust emissions .
WA_W12	You must install all exhaust stacks so that provisions for sampling are included in accordance with EPA Publication 440.1 “A Guide to the Sampling and Analysis of Air Emissions and Air Quality”, as amended from time to time.
WA_R1	At least one month before the commencement of any commissioning, you must provide to EPA a report/reports that include(s): (a) an Environmental Management Plan containing all information required to comply with the relevant Australian Standard to the satisfaction of EPA; (b) a Commissioning Plan containing a program for verification tests that will demonstrate the discharge rates of: (i) particle and odour emissions from the dryer stack; (ii) volatile organic compounds (VOC) and odour emissions from the bitumen storage tank vent during delivery of bitumen; and (iii) environmental noise levels (at locations agreed with EPA) during plant operation

Hanson Construction Materials Pty Ltd

Hanson Construction is a supplier of concrete, aggregates, and sand. They are also listed to produce road base, asphalt and sustainable and recycled construction materials for civil construction and infrastructure projects.

Ballarat Powder Coating & Sandblasting

Ballarat Powder Coating & Sandblasting (BPCS) provides powder coating and sandblasting services for various metal products, such as gates, fences, car parts, machinery and more. Typical powder coating processes include application of a protective and decorative coating to metal surfaces utilising electrostatically charged powder. Typical sandblasting processes include the cleaning or etching metal surfaces using high-pressure air and abrasive material.

Sovereign Concrete Products

Sovereign Concrete manufactures a range of concrete products including structural precast parapets, barriers, sound walls and abutments for freeways and bridges, temporary safety barriers for roadwork site protection, Precast culverts for stormwater drainage, stock crossings and pedestrian underpasses and more.

GHD observed a concrete batching plant to be located on site.

Northway Sandblasting

Northway Sandblasting provides wet abrasive blasting services, priming, and painting services for products, such as vehicles, machinery, equipment, and structures. It is listed to have large blasting booth, a spray painting truck, and a mobile unit.

Selkirk Pty Ltd

Selkirk is a brick and paver manufacturer based in Ballarat, Victoria. Selkirk produces a range of clay and concrete products for the building industry, both domestic and international. GHD notes that Selkirk is located right outside the 2 km buffer.

Automotive Services

Albins

Albins is located at 5 Daveyduke Drive and listed to manufacture racing automotive parts. No significant odour or dust was observed by GHD.

West Exhaust Ballarat

West Exhaust Ballarat (WEB) is a car exhaust specialist and provides mufflers, exhausts, suspension parts and exhaust systems. WEB stocks a wide variety of muffler and exhaust products and are listed to manufacture and fit exhaust systems.

AutoMekanika Service Centre

AutoMekanika is a small-scale automotive service business.

Axis Engineering

Axis engineering is a small family-owned automotive business that specialises in fabrication. They are listed to mainly fabricate and machine components for the transport industry, but also provide for the Automotive, Mining, Agricultural, Rail, Architectural, Furniture, Electrical and Hydraulics industries, along with general and custom engineering in Australia and New Zealand.

Berklee Limited

Berklee Limited designs and manufactures exhaust systems and components for the automotive industry.

Goldenacres

Goldacres is an agricultural chemical sprayers manufacturer and supplier.

Jason Clark Automotive

Jason Clark Automotive is a small-scale small scale automotive service business located at 11 Old Creswick Road.

Learmonth Road Smash Repair

Learmonth Road Smash Repair is a car repair shop that specialises in smash repairs, car detailing, and cosmetic restoration.

Motacare Auto Service Centre

Motacare is a small-scale small scale automotive service business located at 287-289 Learmonth Road. Services include mechanical repairs, towing, battery servicing and restraint fittings.

MaxiTRANS Ballarat Manufacturing and Head Office

MaxiTRANS is a trailer manufacturer business that provides a variety of trailer types including: Tautliners, Semi-Trailers, Skels, Refrigerated and Dry Freight Vans, Semi-Tippers, Side-Tippers, Truck Body and Dog Tippers, Moving Floors, Live Bottom Floors and Dollies

SEM Fire and Rescue

SEM Fire and Rescue specialises in designing, manufacturing and servicing vehicles for emergency services. Supplies are for services such as fire brigades, emergency services, and private customers.

Sovereign Caravans

Sovereign Caravans is a locally owned and operated caravan business and provide routine service for the family caravan, repairs, upgrades, and custom-built commercial vehicle.

Paul Wren Diesel Mechanics PTY LTD

Paul Wren is a small-scale automotive service business for trucks and trailers.

Food Manufacturing

Karon Farm Coffee Roasters

Karon Farm Coffee is a speciality coffee roasting business located at Shed 5/10 Builders Close. They are listed to have a coffee roastery is based in Gordon where it is assumed that the majority of coffee roasting is undertaken. A few stacks were observed at the Ballarat location by GHD.

Hakubaku Australia PTY Ltd

Hakubaku Australia produces authentic Japanese organic noodles including Somen, Udon, Soba, Ramen, Cha soba and Yakisoba.

Sensate

Sensate is a food manufacturer and specialist in providing flavouring, colouring, and seasonings supplier to the food, beverage, dairy, bakery, confectionery, small goods and pet food industries.

Tiptop Bakery

During GHD site visit, Tiptop Bakey was observed at 5 Old Creswick Road Shed 5. However no public information of this site was available online and no licences can be found for this site. No visible stacks were observed from the facility, and it is likely to be a storage warehouse.

McCain Foods

McCain Foods is a large scale food manufacturing company. The Ballarat facility is listed to be a potato manufacturing facility and reports to the NPI. Foods manufactured by McCains include ready-made meals of pizza, chips, vegetables etc. GHD observed venting from a stack at the facility during the site visit.

Chemical Processes

Sovereign Press Pty Ltd

Sovereign Press Pty Ltd provides commercial printing, digital and off-set printing services for a variety of products, such as brochures, flyers, posters, books, magazines, business cards, and more.

Haymes Painting

Haymes is a paint manufacturing company located at 1 Waringa Drive and supplies painting for interior and exterior uses in Australia. Haymes has various locations in Ballarat, at Waringa Drive they provide retail of paints. During GHDs site visit, possible small scale paint manufacturing was noted to be taken at this facility.

Bulace Dyeing

Bulace Dyeing provides dyeing services for a variety of fabrics, laces, trims, elastics, and other products. It is a bespoke dyehouse that caters for the colouration of goods for the local fashion industry, sporting goods, uniforms, and industrial wear.

Coppens Signs

Coppens Signs provides sign making services for products such as vehicles, banners, safety, traffic, industrial, transportation, labelling, fire safety, honour boards, magnetic and A frames. They also offer large format digital printing and customised solutions for different sign requirements.

Waste/Recycling Services

Darren Pollard

Darren Pollard holds and EPA licence for the acceptance of end-of-life vehicles. However it appears to be a residential address. It is likely for the site to be located elsewhere.

Mccallum Disability Services Inc

Mccallum Disability Service is an organisation that provides a range of services for people with disabilities. They also operate Ballarat Regional Industries (BRI), which employs over 300 people with disabilities in sectors such as manufacturing, packaging, recycling, gardening, and catering. Mccallum Disability Services hold two permission licences for a waste and recovery at the Mitchell Park Site. Under both permission licences they are licenced to accept waste types:

– Liquid paperboard (Z410)
– Plastics, PIC #1 through #7 (Z500)
– Glass (Z100)
– Aluminium (Z310)

InfraBuild Recycling

InfraBuild Recycling operate multiple facilities, they collect, process and sell various types of scrap metal and holds two registration licences for a waste and recovery facility located in Wendouree. Under the registration licence the site is licenced to accept waste types:

– T325: End-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance
– Z320: Non-ferrous metals, other than Aluminium

Suez Recycling & Recovery Pty Ltd

Suez operate a waste and recovery facility in Wendouree which collect, process and sell various types of waste. Under the registration licence the site is licenced to accept waste types:

– Z400: Cardboard
– T300: E-waste

Vic Waste Solution Pty Ltd

Vic Waste Solutions is a local company that provides waste management and recycling services for commercial and industrial customers in Ballarat North. It operates a waste transfer facility that accepts various types of waste materials and hold two registration licences for a waste and recovery facility and acceptance of tyre storage. Under both the registration licences they are licenced to accept waste types:

– K300: Commercial garden & landscaping organics that does not contain any physical or chemical contamination
– K310-H: Timber treated with hazardous substances, including sawdust
– K310-NH: Untreated timber, including sawdust
– T140: Tyres, including tyre pieces greater than 250 millimetres in size measured in any dimension
– Y100: Concrete
– Y110: Bricks
– Y130: Plaster board and cement sheeting
– Y140: Asphalt
– Z100: Glass
– Z300: Steel
– Z310: Aluminium
– Z320: Non-ferrous metals, other than Aluminium
– Z400: Cardboard
– W_2: Industrial Waste (Construction and Demolition) - Waste from construction, demolition and other sources which is solid inert waste
– W_3: Industrial Waste (Commercial and Industrial) - Waste from commercial and industrial sources that includes putrescible waste
– W_5: Municipal green waste - vegetation, garden, landscaping, and natural fibrous wastes

Wheelie Waste Pty Ltd

Wheelie Waste provides waste management and recycling services to local government, commercial, and private customers. Some services include bin hire, recycling and recovery as well as waste treatment and disposal. Wheelie Waste hold two registration licences for a waste and recovery facility. Under both the registration licences they are licenced to accept waste types:

- Z300: Steel
- Z400: Cardboard
- Z500: Plastics, PIC #1 through #7
- Z100: Glass
- W_2: Industrial Waste (Construction and Demolition) - Waste from construction, demolition and other sources which is solid inert waste

King Marine Scrap Metal

King Marine Scrap Metal is a family-owned business that offers removal and recycling services for various types of scrap metal, such as aluminium, copper, iron, brass, and lead. No EPA licences have been issued for the Ballarat North Site. GHD observation of the site included a waste transfer station comprising of various types of scrap metals stored in stockpiles.

Other Services

Orora

Orora is a packing solution specialist that manufacture glass bottles, aluminium cans, closure and caps, boxes and cartons and packaging equipment. Some services also include printing and signing, product sourcing and research and development.

Mentay

Mentay is a steel fabricator industry that manufactures cricket pitch rollers as well as trailers, bins, tanks and custom designs.

HTW Welding

HTW Welding specialises in Aluminium, Mild steel and Stainless Steel welding for automotives.

Laminex Australia

Laminex Australia is a decorative laminate specialist. They also manufacture engineered stone, modern laminates, acrylic surfaces, timber panelling products etc.

Petra Minerals

Petra Minerals is a company that develops minerals in alluvial form in the Central Victorian Goldfields. It has a large resource of high purity quartz which may contains gold as well as a range of heavy minerals. Petra Minerals was formed in 1996 and merged with Ballarat Regional Industries in 2023. GHD site visit indicates that the facility was unmarked and had various dirt stockpiles around the site with heavy vehicle movement.

Gekko Systems

Gekko Systems is a mining equipment manufacturer which designs, manufacture and installs equipment and plants for a variety of minerals including gold, silver and polymetallic.

Hasco Foundry

Hasco Foundry produces castings in aluminium, bronze, brass, cast and ductile iron. It is a family business that supports local customers and projects, such as the Ballarat Council and MaxiTRANS and also makes customised products, such as plaques and vintage automobilia.

Ballarat Sand and Soil

Ballarat Sand & Soil, Ballarat's supplies soil, mulch, aggregates, sand, garden supplies, firewood, sleepers, toppings etc.

Water Reclamation Plant

Central Highlands Region Water Corporation

The Ballarat North WRP is owned by Central Highlands Water and operated by Veolia. The WRP is located directly south of the Core Area of the PSP, bordered by Western Freeway and Gilles Road, and has a treatment capacity of approximately 8.4 ML/day. They hold one EPA Operating Licence and two permits as outlined in Section 4.

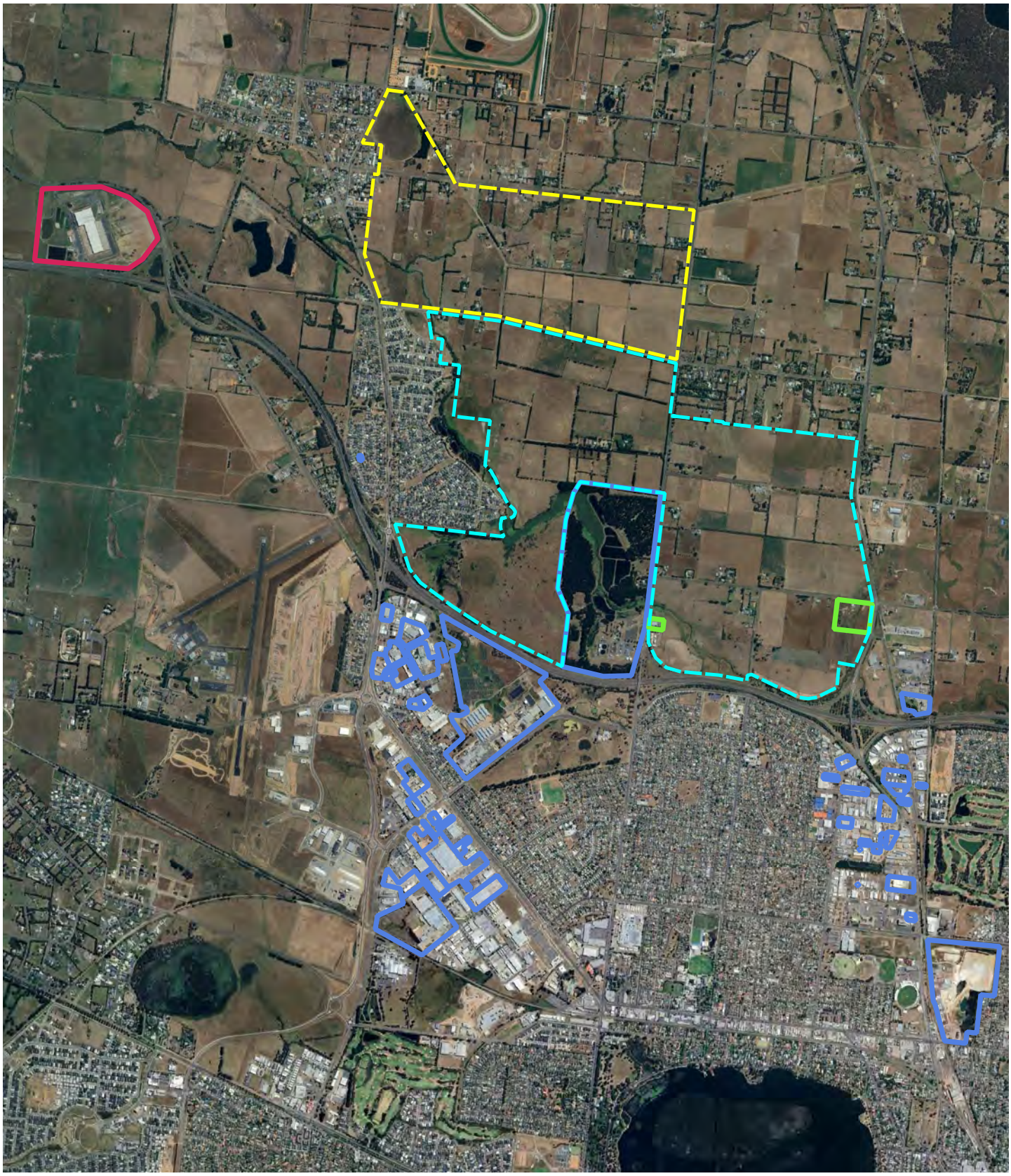
The WRP receives both domestic wastewater from Ballarat North as well as industrial waste from industries such as McCain Foods potato processing located south of the WRP. There are currently two odour control systems in place and are as follows:

– Inlet works air is extracted to an odour control facility (OCF)
– Biofilter: receives foul air from sludge dryer and exhaust gas from dust extraction system

4.1.3 Outside Precinct within 2 km of expanded area

Central Victoria Livestock Exchange (CVLX)

CVLX is a regional livestock exchange located to the west of Miners Rest. They provide retail services for sheep, lamb, and cattle market. It is estimated that CVLX host approximately 112 sales per year including monthly store cattle sales, weekly prime cattle sales, and weekly sheep sales.



Legend

Site Layers

- Core Area
- Expanded Area (Inclusion TBC)

Industry Boundary All

- Industries within 2km of the Core Area
- Industries within 2km of the Expanded Area
- Industries within the Precinct

Paper Size ISO A4

0 0.75 1.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

All Identified Industries

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 7

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 16/05/2024

Data Source: Google Earth Imagery 2024.
Created By: ylim

Legend

Boundary
- Core Area

Industry Boundary All
- Identified Industries within 2km of Core Area

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

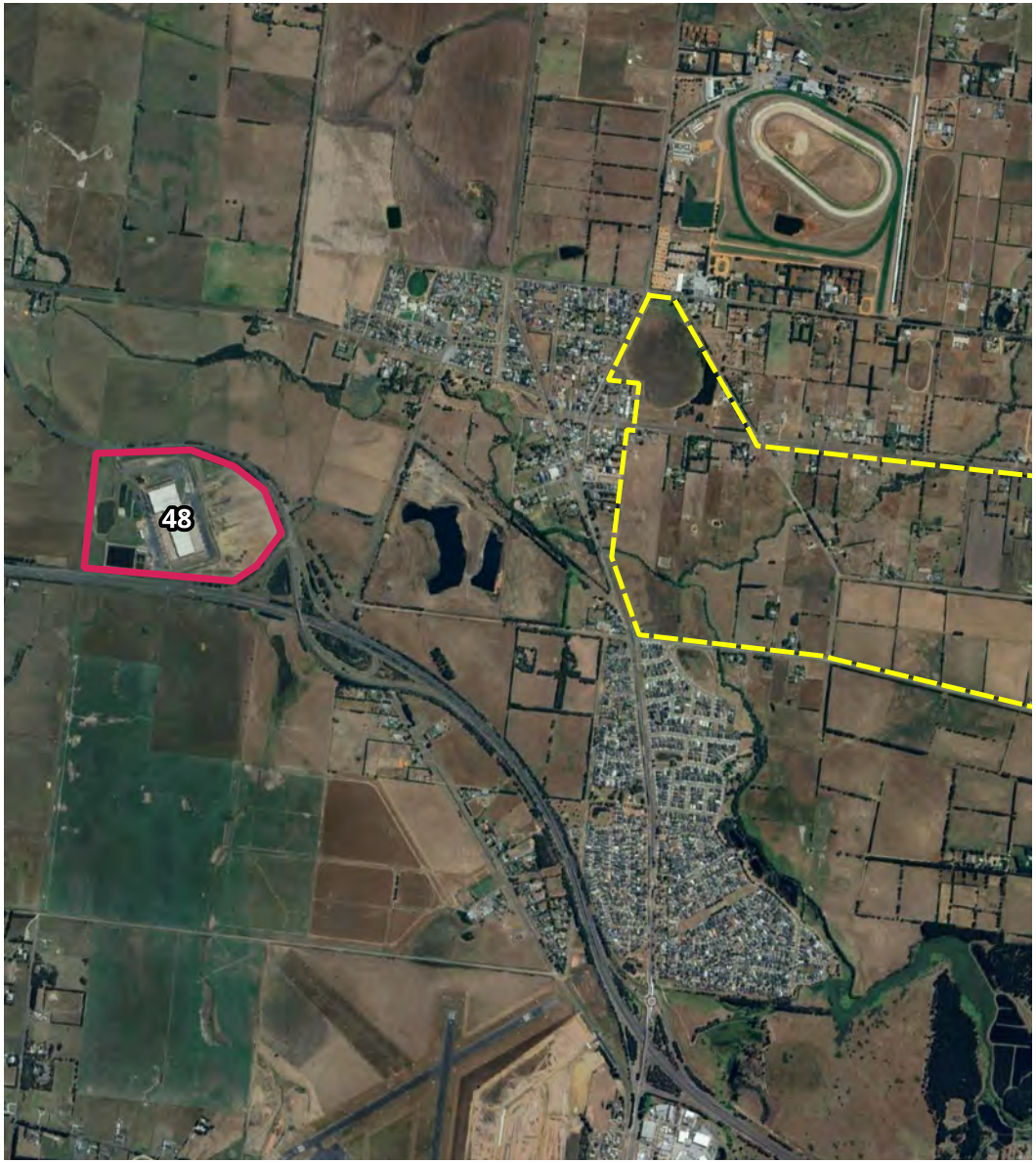
Industries within 2km of Core Area

Project No. **12619620**
Revision No. **-**
Date. **10/11/2023**

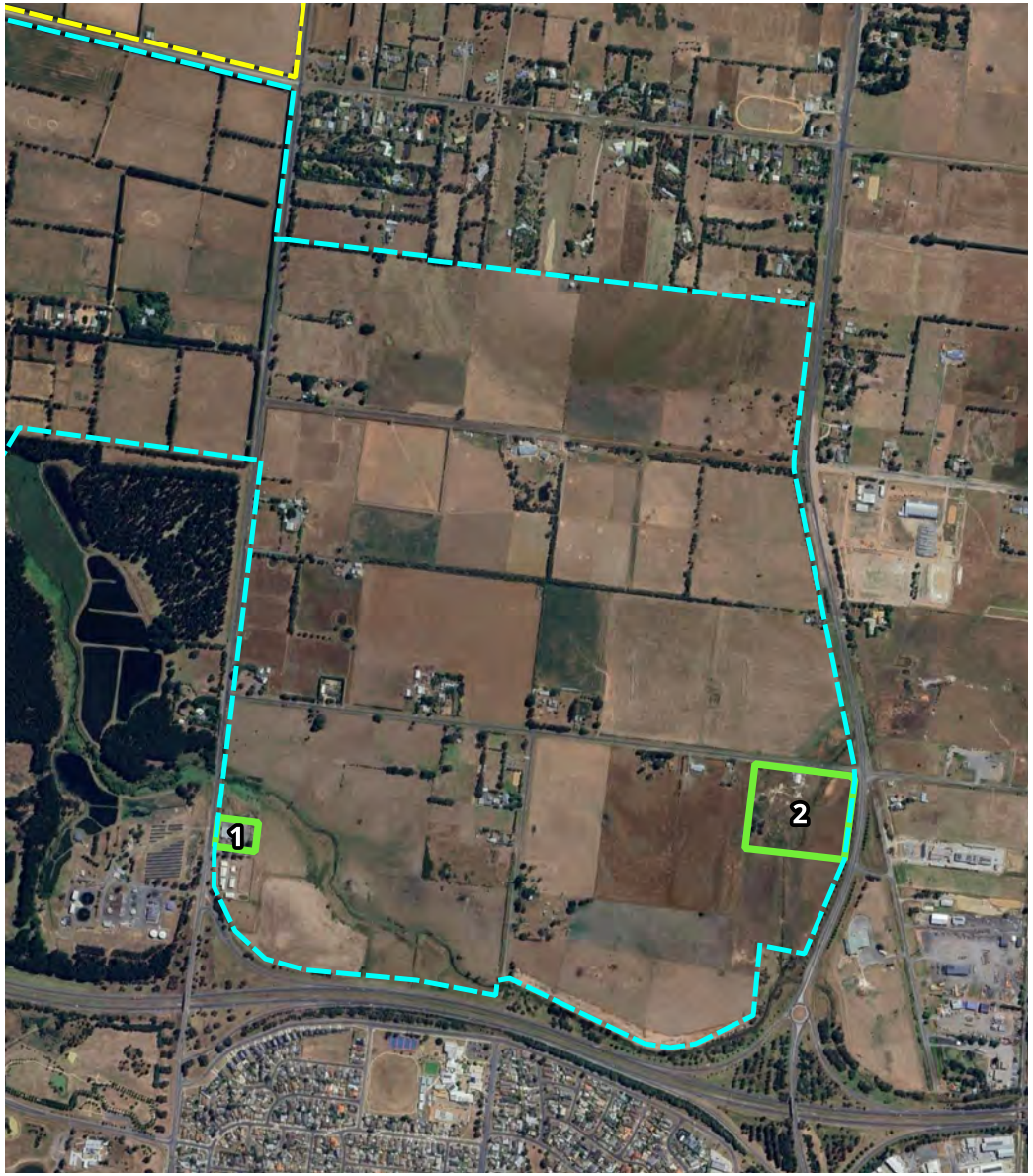
FIGURE 8

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 10/11/2023

Data Source:Google Earth Imagery 2023.
Created By: ylim



Identified Industries within 2km of Expanded Area



Identified Industries within Precinct

Legend

Boundary
- Core Area
- Expanded Area (Inclusion TBC)

Industry Boundary
- Expanded Area Industry Boundary (Inclusion TBD)
- Precinct Industry Boundary

Paper Size ISO A4

0 0.25 0.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

Identified Industries with 2km of Expanded Area and Precinct

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 9

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 16/05/2024

Data Source:Google Earth Imagery 2024.
Created By: ylim

4.2 Transport and civil infrastructure related sources

Major transport sources of noise and vibration may impact on future sensitive developments from the following transport associated (mobile) activities and air traffic within and surrounding the Precinct, as shown in Table 5.

A brief overview and description of the major identified noise and vibration sources is provided below.

The following descriptions are based on GHD's understanding of the process at each source from a typical source of the type identified, planning permits, an examination of the facilities' website where available, and a site visit.

Western freeway

Western freeway is a roadway connecting Melbourne city with Adelaide and other major and local roads. Most of the road to the south of the Precinct contains two east bound and two west bound lanes. The average annual daily traffic (AADT) and heavy vehicle percentage of the Western Freeway is as follows:

– Between Western Highway Onramp & Western Highway Offramp:
  - 8700 (east bound)/19%
  - 7700 (west bound)/20%
– Between Western Highway Onramp & Gilles Street:
  - 6,600 (east bound)/22%
  - 6,100 (west bound)/23%

This is expected to be the major noise contributor at the southern boundary of the Precinct due to the large volume of daily traffic.

Howe Street

Howe Street runs through Miners Rest and to the western border of both the Core and Expanded areas running in a North-south alignment. The two way annual average traffic volume is substantially less at approximately 7300 vehicles per day with 7.5% of those as heavy vehicles.

Midland Highway

Midland Highway borders the eastern side of the Core area running in a north-south alignment. Traffic volume is similar to that of Howe Street at approximately 8600 vehicles per day with 8% of those as heavy vehicles.

Ballarat Aerodrome

The aerodrome is located southwest of the Precinct and is chiefly utilised for emergency services, civil aircraft operations, and flight training. Both the airport masterplan (Kneebush Planning Pty Ltd, 2013) and Ballarat Aerodrome Noise Modelling Report (Kneebush Planning Pty Ltd, 2018) are being updated in the Ballarat Airport Strategy and Master Plan 2024 document. While the finalised documents do not show Australian Noise Exposure Forecast (ANEF) contours above ANEF 20, this is likely to change in the revised versions as the operation of larger aircraft at the airport is being considered. The 2043 Australian Noise Exposure Concept (ANEC) will inform the area of interest. The potential for impact from aircraft noise on the Precinct has not yet been established, and it is not known whether specific noise mitigation measures to manage noise will be required.

Updated draft study on aircraft noise (Ballarat airport noise study. Noise model report. Marshall Day Acoustics, March 2024) envisages further increase in number of aircraft movements from approximately 53900 aircraft movements in 2023 to 72595 by 2043 with compound growth rate around 1.5% per annum.

It is understood that there is no formal ban on night time flights in the area and 5-10% of flights may occur during night time (7 am- 7 pm). Results of the draft report for year 2023 show that calculated aircraft noise exposure index between 20 and 25 extends into existing residential houses at the south western boundary of the Precinct. Further increase of aircraft movement by 2043 may affect a small area at the south west boundary of the Precinct where ANEC may exceed 20. AS 2021 recommends that residential land use, including houses, units, flats and caravan parks is restricted within the 20 ANEF contour. In areas within the 20 to 25 ANEF contour, residential land use proposals are conditionally acceptable, subject to the inclusion of appropriate sound insulation measures to protect the interior of the dwellings. This issue may need to be addressed in future if residential buildings or similar sensitive land uses are permitted in the south western area of the new Precinct where ANEF is expected to exceed 20.

Table 5 Identified transport noise sources

Source	Location	Operations	Operating hours	Potential sources of amenity impact	Primary concern	Location
Western Freeway	To the south of the precinct	Freeway	Constant	Vehicle noise	Noise	Outside Precinct
Midland Highway	To the east of the precinct	Highway	Constant	Vehicle noise	Noise	Outside Precinct
Howe Street	To the west of the precinct	Road	Constant	Vehicle noise	Noise	Outside Precinct
Ballarat Aerodrome	South west of the Ballarat North PSP	Local airport	N/A	Aircraft noise	Noise	Outside Precinct

4.3 Former Wendouree Tip Site

The Wendouree Tip Site is a former landfill site that is located in the southern portion of the Core Area. It was used for waste disposal from 1960 to 1995 and covered an area of approximately 40 hectares. GHD notes that the site was closed in 1995 and capped with clay, topsoil and revegetated with native plants and grasses

The site has a gas extraction system which collects and flares the landfill gas generated by decomposing waste and the site also has a leachate collection system that prevents the contaminated water from seeping into the groundwater.

There is no amenity separation applicable to the former landfill site. GHD notes that a Land Capability assessment has been procured by the VPA to understand potential for contamination from the Former Wendouree Tip Site.

4.4 Equine Precinct

Directly north of the expanded area lies the Equine Precinct. The major roads running through the precinct include Kennedy's Road, Midas Road and Gilles Road. The Equine Precinct is currently zoned under SUZ7, SUZ13 and surrounded by largely FZ and GRZ1.

The Equine Precinct consists of the Dowling Forest Racecourse, Dowling Forest Racecourse reserve, Ballarat Veterinary Practice Equine Clinic, training facilities, residential dwellings, and grazing lands.

As of 2019[5], the racecourse recorded approximately 550 horses were listed to be trained onsite with approximately 30 racing meets per year. Major facilities on site include:

– Racecourse proper
– Uphill synthetic track
– Various tracks (sand and grass)
– Undercover horse walker
– Horse Pool
– Trainer Stables

There is the potential for odour emissions from waste materials such as manure, washdown water and dust emissions from any unpaved surfaces. The racecourse will be required to mitigate their odour and dust impacts with the following likely controls to form part of any management plan for the facility:

– Frequent (daily) removal of solid/liquid waste
– Temporary storage of waste would be in storage bins with lids
– The bins will be kept clean when not in use
– Stables washed down on daily basis
– Wash down water likely to be drained to subsurface drains and foul water drains.

There is no amenity separation applicable to the equine precinct.

[5] **Spiire. (October 2019) Dowling Forest Precinct Review – Final Report**

4.5 Site visit

At the site visit conducted on the 17 October 2023, the following observations regarding odour, dust and noise were made:

– No significant odour was observed at any of the industries identified in the desktop assessment
– The ambient noise environment within the Precinct area at the time was observed to be predominantly influenced by traffic, which included a mix of domestic vehicles and vehicles servicing industrial facilities
– In addition to the typical urban ambient noise environment, noise was observed to be prominent from the following sources:
    - Western Freeway

4.6 Complaint history

EPA and Council have provided complaint records for odour and dust within the area for the period between 2015 to 2023. A summary of this data can be found in Table 6.

The most known number of complaints was attributed to CVLX, with a total of 80 complaints made in relation to odour from the saleyard and livestock. Two reports were made in relation to odour and noise from McCain Foods, while Butler excavations and Ballarat North WRP both received one complaint each.

Table 6 Summary of received complaints

Alleged Source	Date	Location	Comment	Odour/Dust/Noise	Source
Butler Excavations PTY LTD	26/07/2023	M8, Wendouree, Ballarat, Victoria, 3355, Australia	Butler Excavation PTY LTD have been burning off for the last three days	Odour/Dust	EPA
Central Highland Region Water Corporation (Ballarat North WRP)	21/01/2015	Muir Road, Miners Rest, Victoria, 3352	Odour related to raw sewerage	Odour/noise	EPA
McCain Foods	22/11/2017	NA	Intermittent odour	Odour	Council
	6/8/2022	NA	NA	Noise	Council

4.7 Legislation and guidelines

4.7.1 Environment Protection Act 2017

EPA Victoria implemented a new legal framework which came into force on 1 July 2021, with the intention for this framework to drive environmental improvements in industrial operations. The cornerstone of the Environment Protection 2017 (Act) is the general environmental duty (GED). The GED requires all Victorian businesses and individuals to prevent and minimise harm to the environment and human health as far as reasonably practicable. Any new or existing plant or development will be required to meet the GED. The expectation is that individuals will manage their activities to avoid the risk of environmental damage. There is also a requirement to quickly and appropriately respond if pollution does occur.

For businesses already managing their environmental risks, the GED generally means little to no change to how they operate. Most businesses already follow good management practices. This will make complying with the GED easier. EPA Victoria has committed to working with industry to help them understand how to fulfil their obligations, by providing guidance, advice and other support. Complying with the GED is about taking reasonable proactive steps and employing good environmental work practices. Compliance with the GED can be through following responsibilities under occupational health and safety (OHS) laws, meeting industry standards, adopting industry better management practices, and following other relevant legislation related to the environment. In effect, the GED makes it clear that it is the individual businesses' responsibility to reduce risk to the environment and to protect it.

4.7.2 Environment Reference Standard

The EP Act's environment protection framework includes the Environment Reference Standard (ERS). This identifies environmental values, air indicators and objectives that set the benchmark for the quality of the air environment needed to protect environmental values. The environmental values identified include:

– Life, health and wellbeing of humans
– Life, health and well-being of other forms of life, including the protection of ecosystems and biodiversity
– Local amenity and aesthetic enjoyment
– Visibility
– The useful life and aesthetic appearance of buildings, structures, property and materials
– Climate systems that are consistent with human development, the life, health and well-being of humans, and the protection of ecosystems and biodiversity

The ERS is a reference standard, not a 'compliance standard' for businesses i.e. it relates to ambient air and not any individual facility. The ERS replaces SEPP (AQM) and generally adopts the objectives in the National Environment Protection Measure (Ambient Air Quality) (NEPM AAQ) with some modifications.

The following air quality indicators, and resepctive objectives, relevant to this assessment are outlined below:

– Particles as PM_{10} (maximum concentration)
  - 50 µg/m3 for an averaging period of one day
  - 20 µg/m3 for an averaging period of one year
– Particles as $PM_{2.5}$ (maximum concentration)
  - 25 µg/m3 for an averaging period of one day
  - 8 µg/m3 for an averaging period of one year
– Odour
  - An air environment that is free from offensive odours from commercial, industrial, trade and domestic activities

4.7.3 EPA Publication 1961

EPA Publication 1961 Guideline for Assessing and Minimising Air Pollution provides businesses and risk assessors with a framework for evaluating and minimising air pollution in accordance with the requirements of the GED.

This guideline forms part of Victoria's environmental protection framework that establishes the state of knowledge to protect the environmental values of the ambient air environment. The guideline describes the General Environmental Duty (GED) which requires anyone engaging in any activity that may give rise to risks of harm to human health or the environment from pollution or waste to minimise those risks, so far as reasonably practicable.

As such, emitters of pollution to air have a responsibility to put in proportionate controls to eliminate or minimise risks to human health or the environment. Being proportionate and preventative requires duty holders to:

– Understand their risks
– Actively seek out ways to eliminate or minimise these risks, so far as reasonably practicable
– Ensure any risks remaining after the implementation of all controls are within acceptable limits

The purpose of the guideline is to provide a framework to assess and control risks associated with air pollution.

The guideline outlines a risk management approach that involves a repeating cycle of four steps, namely:

Identifying hazards

This involves identifying, and if necessary, quantifying emission sources. This also involves characterising the receiving environment including local topography, meteorology, background air quality and nearby sensitive land uses.

Assessing risks

A three-tiered approach to the assessment of risks from air pollution is outlined, namely:

– Level 1 assessment: qualitative or semiquantitative assessment, used to assess risks from activities that either have intrinsically low risks, or have common, well-understood risks that can be controlled without extensive assessment
– Level 2 assessment: involve the use of dispersion modelling or monitoring with predicted concentrations benchmarked against air quality assessment criteria (APAC)
– Level 3 assessment: detailed risk assessment, used when a simple comparison of a pollutants concentration to an APAC cannot adequately assess risks

Implementing controls

Emitters should demonstrate how existing or proposed risk controls minimise risks so far as reasonably practicable.

Checking controls

To evaluate performance, emitters should have clearly documented environmental performance objectives that can be monitored and reported on.

Publication 1961 however does not address odour or nuisance dust. These are dealt with via Publications 1943 and Publication 1883.

4.7.4 EPA Publication 1943

Section 13.7 of EPA Publication 1961 describes a nuisance dust risk assessment and directs the user to the *EPA Publication 1943 Guidance for Assessing Nuisance Dust*. Nuisance dust is different to the air pollutants of particulate matter such as PM_{10} which are assessed under the health criteria within EPA Publication 1961. Nuisance dust generally comprises larger dust particles which create visible impacts when emitted.

The purpose of Publication 1943 is to:

– “Provide methods for assessing the impacts of nuisance dust on human health and wellbeing, including site specific risk assessment methods” (EPA 2022)
– “Provide guidance on what to include in any report relating to the assessment of nuisance dust in Victoria” (EPA 2022)

The agent of change has the responsibility to assess the risk of nuisance dust, with the following responsibilities:

– Consider their obligations under the GED including the implications of the proposal on human health and amenity
– Avoid land use conflict
– Ensure potential impacts on nearby land uses are appropriately mitigated and managed

EPA Publication 1943 uses four-steps to assess the risk of nuisance dust impacts from an emission source, as follows:

– Step 1: Dust source hazard potential
– Step 2: Exposure pathway effectiveness
– Step 3: Receiving environment sensitivity
– Step 4: Overall risk of dust impacts (combining steps 1 to 3)

The publication allocates a quantitative value to the outcome of each assessment step, to obtain an overall level of risk encompassing each aspect. The allocations are selected for several components contributing to the risk factor in each step, using the examples given by EPA.

4.7.5 EPA Publication 1883

Publication 1883 provides information on how to assess the risk posed by odour emission sources and to understand the receiving environment where effects might occur. This guidance is focused on the assessment of odour under the provisions of the EP Act, including the GED, which requires all Victorians to take precautionary and reasonable actions to avoid hazards causing harm. The guideline is primarily intended for government, the planning sector, practitioners, and specialists, who need to understand offensive odours that are associated with a development proposal, investigation, or study where an odour assessment is required. Risk assessment is related to whether the risk of harm can be easily understood through the assessment framework. The publication provides a framework for three levels of risk assessment, according to the odour impact potential of an industry or site. Publication 1883 is to be utilised once an assessment of the separation distance has been undertaken to assess for any potential constraints. The three levels of assessment include:

– Level 1 – Gateway assessment of emissions duration, wind direction and cumulative odour sources
– Level 2 – Source-Pathway-Receptor assessment
– Level 3 – Detailed risk assessment that could include:
    - Comparisons with similar operations or case studies
    - Risk assessment using field odour surveillance data
    - Complaint assessment
    - Community odour surveys/questionnaires and odour diaries

4.8 Separation distance guidelines

Two classes of buffer/separation distance guidelines are relevant in the context of planning in Victoria, namely threshold distances and buffer (or separation) distances.

4.8.1 Clause 53.10 – Threshold distances

Victorian Planning Schemes seek to ensure that planning resolves and does not create land use conflicts. This is typically acheived by providing separation distances between potentially conflicting land use zones that may result in incompatable uses.

Clause 53.10 of the VPPs seeks to define those types of industries and warehouses which if not appropriately designed and located may cause offence or unacceptable risk to the neighbourhood.

The clause sets out the threshold distance that is the minimum distance from any part of the land of the proposed use of or buildings and works for specified uses that have adverse amenity potential.

The table to the Clause 53.10 includes three columns that refer to the type of production or use or storage (purpose) which may result in adverse amenity potential and includes the threshold distance in metres and notes:

– **Note 1** is where the threshold distance is variable, dependent on the process to be used and the materials to be processed or stored
– **Note 2** is where an assessment of risk to the safety of people located off the land may be required

Clause 53.10 does not itself trigger the need to obtain a permit, however Clause 66.02 – 7 (use and development referrals) requires that an application is referred to the EPA as the determining referral authority if the proposal is to use land for an industry or warehouse for a purpose listed in the table to Clause 53.10 with no threshold distance specified or if the threshold distacne is not to be met.

Over the years there have been a number of VCAT, Planning Panel and Advisory Committee reports and recommendations in relation to the use and operation of the threshold distances (separation distances) included in under clause 53.10 – Uses with adverse amenity potential.

The following Planning Panel commentary provides a snapshot as to the recent application of the threshold distances listed under Clause 53.10 and the separation distances included in the EPA Guidelines 1518 – *Recommended Separation Distances for Industrial Residual Air Emissions*.

Melbourne Planning Scheme Amendment C221 – West Melbourne Waterfront (26 January 2017)

The purpose of the Panel Hearing was to consider submissions in response to a rezoning application to facilitate a mixed use development of approximately 2.8 hecatres comprising substantial residential, retail, commercial and open space land uses. The subject land is proximate to both the Footscray Major Activty Centre and the Melbourne's Central Business District.

The Panel considered odour and dust impacts from surrounding industry and considered whether the site could achieve adequate separation distances. The following commentary in relation to the application of Clause 53.10 and EPA 1518 Guidelines are as follows:

– *The Panel reiterates that it is satisfied that the most relevant consideration in the establishment of appropriate separation distances between existing industries and proposed new sensitive land uses are the EPAV 1518 Guidelines.*
– *The Panel agrees with the views of the Advisory Committee, which notes that Clause 52.10 (now 53.10) does not act as a 'reverse buffer' (the concept of 'reverse buffer' is where an impact generating use is protected from encroachment by sensitive uses, rather than the sensitive use being protected from encroachment by a use with adverse impacts). It does not provide a statutory buffer for the location of residential uses that is a suitable distance from existing industries. Industries are not therefore completely protected from encroachment of residential uses.*

In considering the evidence, the Panel made the following conclusion:

– *The Panel considers that the EPAV 1518 Guideline is the relevant guideline to inform separation distances between existing commercial/industrial uses and proposed sensitive uses. Informed by these Guidelines and the testing of the evidence, the Panel is satisfied that, subject to further assessment and detailed site planning, the introduction of sensitive uses on [sic] subject site can be accommodated in a manner that will afford adequate separation distances from existing commercial and industrial operations in the Dynon Precinct*

Summary

The use of the *EPA Guideline - Recommended Separation Distances for industrial residual air emissions 1518 (March 2013)* is the preferred approach to determining suitable separation distances between existing industrial and proposed new sensitive uses. GHD notes that Publication 1518 is to be superseded by Publication 1949 Separation Distance Guideline (currently in Draft form at the time of writing this assessment).

4.8.2 EPA separation distances (Publication 1518 and Draft Publication 1949)

In the case of an existing industrial use, the EPA recommends buffer distances should be considered when preparing a planning scheme, planning scheme amendment or planning permit application. A buffer distance is a planning instrument used to provide separation of sensitive land uses (i.e. residential, schools, hospitals) from existing premises with the potential for off-site emissions (odour or dust) that can cause dis-amenity in the event of unintended emissions. The use of separation distances can:

– Prevent land use conflict
– Help protect the health and amenity of sensitive land uses
– Minimise risks and mitigate odour and dust impacts from certain industries and activities
– Help protect industrial and commercial land uses and activities
– Provide local government, industry, developers and the community with some certainty about future land use

Recent advice from EPA regarding Draft Publication 1949 noted that the separation distances are not a substitution for pollution controls. The industry should still be minimising risks of odour and dust so far as reasonably practical based on the current state of knowledge in that sector, (i.e., meeting the GED for that sector). Therefore, the separation distance is not a substitution for pollution controls and complying with the GED.

The purpose of the EPA separation distance guideline is to provide recommended minimum separation distances between odour or dust emitting industrial land uses and sensitive land uses. The guideline is to support land use and development decisions that:

– Protect the community from human health and amenity risks associated with unintended offsite odour and dust impacts generated by industry
– Protect industry from inappropriate land use and development nearby that may constrain operations

In the case of the Precinct, the EPA recommended separation distance guideline (Publication 1949 and Publication 1518) will apply to existing industries in and surrounding the Precinct.

GHD notes that one major change between the two publications is that EPA Publication 1518 seeks to protect for upset conditions while the latest Publication 1949 seek to protect for routine operations.

Note that noise, vibration, ambient and hazardous air pollutants, and light spill are not considered in the separation guideline.

4.8.3 Separation distances

The industrial premises and uses identified in Section 4.1 which attract separation distances under EPA publications 1949 and 1518 are listed in Table 7. A description is given below of the evaluation of each industrial premise.

Table 7 Default separation distances for identified industries

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
	Within Precinct					
Smith Wil Asphalt	**ODOUR** Asphalt contractor	NA For asphalt production of >100 tonnes per week to have a 500 m separation distance. GHD did not observe any batching plant on site during the site visit.	NA For existing asphalt plants of sensitive use applications or relocation of plants. It is specified for asphalt plants which have >100 tonnes per week to have a 1000 m separation distance. GHD did not observe any batching plant on site during the site visit.	NA For bitumen batching plants a 1000 m separation distance is applied.	NA	N
Ballarat Caravan & Trailer Repairs	**ODOUR** RV Repair Shop, potential spray painting	NA	NA	NA	NA	N
Outside Precinct within 2Km of Core Area						
Non-metallic Mineral Products						
Boral Asphalt	**ODOUR** Asphalt contractor	500 m For asphalt production of >100 tonnes per week.	1000 m For existing asphalt plants of sensitive use applications or relocation of plants. It is specified for asphalt plants which have >100 tonnes per week. GHD notes that from correspondence with EPA it is likely to revert back to 500 m for plants with appropriate odour controls.	1000 m For bitumen batching plants a 1000 m separation distance is applied.	500 m	Y
Western Victoria Asphalt Pty Ltd	**ODOUR** Hot mix asphalt batching plant				500 m	Y

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Hanson Construction Materials Pty Ltd	**DUST** Concrete production	100 m For production of concrete greater than 5000 tonnes per year a 100 m separation distance is recommended.	100 m Concrete plant for the production of concrete	300 m Relevant for concrete batching plant, with a production rate exceeding 5,000 tonnes per year.	100 m	N
Sovereign Concrete Products	**DUST** Concrete				100 m	N
Northway Sandblasting	**DUST** Sandblasting	NA No applicable category for undertaken activities	300 m/500 m Blasting of metal objects in the open using wet abrasive cleaning has an applicable separation distance of 300 m while dry abrasive cleaning has an applicable distance of 500 m.	500 m Applicable for abrasive blast cleaning or metal coating and finishing	500m	N
Ballarat Powder Coating & Sandblasting	**DUST** Powder Coating and sand blasting				500 m	N
Selkirk Pty Ltd	**ODOUR** Brick Manufacturing	250 m Production of bricks, tiles, pipes, pottery goods or refractories, processed in dryers or kilns.	250 m Applicable for industries manufacturing bricks processed in dryer or kilns.	500 m Applicable for industries manufacturing cement, lime, clay bricks, tiles and pipe refractories, with a design production rate exceeding 10,000 tonnes per year:	250 m	N
Automotive Services						
Albins	**DUST/ODOUR** Car part manufacturer	NA	100 m Applicable for industries that involve spray painting	100 m For automotive body, paint and interior repair	100 m	N
West Exhaust Ballarat	**DUST/ODOUR** Machine shop				100 m	N
AutoMekanika Service Centre	**DUST/ODOUR** Mechanic				100 m	N
Axis Engineering	**DUST/ODOUR** Mechanic				100 m	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Berklee Limited	**DUST/ODOUR** Automotive parts manufacturer				100 m	N
Goldenacres	**DUST/ODOUR** Agricultural chemical spray equipment manufacturing				100 m	N
Jason Clark Automotive	**DUST/ODOUR** Mechanic				100 m	N
Learmonth Road Smash Repair	**DUST/ODOUR** Mechanic				100 m	N
Motacare Auto Service Centre	**DUST/ODOUR** Mechanic				100 m	N
MaxiTRANS Ballarat Manufacturing and Head Office	**DUST/ODOUR** Trailer manufacturer				100 m	N
SEM Fire and Rescue	**DUST/ODOUR** Automotive manufacturer				100 m	N
Sovereign Caravans	**DUST/ODOUR** Trailer manufacturer				100 m	N
Paul Wren Diesel Mechanics PTY LTD	**DUST/ODOUR** Truck repair shop				100 m	N
Food Manufacturing						
Karon Farm Coffee Roasters	**ODOUR** Coffee roasters	500 m No applicable separation distance for productions less than 200 tonnes per year. For productions greater than 200 tonnes a year, a separation distance of 500 m is applicable.	500 m No applicable separation distance for productions less than 200 tonnes per year. For productions greater than 200 tonnes a year, a separation distance of 500 m is applicable.	500 m Food production including frying, drying or roasting, exceeding 200 tonnes per year has a separation distance of 500 m.	500 m	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Hakubaku Australia PTY Ltd	**ODOUR** Production of noodle products.	500 m Applicable for productions greater than 200 tonnes per year.	500 m Applicable for productions greater than 200 tonnes per year. Noodle production may be classified under produce processing works.	500 m Applicable for small goods production that including smoking and drying, exceeding 200 tonnes per year	500 m	N
Sensate	**ODOUR** Colouring and flavouring manufacturer	NA GHD site visit observed no visible stacks from the small facility and unlikely to exceed this amount.	NA	NA	NA	N
Tiptop Bakery	**ODOUR** Bakery	100 m Bakery exceeding 200 tonnes per year of production.	100 m Bakery exceeding 200 tonnes per year of production.	100 m Bakery exceeding 200 tonnes per year of production.	100 m	N
McCain Foods	**ODOUR** Potato processing for ready-made food products	NA No specific category for potato production and processing.	500 m Applicable for produce processing works including deep fat frying, roasting or drying with productions greater than 200 tonnes per year.	500 m Applicable for food production including frying, drying or roasting, exceeding 200 tonnes per year.	500 m	Y
Chemical Processes						
Sovereign Press Pty Ltd	**ODOUR** Print shop	500 m Applicable for printing industries emitting >100 kg per day of VOCs.	500 m Applicable for printing industries emitting >100 kg per day of VOCs.	500 m Printing and coating works with heated curing ovens	500 m	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Haymes Painting	**ODOUR** Paint manufacturing	500 m Applicable for industries involving paint manufacturing exceeding 2,000 tonnes per year.	500 m Applicable for industries involving paint manufacturing exceeding 2,000 tonnes per year.	500 m Applicable for industries involving paint manufacturing, blending and mixing exceeding 2,000 tonnes per year	500 m	Y
Bulace Dyeing	**ODOUR** Fabric Dyeing	250 m Textile manufacturing and processing including dyeing or finishing cotton, linen, woollen yarns or textiles	100 m For industries involved in dyeing or finishing of cotton, linen and woollen yarns and textiles.	300 m Dyeing or finishing of cotton, linen and woollen yarns and textiles	100 m	N
Coppens Signs	**ODOUR** Signwriters	500 m Applicable for printing industries emitting >100 kg per day of VOCs.	500 m Applicable for printing industries emitting >100 kg per day of VOCs.	500 m Printing and coating works with heated curing ovens	500 m	N
Waste Services						
Darren Pollard	**DUST** Acceptance of end-of-life vehicles	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	250 m Classified under Materials recovery and recycling facility for collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials	500 m Vehicle recycling or disposal	250 m	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Mccallum Disability Services Inc	**DUST** Storage of scrap aluminium, glass, liquid paperboard, plastics	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	250 m Classified under Materials recovery and recycling facility for collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials	200 m Transfer station	250 m	N
InfraBuild Recycling	**DUST** Storage of end-of-life vehicles and non-ferrous metals	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	500 m Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	500 m Vehicle recycling or disposal	500 m	N
Suez Recycling & Recovery Pty Ltd	**DUST** Storage of cardboard and e-waste	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	250 m Classified under Materials recovery and recycling facility for collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials	200 m Transfer station	250 m	N
Vic Waste Solution Pty Ltd	**ODOUR/DUST** Storage of variety of material	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	500 m Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	200 m Transfer station	500 m	N
Wheelie Waste Pty Ltd	**DUST** Storage of steel, cardboard, glass, industrial waste	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	250 m Classified under Materials recovery and recycling facility for collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials	200 m Transfer station	250 m	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
King Marine Scrap Metal	**DUST** Storage of scrap metal waste	Case by case Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	500 m Collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials.	200 m Transfer station	500 m	N
Other Services						
Orora	**ODOUR/DUST** Packaging company – aluminium cans, glass bottles, labelling	500 m Non-ferrous metal production – which involves the processing, smelting or melting non-ferrous metals or ores using furnaces, ovens or electrolysis. – 100 m separation distance is applicable for less than 100 tonnes per year – 250 m separation distance for 100 to 2,000 tonnes per year – 500 m separation distance for greater than 2,000 tonnes per year	NA There is no specific category for the production of aluminium cans or glass bottles.	NA	500 m	Y
Mentay	**ODOUR** Steel fabricator	NA	NA	NA	NA	N
HTW Welding	**DUST** Welder	NA No applicable category for undertaken activities	NA No applicable category for undertaken activities	NA No applicable category for undertaken activities	NA	N

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
Laminex Australia	**ODOUR** Laminate manufacturer	100 m Paper and paper pulp manufacture by other methods using semi-processed materials.	500 m Paper and paper pulp manufacture using semi-processed or recycled materials.	NA	500 m	N
Petra Minerals	**DUST** Mineral works and storage/sorting.	250 m Mine for other minerals which involves crushing, screening, stockpiling and conveying of other minerals	250 m Mine for other minerals which involves crushing, screening, stockpiling and conveying of other minerals	NA	250 m	N
Gekko Systems	**DUST** Mining manufacturer	NA	100 m No direct classification but equipment may involve spray painting.	100 m For automotive body, paint and interior repair	100 m	N
Hasco Foundry	**DUST** Foundry	NA	100 m Sand casting with less than 500 kg/cycle	NA	100 m	N
Ballarat Sand and Soil	**DUST** Sand and soil retailer	NA No applicable category for undertaken activities	NA No applicable category for undertaken activities	NA No applicable category for undertaken activities	NA	N
Water Reclamation Plant						
Central Highlands Region Water Corporation	**ODOUR** Wastewater treatment	Sewerage Treatment Plant: Premises on or from which sewage (including sullage) effluent, is treated, discharged or deposited Exceeding a design or actual flow rate of 5,000 litres per day Type of installation: mechanical/biological wastewater treatment plant	Exceeding a design or actual flow rate of 5,000 litres per day: see further guidelines (Appendix B) Type of installation: mechanical/biological wastewater treatment plant Buffer = $10n^{1/3}$ With n = 38,125 EP (2018)	NA	335 m (2018) 374 m (2028) 407 m (2048)	Y

Company	Industry type and activity/definition	EPA 1518 Guideline separation distance (m)	Draft EPA 1949 Guideline separation distance (m)	Clause 53.10	Applied Separation distance	Impact Precinct (Y/N)
		Buffer = $10n^{1/3}$ With n = 38,125 EP (2018) Separation distance = 335 m With n = 52,838 EP (2028) Separation distance = 374 m With n = 67.994 EP (2048) Separation distance = 407 m	Separation distance = 335 m With n = 52,838 EP (2028) Separation distance = 374 m With n = 67,994 EP (2048) Separation distance = 407 m			
Central Victoria Livestock Exchange - CVLX	**ODOUR/DUST** Livestock exchange yard	500 m Applicable for industries with livestock sales of greater than 500 heads.	2000 m A separation distance of 2000 m is relevant for stock sale yards with salles of greater than 30,000 heads per week. CVLX has weekly sales of cattle and sheep with a facility capacity of greater than 30,000 heads.	NA	2000 m	Y

The section below outlines identified industry separation distances that affect the PSP.

Industries with separation distances affecting the PSP

Core Area

Boral Asphalt (separation distance 500 m)

The current EPA separation distance applicable for Boral Asphalt in Publication 1518 scribes a 500 m buffer (with the potential amenity impact relating to odour). The new Draft Separation Distance Guideline, EPA Publication 1949 introduces two categories for asphalt plants, with the following distances proposed:

– 100 tonnes per week, new plant – 500 m

– 100 tonnes per week, existing plant – 1,000 m

The following justification is provided in the Guide to separation distance and landfill buffer changes obtained from the Engage Victoria website[6] "Two categories created for asphalt plants to account for agent of change situations where there is encroachment of older plants. Control technology of newer plants is expected to be of a higher order."

It is too broad to recommend a 1,000 m buffer for all existing plants without taking into account the individual technology at each premises. There are many existing asphalt plants within Victoria that currently employ best practice technology on par with new plants. The new category also does account for the situation where existing plants upgrade their operations to be in line with new plant technology. Perhaps instead of new vs existing as the category currently stands, the two distances should be based on technology type (i.e. new technology vs old technology).

In 2021 GHD prepared an Amenity Risk Assessment2[7] for the Arden Precinct for the Victorian Planning Authority. One of the primary issues concerned an existing asphalt plant with a 500 m separation distance that posed a constraint to the proposed future urban stature of the Precinct. An assessment was undertaken in accordance with the 'agent of change' principle outlined in existing EPA Victoria Publication 1518 to investigate if a variation of the identified default separation distance was appropriate. A combination of a qualitative risk assessment (Source-Pathway-Receptor concept) and fieldwork investigation (odour surveillance) was undertaken to investigate a possible variation to the separation distance and the subsequent risk posed to amenity.

The outcome of S-P-R risk assessment indicated the overall level of risk from the asphalt plant was medium. The overall risk was considered to apply to the entire recommended separation distance. Based on the results of the odour surveillance, a portion of the asphalt plant's medium risk zone was then increased to moderate risk as obvious odour was detected out to a maximum distance of 152 m. Beyond 152 m no obvious odour was detected, while subtle odour was detected out to a maximum distance of 377 m. No change to the S-P-R risk categorisation was required for subtle odour observations, therefore medium risk remained from 152 m to 377 m. Given that no odour was detected beyond 377 m, the risk categorisation was reduced from medium to low to give a greater weight to the empirical evidence. The reduction to low risk beyond 377 m was also supported by the complaint history, with a lack of complaints from the existing receptors located within the recommended separation distance.

The findings of GHD was also supported by EPA and a peer review who undertook an additional 10 odour surveys of the existing plant which also supported GHD's findings.

From this risk assessment, an increase to the recommended separation distance to 1,000 for an existing asphalt plant does not align with the recent experience of GHD's which resulted in a low risk of odour impact beyond 377 m.

[6] **https://engage.vic.gov.au/separation-distances-and-landfill-buffers**

[7] **https://vpa-web.s3.amazonaws.com/wp-content/uploads/2021/09/Arden-Precinct-Arden-Structure-Plan-Amenity-Risk-Assessment-GHD-August-2021.pdf**

As such GHD has recommended a 500 m separation distance for Boral Asphalt based on EPA Publication 1518 and previous experience. Further to this, GHD had some correspondence[8] with EPA's odour expert in relation to the separation distance change for asphalt plants and the advice provided was that the 1,000 m is likely to revert back to 500 m in the final version of EPA Publication 1949.

Haymes Paint (separation distance 500 m)

EPA Publication 1518 and 1949 specifies a 500 m separation distance for the production of paints with a throughput of 2,000 tonnes per year. GHD does not know the throughput of Haymes Paint and has therefore conservatively applied the 500 m separation distance based on observations made during the site visit. The potential amenity impact relates to odour.

Western Victoria Asphalt (separation distance 500 m)

Similar to Boral Asphalt, Publication 1518 and Publication 1949 specify a 500 m separation distance for an "Asphalt plant". As Western Victoria Asphalt hold an EPA Works Approval for "Bitumen Asphalt Batching Works" and are licenced for the installation of "hot mix asphalt batching plant with production capacity 60 tonnes per hour." It appears that no works for the construction of an asphalt plant has been undertaken as of yet, however a 500 m separation distance has been applied to the site. The potential amenity impact relates to odour.

Orora (separation distance 500 m)

Publication 1518 specifies a 500 m separation distance for the production of non-ferrous metals which involves the processing, smelting or melting non-ferrous metals or ores using furnaces, ovens or electrolysis. GHD assumes the production of aluminium cans to fall within this category and has applied the 500 m separation distance for production quantities greater than 2,000 tonnes per year. Based on observations made during the site visit as well as publicly available information online

McCain Foods

Publication 1518 specifies a 500 m separation distance for produce processing works including deep fat frying, roasting or drying with productions greater than 200 tonnes per year. McCain Foods is one of the biggest food manufacturing centres in Ballarat North and processes potatoes for a range of products. Based on the site visit conducted on 18 October 2023 and a review of the aerial imagery, the main food processing facilities is largely situated in the southern portion of the site. The northern portion situated along Western Freeway consists of solar panels, therefore GHD has applied a 500 m separation distance from the activity boundary. The potential amenity impact relates to odour.

Central Highlands Region Water Corporation (separation distance 407 m 2048)

For Sewerage Treatment Plants, Publication 1518 and 1949 have specific separation distance calculations based on the type of treatment installation at the site. Based on information provided by Central Highlands Region Water Corporation, the Ballarat North WRP is noted to have "mechanical/biological wastewater treatment plant". Under both publications the following equation is used to calculate relevant separation distances:

Buffer = $10n^{1/3}$ where n = equivalent population

Based on previous studies, separation distances for the Ballarat North site have been undertaken for the years of 2018, 2028 and 2048:

– 2018: With n = 38,125
  - Separation distance = 335 m
– 2028: With n = 52,838 EP
  - Separation distance = 374 m
– 2048: With n = 67,994 EP (2048)
  - Separation distance = 407 m

[8] Email from EPA's Chris Bydder dated 17 November 2023

Under the Ballarat North Planning Scheme, Ballarat North WRP have an Environmental Significance Overlay (Schedule 4 – Wastewater Treatment Plant Buffer Area) (ESO4) which applies to the whole of the Ballarat North WRP site. The ESO boundary defines the area beyond which sensitive land uses are acceptable unfettered. The current ESO4 is based on the 400 m buffer distance applicable for a mechanical/biological wastewater plant under the former *Recommended Buffer Distances for Industrial Residual Air Emissions (EPA, 1990)*[9]. The ESO4 extends approximately 335 m to the east and 270 m to the west from the boundary of the site. This remains approximately consistent with a 407 m separation distances scribed from the activity site as per recommended in Publication 1518 and 1949.

Based on the results, GHD has applied the ESO4 separation distance for the Ballarat North WRP. The potential amenity impact relates to odour.

Expanded Area

Central Victoria Livestock Exchange (separation distance 2000 m)

Under Publication 1518 and 1949, CVLX is categorised under "Livestock exchange yard" where a 2000 m separation distance has been applied for stock sale yards with salles of greater than 30,000 heads per week. GHD notes that CVLX have weekly sales of cattle and sheep with a facility capacity of greater than 30,000 heads. Therefore a 2000 m separation distance has been applied conservatively. The potential amenity impact relates to odour.

Industries with separation distances with no impact to PSP

Hanson Construction Materials Pty Ltd (separation distance 100 m)

Hanson Construction is best described by EPA Publications 1949 and 1518 as a concrete plant which requires a separation distance of 100 m given a throughput of >5,000 tonnes per year. GHD does not know the throughput of Hanson and has therefore conservatively applied the 100 m separation distance to the site based on a visual inspection. The potential amenity impact relates to dust.

Sovereign Concrete Products (separation distance 100 m)

Similar to Hanson Construction, Sovereign Concrete Products requires a separation distance of 100 m given a throughput of >5,000 tonnes per year. GHD does not know the throughput of Sovereign Concrete Products and has therefore conservatively applied the 100 m separation distance to the site based on a visual inspection. The potential amenity impact relates to dust.

Northway Sandblasting (separation distance 500 m)

Publication 1949 specifies a 500 m separation distance under "abrasive blasting" for dry abrasive cleaning and 300 m for west abrasive cleaning. A review of publicly available information online shows that Northway Sandblasting includes services that include air and water pressure sandblasting. Therefore a 500 m separation distance has been applied. The potential amenity impact relates to dust.

Ballarat Powder Coating & Sandblasting

Similar to Northway Sandblasting, GHD has applied a 500 m separation distance. The potential amenity impact relates to dust.

Selkirk Pty Ltd (separation distance 250 m)

Publication 1518 and 1949 require a 250 m separation distance for industries manufacturing bricks processed in dryer or kilns. Therefore a 250 m separation distance has been applied.

[9] EPA (1990*) Recommended Buffer Distances for Industrial Residual Air Emissions*

Automotive services (separation distance 100 m)

Under Publication 1949, new guidelines require a 100 m separation distance for automotive services that may include spray painting. GHD has applied this separation distance to the following automotive services identified within 2 km of the core area:

– Albins
– West Exhaust Ballarat
– AutoMekanika Service Centre
– Axis Engineering
– Berklee Limited
– Goldenacres
– Jason Clark Automotive
– Learmonth Road Smash Repair
– Motacare Auto Service Centre
– MaxiTRANS Ballarat Manufacturing and Head Office
– SEM Fire and Rescue
– Sovereign Caravans
– Paul Wren Diesel Mechanics PTY LTD

Karon Farm Coffee Roasters (separation distance 500 m)

Publication 1518 and 1949 specify a 500 m separation distance for production quantities greater than 200 tonnes per year for coffee roasters. Although from GHDs site visit, it is likely for the production quantity to be less than this amount, a 500 m separation distance has been applied conservatively.

Hakubaku Australia PTY Ltd. (separation distance 500 m)

Publication 1518 and 1949 specify a 500 m separation distance for production quantities greater than 200 tonnes per year for produce processing works.

Tiptop Bakery (separation distance 100 m)

Publication 1518 and 1949 specify a 100 m separation distance for production quantities greater than 200 tonnes per year for baked goods.

Sovereign Press Pty Ltd (separation distance 500 m)

Publication 1518 and 1949 require a 500 m separation distance for printing industries emitting greater than 100 kg per day of VOCs. Based on GHDs site visit, a 500 m separation distance has been applied conservatively.

Bulace Dyeing (separation distance 250 m)

Under Publication 1518, a 250 m separation distance is required for textile manufacturing and processing including dyeing. However under the new guidelines Publication 1949 specifies a 100 m separation distance. GHD has applied a 250 m separation distance conservatively.

Coppens Signs (separation distance 500 m)

Publication 1518 and 1949 require a 500 m separation distance for printing industries emitting greater than 100 kg per day of VOCs. Based on GHDs site visit, a 500 m separation distance has been applied conservatively.

Waste services (separation distance 250 m)

Publication 1518 and 1949 specify a 250 m separation distance in relation to dust for “material recovery and recycling facilities” which involve collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials. GHD has applied a separation distance of 250 m to the following industries:

– Darren Pollard
– Mccallum Disability Services Inc
– Suez Recycling & Recovery Pty Ltd
– Wheelie Waste Pty Ltd

Waste services including scrap metal (separation distance 500 m)

Publication 1518 and 1949 specify a 500 m separation distance in relation to odour for “material recovery and recycling facilities” which involve collecting, dismantling, treating, processing, storing, recycling, or selling used or surplus materials. GHD has applied a separation distance of 500 m to the following industries:

– King Marine Scrap Metal
– InfraBuild Recycling

Waste services including putrescible waste (separation distance 500 m)

Publication 1518 and 1949 specify a 500 m separation distance in relation to odour for “material recovery and recycling facilities” which involve recycling, processing and transfer of liquid waste including sludges. GHD has applied a separation distance of 500 m to the following industries:

– Vic Waste Solution Pty Ltd

Laminex Australia (separation distance 500 m)

Publication 1518 and 1949 require a 500 m separation distances for industries involved with paper and paper pulp manufacture using semi-processed or recycled materials. Laminex in Ballarat North manufactures laminate using paper materials therefore a 500 m separation distance has been applied.

Petra Minerals (separation distance 250 m)

Publication 1518 and 1949 require a 250 m separation distance for mining for minerals which involves crushing, screening, stockpiling, and conveying of other minerals. GHD observed various stockpiles on site with a unmarked enclosed building where crushing, screening and conveying of minerals could take place. Therefore a 250 m separation distance in relation to dust has been applied.

Gekko Systems (separation distance 100 m)

Under Publication 1949, new guidelines require a 100 m separation distance for automotive services that may include spray painting. Gekko systems is primarily involved in manufacturing of mining automotives which may involve spray painting; therefore a 100 m separation distance has been applied.

Hasco Foundry (separation distance 100 m)

Publication 1949 requires a 100 m separation distance for sand casting with less than 500 kg/cycle. Based on a review of publicly available information, GHD has applied a 100 m separation distance.

Industries with no separation distances

Smith Wil Asphalt

Smith Wil Asphalt lay asphalt from Boral or Centre State and lay it in other locations. The Gillies Road site is used as offices and storage of equipment used to lay asphalt. GHD did not observe any batching plant on site during the site visit, therefore no separation distance has been applied.

Ballarat Caravan & Trailer Repairs

No stacks were observed by GHD during the site visit, assumed to be just repair shop and no separation distance has been applied.

Sensate

Production of food colouring and flavouring does not fall under any category of relevant publications. GHD notes that during the site visits not visible stacks were observed.

Mentay

There is no applicable separation distance for steel fabrication services.

HTW Welding

There is no applicable separation distance for welding services.

Ballarat Sand and Soil

There is no applicable separation distance for retail suppliers of sand and soil.

4.8.4 Application to precinct

The separation distances should be scribed from the envelope of potential sources within the premises as per the EPA separation guidelines (Method 1 – Urban method), however, given the uncertainty regarding the individual sources within some of the identified facilities, the property boundary has been used to define the envelope of the sources (this is a conservative approach). For other sites where appropriate level of information was available such as EPA Licences the separation distance was scribed from the envelope of sources. The separation distances should be drawn from the activity boundary relevant to that separation distance.

In total, five industries with a separation distance affecting the Core Area of the PSP were identified and displayed in Figure 10. One industry with a separation distance was identified to affect the Expanded Area of the PSP and displayed in Figure 11. 35 industries with separation distance not affecting the PSP were identified (Figure 12 to Figure 14).

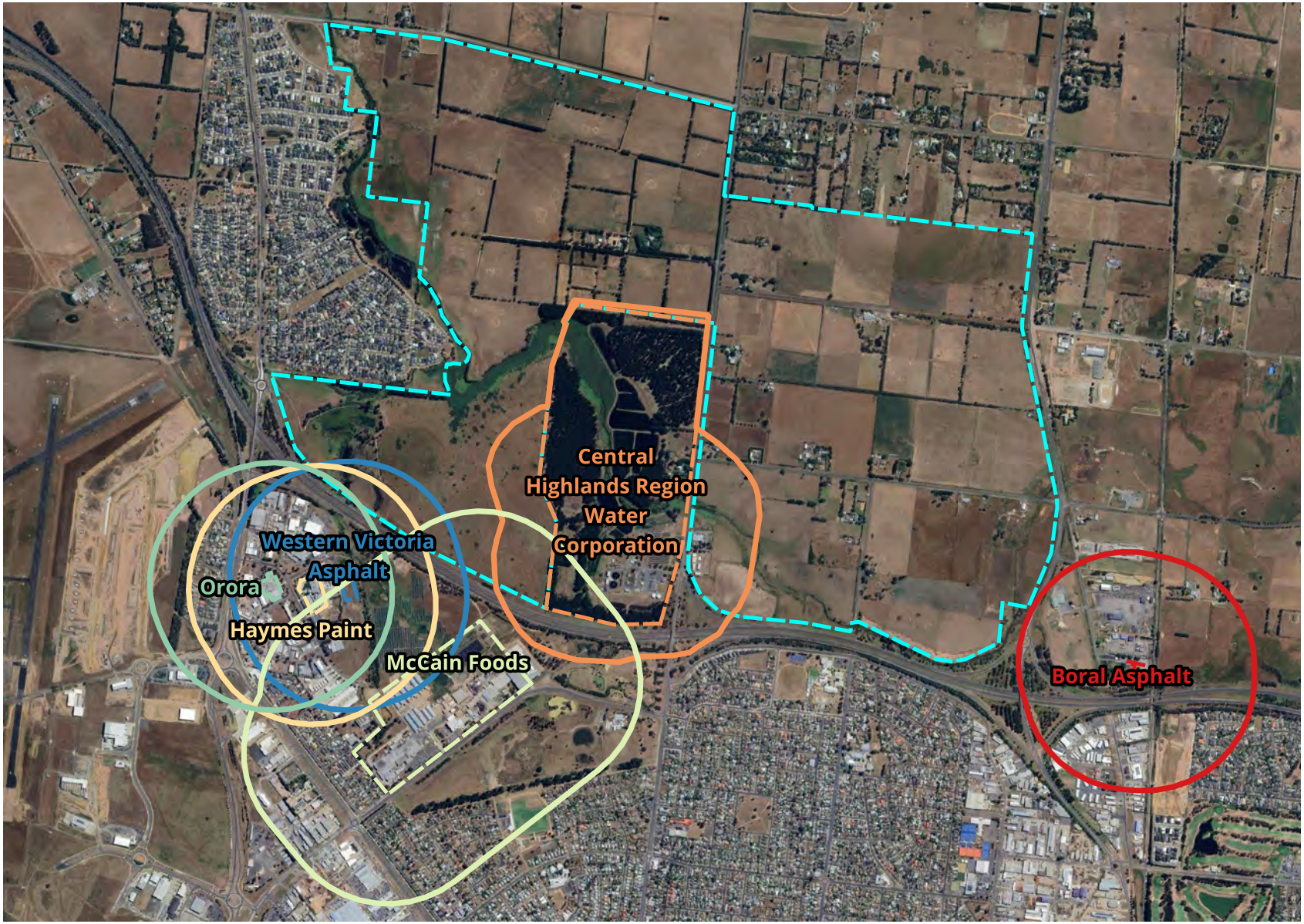
Core Area

The impact of each of the identified separation distances can be seen in Figure 10. The figure shows that the the ESO4 separation distance from Central Highlands Region Water Corporation to have the largest impact on the PSP. It encompasses the central region of the PSP by approximately 0.40 km^2, approximately 335 m to the east of the site boundary and 270 m to the west of the site boundary. The 500 m separation distance from McCains Foods encompasses some of the far south-western side of the Precinct by approximately 310 m. The other industries Western Victorian Asphalt, Orora and Haymes Paint marginally encompass the southwest border of the PSP by 225 m, 20 m and 125 m respectively. The 500 m Boral Asphalt buffer marginally falls short of the southeastern portion of the PSP, GHD has included Boral Asphalt here as the current guidelines scribes a 1000 m separation distance from asphalt plants, however GHD notes that from correspondence with EPA it is likely to revert back to 500 m for plants with appropriate odour controls.

The separation distances which encroach the precinct to the west are unlikely to have a significant impact to the core area as it encompasses the Ballarat Town Commons which will not be developed.

Expanded Area

The impact of the identified separation distances can be seen in Figure 11. The figure shows that the 2000 m CVLX separation distance to extend to the western portion of the PSP encompassing approximately 0.5 km^2 of the PSP. No other industry was identified to affect the expanded area of the PSP.



Legend

Boundary
- Core

Industry Boundary
- Boral Asphalt
- Ballarat North WRP Activity Site
- Haymes Paint
- McCain Foods
- Orora
- Western Victoria Asphalt Pty Ltd

Industry Separation Distances
- Boral Asphalt
- ESO Ballarat North WRP
- Haymes Paint
- McCain Foods
- Orora
- Western Victoria Asphalt Pty Ltd

Paper Size ISO A4

0 0.5 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

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Ballarat North Adverse Amenity Impact Assessment

Core Area Separation Distance Encroachment

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 10

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 16/05/2024

Data Source:Google Earth Imagery 2024.
Created By: ylim

Legend

Boundary

Expanded Area (Inclusion TBC)

Industry Boundary

CVLX

Buffered

Buffered

Paper Size ISO A4

0 0.5 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

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Ballarat North Adverse Amenity Impact Assessment

Expanded Area Separation Distance Encroachment

Project No. **12619620**
Revision No. **-**
Date. **04/07/2024**

FIGURE 11

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Print Date: 04/07/2024

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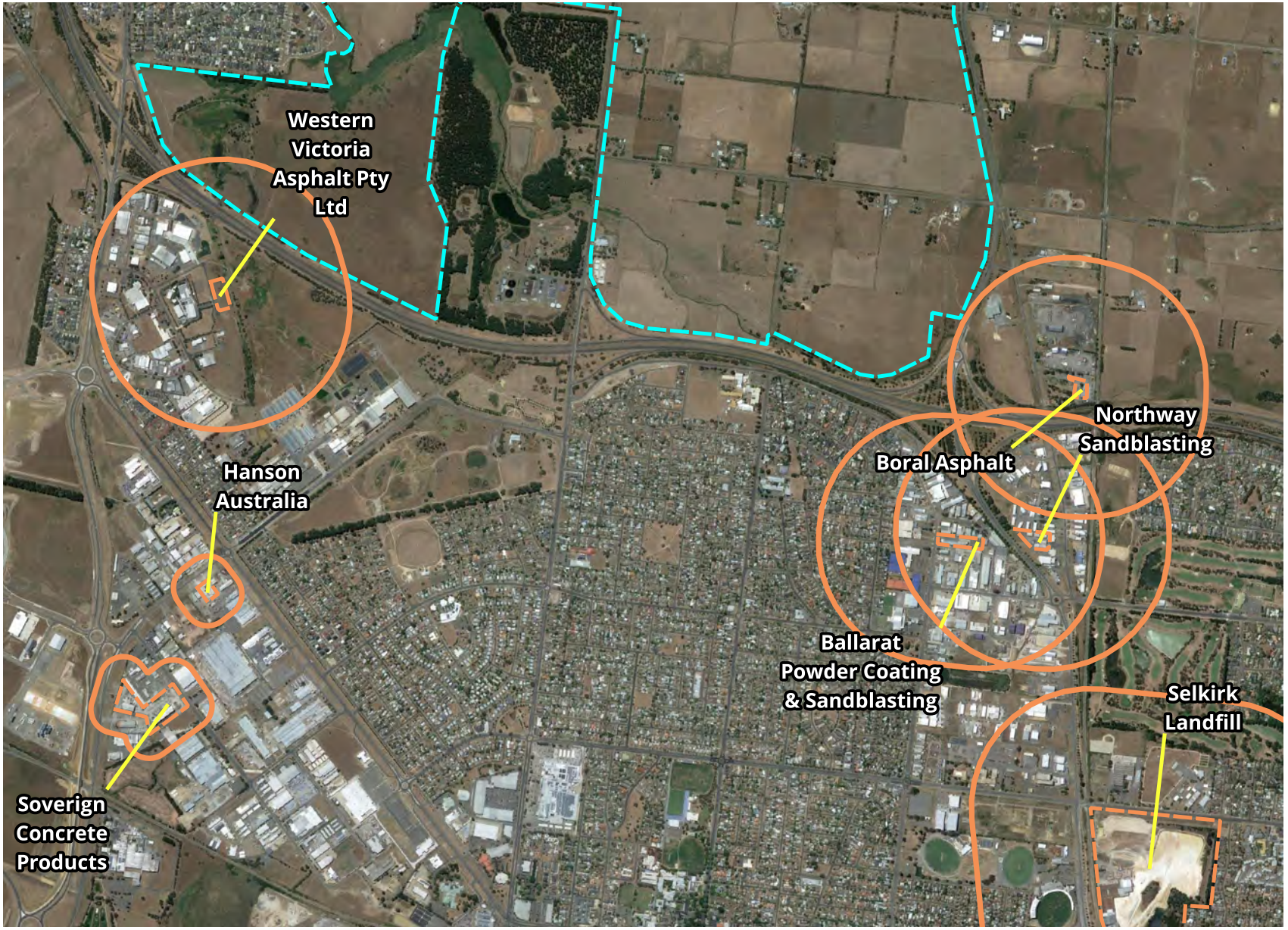

Legend

Boundary

- Core

Separation Distances

- Non-metallic Industry Boundary
- Non-metallic Industry Buffer

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Non-metallic industries with separation distances

Project No. **12619620**
Revision No. **-**
Date. **17/11/2023**

FIGURE 12

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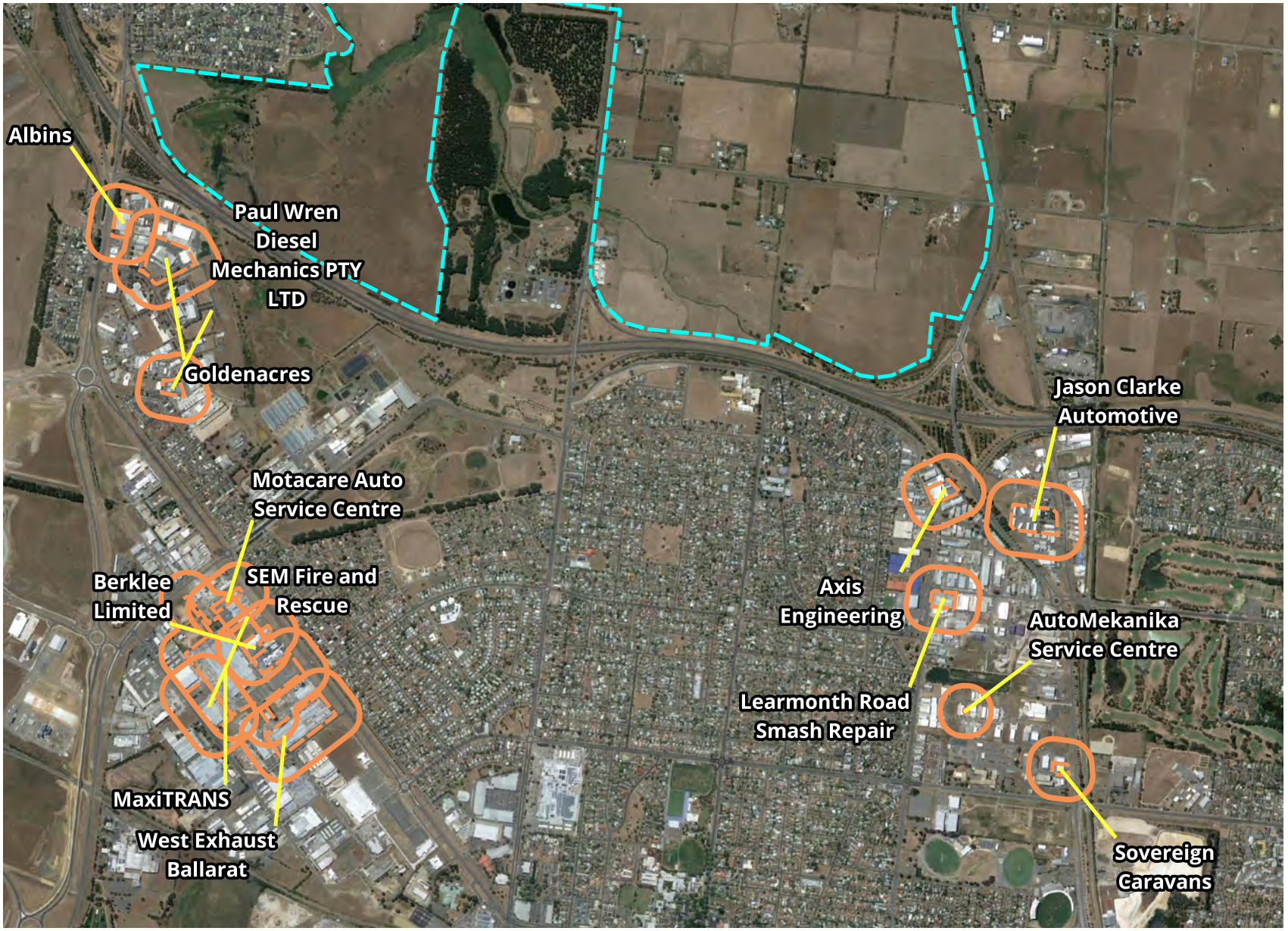

Legend

Precinct Boundary

- Core

Separation Distances

- Automotive Industry Boundary
- Automotive Industry Buffer

Paper Size ISO A4

0 0.25 0.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

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Ballarat North Adverse Amenity Impact Assessment

Automotive industries with separation distances

Project No. **12619620**
Revision No. **-**
Date. **17/11/2023**

FIGURE 13

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 17/11/2023

Data Source:Google Earth Imagery 2023.
Created By: ylim

Legend

Boundary

- Core
- Expanded (Inclusion TBC)

Separation Distances

- Food Manufacturing Industry Boundary
- Food Manufacturing Industry Buffer

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Food Manufacturing industries with separation distances

Project No. **12619620**
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Date. **17/11/2023**

FIGURE 14

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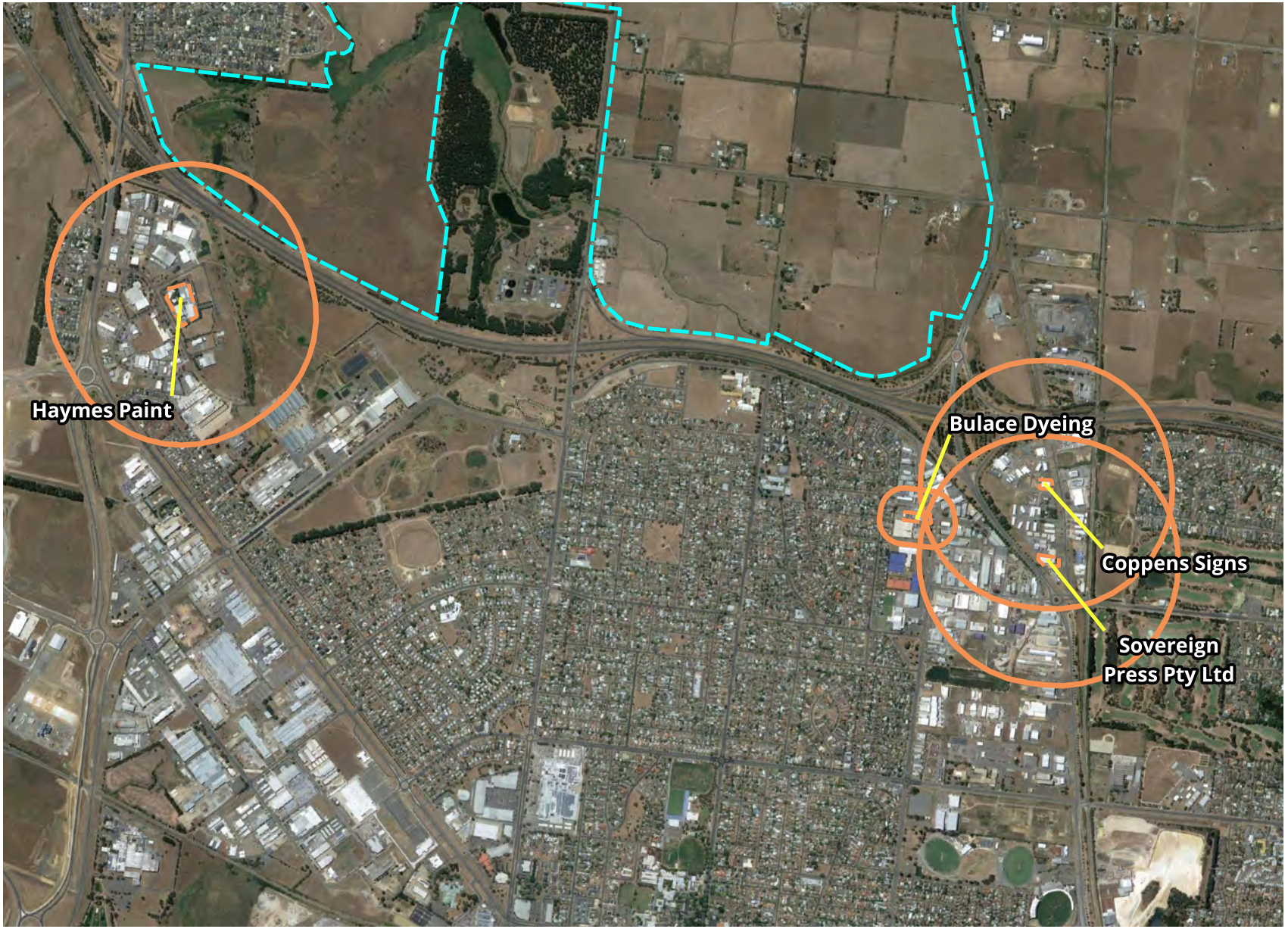

Legend

Boundary

- Core
- Expanded (Inclusion TBC)

Separation Distances

- Chemical Processes Industry Boundary
- Chemical Processes Industry Buffer

Paper Size ISO A4

0 0.25 0.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

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Ballarat North Adverse Amenity Impact Assessment

Chemical Processes industries with separation distances

Project No. **12619620**
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Date. **17/11/2023**

FIGURE 15

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 17/11/2023

Data Source:Google Earth Imagery 2023.
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Legend

Boundary

- Core Area
- Expanded Area (Inclusion TBC)

Separation Distances

- Waste Services Boundary
- Waste Services Buffer

Paper Size ISO A4

0 0.25 0.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

GHD

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Ballarat North Adverse Amenity Impact Assessment

Waste Services with separation distances

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 16

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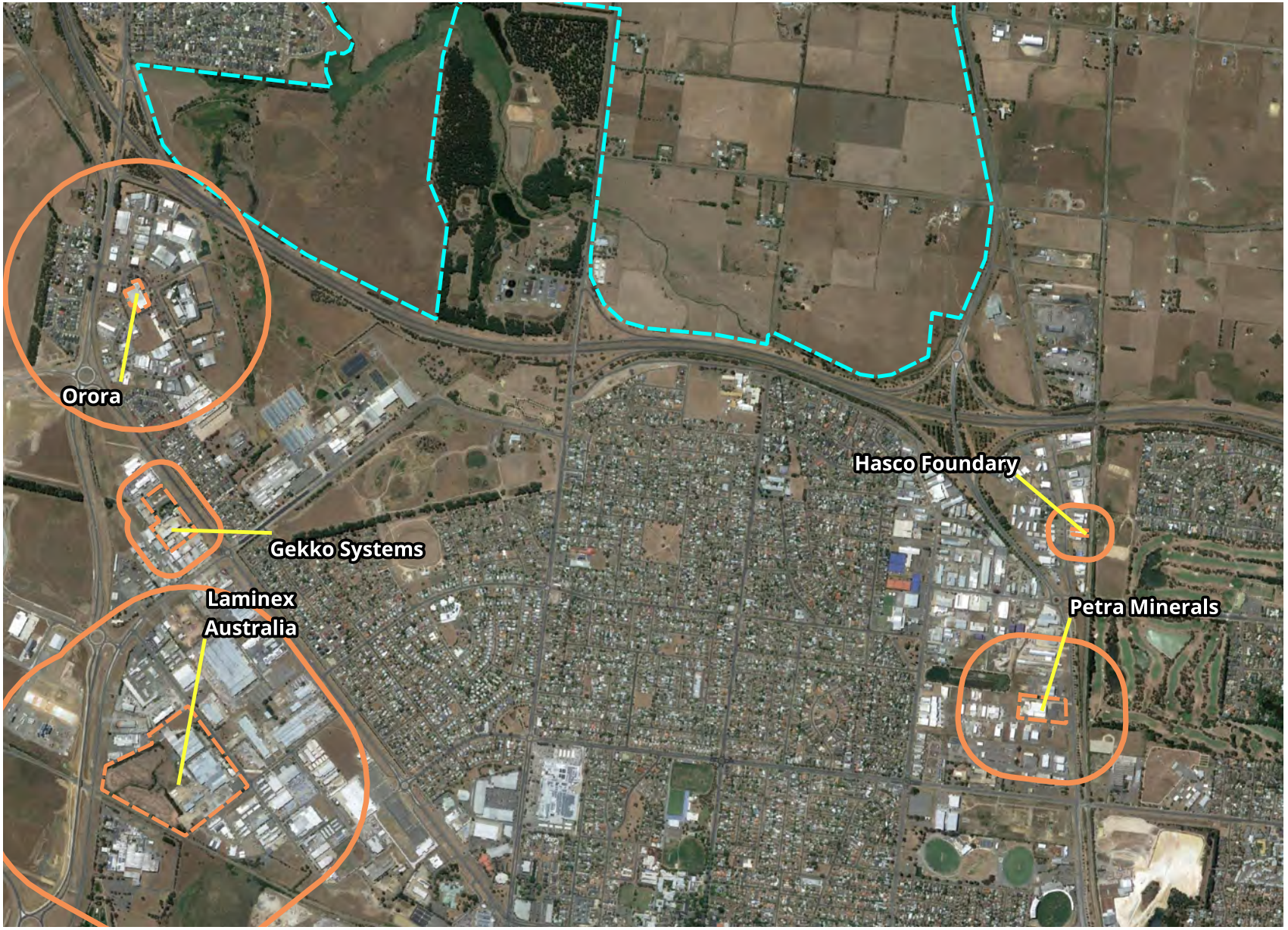

Legend

Boundary

- Core
- Expanded (Inclusion TBC)

Separation Distances

- Other Services Boundary
- Other Services Buffer

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Other Services with separation distances

Project No. **12619620**
Revision No. **-**
Date. **17/11/2023**

FIGURE 17

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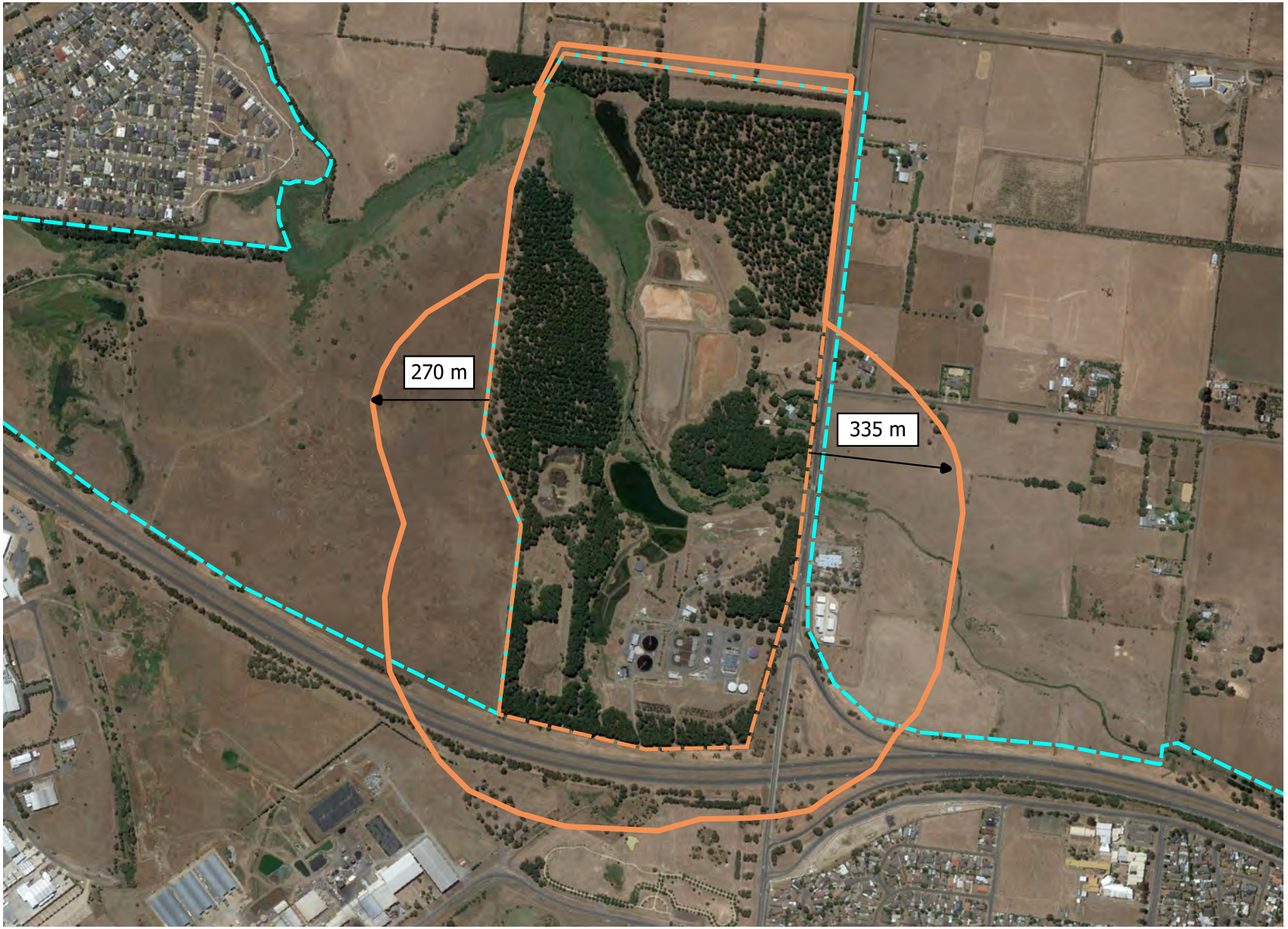

Legend

Boundary

- Core

Separation Distances

- Ballarat North WRP Boundary
- ESO4 Separation Distance

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Ballarat North Adverse Amenity Impact Assessment

Ballarat North WRP with separation distances

Project No. **12619620**
Revision No. **-**
Date. **17/11/2023**

FIGURE 18

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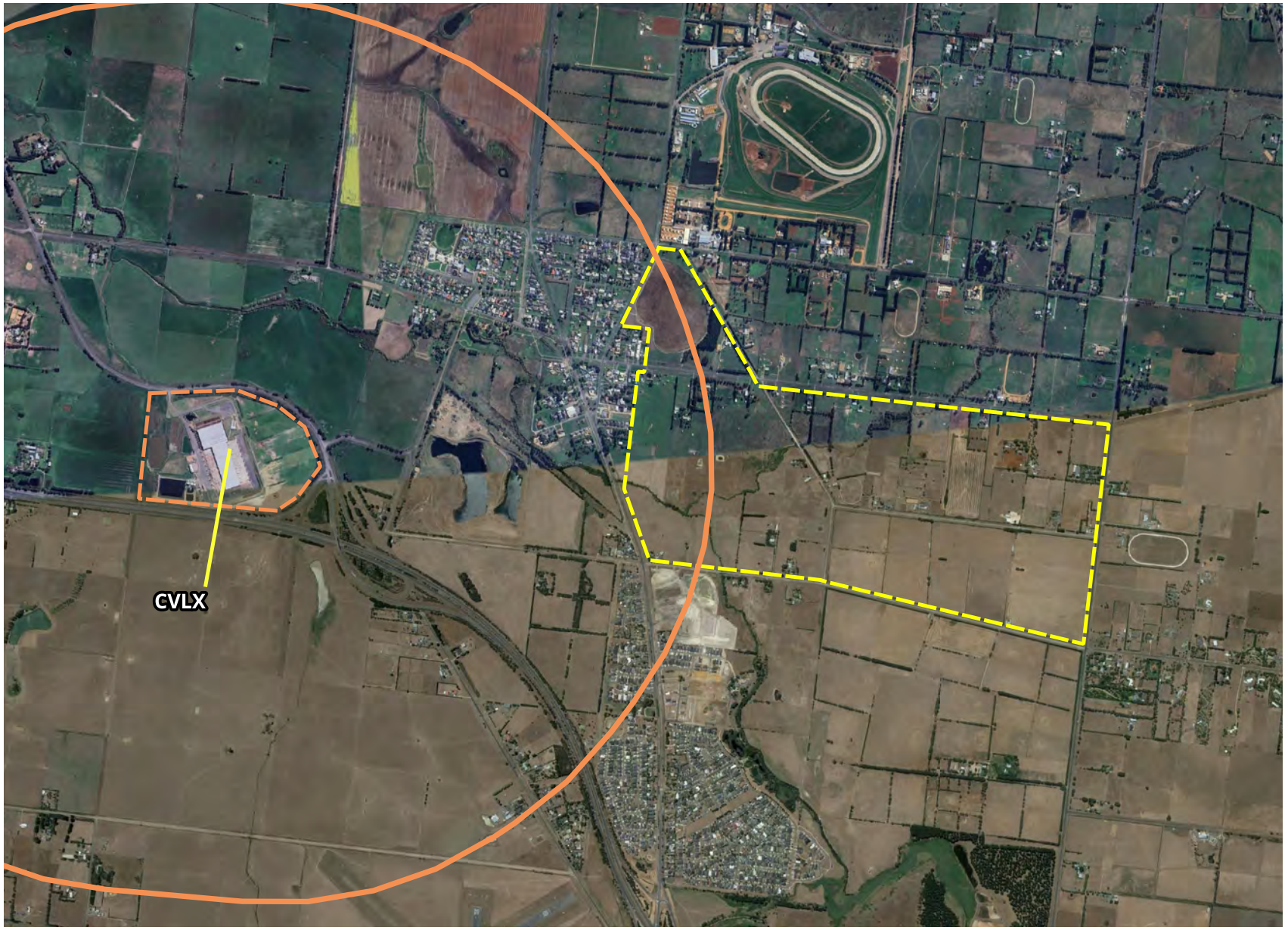

Legend

Boundary

- Core
- Expanded (Inclusion TBC)

Separation Distances

- CVLX Boundary
- CVLX Buffer

Paper Size ISO A4

0 0.25 0.5 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

GHD

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Ballarat North Adverse Amenity Impact Assessment

Livestock yard industries with separation distances

Project No. **12619620**
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Date. **17/11/2023**

FIGURE 19

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4.9 Transport

4.9.1 Vehicle emissions

The EPA has identified motor vehicles as being a major source of urban air pollution. In Melbourne in 2006, motor vehicle emissions contributed the following levels of pollutants to the overall air quality[10]:

– 72 per cent of all carbon monoxide (CO) emissions
– 70 per cent of all nitrogen oxides (NOx) emissions
– 28 per cent of all volatile organic compounds (VOC) emissions
– 31 per cent of all emissions of $PM_{2.5}$
– 27 per cent of all emissions of PM_{10}
– 6 per cent of all sulphur dioxide (SO_2) emissions

The EPA conducted a four year review[11] of air quality near major roads in Melbourne (including the Westgate Freeway) and Geelong in 2006. That study concluded:

– Particles measured as PM_{10} and $PM_{2.5}$ generally remained below intervention (criteria) levels
– In general, particle levels were similar to or slightly above background levels
– Carbon monoxide, nitrogen dioxide and sulphur dioxide were below intervention (criteria) levels
– Carbon monoxide, nitrogen dioxide and sulphur dioxide were similar to background site monitored
– Benzene levels were at intervention (criteria) levels
– Benzene levels were above background levels
– Within a short distance from the road, the air quality objectives are generally met, for example, the level of PM_{10} declined by 50% within 20 m of the roadside
– Improved fuel standard and vehicle design is expected to improve air quality near roads despite increased vehicle usage

Further, there is currently a parliamentary inquiry into the Health Impacts of Air Pollution in Victoria, with one of the focus areas being vehicle emissions. The report prepared as part of the inquiry notes that heavy vehicles, diesel vehicles and idling of vehicles have the largest impact on air quality. Various recommendations are outlined in the inquiry related to diesel vehicle emissions standards, guidelines to assist with the location of facilities (such as childcare centres) and methods to reduce vehicle idling.

In the absence of local policy, the policy outlined by the Brisbane City Council can be utilised as a guide. The Brisbane City Council planning scheme includes a transport air quality corridor planning scheme policy that provides guidance on best-practice built form and landscape design elements to:

1. Minimise the impacts of air pollution from vehicle traffic on the health and wellbeing of users of a child care centre, multiple dwelling, residential care facility or retirement facility
2. Maximise wind movement around buildings and the dispersion of traffic air pollutants
3. Minimise the impacts of air pollution from a tunnel ventilation stack on the health and wellbeing of occupants of sensitive uses

[11] EPA Victoria (2006) Publication 1025: *Environmental Report - Review of air quality near major roads*. Retrieved from: https://www.epa.vic.gov.au/-/media/epa/files/publications/1025.pdf

4.9.2 Application to the Precinct

Vehicle Emissions

Although none of the categories strictly apply to the Precinct, the first category can be used as a general principle to minimise impacts of air pollution from vehicle traffic. It is widely recognised that traffic pollutants reduce as distance from the road kerb increases. Thus, setting back sensitive development as far as practicable from Western Freeway will provide the best outcome for the health and well-being of occupants. Brisbane City Council recommend separation distances for the different traffic route types which are based on best available air quality roadside monitoring data and air quality modelling predictions.

The Brisbane City Council policy outlines the following acceptable outcome which can be applied to Western Freeway, Midland Highway and Howe Street:

– Development for a multiple dwelling, residential care facility, rooming accommodation where accommodating six people or more, or retirement facility.
– A set back distance separating the sensitive use from the kerb in accordance with recommended separation distances for the different traffic route types. A minimum of 30 m is recommended for a motorway, 20 m for a high-volume traffic route and 10 m for an intermediate volume traffic route.

The Western Freeway borders the south of the Precinct in east-west direction. This is an arterial road with a higher traffic volume as summarised in Section 4.2. These volumes may increase in future if the area will attain more residents and businesses. If Western Freeway is considered to be a high-volume traffic route then a 30 m set back from the kerb to sensitive uses would be sufficient. This should be confirmed by analysis of road traffic noise impact performed in accordance with VicRoads Traffic Noise Reduction Policy 2005. The buffer should be sufficient to meet 65 dB(A) $L_{A10,18hrs}$ criterion. This is relevant to development of new arterial roads and not directly applicable to new sensitive land uses encroaching upon existing roads, but can be used as a benchmark to ensure reasonable acoustic amenity for future residents.

Midland Highway borders the eastern side of the Core area running in a north-south alignment. There is a moderate amount of traffic volume as summarised in Section 4.2. If Midland Highway is considered to be a high-volume traffic route then a 20 m set back from the kerb to sensitive uses may be sufficient.

Howe Street runs through Miners Rest and to the western border of both the Core and Expanded areas running in a North-south alignment. There is a moderate amount of traffic volume as summarised in Section 4.2. If Ballarat-Maryborough Road is considered to be an intermediate-volume traffic route then a 10 m set back from the kerb to sensitive uses would be sufficient.

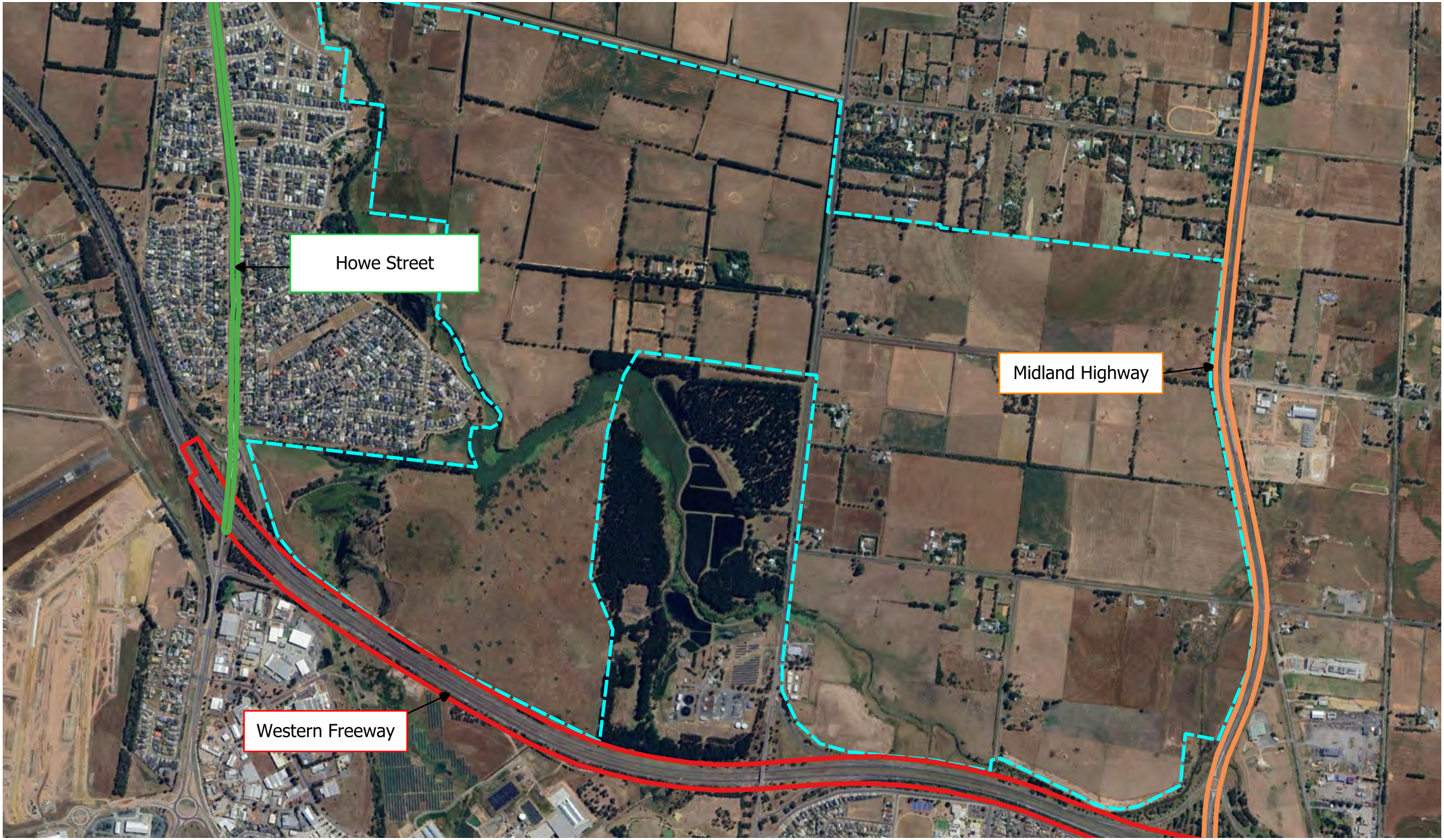
All other routes running through the precinct (i.e. Gilles Road, Sharpes Road, Muir Road, Garland Road, Sims Road, Olliers Road) are all considered to be local roads with small amounts of traffic and don't require setbacks.

The above set back for all roads have been displayed in Figure 20 and Figure 21. All setbacks specified above do not extend to the precinct boundary. The Ballarat Long Term Growth Options Paper (2020) has referenced:

"The Northern GIA is affected by road traffic noise from the Western Freeway and Midland Highway. Based on year 2031 traffic estimates and VicRoads requirements, the following noise mitigation measures apply to the GIA:

– *A 30 m buffer zone from the Western Freeway at the southern GIA boundary for residential dwellings.*
– *A noise wall between 2 and 4 m high at the GIA southern boundary with the Western Freeway.*
– *A noise wall between 2 and 3 m high at the GIA eastern boundary with the Midland Highway.*
– *Consideration of buffer zones, building restrictions (planning), building treatment or landscaping in cases where noise walls cannot be applied to the southern or eastern boundaries (e.g. access requirements)."*

Where the development cannot meet the recommended separation distance from the kerb, the policy includes an alternative to install ducted mechanical ventilation with the supply of clean outdoor air. Where the ventilation outdoor air intakes cannot be sufficiently separated from the kerb, a third alternative for achieving clean air for building occupants is provided. This involves installing particle filtration in combination with ducted mechanical ventilation.



Legend
- Core Area
- Western Freeway - 30m Setback
- Midland Highway/Ballarat-Maryborough - 20 m Setback
- Howe Street - 10 m Setback

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

Transport Air Quality Setback - Core Area

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 20

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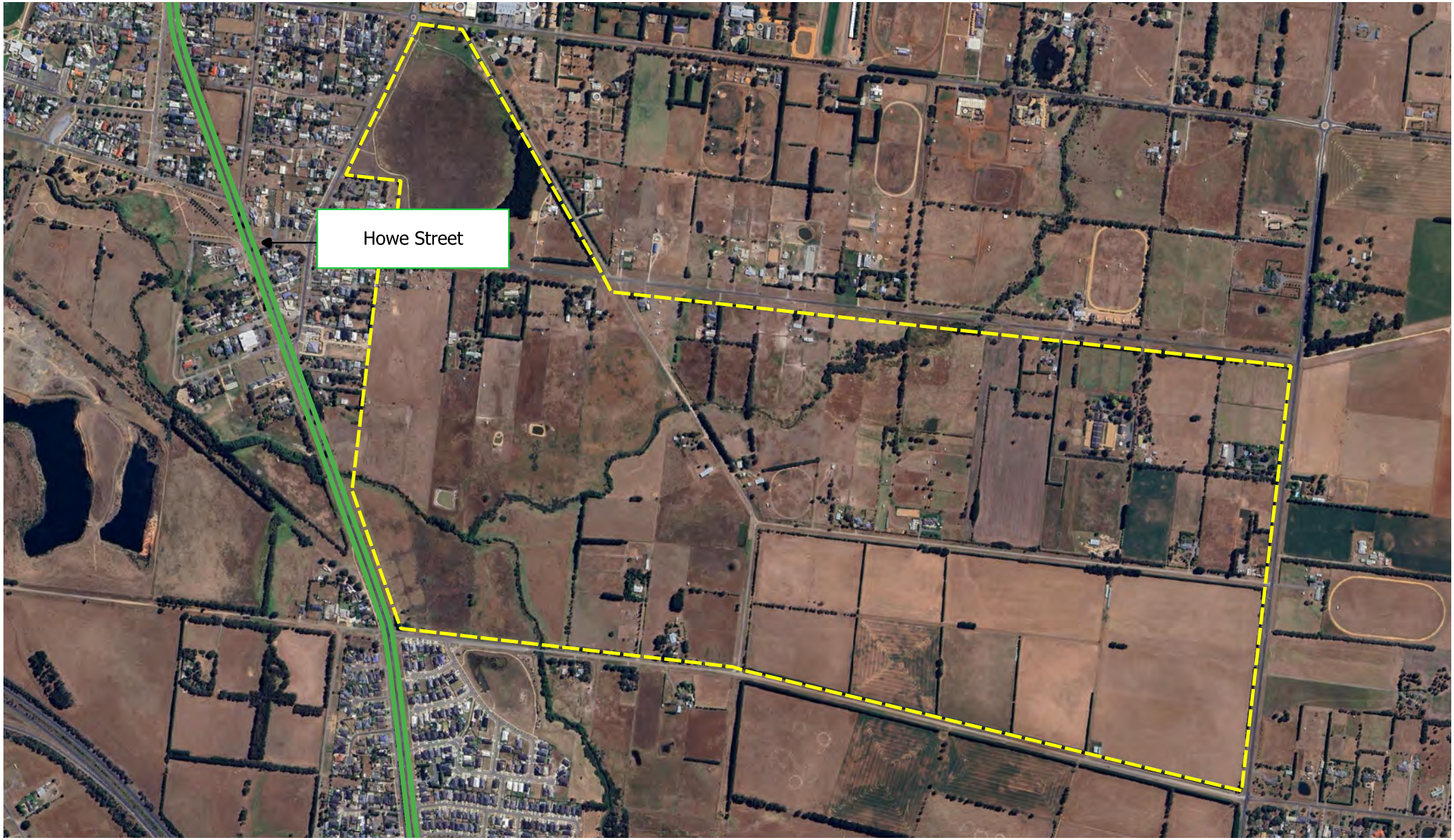

Legend

Boundary

- Expanded Area (Inclusion TBC)
- Howe Street - 10 m Setback

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

Transport Air Quality Setback - Expanded Area

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 21

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4.10 Future uses

Review of the Engage Victoria website and EPA website, at the time of preparing this report, indicates that there were no new uses proposed for the area that were seeking EPA approvals.

GHD notes that any future changes to the sites, which may impact the buffers will be subjected to further assessment through relevant departments or agencies: guidance and practice notes, strategies or documents.

4.11 Variation to separation distances

Sections 5.2 and 6.2 of Draft EPA Publication 1949 outlines the requirements to vary a separation distance. This section details Stage 3 of the decision-making process for both odour and dust separation distances. When an alternative separation distance is being considered, a risk assessment is prepared to determine the variability of the separation distance.

Draft EPA Publication 1949 identifies the following factors that can impact the acceptability of a recommended separation distance for odour and dust:

– Cumulative impacts
– Interface land uses
– The scale and configuration of the operation
– The environment surrounding the odour emitter
– Size of the source
– Type of dust emission
– Meteorology
– Terrain and interface land use
– The sensitivity of the receptor (existing and/or proposed)
– Historical context
– Management practices and engineering controls employed by the relevant industry

If these factors influence the acceptability of a recommended separation distance, EPA recommends a risk assessment be prepared to demonstrate that either the recommended separation distance is acceptable or the recommended separation distance can be varied.

4.12 Risk Assessment

A risk assessment identifies and evaluates the impacts and risks associated with an activity that may cause harm to human health or the environment. The purpose of a risk assessment for odour or dust is to show a clear understanding of the potential impacts of the activity source (whether it be odour or dust) on sensitive land uses. The findings of a risk assessment will assist in determining if a variation to a recommended separation distance is possible and appropriate.

EPA recommends that the risk assessment be to the satisfaction of the decision maker and should follow the guidelines set out in EPA publications relevant to the activity source:

– For an odour risk assessment, refer to Guidance for assessing odour (EPA publication 1883)
– For a dust risk assessment, refer to Guidance for assessing nuisance dust (EPA publication 1943)

EPA also recommends that a risk assessment uses a variety of assessment tools noted in relevant EPA publications to identify key elements that may affect the risks of odour or dust emissions from the source. A combination of tools can assist in providing a practical and compelling risk assessment.

Further detail on environmental and site-specific factors for odour and dust are outlined below.

4.12.1 Odour

To seek a variation of a recommended odour separation distance, Draft EPA Publication 1949 outlines that the proponent should:

– Provide a risk assessment that details the factors and risks associated with the odour source
– Based on the findings of the risk assessment, propose an alternative separation distance
– Based on the factors outlined in this section, demonstrate the proposed separation distance poses a low risk of odour impact

The three key assessment factors that EPA recommends are taken into consideration when considering an application to vary a recommended separation distance for odour are:

– Environmental and site-specific factors
– Management practices
– Engineered controls

An odour risk assessment in accordance with EPA Publication 1883 Guidance for Assessing Odour includes:

– Level 2 Assessment:
  - Source-Pathway-Receptor assessment
– Level 3 Assessment:
  - Comparison with similar operations
  - Field odour surveillance in accordance with EPA Publication 1881: Guidance for field odour surveillance
  - Complaint data analysis
  - Dispersion modelling

4.12.2 Dust

To seek a variation of a recommended for a dust separation distance, Draft EPA Publication 1949 outlines that the proponent should:

– Provide a risk assessment based on the source, pathway, receptor model, considering cumulative impacts where relevant
– Based on the findings of the risk assessment, propose an alternative separation distance
– Demonstrate that the proposed separation distance poses a low risk of dust impact

Evidence that the proposed separation distance poses a low risk of harm from dust may include an assessment of the size of the dust source, the type of dust emission, the frequency, intensity and duration of the dust emission and the level of dust control implemented.

A nuisance dust risk assessment in accordance with EPA Publication 1943 Guidance for Assessing Nuisance Dust may include:

– Source-Pathway-Receptor assessment
– Comparison with similar operations
– Dust monitoring
– Dust modelling and Dust Assessment

4.13 Level 2 Odour Assessment

Six industries were identified in Section 4.7 to have separation distance that encroaches the PSP, with Boral marginally just outside of the PSP. As such further assessment has been undertaken for each industry. Operations for all industries are related to risk of odour emissions, therefore GHD has referred to the Guidance for Assessing Odour (EPA Publication 1883) to assess the risk from the site. EPA Publication 1883 offers three levels of risk assessment to examine the potential for odour impacts to occur from industries.

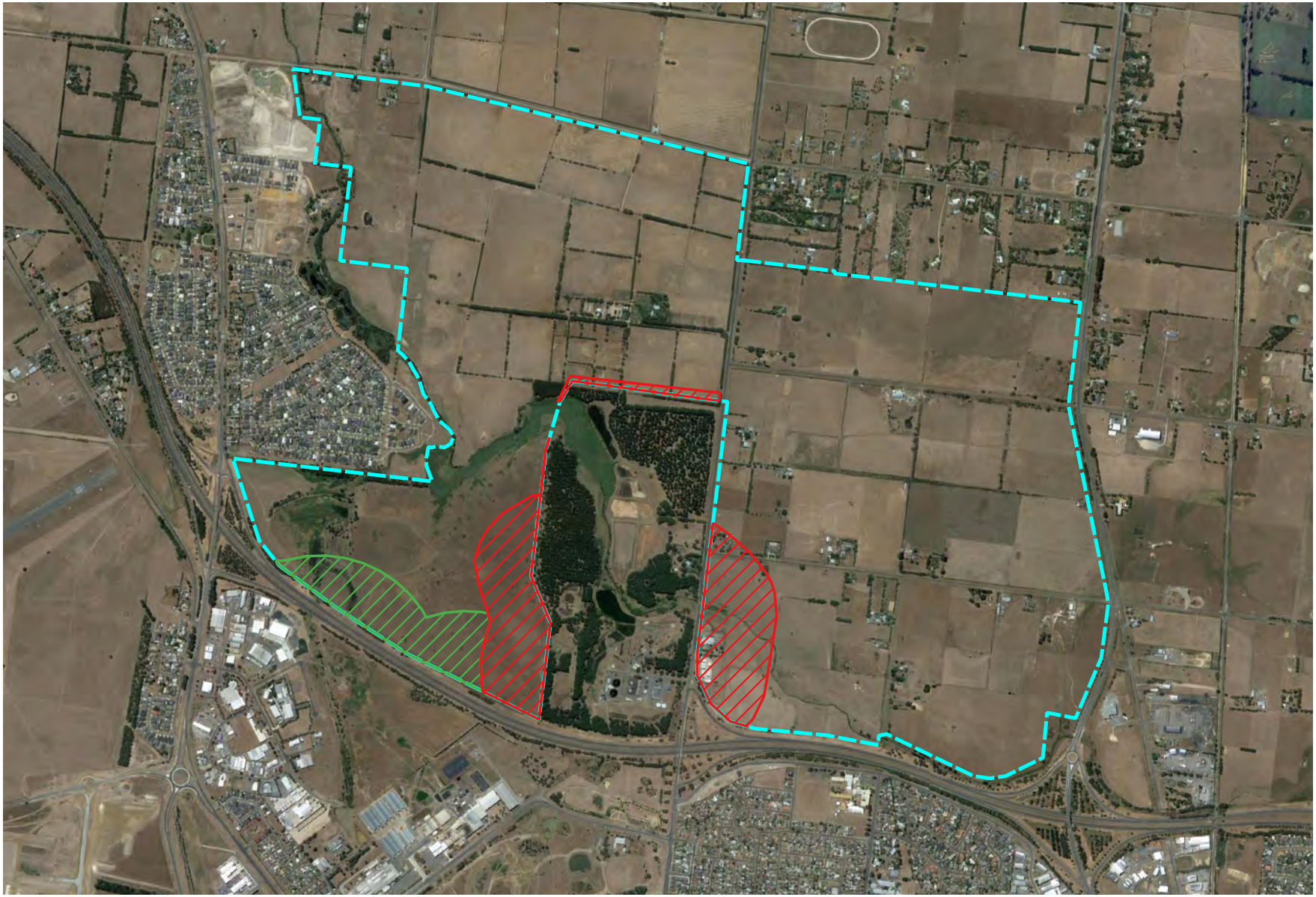
The level 2 assessment uses a source/pathway/receiving environment tool to assess the level of risk from the odour source. This is a qualitative method, however the outcome of the assessment is quantified with the use of scores determined by the EPA. The scoring of the assessment outcome is based on three attributes:

– Hazard potential of the source (odour source score – OSS)
– Exposure pathway between the source and sensitive locations (odour pathway score – OPS)
– Sensitivity of the receiving environment (odour receiving environment score – ORS)

GHD has applied the steps and tools in the level 2 assessment for each of the industries identified in Section 4.7 that have separation distances which encompass the PSP. The outcome of the level 2 assessment for each industry identified is summarised in Table 8 while the detailed assessment can be found in Appendix A to Appendix G. A plot of the risk rating for lands encroached by identified separation distances has been displayed in Figure 22.

Table 8 Summary of Level 2 Source-Pathway-Receptor Assessment for identified industries

	OSS	OPS	ORS	Overall Score	Rating	GHD Comments
Core Area						
Boral Asphalt	2	2	3	7	Low	No further assessment required.
Haymes Paint	2	2	3	7	Low	
Western Victoria Asphalt	2	2	3	7	Low	
Orora	2	2	3	7	Low	
McCain Foods	1	3	3	7	Low	
Central Highlands Region Water Corporation	4	3	3	10	High	Further assessment required – GHD notes that this has been undertaken in previously through odour modelling in the form of a ESO4. Refer to section 4.15
Expanded Area						
Central Victoria Livestock Exchange	4	2	3	9	Medium	Borderline case where further assessment may be required – Refer to section 4.15



Legend

Boundary

- Core

Level 2 S-P-R Risk Rating

- Low Risk
- High Risk

Paper Size ISO A4

0 0.5 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

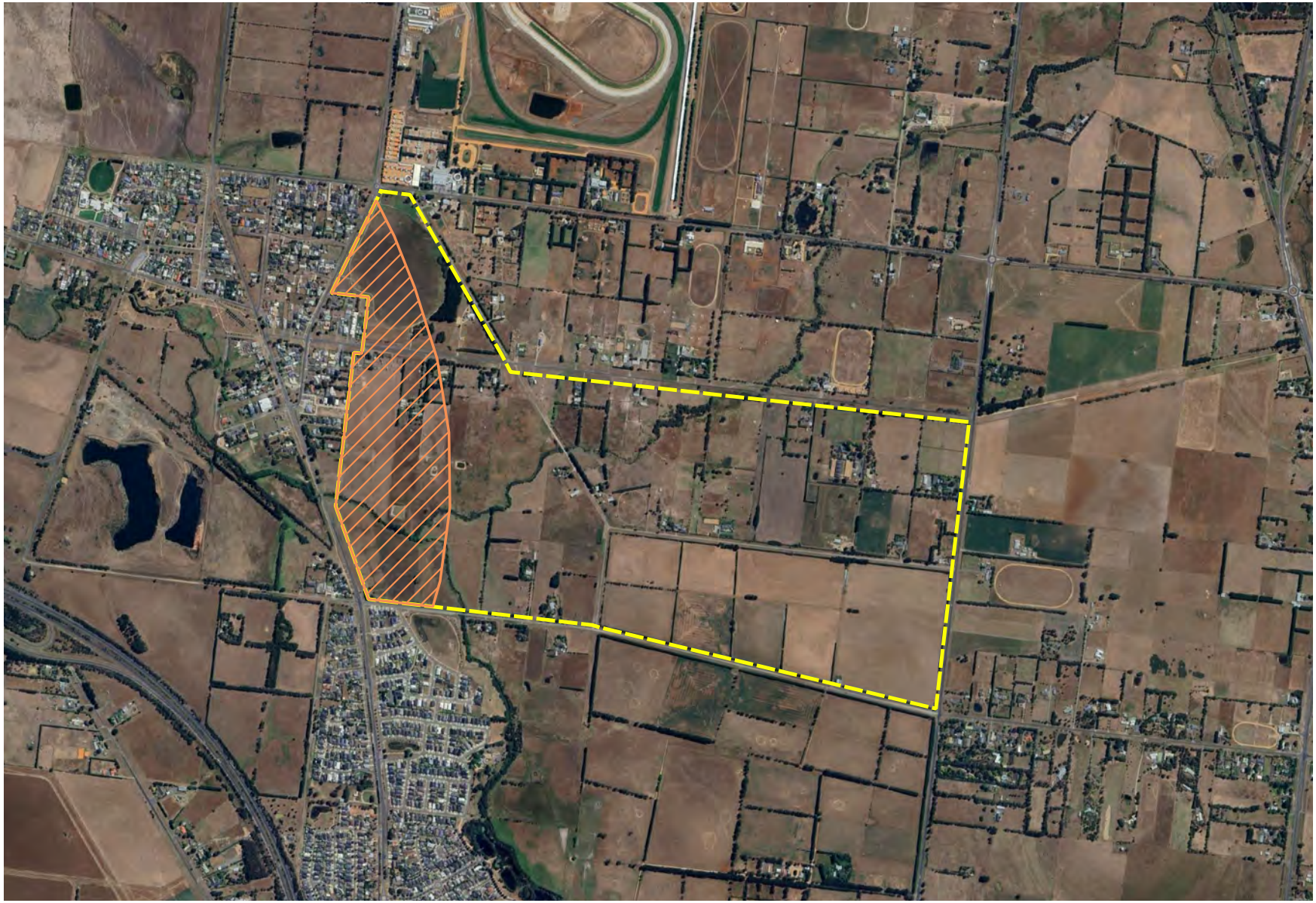
Core Area S-P-R Risk Rating

Project No. **12619620**
Revision No. **-**
Date. **16/11/2023**

FIGURE 22

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 16/11/2023

Data Source:Google Earth Imagery 2023.
Created By: ylim



Legend

Boundary

Expanded Area (Inclusion TBC)

Level 2 S-P-R Risk Rating

Medium Risk Area

Paper Size ISO A4

0 0.25 0.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

GHD

Victorian Planning Authority

Ballarat North Adverse Amenity Impact Assessment

Expanded Area S-P-R Risk Rating

Project No. **12619620**
Revision No. **-**
Date. **16/05/2024**

FIGURE 23

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12619620\GIS\Maps\Working\12619620_Sitemap_Ballarat North.qgz
Print Date: 16/05/2024

Data Source:Google Earth Imagery 2024.
Created By: ylim

4.14 Air quality mitigation strategies

To reduce disamenity (odour and dust impacts) to the proposed sensitive uses in the Precinct, the following potential mitigation measures are outlined for consideration where appropriate (i.e. in the event sensitive uses are located within a separation distance during the transition phase of an industry). Note that these are general in nature and a detailed assessment should be undertaken as required to quantify the nature of the impact and adequacy of any proposed mitigation measures.

Interface Land Uses

Interface land uses are those that can be located within separation distances between industrial land uses and sensitive land uses. Interface land uses neither generate significant odour emissions, nor warrant protection from them.

Table 3 from Draft EPA Publication 1949 reproduce here as Table 9 provides examples of activities and their suitability as interface land uses. This is not intended to be an exhaustive list of all activities. Other activities not listed should be assessed in accordance with the principles contained in this document.

Table 9 Interface land uses

Suitability	Land use
To be encouraged	Agriculture, car parks, emergency services facilities, natural systems, service stations, garden supplies, plant nursery, veterinary centre.
To be considered (subject to assessment)	Industry with no adverse amenity potential/risk of harm to human health and the environment, utilities (except for sewage works) offices, research centres, retail premises, informal outdoor recreation.
To be prevented	Land uses sensitive to odour and dust - including dwellings, hospitals, aged care facilities, education centres, childcare centres, places of worship, corrective institutions

Control of air quality emissions through built form

– The principal option is to limit the exposure of air emissions to residential openable windows/balconies. This can be dealt with in the design and orientation of buildings through urban design measures.
– Mechanical ventilation for rooms facing the potential source.
– Locate air intakes away from the potential source i.e. on the lee wind side of the building.
– Use of a filtration unit on heating, ventilating and air conditioning (HVAC) systems.
– Non-openable windows facing the potential source.

Control at source

Odour/dust emissions at source in an industrial premises can be reduced by odour/dust treatment/control. This can be requested for new industries as part of best practice or required by EPA. For those industries identified to cause a constraint, it is the EPA's responsibility to enforce compliance with Environmental Reference Standard (ERS) and the General Environmental Duty (GED) so that these sites do not cause off-site adverse impacts or odour/dust complaints under normal operations. EPA is also responsible for validating and investigating any odour/dust complaints that they receive.

It is also recognised that where there are industrial air emissions from a premises, even with good pollution control technology and practice, there may still be unintended emissions which must be anticipated and allowed for. Recent advice from EPA regarding Draft Publication 1949 noted that the separation distances are not a substitution for pollution controls. The industry should still be minimising risks of odour and dust so far as reasonably practical based on the current state of knowledge in that sector, (i.e., meeting the GED for that sector). Therefore, the separation distance is not a substitution for pollution controls and complying with the GED. Under the VPPs, industrial land uses have use rights which enable the industry to operate, provided they comply with relevant regulations.

4.15 Summary

From the results of the separation distance assessment, five constraints to the proposed Ballarat North Core Area and one key constraint for the Ballarat North Expanded Area were identified. Namely:

Core Area

– Haymes Paint, 500 m separation distance (odour)
– Western Victoria Asphalt, 500 m separation distance (odour)
– Orora, 500 m separation distance (odour)
– McCain Foods, 500 m separation distance (odour)
– Central Highlands Region Water Corporation, ESO4 (odour)

Expanded Area

– CVLX, 2000 m separation distance (odour)

Based on the outcomes of a level 2 risk assessment (section 4.11), Haymes Paint, Western Victoria Asphalt, Orora and McCain Foods have been assigned a “low risk” odour rating through a Level 2 Assessment.

Ballarat North WRP has been assigned a “high risk” odour rating and CVLX has been assigned a “medium risk” odour rating.

GHD notes that from a review of the most recent aerial imagery shows that no Western Victoria Asphalt plant has been built at the proposed site listed in the works approval document.

Based on the factors identified by Draft EPA Publication 1949 that can impact the acceptability of a recommended separation distance for odour and dust (section 4.11), the VPA may wish to further investigate the CVLX separation distance in the form of a risk assessment in accordance with Draft EPA Publication 1949. The risk assessment would demonstrate that either the recommended separation distance is acceptable, or the recommended separation distance can be varied. Based on GHD’s experience with CVLX and the large amount of complaint history, it is highly unlikely for the buffer to be reduced with further assessment. Hence GHD recommends the 2 km is adopted.

The conflicting sites relates to odour, any risk assessment should be undertaken in line with EPA Publication *1883 Guidance for assessing odour.* GHD notes that the purpose of the risk assessment would be not to redraw a line in the land outside of which there are “no risks”, but to assist in determining the level of risk of harm to human health and the environment and inform on the degree of risk in areas within the separation distance and what uses may be suitable.

Ballarat North WRP has been identified as a “high risk” site, with an existing ESO buffer. Previous odour modelling has been undertaken for the Ballarat North WRP and provided to GHD indicates that the risk of odour impact aligns with the current ESO buffer, therefore any changes to this buffer overlay is unlikely. This modelling work that has been undertaken would be considered to form one of the tools recommended as part of a Level 3 odour risk assessment. Based on the modelling results the identified area of “high risk” from the level 2 assessment would be unchanged and remain at high.

5. Noise and vibration impact

5.1 What is noise

Noise is generally defined as unwanted sound, which may be hazardous to health, interfere with speech, normal activities and could potentially be disturbing, irritating, or annoying. Noise can be generated from various sources, such as industrial/commercial premises, musical instruments, and transport operations.

Noise sources may have certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content. These characteristics may evoke penalties in accordance with Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Publication 1826.2, Environment Protection Authority, March 2021) (the Noise Protocol). There is evidence to suggest that noise with these characteristics can cause greater annoyance than noise without these characteristics at the same noise level.

5.2 Potential major noise sources

Industrial and commercial noise sources, which could have potential noise impacts on the amenity of noise sensitive uses within the PSP are mainly located outside of the PSP area (except of Ballarat Caravan & Trailer Repairs and Smith Wil Asphalt). There are some industries that are situated adjacent to the PSP boundaries like the WRP. List of industries that may impact on future sensitive land uses can be found in section 4.1.

There are road noise sources within the PSP and at the site boundary. They are expected to impact on areas that are adjacent to the busy roads (west, south, and east of the Precinct). Aircraft flyovers from Ballarat Aerodrome may be audible across all of the area.

Groups of major existing noise sources are summarised in Table 10. Noise monitoring program was not carried out for the area. Therefore it is difficult to suggest what noise levels may be typical for inner and boundary areas of the Precinct. A noise monitoring programme may be performed in future to characterise existing ambient and background noise levels, suggest applicable noise criteria and analyse suitability of land for particular use.

Table 10 Potential noise impacts from existing sources

Location	Source	Description	Part of the Precinct impacted
To the southern boundary of the Precinct	Western freeway	Traffic noise, with peaks during rush hours and events with maximum traffic volumes	Southern part of the Precinct
To the eastern boundary of the Precinct	Midland highway	Traffic noise	Eastern part of the Precinct
To the western boundary of the Precinct	Ballarat- Maryborough Road	Traffic noise	Western part of the Precinct
All site	Ballarat Aerodrome	Aircraft noise from flyovers	All Precinct
Within the southern part of the Precinct, at the southern boundaries of the Precinct	Multiple industrial sources	Mechanical equipment, loading and delivery activities	South and south western parts of the Precinct

5.3 Existing potential primary vibration sources

Potential vibration sources within and adjacent to the Ballarat North PSP may result from the following features:

– Pass-buys of heavy vehicles on the roads
– Ballarat Aerodrome

It should be noted that vibration impact may be noticeable in close proximity to a major road with traffic of heavy vehicles. It is not expected to be significant at larger separation distances. Airplane flights at lower altitudes may cause structural response of affected buildings like rattle of window panes. This effect is not expected in the area if flights are performed in accordance with conventional air traffic rules.

5.4 Legislation, guidelines and standards

5.4.1 The Noise Protocol

Noise associated with commercial, industrial and entertainment premises is managed under the EPA Victoria Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (the Noise Protocol).

The Noise Protocol provisions have been incorporated into the Environment Protection Regulations 2021 (EP Regulations 2021). The Noise Protocol provides a procedure for the purpose of determining noise limits for new and existing commercial, industrial and trade premises and entertainment venues as defined by the EP Regulations 2021. It sets the methodology for assessing the effective noise level to determine unreasonable noise under the provisions of EP Regulations 2021.

The Noise Protocol sets the maximum effective noise level allowed in a noise-sensitive area from commercial/industrial premises depending on the time of day, land use zoning and existing background noise levels. It should be noted that rezoning of the expanded part of the PSP (north) area to other types of the zones may change noise criteria applicable to existing or future industry or commercial facilities, which may require revision of applicable noise limits for existing and future noise generating activities. It should be noted that meeting limits in the Noise Protocol does not eliminate need for consideration of general environmental duty in the Environment Protection Act 2018. Potential environmental noise emissions from individual developments in the Precinct should be assessed in accordance with the requirements of the Noise Protocol during planning approval stages and where relevant planning conditions incorporated to require individual developments to demonstrate compliance with the Noise Protocol noise limits at the surrounding noise sensitive areas.

5.4.2 Victoria Planning Provisions (VPP) – Clause 58.04-3

Relevant clauses of the planning scheme specify indoor noise levels that should be met for residential dwellings within industrial areas or in a road or rail noise influence area.

In 2017, DELWP released a practice note for *Assessing External Noise Impacts for Apartments – Planning Practice Note 83* (August 2017) (PPN 83) to provide guidance about the operation of the VPP Clause 58.04-3. Potentially this document may be applicable in case apartment or similar developments will be planned in the Precinct due to presence of arterial roads and industries.

Table 11 VPP Clause 58.04-3 Noise influence area and indoor design noise criteira

Noise source	Noise influence area	Indoor noise criteria
Zone interface		Not greater than 35 dB(A) for bedrooms, assessed as a $L_{Aeq,8hr}$ from 10 pm to 6 am. Not greater than 40 dB(A) for living areas, assessed $L_{Aeq,16hr}$ from 6 am to 10 pm.
Industry	300 metres from the industrial 1, 2 and 3 zone boundary	
Roads		
Freeways, tollways and other roads carrying 40,000 Annual Average Daily Traffic (AADT) Volume	300 metres from the nearest trafficable lane	

Note that the *noise influence area* should be measured from the closest part of the building to the noise source.

It should be noted that only south western and south eastern parts of the core PSP area is formally classified as a “noise influence area” under definitions in Table 11. Distance 300 m from IN1Z and IN3Z zones covers areas adjacent to the north of the Western freeway.

5.4.3 Indoor sound levels – AS/NZS 2107

It is recommended the indoor sound levels of any building comply with the Australian Standard AS/NZS 2107:2016 "*Acoustics – Recommended design sound levels and reverberation times for building interiors*" (AS/NZS 2107: 2016). It should be considered as a supplimentary requirement to acoustic specification in the VPP Clause 58.04-3.

Table 1 of AS/NZS 2107: 2016 outlines recommended internal design sound levels and reverberation times for residential buildings, as reporoduced in Table 12. It should be noted that these recommendations are not applicable to rail or aircraft noise.

Table 12 Table 1 of AS/NZS 2107: 2016 Design sound levels for residential buildings

Type of occupancy/activity	Design sound level ($LA_{eq,t}$) range
Houses and apartments in suburban areas or near minor roads	
Apartment common areas (e.g. foyer, lift lobby)	45 to 50
Living areas	30 to 40
Sleeping areas (night time)	30 to 35
Work areas	35 to 40

5.4.4 Sleep disturbance

Impact of noise on sleep quality is greatly studied from long term effects perspective and sleep disturbance due to intermittent events is better correlated with maximum noise levels. Long term effects are typically addressed via design of average noise levels (such as $L_{Aeq,8hr}$), whereas sleep disturbance is better correlated to the maximum noise levels per event (i.e. L_{Amax}). Sleep disturbance can occur via changes in sleep state and awakening is more related to subjective assessments of sleep quality [NSW Road Noise Policy 2011 (NSW RNP)].

The World Health Organisation (WHO) *Guidelines for Community Noise* recommend a maximum internal noise level of L_{Amax} 45 dB(A) for sleeping areas and can be considered as equivalent to 60 dB(A) external noise level on a 15 dB outside and inside conversion for partially open windows. It is noted that a level of L_{Amax} 45 dB(A) is based on the noise level at which effects of noise induced awakenings are observed.

Studies by the EnHealth Council documented report titled *The health effects of environmental noise – other than hearing loss* dated May 2004 and also referenced in NSW RNP states that for short term events for good sleep over eight hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately L_{Amax} 45 dB(A) more than 10 or 15 times per night.

The NSW RNP also provides a summary of research in relation to noise induced sleep disturbance to date including the WHO and enHealth concluding the following:

– Maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep
– One or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly

A summary of the discussed sleep disturbance criteria is presented in Table 13. The NSW RNP approach has been previously accepted by Victorian Civil and Administrative Tribunal (VCAT) in relation to sleep disturbance. It should be noted sleep disturbance effects are usually taken into account in setting noise limits in regulatory and planning documents and is not considered separately.

Table 13 Summary of L_{max} Criteria for Sleep Disturbance

Source	Recommended internal L_{Amax}	Equivalent recommended external level[(1)]	Comment
WHO	45 dB(A)	60 dB(A)	Level at which the effects of noise induced sleep disturbance are observed.
enHealth Council	45 dB(A)	60 dB(A)	Recommended maximum noise level not exceed more than 10 – 15 times per night for a good sleep over eight hours.
NSW RNP	50 – 55 dB(A)	65 – 70 dB(A)	Level below unlikely to awaken people from sleep
	65 – 70 dB(A)	80 – 85 dB(A)	Level that not likely to affect health and wellbeing significantly if only occur one or two events per night.
[1]Equivalent external level based on a typical outdoor to indoor conversion of 15 dB for partially open windows. This is adopted by WHO guidelines.			

5.4.5 Aircraft noise – AS 2021:2015

Aircraft noise impact is assessed against the requirements of the Australian Standard AS 2021 – *Acoustics – Aircraft Noise Intrusion – Building Siting and Construction*.

In accordance with the AS 2021, the acceptability of the location of building is dependent on the applicable ANEF (Australian Noise Exposure Forecast) from aircraft noise to the site as outlined in Table 14.

Table 14 AS2021 Building Acceptability based on Aircraft noise exposure

Building type	Site ANEF		
	Acceptable	Conditionally Acceptable	Unacceptable
House, home unit, flat, caravan park	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Hotel, motel, hostel	< 25 ANEF	25 – 30 ANEF	>30 ANEF
School, university	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Hospital, nursing home	< 20 ANEF	20 – 25 ANEF	>25 ANEF
Public building	< 20 ANEF	20 – 30 ANEF	>30 ANEF
Commercial building	< 25 ANEF	25 – 35 ANEF	>35 ANEF
Light industrial	< 30 ANEF	30 – 40 ANEF	>40 ANEF
Other industrial	Acceptable in all ANEF Zones		

Acceptable sites

For a building site that is classified as ‘acceptable’, there is usually no need for the building design and construction to provide protection specifically against aircraft noise. However, it should not be inferred that aircraft noise will be unnoticeable in areas with ANEF 20 contour or lower.

Conditionally acceptable sites

For a building site that is classified as ‘conditionally acceptable’, the maximum aircraft noise levels for the relevant aircraft within the proposed development should achieve the recommended AS 2021 indoor design aircraft noise levels.

Unacceptable sites

For a building site that is classified as 'unacceptable', construction of the proposed building should not normally be considered. Where in the community interest development is to occur in such areas where the relevant planning authority determines that a development may be necessary within existing built-up areas designated as unacceptable, then constructions should consider attenuation measures to achieve the recommended AS 2021 indoor design aircraft noise levels.

The airport masterplan (Kneebush Planning Pty Ltd, 2013) and Ballarat Aerodrome Noise Modelling Report (Kneebush Planning Pty Ltd, 2018) contain Australian Noise Exposure Forecast (ANEF) contours predicted for future operation of the airport. While these existing assessments of aircraft noise impacts do not show that ANEF 20 and above contours will cover the area of the PSP, this is likely to change in the revised studies presently being completed as the operation of larger aircraft is considered. Accordingly, the potential for impact from aircraft noise on the Precinct has not yet been established, and it is not known whether specific noise mitigation measures to manage noise be required. In the event Ballarat Aerodrome experiences a significant increase of the aircraft movements, changes in the type of aircraft operated, or other factors that may increase the impact of noise impact, further studies may be required to identify the need for aircraft noise mitigation in sensitive land uses.

Recent draft aircraft noise assessment (Ballarat airport noise study. Noise model report. Marshall Day Acoustics, March 2024) shows that a small part of the precinct at the south west boundary may experience ANEF between 20 and 25, which is classified as "conditionally acceptable" for houses and other sensitive developments (refer to section 4.2). This issue may need to be addressed in future if residential buildings or similar sensitive land uses are permitted in the south western area of the new Precinct, which typically means that houses should provide a better noise attenuation.

Ballarat PSP has additional provisions for aircraft noise. Clause 18.02-7S Airports and Airfields states the following:

"Avoid zoning or overlay changes that allow noise-sensitive land uses outside the Urban Growth Boundary, and encourage measures to reduce the impact of aircraft noise in planning for areas within the Urban Growth Boundary, where ultimate capacity or long-range noise modelling indicates an area is within 'number above' contours (N Contours) representing:

– 20 or more daily events greater than 70 dB(A). 50 or more
– daily events of greater than 65 dB(A). 100 or more daily
– events greater than 60 dB(A)
– Six events or more between the hours of 11 pm to 6 am greater than 60 dB(A)."

Based on results of the recent aircraft noise assessment part of the precinct land at the south western boundary may experience number of events at 70 dB(A) more than 20, It means that this part of the Precinct should not be rezoned for noise sensitive uses under current recommendations in the Ballarat Planning Scheme, or consideration should be given to impact control solutions for future developments. It should be noted that findings in the latest aircraft noise assessment are still awaiting endorsement by AirServices Australia and projected increase in the air traffic in the area may not occur at the rates assumed in the aircraft noise report.

5.4.6 National Airport Safeguarding Framework

The *National Airports Safeguarding Framework* (NASF) developed by the Department of Infrastructure, Regional Development and Cities provides guidance on planning requirements for development that affects aviation operations. This includes building activities around the airport that might impact airport operations.

Guideline A of the NASF provides advice on the use of a supplementary suite of noise metrics, including the Australian Noise Exposure Forecast (ANEF) system and frequency-based noise metrics (N-contours), to inform strategic planning and provide communities with comprehensive and understandable information about aircraft noise.

5.5 Discussion of potential noise impacts from existing sources

Industrial and commercial noise sources, which could have potential noise impacts on the amenity of noise sensitive uses within the PSP are mainly located outside of the area except the southern part where asphalt plant and trailer repair are located. There are transport noise sources within the Ballarat North PSP and at the area boundary.

The Expanded area is currently zoned as Farming zone (FZ). Provisions of the Clause 35.07 of the Ballarat Planning Scheme are applicable to developments in this zone. This clause contains requirements for accommodation issues including noise if it may be affected specific recommendations as relevant to noise. The adverse impact may be caused by vehicular traffic, noise, blasting and vibration from an existing or proposed extractive industry operation if it is located within 500 metres from the nearest title boundary of land. Specific noise provisions may be applicable to future noise sensitive developments if rezoning is implemented for the Expanded area, which at the time of the assessment is still to be confirmed.

The Core area of the PSP is zoned as Urban Growth Zone (UGZ), which also does not have specific requirements for noise or vibration control. However if part of the Precinct may be intended for an apartment development funded by Victoria's Big Housing Built, then additional noise provisions in Clause 52.20-07 are applied. They specify internal design levels, which are similar to that described in the paragraph below. Similar provisions for internal noise levels of apartments can be found in Clause 55.07-7.

Planning requirements for the area and Clause 58.04-3

Sensitive land uses adjacent to the rail corridor and arterial roads are subject to noise control requirements in Ballarat Planning Scheme and other regulatory documents. Noise influence area extends 300 m from Industrial 1,2 and 3 zones and freeways, tollways carrying 40000 AADT traffic volume.

Recommended indoor noise limits for new dwellings outlined in Clause 58.04-3 are as follows:

1. Not greater than 35 dB(A) for bedrooms, assessed as an LAeq,8h from 10 pm to 6 am
2. Not greater than 40 dB(A) for living areas, assessed LAeq,16h from 6 am to 10 pm

Due to the relatively quiet rural nature of the area within the Ballarat North PSP, it is recommended that the above indoor noise limits are met, regardless of whether the proposed dwelling is located within relevant zones as per Clause 58 or not. This includes consideration of small industrial and commercial establishments such as auto and repair facilities.

5.6 Discussion of potential noise emissions

Ballarat North PSP may include noise sensitive developments. New and existing industrial and business/commercial dwellings have the potential to emit noise which may impact existing and future sensitive uses within the Precinct.

Clause 13.05-1S Noise management of the Ballarat Planning Scheme, gives reference to the following policy documents:

– The noise requirements in accordance with the Environment Protection Regulations under the Environment Protection Act 2017
– Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues (Publication 1826, Environment Protection Authority, May 2021) (the Noise Protocol)

Any proposed development within the Precinct should be designed and constructed such that the environmental noise emissions comply with the requirements of the Noise Protocol at the relevant surrounding noise sensitive receivers. This also includes new small commercial establishments such as petrol stations, auto facilities, workshops, and the like.

Where relevant, the planning authority should ensure that appropriate planning conditions are imposed to require prospective developments to demonstrate compliance with the Noise Protocol at surrounding noise sensitive areas. This involves requiring an acoustic assessment by a qualified acoustic engineer or other suitably skilled person to the satisfaction of the responsible authority, to demonstrate that the proposed development complies with the requirements of the Noise Protocol.

5.7 Discussion of potential vibration impacts

Pass-bys of heavy vehicles on arterial and local roads may induce ground borne vibration if sensitive receivers are located close to a road. Associated vibration may cause intermittent vibration nuisance to occupants of the surrounding sensitive receivers. Vibration levels at sensitive receivers would depend on various factors such as source type, distance to receivers and ground/soil properties. It should be noted that Victoria's regulatory documents do not contain ground borne vibration and noise criteria. NSW Rail Infrastructure Noise Guideline 2013 suggest criteria for ground- borne noise (measured inside buildings), they are summarised in the table below.

Table 15 Summary of ground- borne trigger levels $L_{Amax,Slow}$ for rail projects

Sensitive use	Time of day	Internal noise limit
Residential	Day (7 am- 10 pm)	40 dB(A)
	Night (10 pm- 7 am)	35 dB(A)
School, educational institutions, places of worship	When in use	40 – 45 dB(A)

The Guideline references NSW DEC Assessing Vibration: A Technical Guideline (2006) for vibration limits that may be applicable to rail projects.

It is difficult to recommend buffer for sensitive developments due to dependence of the impact on multiple factors. Vibration assessment carried out by a qualified acoustic engineer during development assessment stage is recommended in case sensitive developments are planned close to roads that may carry substantial traffic volume of heavy vehicles.

It is known that sometimes noise from low flying aircraft may cause structural response of buildings such as rattling of window panes. Operation of aircraft from Ballarat Airdrome is not expected to cause such effects if operation of aircraft is carried out in accordance with air safety rules and approved aviation practices.

5.8 General noise and vibration mitigation strategies

This section provides general guidance on potential mitigation strategies that could be implemented to control noise within prospective noise sensitive developments within the Ballarat North PSP and could be considered for control of external noise sources such as industrial noise, traffic and aircraft applicable to the proposed PSP.

Relevant in-principal noise mitigation strategies include:

– *Land use controls* (separating the location of noise-producing activities from sensitive areas)
– *Control in transmission* (reduce noise level at the receiver but not necessarily the environment surrounding the source, e.g. noise barrier, etc.)
– *Receiver control* (localised acoustic treatment at sensitive receptor)

More details on noise mitigation strategies may be provided as PSP progresses and more information is available for analysis of possible environmental impacts.

5.9 Summary

A summary of the noise assessment and recommendations for possible land uses that may be located within the Precinct are presented in Table 16.

Table 16 Noise assessment summary

Item	Assessment Item	Report Section	Summary	Recommendation for proposed uses to be located within the Precinct
1	**Ballarat Planning Scheme**			
1.1	Clause 13.05-1S Noise Abatement	5.4.1	Noise emissions from external plants associated with proposed developments within the Precinct (prospective industrial, commercial, residential, etc.) should comply with the requirements of the Noise Protocol	Appropriate planning permit conditions are imposed to require prospective developments to demonstrate compliance with the Noise Protocol at surrounding noise sensitive areas. Consideration of an acoustic assessment required by planning authority as part of the development approval process.
1.2	Clause 18.02-7S Airport and airfields	5.4.5	Ballarat Aerodrome currently accommodates aircraft operations where ANEF 20 or greater contours for aviation noise may cover small part of the south western PSP area. Also N70 contours are predicted to cover south western part of the Precinct. If results of the updated noise modelling study are endorsed, sensitive uses cannot be considered acceptable until unless	Although latest aircraft noise assessment shows that part of the precinct may be exposed to aircraft noise, this is based on certain assumptions including gradual increase of air traffic, which may or may not happen by year 2043. To address potential issues associated with aircraft noise: – Aircraft noise monitoring programme may be carried out in the area with greatest predicted exposure to confirm suitability of the land for sensitive development. However this will not address possible increase of aircraft noise in future. – Indicate area with predicted higher aircraft noise as not suitable for residential or other sensitive developments, or – Introduce planning provisions requiring developer to implement acoustic treatments of residences or other sensitive developments.
1.3	Clause 35.07 Farming zone	5.5	North of the Precinct (expanded PSP area) is classified as a Farming Zone	Consideration of an acoustic assessment required by planning authority as part of the development approval process. Acoustic assessment should be undertaken if the potential for accommodation to be adversely affected by vehicular traffic, noise and vibration from an existing or proposed extractive industry operation if it is located within 500 metres from the nearest title boundary of land on which a work authority has been applied.
1.5	Clause 52.20-7.7 Noise impacts, Clause 55.07, Clause 58.04-3	5.5	May be applicable to housing funded by Victoria's Big Housing Build program and future apartment developments if farming zone is changed to residential or other relevant zones	The clause contains internal noise requirements. They should be met for noise from mechanical plants or buildings located within a noise influence area. Proposed noise sensitive development within the PSP to be required to undertake a detailed noise intrusion assessment to demonstrate that the proposed design meets the internal noise limits.
2	**The Noise Protocol**	5.4.1 5.6	Applicable to industrial, commercial and entertainment premises	Refer to Items 1.1 and 1.5 above.

Item	Assessment Item	Report Section	Summary	Recommendation for proposed uses to be located within the Precinct
3	**AS/NZS 2107 Indoor Sound Levels**	5.4.3	Recommended as supplementary design internal noise level for residential dwellings in addition to provisions of Clauses 52.20-7.7, 55.07 and 58.04-3.	
4	**Sleep disturbance**	5.4.4	External sources such as traffic and industrial noise can high levels of generate short term noise events that could result in sleep disturbance at night.	Satisfaction of the sleep disturbance criteria in the bedrooms or sleeping areas of the noise sensitive development as defined by the limits recommended by the World Health Organisation.
5	**AS 2021 Aircraft noise**	5.4.5 5.5	The Precinct is supposed to be located outside of the ANEF 20 contour for Ballarat Aerodrome. Buildings developed within the Precinct are supposed to be acceptable for noise sensitive uses such as residential, accommodation, educational and health uses in accordance with the AS 2021.	*If air traffic operation will be expanded at Ballarat Aerodrome, the aerodrome operator should produce ANEF contours to verify that sensitive land uses in the Precinct PSP do not lay in the areas with ANEF exceeding 20.*
6	**National airport safeguarding network**	5.4.6	Refer to Item 1.2 above	Refer to Item 1.2 in above.
7	**Vibration impact**	5.7	Vibration from heavy vehicles movements potentially impact a part of the PSP adjacent to arterial and busy roads.	Vibration assessment is recommended before application approval is lodged in the event sensitive developments are planned close to arterial roads.

6. Future land use planning considerations

6.1 Key findings and development constraints

The key findings from each of the assessments are detailed below.

6.1.1 Odour and dust

EPA complaint history indicates that odour has been the predominant adverse amenity impact to air quality surrounding the Precinct. The most known number of complaints was attributed to CVLX followed by McCain Foods. Majority of complaints related to CVLX were listed under odour from livestock. It is noted that this type of odour character is more likely to be from sales held by CVLX while livestock are present on site.

A number of industries within the assessment area (2 km radius from the Ballarat North Precinct boundary) were identified as requiring a separation distance based on the EPA separation distance guidelines with a total of five industries encroaching the Core Area and one industry encroaching the Expanded Area.

The application of separation distances from the EPA guidelines showed that the Ballarat North PSP is affected by separation distances. Four industries with separation distances of 500 m pose some constraint on the Ballarat North PSP Core Area, namely Haymes Paint, Western Victoria Asphalt, Orora and McCain Foods. The Ballarat North WRP has an assessed separation distance of 407 m based on an equivalent population for 2048. Only one industry was identified to constrain the Ballarat North PSP Expanded Area, CVLX which attracts a 2000 m separation distance and encroaches a section of the western portion of the PSP.

In terms of other constraints identified to the Ballarat North PSP, a 30 m set back to mitigate air emissions from roads were also recommended for the Western Freeway to the south of the PSP, while a 20 m set back for Midland Highway and 10 m set back Howe Street is recommended.

Draft EPA Publication 1949 outlines that a separation distance may be varied if a risk assessment is undertaken to determine the variability of the separation distance. The following factors are identified as impacting the acceptability of a recommended separation distance for odour and dust:

– Cumulative impacts
– Interface land uses
– The scale and configuration of the operation
– The environment surrounding the odour emitter
– Size of the source
– Type of dust emission
– Meteorology
– Terrain and interface land use
– The sensitivity of the receptor (existing and/or proposed)
– Historical context
– Management practices and engineering controls employed by the relevant industry

Some of these factors may influence the acceptability of the recommended separation distances identified to pose a constraint, in such cases EPA recommends a risk assessment be prepared to demonstrate that either the recommended separation distance is acceptable, or the recommended separation distance can be varied. Given all conflicting sites relate to odour, any risk assessment should be undertaken in line with EPA Publication *1883 Guidance for assessing odour.*

A Level 2 odour risk assessment has been undertaken in accordance with EPA Publication 1883 Guidance for Assessing Odour for the identified six industries plus Boral Asphalt which had its separation distance marginally outside the PSP. Boral Asphalt, Haymes Paint, Western Victoria Asphalt, Orora and McCain Foods have been assigned a “low risk” odour rating. CVLX has been assigned a “medium risk” odour rating and Ballarat North WRP has been assigned a “high risk” odour rating.

For the “medium risk” and “high risk” sites, namely CVLX and Ballarat North WRP further assessment can be undertaken in the form of a level 3 odour assessment in line with EPA Publication 1883. GHD notes that as Ballarat North WRP has already had odour dispersion modelling undertaken which would form part of a Level 3 assessment. The outcome from the odour dispersion modelling indicates that the odour impact aligns with the ESO4 therefore it is unlikely for this ESO4 buffer to be modified and with the risk remaining high.

Based on GHD’s experience with CVLX and the large amount of complaint history, it is highly unlikely for the buffer to be reduced with further assessment. Hence GHD recommends the 2 km is adopted.

Therefore for both industries, no sensitive receptors should be proposed within the separation distances.

6.1.2 Noise and vibration

The following activities and industries may have the potential to impact the Ballarat North PSP:

– Noise from industries and businesses operated within the Precinct or close to the boundaries (asphalt plant, WRP)
– Noise from industries and businesses that are close to the Precinct boundaries (dominantly south eastern and south western areas)
– Noise from arterial and busy roads at the Precinct boundaries (Western freeway, Ballarat- Maryborough Rd, Midland Highway)
– Aircraft noise from Ballarat Aerodrome

Noise monitoring programme was not performed to characterise existing noise impact from industries and transport or background in the area. It may be beneficial to carry out unattended and attended noise measurements in line with requirements in EPA Victoria Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (the Noise Protocol). It will allow to obtain additional information on classification of background in the area and existing impact from industries and roads especially at the southern boundary of the precinct.

Sensitive land uses adjacent to arterial roads or industrial zones are subject to noise control requirements in Ballarat Planning Scheme and other regulatory documents as described in section 5.4. Proposed noise sensitive developments in a noise influence areas should be required to undertake a detailed noise intrusion assessment by a qualified acoustic engineer or other suitably skilled person to the satisfaction of the responsible authority, to demonstrate that the proposed design meets the following internal noise limits from external noise sources:

– Recommended indoor noise limits outlined in VPP Clause 58.04-3 as follows:
    - Not greater than 35 dB(A) for bedrooms, assessed as an LAeq,8h from 10 pm to 6 am
    - Not greater than 40 dB(A) for living areas, assessed LAeq,16h from 6 am to 10 pm

Due to the quiet rural nature of the area within most of the Precinct, it is recommended that the above indoor noise limits are met, regardless of whether the proposed dwelling is located within a noise influence area or not. This includes consideration of small industrial and commercial establishments such as auto, repair facilities and the like.

Any proposed development within the Precinct should be designed and constructed such that the environmental noise emissions comply with the requirements of the Noise Protocol at the relevant surrounding noise sensitive receivers. This also includes new small commercial establishments such as petrol stations, auto facilities, workshops, and the like.

Where relevant, the planning authority should ensure that appropriate planning conditions are imposed to require prospective developments to demonstrate compliance with the Noise Protocol at surrounding noise sensitive areas. This involves requiring an acoustic assessment by a qualified acoustic engineer or other suitably skilled person to the satisfaction of the responsible authority, to demonstrate that the proposed development comply with the requirements of the Noise Protocol.

6.2 Mitigation measures

It is assumed that the development of the site will occur incrementally over time, and therefore it is important that the management of the transition from existing to proposed uses minimises short term impacts of non-compatible uses.

Land use controls

Separating odour and/or dust producing activities from sensitive areas using a setback strategy (e.g. open space design adjacent to odour and/or dust sources to provide a reduction through setback distances to sensitive uses) is commonly adopted and recommended as part of this study locating sensitive uses outside the identified separation distance areas of existing industries.

The identified separation distances, as a minimum, indicate where the establishment of sensitive uses should be avoided to reduce potential adverse amenity issues.

Based on separation distances, this report has highlighted some locations where existing industries may have a detrimental impact on the amenity of proposed new sensitive uses and pose a conflict to the proposed uses within the Ballarat North PSP.

It is considered that the location of sensitive uses within prescribed separation distances of existing industries could raise the following two problems:

1. A risk to future sensitive uses being subjected to unacceptable odour, noise and dust during operations (amenity impacts)
2. The encroachment of sensitive uses on the separation distance areas of existing industries may result in unachievable or unreasonable requirements on the industries to mitigate the impacts at the source (reverse amenity impacts)

In order to manage the conflicts between existing and proposed land uses, there must be a balance between selecting measures that sufficiently mitigate amenity impacts and avoiding over regulation and therefore impacting on the ability to achieve other objectives such as urban growth and environmental sustainability.

Use of interface land uses located within separation distances between industrial land uses and sensitive land uses is another measure that can be utilised. Interface land uses neither generate significant odour emissions, nor warrant protection from them. Table 3 from Draft EPA Publication 1949 provides examples of activities and their suitability as interface land uses. Other activities not listed should be assessed in accordance with the principles contained in this document.

Staged development

Undertake a staged development approach (via a staging plan) to the extent possible as the area is predominantly in private ownership – so that sensitive uses are not developed within separation distance areas until the industry adequately reduces the off-site impacts or provides information pertaining to transitioning out of the area. Planning policy may be introduced to support this approach and put the onus on ensuring appropriate separation rests with the encroaching sensitive land use.

Control through built form

Some possible air and noise mitigation strategies that are available include (see sections 4.14 and 5.8 for further detail):

– Control in transmission i.e.:
    - Noise barriers
    - Earth mounds
    - use of landscaping features to provide acoustic barrier effect
    - use of terrain to provide efficient acoustic screening

– Control at receiver i.e.:
    - Building orientation where noise sensitive rooms do not face significant air pollution and noise sources
    - Building design and façade/roof acoustic treatment, e.g. use of materials that provide efficient acoustic attenuation
    - Mechanical ventilation for rooms facing away from the potential air pollution or noise sources
    - Minimising glazing surfaces that face noise sources, use of glazing systems with high sound insulation ratings. Building orientation, building façade and roof acoustic treatment, mechanical ventilation for rooms facing away from the potential source etc.

6.3 Recommended actions

There is a number of different types of planning controls that could be implemented to assist in mitigating the potential for adverse amenity impacts.

Based on the above investigations, the following recommendations should be considered:

- For the “medium risk” and “high risk” sites, namely CVLX and Ballarat North WRP constraining sites further assessment can be undertaken in the form of a level 3 odour assessment in line with EPA Publication 1883. GHD notes that as Ballarat North WRP has already had previous odour dispersion modelling undertaken which would form part of a Level 3 assessment. The outcome from the odour dispersion modelling indicates that the odour impact aligns with the ESO4 therefore it is unlikely for this ESO4 buffer to be modified and remain at high risk. Similarly, it is unlikely for further assessment to change the CVLX separation distance. Therefore VPA should avoid proposing sensitive receptors within the separation distances. GHD does not recommend any further assessment for air quality.
- Careful strategic planning of land uses to:
  - Plan where different types of land uses can be located using a setback strategy (separation distances) noting the planning principles outlined in the Municipal Planning Strategy.
  - Manage and minimise noise impact from sensitive and non-sensitive land use interfaces including but not limited to consideration of in-principle noise mitigation strategies outlined in this report.
  - Confirm future scenarios for Ballarat Aerodrome operations and findings in the draft aircraft noise assessment. If predicted noise impact for future scenarios exceeds recommended values for part of the precinct, noise sensitive developments may not be allowed in there or noise impact control measures must be incorporated into the buildings design.
  - Locate complimentary commercial and other business uses within the specified buffer distances to industrial developments and adjacent to arterial roads (interface land uses). The commercial and business land uses would act as a physical buffer between industrial activities and more sensitive land uses.
- The implementation of design controls within the Ballarat Planning Scheme (the planning scheme) and where appropriate development approval process to:
  - Implement application requirements into the planning scheme to appropriately facilitate sensitive uses within the separation distances and manage the risk of adverse amenity (i.e. an application requirement to undertake an odour/dust risk assessment).
  - Where appropriate place specific planning requirements as part of planning scheme amendments or planning permit conditions (i.e. control of air quality and noise emission) on proposed sensitive land use and developments in particular areas and implementing separation distance areas.
  - Require any proposed apartment developments to undertake external noise intrusion assessment to demonstrate that the development is designed and constructed to achieve recommended noise amenity targets outlined in VPP Clause 58.04-3 and sleep disturbance criteria as defined by World Health Organisation from external noise sources.
  - Require developments with potential to generate noise to undertake further acoustic assessment to demonstrate that the development is designed and constructed to comply with the Noise Protocol requirements at surrounding sensitive uses (including within the Precinct).
- It is recommended to perform noise monitoring to:
  - Estimate existing background levels within the PSP area and classify background in accordance with the Noise Protocol.
  - Characterise ambient noise from existing transport and industrial noise sources, especially at the southern boundaries of the precinct.
  - Estimate typical noise levels from aircraft flyovers since the Precinct is close to Ballarat Aerodrome.
  - Identify risks of excessive impact based on observation of existing noise sources in the area.

Appendices

Appendix A

Boral Asphalt Level 2 Odour Risk Assessment

A-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The asphalt production facility can be categorised under “Asphalt Plant“, as such as a moderate odour potential has been applied to the site.

The odour character can be classified as unwelcome which covers Asphalt/bitumen.

A weighting is then applied for the effectiveness of odour controls at the site. On the NPI, Boral Asphalt is listed to have a fabric filter/baghouse installed onsite and have wind breaks and enclosed stockpiles. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 2 + 0 = 2.

Table A1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table A2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

A-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table A3 presents the selected categories to assess the OPS.

Table A3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of two was determined as the site is located approximately 400 m from the precinct with a slight encroachment to the precinct as discussed in Section 4.
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. Boral Asphalt is located at the southeast portion of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under southeasterly winds and >1% of the year under easterly winds. Therefore, a score of one has been allocated to the PSP.
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation.
– Hours of operation: GHD understands that usual operations occurs between 8 am and 3 pm on weekdays. Therefore, a score of two was determined for hours of operations.

Applying rating from Table A3, the OPS score is 2 (taken as the maximum score of all the categories)

A-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table A4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table A4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table A4, the ORS score is 3

A-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 2
– OPS = 2
– ORS = 3

The overall level 2 assessment score = 7, meaning activity is low risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a low risk, GHD does not consider necessary for further assessment for the proposed facility. The EPA Publication 1883 also does not require further assessment with directions to proceed to reporting.

Appendix B

Haymes Paint Level 2 Odour Risk Assessment

B-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed paint manufacturing facility can be categorised under “Paint and ink production“ as such as a moderate odour potential has been applied to the site.

The odour character can be classified as unwelcome which covers paints/ink.

A weighting is then applied for the effectiveness of odour controls at the site. On the NPI, Haymes Paint is listed to have a fabric filter/baghouse and cyclone/multicyclone installed onsite. There is also a list of cleaner production activities. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 2 + 0 = 2.

Table B1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table B2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

B-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table B3 presents the selected categories to assess the OPS.

Table B3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of two was determined as the site is located approximately 350 m from the precinct with a slight encroachment to the precinct as discussed in Section 4.
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. Haymes Paint is located at the southwest portion of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under south-westerly winds. Therefore, a score of one has been allocated to the PSP.
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation.
– Hours of operation: GHD understands that usual operations occurs between 7:30 am and 5 pm on weekdays. Therefore, a score of two was determined for hours of operations.

Applying rating from Table B3 the OPS score is 2 (taken as the maximum score of all the categories)

B-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table B4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table B4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table B4, the ORS score is 3

B-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 2
– OPS = 2
– ORS = 3

The overall level 2 assessment score = 7, meaning activity is low risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a low risk, GHD does not consider necessary for further assessment for the proposed facility. The EPA Publication 1883 also does not require further assessment with directions to proceed to reporting.

Appendix C

Western Victoria Asphalt Level 2 Odour Risk Assessment

C-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed Asphalt production facility can be categorised under “Asphalt Plant“ as such as a moderate odour potential has been applied to the site.

The odour character can be classified as unwelcome which covers Asphalt/bitumen.

A weighting is then applied for the effectiveness of odour controls at the site. On the Works Approval Licence condition WA_W8, Western Victoria Asphalt is required to install “a baghouse that meets the specifications” supplied and have “enclosed conveyor” systems for asphalt production and “a system that will reuse for site dust control the stormwater that has been captured in the bunds”. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 2 + 0 = 2.

Table C1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table C2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

C-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table C3 presents the selected categories to assess the OPS.

Table C3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of two was determined as the site is located approximately 275 m from the precinct with a slight encroachment to the precinct as discussed in Section 4.
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. Western Victoria Asphalt is located at the southwest portion of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under south-westerly winds. Therefore, a score of one has been allocated to the PSP.
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation.
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation.

– Hours of operation: GHD is unaware of operating hours for Western Victoria Asphalt however assume that operations will be constrained to between typical work hours on weekdays. Therefore, a score of two was determined for hours of operations.

Applying rating from Table C3 the OPS score is 2 (taken as the maximum score of all the categories)

C-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table C4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table C4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table C4 the ORS score is 3

C-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 2
– OPS = 2
– ORS = 3

The overall level 2 assessment score = 7, meaning activity is low risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a low risk, GHD does not consider necessary for further assessment for the proposed facility. The EPA Publication 1883 also does not require further assessment with directions to proceed to reporting.

Appendix D

Orora Level 2 Odour Risk Assessment

D-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed aluminium can manufacturing facility does not have a specific category but is most similar to the category of “metal casting and production as such as a moderate odour potential has been applied to the site.

The odour character can be classified as unsafe which covers Metallic/foundry.

A weighting is then applied for the effectiveness of odour controls at the site. From GHD’s site visit, all manufacturing was observed to be within an enclosed building with any venting occurring from stack on the building. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 2 + 0 = 2.

Table D1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table D2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

D-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table D3 presents the selected categories to assess the OPS.

Table D3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of two was determined as the site is located approximately 450 m from the precinct with a slight encroachment to the precinct as discussed in Section 4
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. Orora is located at the southwest portion of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under south-westerly winds. Therefore, a score of one has been allocated to the PSP
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation
– Hours of operation: GHD understands that usual operations occurs between 8 am and 5 pm on weekdays. Therefore, a score of two was determined for hours of operations

Applying rating from Table D3 the OPS score is 2 (taken as the maximum score of all the categories).

D-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table D4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table D4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table D4, the ORS score is 3

D-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 2
– OPS = 2
– ORS = 3

The overall level 2 assessment score = 7, meaning activity is low risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a low risk, GHD does not consider necessary for further assessment for the proposed facility. The EPA Publication 1883 also does not require further assessment with directions to proceed to reporting.

Appendix E

McCain Foods Level 2 Odour Risk Assessment

E-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed food manufacturing facility can be categorised under “Food preparation“ as such as a low odour potential has been applied to the site.

The odour character can be classified as innocuous which covers fried/roasted foods.

A weighting is then applied for the effectiveness of odour controls at the site. All food manufacturing at McCains are undertaken in enclosed buildings with odour likely to be captured by an exhaust fan and vented. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 1 + 0 = 1.

Table E1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table E2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

E-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table E3 presents the selected categories to assess the OPS.

Table E3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of three was determined as the site is located across the Western freeway from the precinct with a slight encroachment to the precinct as discussed in Section 4
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. McCain Foods is located at the southwest portion of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under south-westerly winds and >1% of the year under southerly winds. Therefore, a score of one has been allocated to the PSP
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation

– Hours of operation: GHD understands that usual operations occurs 24/7. Therefore, a score of three was determined for hours of operations

Applying rating from Table E3, the OPS score is 3 (taken as the maximum score of all the categories).

E-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table E4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table E4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table E4, the ORS score is 3

E-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 1
– OPS = 3
– ORS = 3

The overall level 2 assessment score = 7, meaning activity is low risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a low risk, GHD does not consider necessary for further assessment for the proposed facility. The EPA Publication 1883 also does not require further assessment with directions to proceed to reporting.

Appendix F

Central Highlands Region Water Corporation Level 2 Odour Risk Assessment

F-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed WRP is listed as a mechanical plant which does not fall under a specific category, therefore GHD have applied the category “Sewerage treatment“ conservatively and as such a very high odour potential has been applied to the site.

The odour character can be classified as unsafe which covers Sewage/septic.

A weighting is then applied for the effectiveness of odour controls at the site. The WRP has two odour control systems in place, namely the inlet works and biofilter. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 4 + 0 = 4.

Table F1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table F2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

F-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table F3 presents the selected categories to assess the OPS.

Table F3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of three was determined as the site is located adjacent to the precinct with an encroachment to the precinct as discussed in Section 4
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. Ballarat WRP is located adjacent to the southern portion of the PSP boundary. As such winds from the east to west directions would put the PSP land downwind of the site for approximately:
    - >1% of the year under easterly winds
    - >1% of the year under south-easterly winds
    - >1% of the year under southerly winds
    - >1% of the year under south-westerly winds
    - >1% of the year under westerly winds

    In total approximately 5.7% of the winds are recorded under 2 m/s from all directions, therefore a score of one has been allocated to the PSP
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation
– Hours of operation: GHD understands that based on the nature of wastewater treatment plants while they may not operate all hours of the year, odorous emissions are likely to occur 24/7. Therefore, a score of three was determined for hours of operations

Applying rating from Table F3, the OPS score is 3 (taken as the maximum score of all the categories)

F-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table F4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table F4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table F4, the ORS score is 3

F-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 4
– OPS = 3
– ORS = 3

The overall level 2 assessment score = 10, meaning activity is “high risk” in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a high risk further assessment is required to classify the risk.

Appendix G

CVLX Level 2 Odour Risk Assessment

G-1 Odour Source Score (OSS)

To determine the odour potential of the source, the guideline refers the reviewer to Appendix A and Appendix B. The proposed food manufacturing facility can be categorised under “Feedlots and saleyards“ as such a very high odour potential has been applied to the site.

The odour character can be classified as unwelcome which covers Urine/Manure and animals (livestock).

A weighting is then applied for the effectiveness of odour controls at the site. CVLX have an odour management plan which includes guidelines on best management practices for the sheep yards, cattle yards, truck delivery and wastewater systems. As some mitigation and control measurements will be implemented at the proposed site a moderate weighting has been selected.

Applying the ratings from Table 1 and 2, the OSS score is 4 + 0 = 4.

Table G1 Derivation of scores for odour source hazard potential (Table 1 of EPA Publication 1883)

Score	Activity type	Size of odour hazard	Offensiveness potential
1	Low odour potential: Column 1, Appendix A	**Small size:** Materials usage hundreds of tonnes/m3 per year Area sources of tens of m2.	**Innocuous** Most people would not be bothered by the odour; however, prolonged or frequent exposure may cause adverse reactions.
2	Moderate odour potential: Column 2, Appendix A	**Medium size:** Materials usage thousands of tonnes/m3 per year Area sources of hundreds of m2.	**Unwelcome** Unpleasant odour range: although not likely to be perceived as toxic or unsafe, these odours are usually unwelcomed for most people.
3	High odour potential: Column 3, Appendix A	**Large size:** Materials usage hundreds of thousands of tonnes/m3 per year, or Area sources of thousands of m2.	**Unsafe** Likely to trigger adverse responses as people are likely to perceive odour/s as unsafe or toxic. Most people would adversely react to these odour types.
4	Very high odour potential, Column 4 in Appendix A.		

Table G2 Odour control effectiveness weighting (Table 2 of EPA Publication 1883)

Category	**High:** – Tangible mitigation measures in place leading to little or no residual odour; releases only due to plant failure. – Fully enclosed operations with extraction and treatment equipment utilising best available technology and techniques.	**Moderate:** – Some mitigation measures in place, but significant residual odour remains. – Some areas of the site may be controlled but there are areas not addressed. – There is a lack of maintenance or monitoring of equipment.	**Ineffective:** – Open air operation with no containment – Reliance solely on management techniques requiring human intervention – Composting technology not commensurate with risk of feedstock.
Weighting	-1	0	+1

G-2 Odour Pathway Score (OPS)

To determine the effectiveness of the transmission of odour from the potential source to receiving environment, the following categories are considered:

– Distance of receiving environment to the source
– Meteorology of receiving environment to the source
– Terrain and built form within the area
– Hours of operation of odour generating activities

Table G3 presents the selected categories to assess the OPS.

Table G3 Derivation of scores for odour exposure pathway effectiveness

Score	Category			
	Distance	**Meteorology**	**Terrain & Built From**	**Hours of Operation**
1	**Long distance:** Receiving environment is kilometres or hundreds of metres from source.	**Favourable**: Winds rarely (<10%) blow from source away from receiving environment.	**Favourable:** Highly built-up intervening zone with multiple non-sensitive uses that have no emissions of their own. Densely forested. Source is downslope of receiving environment (or located in a valley or quarry hole).	**Low frequency:** Emissions are rare and only occur if there is a significant upset or multiple lines of failure. Emissions related to specific infrequent planned (monthly or annual) activities).
2	**Medium distance:** Receiving environment is tens to hundreds of metres from source. Separation distance has not been met or only just met at the threshold distances.	**Neutral:** Even distribution of winds (10-20%) from source to receiving environment.	**Neutral:** Moderate vegetation, source is on same altitude as receiving environment. Intervening land use zone contains other non odorous industry or smaller businesses.	**Moderate frequency:** Emissions or operations not continuous, typically confined to business hours during the day. Reasonably regular in frequency (once per day to several times per week).
3	**Short distance:** Receiving environment is adjacent to the source/site. Distance well below (less than half) separation distance).	**Unfavourable** High frequency (>20%) of winds from source to receiving environment.	**Unfavourable:** Flat cleared land. Source is upslope of receiving environment, with isolated dwellings or structures in pathway. Receiving environment abuts source.	**High frequency:** Emissions continuously occurring 24/7 or for long periods at a time (eg. Landfills, oil refineries, sewage treatment plants etc.

– Distance: A score of two was determined as the site is located approximately 1800 m from the precinct with a slight encroachment to the precinct as discussed in Section 4.
– Meteorology: The incidence of light winds (<2 m/s) predominately occur from the southeast and east-southeast for approximately 0.6% and 0.7% of the monitoring period. CVLX is located to the west of the PSP boundary. This would place the PSP downwind of the site approximately >1% of the year under westerly winds. Therefore, a score of one has been allocated to the PSP.
– Terrain & built form: A score of two was determined for the industrial and residential area with both the facility and precinct having approximately the same elevation.
– Hours of operation: GHD understands that usual operations occurs between 8 am and 5:30 pm on weekdays. Therefore, a score of two was determined for hours of operations.

Applying rating from Table G3, the OPS score is 2 (taken as the maximum score of all the categories)

G-3 Odour Receiving Environment Score (ORS)

The sensitivity of the receiving environment has two aspects: the overall land use in the receiving environment and the compliance history, social or historical context experienced by people in the receiving environment (where a +1 is added to the odour receiving environment score (ORS).

Land use is based on the land use terms and nesting diagrams in the Victoria Planning Provisions (VPP) land use terms. These are grouped into three categories, which are fully detailed in Table G4 below. Assessment is based on the most sensitive land-use within (or proposed to be within) the separation distance or two kilometres, whichever is closest.

Table G4 Derivation of scores receiving environment sensitivity

Score	Sensitivity	VPP Land use term or nesting group (number in bold)	Existing Uses
1	Low	– 73.04-3 Agriculture group (sub-group animal production) – 73.04-2 Agriculture group – 73.04-10 Recreational boat facility group – 73.04-15 Warehouse group – 73.04-5 Industry group – 73.04-7 Earth and energy resources group – 73.04-13 Transport terminal group – 73.04-14 Utility installation group – 73.04-16 Renewable energy group – Car park – Saleyard – Tramway – Natural systems – Freeway service centre – Service station	– Industrial use or equivalent rural use (in the case of agricultural odours). No population nearby or uses are transient (e.g., state parks etc.). – Exposure to odours can easily be avoided.
2	Medium	– Research centre – Winery – Cemetery – Crematorium – Emergency services facility – 73.04-8 Office group – 73.04-6 Leisure and recreation group – 73.04-9 Place of assembly group – 73.04-11 Retail premises group – 73.04-12 Retail Premises group (sub-group of shop) – Brothel – Art and craft centre – 73.04-4 Education centre group	– Business areas: exposure can typically be controlled by mitigation at the receptor (incorporated health ventilation and air conditioning systems etc.). – Receptors that are single dwelling or isolated rural dwellings receptor is business/commercial. – Enjoyment of the outdoors: recreational activities, playing sport, populations can move on or plan around exposure.
3	High	– Rural living zones – Hotels/motels – Hospital – Prison – Mixed use zones with residential apartments (at ground or 2 to 3 storeys). – 73.04-1 Accommodation group – Residential areas	– Built up area, towns, many dwellings with backyards and outdoor living areas. – Rural residential, schools, childcare or apartments. – Permanent populations where avoiding exposure is not possible.

In this case, the most sensitive land is proposed in the precinct. GHD is unaware of any compliance, social or historical issues experienced by people in the receiving environment, therefore the additional (+1) is not required to be added.

Applying rating from Table G4, the ORS score is 3

G-4 Overall level 2 score

A level 2 source pathway receiving environment score (SPR) is achieved by adding the ORS, OSS and OPS together. Therefore, based on the above:

– OSS = 4
– OPS = 2
– ORS = 3

The overall level 2 assessment score = 9, meaning activity is medium risk in accordance with the Level 2 assessment. Given the results of the level 2 assessment results in a medium risk it is classified as a borderline cases where there may be one element that can influence the score and tip it into a low or high score. In these cases, this should be explored further.

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