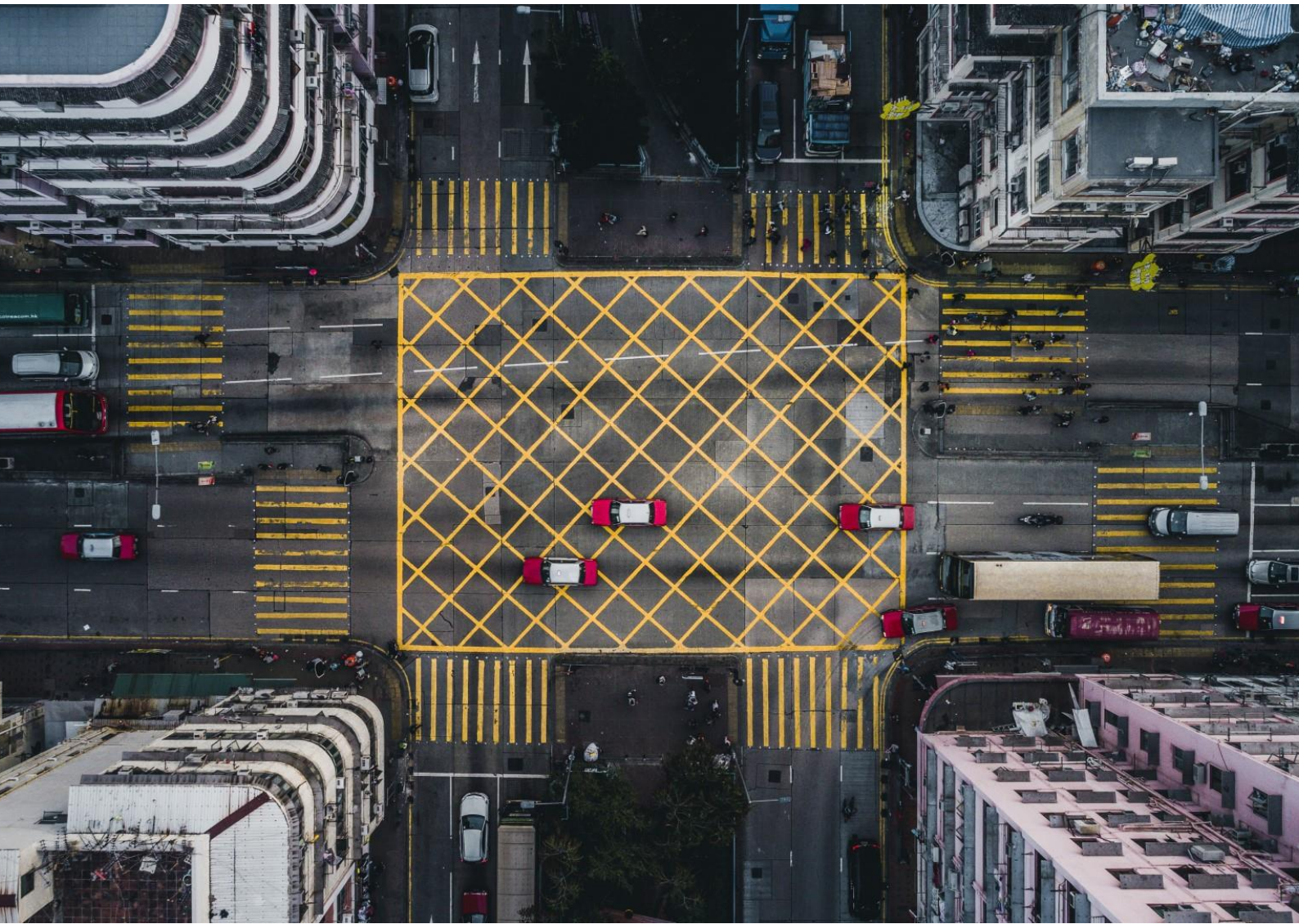
Arden Transport Precinct

Arden Structure Plan – Amenity Risk Assessment

Victorian Planning Authority

23 August 2021

→ **The Power of Commitment**



GHD Pty Ltd | ABN 39 008 488 373
180 Lonsdale Street, Level 9
Melbourne, Victoria 3000, Australia
T 61-3-8687 8000 | **F** 61-3-8732 7046 | **E** melmail@ghd.com | **ghd.com**

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Executive summary

GHD was engaged by the Victorian Planning Authority (VPA) to provide advice regarding the management of adverse amenity impacts in the Arden Transport Precinct (the Precinct).

Work undertaken by GHD in 2019 identified four businesses with a separation distance in accordance with the EPA separation distance guideline[1] (EPA Publication 1518) that affect the Precinct (i.e. in direct conflict with the proposed future urban structure of the Precinct which includes a proposed hospital, proposed primary school and residential dwellings).

The four industries include:

– Citywide – Asphalt plant (500 m separation distance)
– Holcim – Concrete batching plant (100 m separation distance)
– Irwin Stockfeeds – Grain and stockfeed mill and handling facility (250 m separation distance)
– Weston Milling – Flour mill (250 m separation distance)

GHD was subsequently engaged to provide further advice regarding the management of adverse amenity impacts in the Precinct. In accordance with the 'agent of change' principle outlined in EPA Publication 1518 an assessment was undertaken to investigate if a variation of the default separation distances was appropriate. Through a combination of a qualitative risk assessment (Source-Pathway-Receptor concept) and fieldwork investigation (odour surveillance), GHD investigated the potential to vary the separation distances of the four identified industries and the subsequent risk they pose to amenity within the Precinct as proposed.

Risk Assessment Outcomes

Source-Pathway-Receptor assessment

The S-P-R concept allows for a prediction of the odour or dust impact based on the 'magnitude of source release, the effectiveness of the pathway and sensitivity of the receptor'. The S-P-R assessment focused on upset events occurring and the emission controls and management procedures in place to mitigate such events from having an impact offsite.

The outcome of S-P-R risk assessment indicated the overall level of risk from each of the four industries varies from Low for Holcim, Weston Milling and Irwin Stockfeeds to Medium for Citywide. The overall risk is considered to apply to the entire recommended separation distance for each industry given that the separation distances are designed to protect against off-site emissions in the event of an upset.

The results indicate that sensitive uses can be implemented within the separation distances of Holcim, Weston Milling and Irwin Stockfeeds. For Citywide, the implementation of sensitive uses may be acceptable if controls are in place. Control of air quality emissions through built form is one example.

From information provided by Holcim, GHD understands that the concrete batching plant is a temporary facility which is to be de-commissioned when it will be no longer be required for Metro tunnel construction purposes. Thus, the 100 m separation distance identified, and the subsequent low risk will not apply after decommissioning.

Given the assessment concerns existing industries, empirical observations are possible of what is happening on the ground within the Precinct, and therefore considerable weight should be given to the observational findings of community-based tools such as complaints analysis and odour surveillance programs. The S-P-R risk outcomes were therefore adjusted to account for the empirical evidence.

[1] EPA Publication 1518 dated March 2013

Complaint history

EPA sent through an updated complaint history from 2013 until April 2021. A total of fifteen odour complaints alleging odour from Citywide were provided. Of most interest, is the period from the end of 2018 when Citywide installed a large odour control upgrade their site. There were only two odour complaints from 2019 and 2020 combined. With regards to dust there were three complaints attributed to Weston Milling, two for Melbourne Metro Tunnel and one for Irwin Stockfeeds. GHD was unable to verify the sources of the complaints. However, from the existing residential locations within the Precinct there have only been two dust complaints (assumed to be in relation to Weston Miling's upset in 2013 along Muster Terrace), one in relation to Irwin Stockfeeds, no other dust or odour (since 2019) complaints have been recorded in the existing residential locations (see section 2.4 for locations of existing residential receptors). There has also been an increase in sensitive uses in the Precinct with the introduction of the Woolworths development (Corner of Macaulay Road and Vaughan Terrace in North Melbourne) which has not resulted in an increase in complaints. This suggests that the industries are not generating odour or dust reports in nearby residential areas within the recommended separation distances.

Odour surveillance

GHD undertook 10 odour surveys in accordance with the EPA odour surveillance guidance.

Odour was observed from two of the identified industries, namely, Citywide and Irwin Stockfeeds. Odour from Citywide was observed in the surrounding area (e.g. on Arden Street, Green Street etc.), whereas odour from Irwin Stockfeeds was not observed beyond the property boundary.

Updated risk accounting for Empirical evidence

Based on the results of the odour surveillance, GHD increased a portion of the medium risk zone to moderate risk for the Citywide facility as obvious odour was detected out to a maximum distance of 152 m. Beyond 152 m GHD did not detect any obvious odour, with subtle odour being 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, GHD reduced the risk categorisation from medium to low to give a greater weight to the empirical evidence. The reduction to low risk beyond 377 m is also supported by the complaint history, with a lack of complaints from the existing receptors located within the recommended separation distance.

No obvious odours were detected off-site in relation to the other three industries (Holcim, Weston Milling and Irwin Stockfeeds) therefore the S-P-R risk categorisation remained unchanged. Given the S-P-R risk categorisation was low for these three industries, GHD left the risk unchanged at low even with the lack of complaints from within the separation distances.

Meteorology

No further adjustments due to meteorology were made to the distances informing the zones of risk, given that they have already accounted for local wind regimes through the odour surveillance campaign. A conservative approach has been adopted taking the maximum distance detected to inform the zones of risk.

Future land use planning considerations

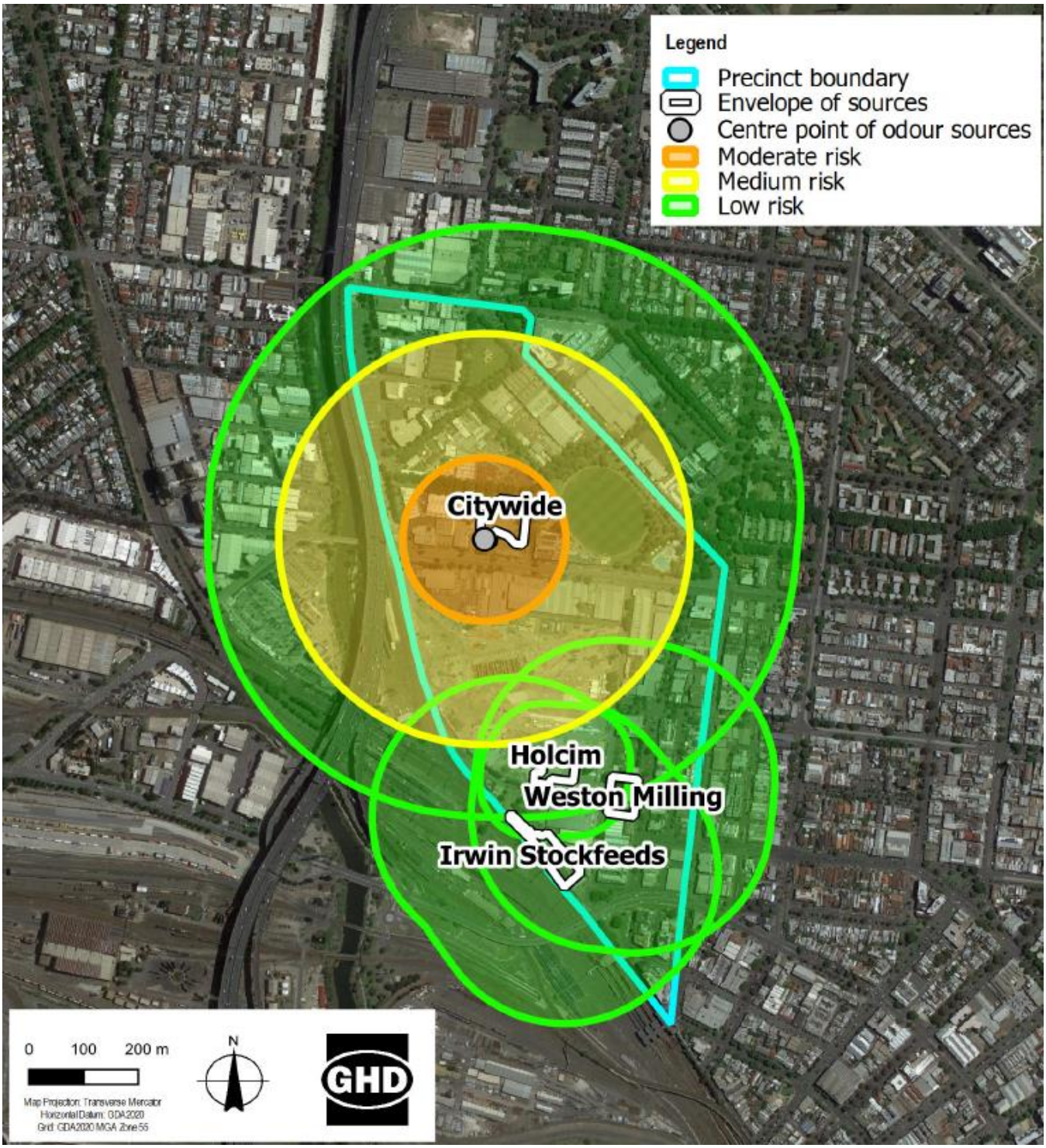
It is assumed that the development of the site will occur incrementally over time, and therefore it is important that the management of the transition from existing to proposed land uses minimises short term impacts of non-compatible uses.

GHD recommends the use of planning controls to assist with the future land use planning of the Precinct, namely:

– Use of interface land uses
– Setback strategy
– Staged development
– Control of odour and dust emissions through built form
– Implementation of application requirements for sensitive uses

From the results of the risk assessment, areas of low and medium risk are considered to be more suitable for the introduction of sensitive uses (subject to mitigation measures being implemented at the receptor for the medium risk areas such as building design controls). For moderate risk areas, sensitive uses are not recommended until controls are implemented at source and receptor. While for high risk areas, sensitive uses are recommended to be prohibited until such time that the industry ceases to operate.

A map of the final risk assessment results taking into account empirical evidence is provided below.



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1. Introduction

1.1 Context

GHD was engaged by the Victorian Planning Authority (VPA) to provide advice regarding the management of adverse amenity impacts in the Arden Transport Precinct (the Precinct). GHD understands that the VPA is currently working to implement a structure plan for the Precinct.

The Precinct is located less than two kilometres from the Melbourne central city and adjacent to the established suburbs of North Melbourne, Kensington, West Melbourne and the evolving mixed-use Macaulay urban renewal precinct. GHD understands that the Precinct will transform underutilised industrial land into a world class urban renewal precinct accommodating 34,000 jobs and 15,000 new residents by 2051. However, to deliver this outcome, the VPA has sought further investigations to assist with the preparation of planning controls to implement the structure plan via a planning scheme amendment.

The VPA has previously engaged the preparation of a desktop Adverse Amenity Impact Assessment of the Precinct. This work was undertaken by GHD in 2019 (GHD 2019[2]) and identified four businesses with a separation distance in accordance with the EPA separation distance guideline[3] (EPA Publication 1518) that affect the Precinct (in direct conflict with the proposed future urban structure of the Precinct which includes a hospital, primary school and residential dwellings).

The four industries are:

– Citywide – Asphalt plant - 208-292 Arden Street, North Melbourne
– Holcim - Concrete Batching Plant - 77 Laurens Street, North Melbourne
– Irwin Stockfeeds – Grain and stockfeed mill and handling facility - 1 Laurens Street, North Melbourne
– Weston Milling – Flour mill - 40 Laurens Street, North Melbourne

The establishment of compatible land uses and/or accommodating industrial uses in contemporary cities is an increasingly significant issue in the development of urban areas, and presents a two-fold challenge:

– The risk of newly developed sensitive uses being subjected to unacceptable amenity impacts
– The encroachment of sensitive uses into the separation distance areas of existing industries which may result in unachievable or commercially unreasonable constraints being required of the industries to mitigate the impacts at the source (‘reverse amenity’)

Through a combination of a qualitative risk assessment and fieldwork investigation (odour surveillance), GHD has investigated the possibility of varying the separation distances of the four identified industries and the subsequent risk they pose to amenity within the Precinct.

It is noted that the assessment undertaken by GHD in this report relates to odour and dust amenity only, in line with EPA Publication 1518. The purpose of a qualitative risk assessment is to maintain sufficient separation between sensitive land uses (such as residences) and industries that have the potential to generate emissions of nuisance dust and/or odour so that on the occasion of an upset or malfunction, the off-site adverse amenity is minimised. This separation distance risk assessment utilises an assessment methodology in accordance with the ‘agent of change’ principle based on Section 9 of EPA Publication 1518, as agreed with EPA[4].

1.2 Purpose of this report

The purpose of this report is to provide advice to the VPA regarding the management of adverse amenity impacts in the Arden Transport Precinct. The report should be read in conjunction with the limitations and assumptions in section 1.4 and 1.5 respectively.

[2] GHD 2019, Arden Adverse Amenity Impact Assessment
[3] EPA Publication 1518 dated March 2013
[4] Meeting with EPA, VPA and DoT on 16 March 2021

1.3 Scope of works

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

General

– Inception meeting held with the VPA, EPA and Department of Transport (DoT) to clarify and confirm methodology, objectives, reporting, program and discuss any outstanding issues or queries.
– Request and review relevant information pertaining to each of the four identified industries.
– Site visits to inspect each of the four identified industries.
– Review of each industry's operations including emission controls and management procedures in place.

Risk Assessment

– Undertake a qualitative risk-based assessment (for odour and dust) based on the Source-Pathway-Receptor concept, to determine the relative risk of amenity impact.
– Based on the local meteorology, establish the likelihood and subsequent risk to amenity occurring during an upset from the four identified industries at the Precinct.
– Conduct an odour surveillance program.

Reporting

– Review the recommended EPA separation distances for each industry and conclude whether there are factors that would likely result in a variation to the separation distance.
– Provide conclusions as to the likely areas of risk to amenity (high, medium and low) within the Precinct (and any mitigation needed).
– Provide recommendations on appropriate planning controls to manage the risk of adverse amenity to support the introduction of sensitive uses while the Precinct is in transition.

1.4 Scope of limitations

This report has been prepared by GHD for the Victorian Planning Authority and may only be used and relied on by Victorian Planning Authority for the purpose agreed between GHD and the Victorian Planning Authority as set out in section 1.2 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 1.5 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Victorian Planning Authority and others who provided information to GHD, which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.5 Assumptions

The following assumptions were made in preparation of the report:

– Operations and odours observed at the four industry's during the time of GHD's site visit (March and April 2021) are assumed to be representative of routine operations.
– Conditions observed during the odour surveillance program are considered to be representative of routine operations.
– Information provided by each industry regarding plant equipment/ technology, operations, control measures and complaint history is true and correct.
– The local meteorological data from the EPA operated automatic weather station (AWS) located at Footscray is representative of the Precinct.

2. Site overview

2.1 Location and land use

The Precinct is located in North Melbourne and encompasses the land bordered by Macaulay Road, Dryburgh Street and the Upfield rail corridor. The centre of the Precinct area, bordered to the west by the Citylink roadway and Upfield rail line, is zoned Public Use (PUZ4 -Transport). The north of the Precinct includes Industrial Zone 1 (IN1Z) and Industrial Zone 3 (IN3Z) land. The Precinct also includes the North Melbourne Cricket Ground at the North Melbourne Recreation Reserve, which is zoned for Public Park and Recreation (PPRZ) use. Mixed Use zoned (MUZ) land is present to the east of the Precinct.

Currently, land uses within the Precinct are predominantly of an industrial nature. Land uses and infrastructure includes transport, warehouses, flour mills, concrete and asphalt batching, automobile garages and laboratories. A number of residences exist in the outer boundaries of the Precinct. Three parks exist in the Precinct; namely North Melbourne Recreation Reserve, Clayton Reserve and Railway Place and Miller Street Park.

The Precinct is shown in Figure 2-1.

2.2 Surrounding land use

As referenced above, the Precinct is surrounded by Kensington to the northwest, West Melbourne to the southwest and the balance of North Melbourne to the northeast and southeast. Kensington comprises mostly general residential zones and parks, with some industry to the southeast. West Melbourne includes mostly industrial development and public use zones for transport and 'other' use. The remainder of North Melbourne consists of residential zones and mixed use zones.

2.3 Sensitive land use

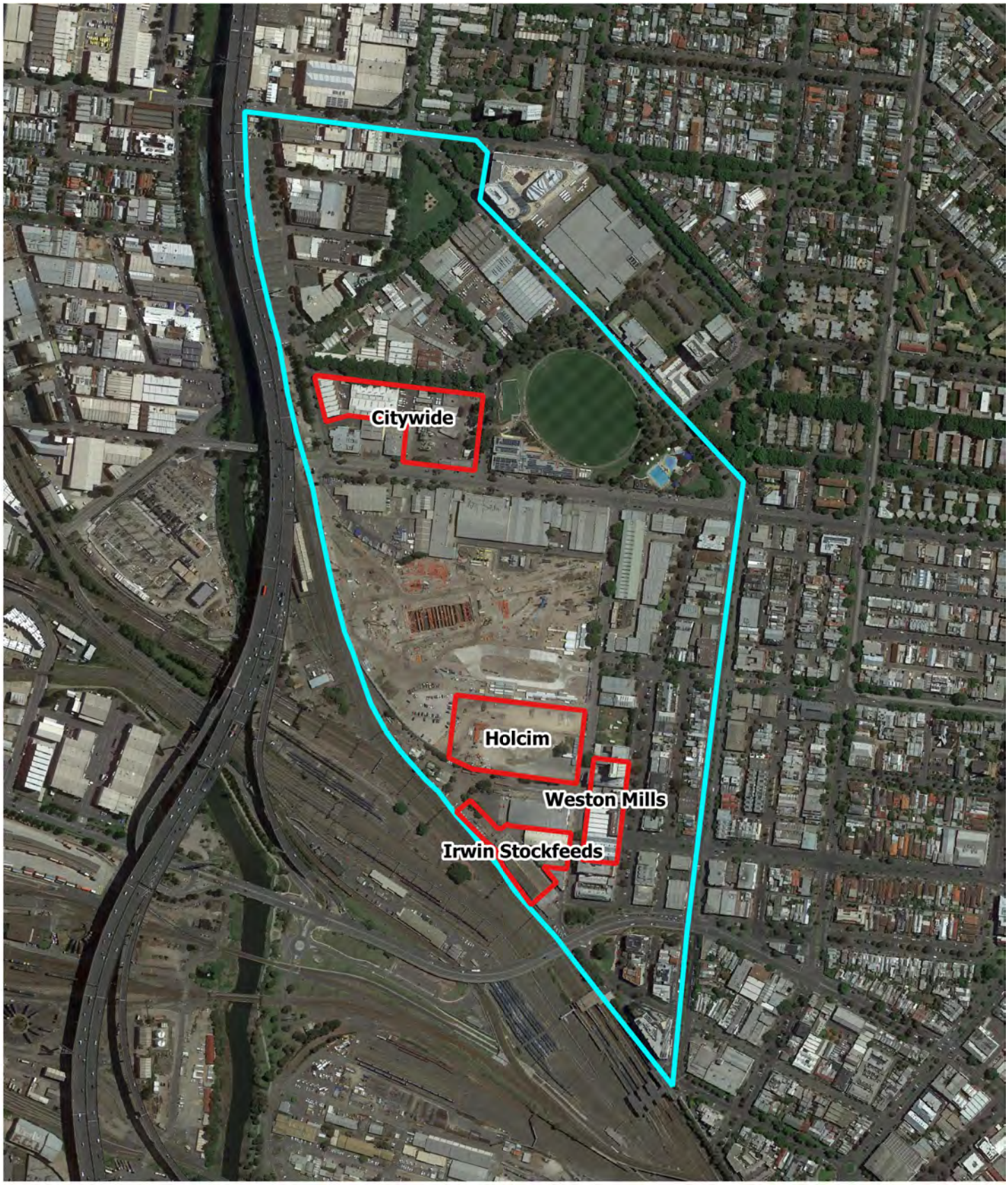
The definition of a sensitive receptor or sensitive land use is defined by the EPA[5] as:

> *'any land uses which require a particular focus on protecting the beneficial uses of the air environment relating to human health and well-being, local amenity and aesthetic enjoyment, for example residential premises, child care centres, pre-schools, primary schools, education centres or informal outdoor recreation sites'.*

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

Current sensitive land uses within the Precinct include the residences located within the Mixed Use Zone located on the eastern edge (which can be seen at Figure 2-1).

[5] EPAV 2013 "Recommended separation distances for industrial residual air emissions" Publication. 1518, March 2013



Legend

- Precinct boundary
- Identified industry

Paper Size ISO A4

0 100 200 m

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

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GHD

Victorian Planning Authority

Arden Adverse Amenity Impact Assessment

Site overview

Project No. 12548247
Revision No. -
Date. 22/04/2021

FIGURE 2-1

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Data Source: Google Earth Imagery 2021.
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2.4 Constraining Industries

As identified earlier at Section 1.1, the GHD 2019 report identified four businesses with a separation distance in accordance with EPA Publication 1518 that affects the Precinct.

The four industries and their recommended separation distance are as follows:

– Citywide – Asphalt plant - 208-292 Arden Street, North Melbourne (500 m separation distance)
– Holcim - Concrete Batching Plant - 77 Laurens Street, North Melbourne (100 m separation distance)
– Irwin Stockfeeds – Grain and stockfeed mill and handling facility - 1 Laurens Street, North Melbourne (250 m separation distance)
– Weston Milling – Flour mill - 40 Laurens Street, North Melbourne (250 m separation distance)

From GHD 2019, it was found that there is currently insufficient separation between the four industries and the existing sensitive receptors within and surrounding the Precinct; namely:

– There are a number of residential sensitive receptors located within the 500 m separation distance of Citywide with the closest being approximately 220 m east of the Citywide plant along Macaulay Road. Other sensitive uses closer include the North Melbourne Cricket Ground which also includes the North Melbourne Football Club Headquarters and the North Melbourne Public Pool.
– There is just under 100 m separation from Holcim to the nearest residence along Munster Terrace.
– There are currently residential sensitive receptors located adjacent to the Weston Milling flour and approximately 30 m east of along Munster Terrace.
– There are currently residential sensitive receptors located adjacent to the Irwin Stockfeeds site along Anderson Street.

The above implies that in the event of an upset at the industries mentioned, a number of existing sensitive receptors would be potentially exposed to a heightened risk of odour or dust impact.

2.5 Proposed future urban structure

The proposed future urban structure the Precinct is to comprise a mix of uses including residential, business education and health. Figure 2-2 provides an indication of where sensitive uses are anticipated relative to the existing adverse amenity separation distances of the four industries identified in section 2.4.

Figure 2-2 ***Proposed Future Urban Structure (Provided by the VPA)***

3. EPA Victoria Publication 1518

3.1 Overview

The EPA Victoria *Recommended separation distances for industrial residual air emissions*, 2013, Publication 1518 (EPA Separation distance guideline) provides advice on recommended separation distances between industrial land uses that emit odour or dust, and sensitive land uses.

The guideline aims to support effective decision making regarding land uses, to:

– Protect local amenity
– Protect existing industry from encroachment by sensitive uses
– Prevent land adjacent to industry from being underutilised

3.2 Purpose

The EPA Separation distance guideline is a planning instrument used to provide recommended minimum separation distances between sensitive land uses (i.e. residential, schools, hospitals and recreation reserves) and industrial premises with the potential for off-site emissions (odour or dust) that can cause disamenity in the event of an upset/malfunction (nuisance dust or odour). Equipment failure, accidents and abnormal weather conditions are among the causes that can lead to emissions affecting sensitive land uses beyond the boundary of the source premises. While it is an objective to eliminate emissions, even with the best of technologies and controls facilities are not always guaranteed to achieve this 100% of the time.

The purpose of the guideline is as follows:

– Provide clear direction on which land uses require separation
– Inform and support strategic land use planning decisions and the consideration of planning permit applications
– Prevent new sensitive land uses from impacting on existing industrial land uses
– Prevent new or expanded industrial land uses from impacting on existing sensitive land uses
– Identify compatible land uses that can be established within a separation distance area

It is noted that the separation distances outlined in the EPA Separation distance guideline are for upset/malfunction conditions resulting in amenity impacts only, i.e. nuisance dust (deposited dust) and odour. Emissions to air (odour or dust) occurring under routine operations should not be used to determine separation distances as they are required to meet health standards.

Under routine operations the State Environment Protection Policy (Air Quality Management) (SEPP (AQM)) and any relevant licence conditions (if the industry is a scheduled premises) should be met and odour/dust should be confined on-site by the implementation of environmental management practices.

The EPA criterion for odour is given in Schedule A of the SEPP (AQM) as 1 odour unit (OU) at the 99.9th percentile.

The health criteria are specified as design criteria (DC) in SEPP (AQM) where the DC for fine (PM_{10}) and very fine ($PM_{2.5}$) particulates values of 80 and 60 µg/m^3, respectively (based on a one hour average) are not to be exceeded.

For so-called nuisance dust (i.e. unrestricted by size except able to be suspended in the air column) the criterion is set in SEPP (AQM) as 330 µg/m^3. It is the fractions of dust coarser than 2.5 or 10 micron that are likely to deposit downwind – causing disamenity when settling on car bonnets, washing hung out to dry or window sills. A direct measure of this impact is undertaken by some form of deposition gauge. This is integrated typically over a month and a value of 4 g/m^2/month (annually averaged) is used as a criterion for unacceptable disamenity.

Unlike routine emissions, unintended emissions are often intermittent or episodic and may originate at or near ground level. Separation distances seek to avoid the consequence of upset industrial residual air emissions.

3.3 Agent of change principle

It is the responsibility of the 'agent of change' to provide evidence to the relevant authorities that a variation from the recommended separation distances is appropriate. The EPA Separation distance guideline (Section 9) outlines the 'agent of change' principle which is defined as the proponent of the proposed land use (i.e. change) that will give rise to the consideration of separation distances. In this case the VPA is proposing sensitive land uses which are considered the 'agent of change'.

The EPA Separation distance guideline discusses the agent of change principle. It identifies six criteria to consider (at Table 4 of the guideline) that allow for a site-specific variation to the default separation distances outlined in Section 9 of the document. These criteria and an explanation for each criterion has been reproduced in Figure 3-1 below.

Criteria	Explanation
Transitioning of the industry	Existing industry has formally indicated that it will transition out of an area and over a specified timeframe.
Plant equipment and operation	The industrial plant and equipment have an exceptionally high standard of emission control technology.
Environmental risk assessment	An environmental risk assessment of IRAEs has been completed that demonstrates a variation is justified.
Size of the plant	The plant is significantly smaller or larger than comparable industries.
Topography or meteorology	There are exceptional topographic or meteorological characteristics which will affect dispersion of IRAEs.
Likelihood of IRAEs	Particular IRAEs are either highly likely or highly unlikely to occur.

Figure 3-1 Criteria for site-specific variation (Table 4 of EPA Separation distance guideline)

3.4 Interface land uses

Section 10.2 of the EPA Separation distance guideline discusses interface land uses which describes land uses that can be located within the specified separation distances (between industrial land uses and sensitive land uses).

Table 5 in the guideline provides examples of interface land uses and their suitability (to be encouraged, considered or prevented). Examples of interface land uses to be encouraged, which may be relevant to the Precinct include business, recreation and conservation and public open spaces.

Interface land uses assist to reduce odour and dust impact dispersing from the industry to the sensitive receptor.

3.5 Application to the Precinct

Once an industrial facility's operations and future intentions are known, the transition provisions in the EPA Separation distance guideline can be used to sequence any proposed sensitive land use development within the existing separation distance.

GHD has utilised the criteria outlined in the agent of change principle (as per section 3.3) to assess the appropriateness of a variation to the four industry's separation distances.

In particular, this assessment focuses on the following four criteria:

– Plant equipment and operation
– Likelihood of Industrial Residual Air Emissions (IRAEs)
– Environmental risk assessment
– Topography or meteorology

As agreed with EPA at the inception meeting for this project, this assessment includes an empirical risk based assessment to determine the likely risk of IRAEs having an impact out to the distance of the separation distance. Under routine operations, the industries will be required to meet the EPA objectives of no offensive odours or nuisance dust beyond the site boundary. Therefore, the assessment focuses on understanding the likelihood of odour and dust emissions during an upset event. GHD considers that an empirical assessment using the Source-Pathway-Receptor concept in conjunction with 'ground truthing' the site-specific experience is the most appropriate method to determine the likely risk of odour and dust impact to the Precinct.

4. Overview of Industries

GHD undertook a site visit to inspect each of the four industries identified in section 2.4. The following sections provides an overview of the operations and technology, emission controls, upgrades and historic performance at each industry.

4.1 Citywide Asphalt Plant

GHD conducted a site visit of the Citywide asphalt plant accompanied by Citywide representatives on 31 March 2021. A summary of GHD's observations during the site visit with regards to odour and dust is also provided within this section.

4.1.1 Operations and technology

Asphalt operations have been occurring at the site since 1952. Citywide and Fulton Hogan commenced a joint venture in 2016 to operate the asphalt plant. The current plant is a combination of Benninghoven and Amman plants and was installed in 2007. The plant is similar to other asphalt plants currently operating across Victoria.

Typical operations occur between 6:00 am to 3:30 pm. However, if required the plant can operate 24 hours per day.

Activities at the site involve producing warm mix asphalt (known as Greenpave) from sand and aggregates, reclaimed asphalt pavement (RAP), lime, and bituminous materials. Greenpave is a warm asphalt mix and is a climate sensitive alternative to traditional hot mix asphalt. The conventional hot mix asphalt process uses one grade of bitumen at approximately 170°C. A reduction in production temperatures and fumes deliver immediate safety benefits to workers and surrounding community stakeholders.

The operations at the site are as follows:

- Raw materials (aggregates) are trucked to site entering via Arden Street and unloaded in the storage bays
- A front end loader transfers the raw material into cold feed bins
- The bins supply calibrated quantities of each aggregate onto a cold feed conveyor belt that feeds a large drum, which then dries and heats the blended material (rotating drum which tumbles the aggregate through stream of hot air)
- Once heated, the blended aggregate is moved up the tower via a bucket elevator and regraded through a screening process into hot aggregate storage bins prior to being weighed and dispatched into the pugmill and mixed with a weighed quantity of bitumen and filler
- The asphalt product is then loaded into the delivery trucks from the base of the elevated pugmill
- If the site is busy, the asphalt is transferred via an enclosed conveyor to heated storage silos

4.1.2 Sources

Odour and dust emissions are expected to occur from:

- Dust emissions associated with the storage and handling of raw material (e.g. sand and aggregates)
- Odour from the asphalt mixing plant stack
- Fugitive odour emissions from the filling and storage of raw materials
- Fugitive odour emissions from finished product loading to trucks

4.1.3 Emission controls

The existing plant has been used in Australia for several years and there are currently seven in operation around the country.

This particular asphalt plant has a number of emission controls and features which make it best practice for environmental emissions, including:

- Aggregate and cold feed bins are covered with a roof, with high side walls to protect against wind generated dust.
- The facility is fully paved to minimise the amount of dust generated by onsite truck activities.
- A sweeper is used daily to clean the paved area.
- To minimise dust generation, where possible most raw materials are received onsite damp.
- A high shade-cloth fence is installed around site perimeter, particularly in the aggregate area to help prevent off-site dust from wind generation.
- Sensors installed on aggregate bins so bins do not overflow.
- An irrigation sprinkler system is installed at the raw aggregate bins and cold feed bins to dampen the raw material when required.
- Dried aggregates are transferred to the mixing tower by an enclosed conveyor system to minimise dust generation.
- Provides a fully enclosed production process from the cold feed bins to the final asphalt product to minimise dust and odour generation.
- Storage of asphalt product is in enclosed silos to minimise odour generation.
- A reverse flow baghouse dust extraction system is attached to the drum dryer to remove combustion gases, moisture and fine particles.
- A dye test is regularly undertaken to check baghouse for leaks.
- The bitumen tanks are bunded and insulated to reduce any odours.
- Odours from the bitumen storage tanks are controlled by an extraction system where the odours travel to a water bath. The water bath results in the heavy molecules sinking to the bottom, whilst the lighter molecules dissolve into the water.
- Filtered air from the baghouse is released to the atmosphere through an 18 m (above ground level) stack to minimise ground level odour and dust generation.
- Any fines collected by the baghouse are transported to the filler silo via enclosed pipe screw conveyors and available for reintroduction to the mixing process, thereby eliminating the disposal of this process residue.
- Odours from the truck fill are controlled by a dedicated secondary air extraction system focused on capturing odour emissions generated during load out into trucks. Emissions are directed back into the aggregate dryer.
- All trucks are covered immediately with a tarpaulin after loading is completed to reduce odour emissions.

4.1.4 Management

The following management procedures are employed by Citywide to minimise emissions:

- Pre-start meeting in the morning with the production manager informed of any issues
- Monthly environmental checks - spot audit checks
- Quarterly boundary checks
- Annual checks of vapor tanks
- Environmental Management Plan in place
- Aspects and Impact Register in place

All operations are monitored and controlled remotely from within the site. All items important to plant operation and emission controls are monitored from the control room. In the event of a malfunction in any part of the plant, the corrective actions can be implemented quickly and efficiently from the control room. The plant can be shut down almost immediately in the event of equipment failure or operational upset, so the risk of extended upset conditions is minimal.

The key to the efficient and effective operation of the plant and pollution control equipment is regular maintenance. All components of the plant are regularly serviced in accordance with the preventative maintenance schedule.

4.1.5 Upsets events

Citywide confirmed that there have been no major upsets in the past 10 years leading to off-site impacts. This suggests the site is well operated. In terms of possible upsets, it is considered by Citywide that a wind event (strong winds during warmer weather) is the most likely upset pathway for dust emissions. However, with the appropriate controls in place, a greater level of dust mitigation would be applied (i.e. increased watering) or dust generating activities stopped in extreme cases. Hence the likelihood of dust generation from a wind event is considered to be unlikely.

If the sprinkler system stops working, Citywide would call the street sweeper and other sources of water on site to dampen material. In terms of plant breakdown, all operations would stop and discussions had with a dedicated maintenance person, this is considered by Citywide to be the ultimate control. Breakdown of the plant would result in a lower level of dust and odour emissions from the site due to lack of operations of the plant. Thus, this upset condition does not result in dust or odour emissions hence no separation distance would be required for such an event.

Other possible (but considered minor) upsets include:

– Lime silo overflow, considered unlikely due to controls in place (see section 4.1.3)
– Hole in baghouse sock, considered unlikely due to controls (see section 4.1.3)

4.1.6 Upgrades/continual improvement/future plans

The following upgrades have been implemented by Citywide to continually improve the site:

– When the joint venture came into place in 2016, crushing operations were removed from the site and removed noisy parts of the plant
– In 2017/18 the bags within the baghouses were replaced
– In November 2018 a new secondary extraction system at the truck loadout area was installed
– In late 2020 the sprinkler system in the aggregate storage area was checked

In terms of future plans, the following was provided by Citywide:

– Proposed upgrade to the aggregate sprinkler system – Citywide is looking to install an automatic system that would operate when certain wind speeds/directions are recorded
– No other future plant upgrades planned
– No commitments have been made for relocation at this time but are committed to continual improvements

4.1.7 Complaints and EPA notices

A complaint history from 2016 onwards was provided by Citywide. This included the following complaints in relation to odour and dust.

– May 2018 - Resident complained about odour ~300-400 m away
– November 2018 - Odour complaint from the back fence (Citywide at Green Street), prompted Citywide to install a new load out extraction system and the bitumen tank water bath
– September 2020 - Complaint about dust from CHEP (243 Arden Street North Melbourne) - was not 100% attributed to Citywide and could be a result of the Metro tunnel / CYP concrete batching

– October 2020 - Odour complaint from the reserve (possibly the basketball courts adjacent to the site), Citywide checked the odour vapour recovery system

In terms of EPA interaction, the following was provided by Citywide:

– In October 2018 loose material was observed on Arden Road and EPA came to investigate. EPA issued a notice in relation to dust. In response, Citywide installed a grate system which trucks drive over which collects loose material.
– EPA noted that near the truck spray area (drivers spray the trucks to prevent material from sticking to the trucks) there was a spill. In order to address this Citywide installed a bund for the chemical storage. This now acts as a major spill capture system in the event of an emergency.

4.1.8 GHD's observations

During GHD's site visit, the site was considered to be clean and raw material stockpiles were damp with no dust identified. In relation to odour, subtle odour was detected next to the bitumen tanks and an obvious but transient odour next to an asphalt truck filling event.

4.1.9 Summary

Based on the above information the following conclusions can be made in relation to Citywide's plant equipment and operations:

– The technology/controls are considered 'best practice' with an exceptionally high standard of emission control technology when compared to other similar asphalt plants in Victoria.
– A number of source-specific control measures in order to reduce odour and dust emissions have been implemented.
– Continual plant upgrades have been implemented. These upgrades have resulted in an overall reduction in odour and dust emissions.
– In addition to the source-specific controls a number of high-level management controls are implemented.
– Following past complaints, Citywide have implemented a number of controls in order minimise the likelihood of the complaint occurring again.
– All potential upsets identified were deemed to have an unlikely likelihood of occurring.
– No upsets have been recorded over the last 10 years. Thus, at such a frequency of less than once in every five years (e.g. once in every 10 years or greater), GHD's experience indicates that a reduced buffer may be appropriate.
– Based on the complaint data dating back to 2016, operations are not generating odour or dust complaints in nearby residential areas and at existing receptors within the recommended septation distance. There are currently residential sensitive receptors located approximately 220 m east of the plant. Other sensitive uses closer include the North Melbourne Cricket Ground which also includes the North Melbourne Football Club Headquarters and the North Melbourne Public Pool.
– GHD concludes that IRAEs from the plant are highly unlikely to occur.

4.2 Holcim Concrete Batching Plant

GHD conducted a site visit of the Holcim concrete batching plant accompanied by Holcim and Rail Project Victoria (RPV) representatives on 12 April 2021. A summary of GHD's observations during the site visit with regards to dust is also provided within this section.

4.2.1 Operations and technology

Concrete batching operations have been occurring at the site for three years to support construction of the Metro Tunnel Project. The plant is a mobile plant imported from Italy.

Typical operations occur between 5:00 am to 7:00 pm. However, if required the plant can operate 24 hours per day.

The daily throughput depends on demand however an average throughput value is approximately 500 m^3/day of concrete.

The operations at the site are as follows:

– Raw material (aggregates) are unloaded in the storage bays
– A front end loader then transfers the raw material into a hooded weigh hopper which is connected to an enclosed conveyor system which transports the material into the plant
– The cement is delivered by road tanker and pneumatically transferred from the sealed silos into the plant via enclosed pipes
– The raw material (aggregates) is then mixed with the cement in an agitator and the concrete is then loaded out into the concrete truck waiting below
– The concrete truck can then exit the site or drive to the wash out bay and add water to the concrete to make it more workable

4.2.2 Sources

Dust emissions are expected to occur from:

– Dust generation from vehicle movement
– Delivery of raw materials
– Storage of raw material in bunkers and stockpiles
– Transfer of material to the batching plant
– Transfer of material by mobile plant, conveyors, hoppers and agitators
– Leakage or spills from silos
– Rupture of fabric filter

No odour emissions are expected to occur from the site.

4.2.3 Emission controls

The concrete batching plant is operated in accordance with EPA Publication 1806 *Reducing risk in the premixed concrete industry* and has a number of emission controls and features which make it best practice for dust emissions, including:

– Transport of raw materials:
  - Raw materials are delivered wet/damp
– Hardstand surface:
  - Site is fully sealed
  - Site is cleaned daily by street sweeper
  - Speed limit on internal unsealed roads enforced
– Ground level storage:
  - Storage bays enclosed on three sides by solid walls
  - Storage bays fitted shade cloth roof
  - Storage bays fitted with sprinkler systems
  - Storage bay stockpiles kept damp to maintain adequate moisture levels to prevent dust dispersion

    - Storage bay stockpiles kept at least 0.5 m below top of panels and inside open ends of bays
    - Storage bay panel walls clearly indicate maximum fill height level and “Do not overfill” warnings
    - Other ‘do not overfill’ management procedures in place and enforced
- Overhead silos
    - Fitted with fully enclosed pneumatic transfers
    - Fitted with emergency pressure alert and automatic cut-out overfill protection
    - Fitted with dust filters
    - Burst-bag detector system
- Transfer of sand and aggregate
    - Front-end loader transfers prevent dust emissions by adequate moisture levels
    - Weigh hopper fitted with a hood to capture dust
    - Conveyor belts fully enclosed and hooded
    - Dust extraction systems fitted around hoppers
- Agitator truck loading and wash down
    - Loading bays roofed and enclosed with doors on one side
    - Loading bays fitted with dust extraction systems
    - Rubber loading socks used
    - Trucks washed with water to remove all dust

4.2.4 Management

The following management procedures are employed by Holcim to minimise emissions:

- A checklist is in place which assists in identifying any issues ahead of time (e.g. check sprinkler system)
- Every three months (or earlier if required) the baghouse gets serviced
- Regular silo and filter inspections are undertaken
- An Environmental Management Plan is in place

All operations are monitored and controlled remotely from within the site. All items important to plant operation and emission controls are monitored from the control room. In the event of any malfunction in any part of the plant, the corrective actions can be implemented quickly and efficiently from the control room. The plant can be shut down almost immediately in the event of equipment failure or operational upset, so the risk of extended upset conditions is minimal.

The key to the efficient and effective operation of the plant and pollution control equipment is regular maintenance. All components of the plant are regularly serviced in accordance with the preventative maintenance schedule.

4.2.5 Upsets events

Holcim confirmed that there have been no major upsets in the three years of operation resulting in off-site impacts. This suggests that the site is well operated. In terms of possible upsets, the following was considered:

- A wind event (strong winds during warmer weather) is the most likely upset for dust. However, with the appropriate controls in place, a greater level of dust mitigation would be applied (i.e. increased watering) or dust generating activities stopped in extreme cases. Hence, the likelihood of dust generation from a wind event is considered to be unlikely.
- Wind generated dust from failure of the sprinkler system. It would likely be identified in the checklist ahead of time and Holcim would get it serviced as soon as possible. Thus, it was considered unlikely to occur.
- Baghouse filter blows a sock. This was considered unlikely as Holcim gets them serviced every three months however if this were to occur they would get it serviced as soon as possible.
- Extraction system failure. Work would stop immediately and Holcim would get it serviced as soon as possible. There would be no dust from the site due to operations ceasing.

4.2.6 Upgrades/continual improvement/future plans

Given the relatively new nature of the plant, no upgrades are proposed.

In terms of future plans, Holcim advises that the plant is expected to operate for a further 18 months (i.e. end of 2022) and will then be demobilised. It will take approximately two months to pack up/demobilise and relocate off site.

4.2.7 Complaints and EPA notices

There have been no dust complaints and no interaction with the EPA.

4.2.8 GHD's observations

During GHD's site visit, the site was clean with no dust identified. Stockpiles of raw materials were damp.

4.2.9 Summary

Based on the above information, the following conclusions can be made about Holcim's plant equipment and operations:

- The technology/controls are considered 'best practice' with an exceptionally high standard of emission control technology when compared to other concrete batching plants in Victoria.
- A number of source-specific control measures in order to reduce dust emissions have been implemented.
- In addition to the source-specific controls a number of high-level management controls are implemented.
- All potential upsets identified were deemed to have an unlikely likelihood of occurring.
- No upsets have been recorded over the three years of operation.
- No dust complaints have been made regarding the plant.
- The plant expected to operate for a further 18 months (i.e. end of 2022) and will then be demobilised.
- GHD concludes that IRAEs from the plant are highly unlikely to occur.

4.3 Weston Milling

GHD conducted a site visit of the George Weston Foods (GWF) Flour mill accompanied by a GWF representative on 13 April 2021. A summary of GHD's observations during the site visit with regards to dust is also provided within this section.

4.3.1 Operations and technology

The flour mill has been operating at the North Melbourne site since 1856. The majority of mill equipment is from the 1980s and 1990s, however this equipment is not dissimilar to what is currently available, with the main advancements being in energy efficiency.

The mill operates 24 hours a day, seven days per week with trucks entering the site from 7:00 am to 11:00 pm. The current throughput is estimated to be 90,000 tonnes per annum of wheat.

The operations at the site are as follows:

- Wheat is received by road tanker within a building where the wheat is unloaded into an intake pit in the ground.
- The wheat is then transported to the bulk storage silos via an underground conduit connected to the pit.
- Wheat is then cleaned and screened. Aspiration (draw air through wheat) is undertaken. Water is then sprayed on the wheat.
- Wheat then enters milling process where the grain kernels are broken open using rollers, after a series of breaks the grain is sifted using sieving operations and air aspiration.
- The flour then passes through smooth reducing rollers.

– The finished product (flour) is then stored in large bins onsite.
– Out loading is dispatched via bulk loading into tankers for removal by truck.

4.3.2 Sources

Dust emissions are expected to occur from:

– During wheat receival/tipping
– The pneumatic conveying system (positive and negative conveying) used throughout the milling process
– Out loading of flour

No odour emissions are expected from the site.

4.3.3 Emission controls

The flour mill has a number of emission controls and features which make it best practice for dust emissions, including:

– The site is fully sealed to prevent dust
– The site is cleaned daily to prevent dust
– Receival and loadout is undertaken within an enclosed building with an openable roller door
– Ambient extraction systems are in place on sides of the intake pit when trucks tip wheat
– Burnley baffles exist within the pit to suppress dust when trucks tip wheat
– The milling process is fully enclosed within a building
– The milling process is connected to a large dust collection system – combination of cyclones (coarser particles) and fabric filters (baghouses). Some quite large consisting of 100 socks.
– Differential pressure gauges monitor fabric filters for leaks/ baghouse failure
– Silos have dust collectors (three dust collectors in total and one exhaust/aspiration in main plant)
– Pneumatic process lines during milling have a large pressure through pipes which are fitted with over-clamps so the pipes cannot move (clamps fitted over joining clamps to prevent separation)
– All pneumatic transfer end at a receiver where there is a dust collector which contains filter bags with a 500 g/m^2 felt material used
– Stacks on roof serving each baghouse
– Trucks under negative pressure during flour loadout
– Load out has a dust extraction system
– Rubber socks fall down into the truck during loading to prevent dust

4.3.4 Management

The following management procedures are employed by GWF to minimise emissions:

– Every four months (or earlier if required) the baghouse gets serviced/checked
– Prompt clean up is undertaken of any flour accumulation
– Training is provided to all staff on dust explosions
– An Environmental Management Plan in place

All operations are monitored and controlled remotely from within the site. All items important to plant operation and emission controls are monitored from the control room. In the event of any malfunction in any part of the plant, the corrective actions can be implemented quickly and efficiently from the control room. The plant can be shut down almost immediately in the event of equipment failure or operational upset, so the risk of extended upset conditions is minimal.

The key to the efficient and effective operation of the plant and pollution control equipment is regular maintenance. All components of the plant are regularly serviced in accordance with the preventative maintenance schedule.

4.3.5 Upsets events

GWF confirmed that there has been one major upset, last occurring eight years ago in 2013. The following details were provided by GWF:

– The upset occurred due to pneumatic line separation at joining clamp causing flour to be released to atmosphere. Flour 1 cm thick was dispersed onto Munster Terrace.

The separation of pneumatic line at joining clamp or a worn through section of pneumatic lines causing product to leak is now considered unlikely now due to over clamps being installed so the pipes cannot move. This modification was made after the upset event in 2013.

Other possible upset events considered include:

– Baghouse fabric filter sock failure is considered to be unlikely as they are checked and monitored regularly. Differential pressure gauges are also used to monitor fabric filters for leaks/baghouse failure.
– Extraction system failure is considered to be unlikely, with the control being to immediately cease activities until rectified.

4.3.6 Upgrades/continual improvement/future plans

In terms of future upgrades, GWF advise that a new aspiration on loadout is proposed to capture dust.

In terms of future plans, GWF plan to one day re-locate the mill and leave the current site, however no time lines were provided.

4.3.7 Complaints and EPA notices

There have been two dust complaints approximately eight years ago associated with the identified upset event.

4.3.8 GHD's observations

During GHD's site visit, the site was clean with no dust identified. Some dust residue was observed in the netting hooked up to the roof within the receival and out loading area.

4.3.9 Summary

Based on the above information the following conclusions can be made about GWF's plant equipment and operations:

– The technology/controls are considered 'best practice' with an exceptionally high standard of emission control technology when compared to other similar flour mills in Victoria.
– A number of source-specific control measures in order to reduce dust emissions have been implemented.
– In addition to the source-specific controls a number of high-level management controls are implemented.
– Following the past upset, GWF implemented a number of controls in order minimise the likelihood of the upset occurring again.
– All potential upsets identified were deemed to have an unlikely likelihood of occurring.
– Only one upset resulting in off-site impact was recorded eight years ago. Thus, at such a frequency of less than once in every five years (e.g. once in every eight years or greater), GHD's experience indicates that a reduced buffer may be appropriate.
– Based on the complaint data, operations are not generating dust complaints in nearby residential areas and at existing receptors within the default buffers. There are currently residential sensitive receptors located approximately 30 m east of the plant along Munster Terrace.
– GHD concludes that IRAEs from the flour mill are highly unlikely to occur.

4.4 Irwin Stockfeeds

GHD conducted a site visit of the Irwin Stockfeed site accompanied by a Irwin Stockfeed representative on 13 July 2021. A summary of GHD's observations during the site visit with regards to dust and odour is also provided within this section.

4.4.1 Operations and technology

Irwin Stockfeeds operates stockfeed mills and distribution warehouses throughout Victoria. The North Melbourne site manufactures stock feeds for all ruminant species. The North Melbourne site includes milling and grain handling, with a throughput of 100,000 tpa.

The facility has been operating at the site for approximately 30 years and operates from as early as 4:00 am, with the first delivery not occurring until sunrise. Operations continue (intermittently) until around 8:30 pm, however this could be as late as 11:00 pm – 12:00 am during the peak season.

The plant is considered to be an expiring asset and the oldest of three operated by Irwin Stockfeeds (Lang Land and Kyabram).

The operations at the site are as follows:

- Grain receival (occurs via two methods):
  - Receival delivered by trucks tipped into an in-ground 40t pit with grate over top. Area is enclosed with shelter over top. This is then transferred via internal duct work into the mill.
  - Receival delivered by trucks via hopper and auger in the open air, then transferred to silo.
- Additive receival:
  - Receival delivered by trucks occurs inside a building with material unloaded onto floor and then pushed into bays via a front-end loader.
- Grain cleaning
- Grain milling - undertaken via a roller mill
- Batching - weighing of raw material ingredients according to formulated recipes for each batch of feed
- Mixing - to provide a consistent compound mix of ingredient
- Product distribution - product is transferred to the load out system which drops the product into a truck waiting below.

4.4.2 Sources

Dust and odour emissions are possible from:

- Dust from the receival process
- Dust from production process
- Odour from grain getting wet (causes fermentation)

4.4.3 Emission controls

The following controls are implemented at the site in relation to dust and odour:

- Dust
  - Grain receival: distance between truck and hopper is minimised, the pit is enclosed with a shelter over the top to protect against wind.
  - Any spills are cleaned up immediately while the truck is unloading.
  - Additive receival: occurs within an enclosed building eliminating wind effects.
  - Production processes: occur inside the enclosed building.
  - Continuous cleaning and sweeping of the floors occur inside. A vacuum is also used to remove/transport dust.

- Frequent cleaning of the site including baghouses to remove any accumulated dust (usually on a Saturday) is undertaken.
- The main dust controls implemented include cyclones and baghouses throughout the processing stage. The collection efficiency of a baghouse is independent of particle size and is typically greater than 99% removal. A cyclone's removal efficiency tails off as particle size reduces and will typically give a removal efficiency of approximately 85% for coarse dust, reducing to 65% for fine dust. The application of these mitigation technologies dramatically reduces dust emissions at source. It should be noted that these mitigation measures have no effect in reducing odour emissions.

– Odour
  - If grain gets wet it can ferment and cause an odour
  - Sweepers and a vacuum are utilised to remove any accumulated dust including around the building perimeter.

4.4.4 Management

The following management procedures are employed by Irwin Stockfeeds to minimise dust and odour emissions:

– Regular baghouse servicing/checks
– Prompt clean up is undertaken of any grain/ material including use of sweeping and vacuuming

4.4.5 Upsets events

The emission of concern in the event of an upset is likely to be dust rather than odour. The main upset pathway would be considered to be failure of a baghouse sock leading to unmitigated emissions depositing offsite.

With appropriate monitoring and management in place the likelihood of such an event occurring is unlikely.

Other minor upset could be considered to be transfer points. The grain can wear out the steel over time which can result in holes in the pipework causing grain to fall through. This can fall to the floor attracting birds/mice, however, is not a major dust source. These holes are regularly patched up as required.

In terms of odour, if grain gets wet then there is the possibility of odour. This would normally occur if some material were to penetrate the building. Spills are regularly cleaned so the likelihood that odours would be generated at a sufficient strength to be noticed off-site is unlikely.

No past upsets were identified by Irwin Stockfeeds.

4.4.6 Upgrades/continual improvement/future plans

Irwin Stockfeeds indicate that they often look at operational solutions at the North Melbourne site and look for improvements (e.g. removed a grain that was required to be hammered).

From our discussion during the site visit it is our understanding that Irwin Stockfeeds intend to stay at the site indefinitely.

4.4.7 Complaints and EPA notices

From complaint information provided to GHD from the EPA, we understand that no dust complaints have been attributed to the Irwin Stockfeeds operation.

Irwin Stockfeeds indicated that one individual who owns a property (which is currently vacant) nearby made a dust complaint. The complaint was mainly in relation to dust in the drains which was not sourced to Irwin Stockfeeds.

4.4.8 GHD's observations

During the site visit GHD observed grain receival via the two methods. Both methods resulted in minimal dust contained to the area where receival occurs, with the enclosed area capturing majority of the dust. The receivals areas were clean with minimal material on the surface, it was evident that dry cleaning is undertaken regularly. Inside the processing building, a truck receival was also observed with minimal dust being was observed. Overall the building internals were observed to be clean and well kept including the load out area. No odour was observed during the site visit.

From external perimeter inspections during the odour surveys, GHD observed a small amount of grain material emanating from the enclosed building through gaps in the building. This material has the possibility of leading to offsite dust/odour impacts from wind erosion and from getting wet. GHD observed some grain odour adjacent to the building during the odour surveys.

4.4.9 Summary

Based on the above investigations and findings, the following conclusions can be made about the plant equipment and operations:

– A number of source-specific control measures are in place to reduce dust emissions.
– In addition to the source-specific controls a number of high-level management controls are implemented to minimise dust and odour.
– All potential upsets identified were deemed to have an unlikely likelihood of occurring.
– No past upsets were provided by Irwin Stockfeeds.
– Based on the complaint data, operations are not generating dust or odour complaints in nearby residential areas and at existing receptors within the default separation distance. There are currently residential sensitive receptors (apartment buildings) located adjacent to the site.
– GHD concludes that IRAEs from the facility are highly unlikely to occur.

5. Risk Assessment

The following section outlines the qualitative S-P-R assessment undertaken to assess the risk to amenity from the four industries. In addition to the S-P-R assessment, an odour surveillance program was undertaken to 'ground truth' the likely risk of odour impact to the Precinct.

Given the assessment concerns existing industries, considerable weight is then given to the observational findings of community-based tools such as complaints analysis and odour surveillance program to inform the overall risk to amenity within the Precinct.

5.1 Source-Pathway-Receptor Assessment

5.1.1 Methodology

From the meeting with EPA[6], a risk assessment based on the Source-Pathway-Receptor (S-P-R) model was deemed the most appropriate approach to understanding the overall risk from the industries to amenity impact in the Precinct. With assistance from the EPA, the approach taken has been prepared in consultation with guidance provided from the EPA which is similar to the approach outlined by the Institute of Air Quality Management (IAQM) UK *Guidance on the assessment of odour for planning (July 2018),* recommended by EPA on previous projects completed by GHD.

The guidance allows for a qualitative risk-based assessment when modelling is not able to accurately represent the reality of the situation being assessed, e.g. if the odour or dust effects are likely to be significantly influenced by accidental, unexpected, or unknown releases (upset events leading to IRAEs). In such instances a qualitative estimate may be more appropriate, on the basis that it is better to be broadly correct than precisely wrong.

Thus, the S-P-R assessment presented in this section focuses on upset events occurring and the emission controls and management procedures in place to mitigate such events from having an impact offsite.

The following describes the S-P-R concept, which has been utilised for this assessment:

S-P-R concept

The Source-Pathway-Receptor model describes the three fundamental elements which must be present for odour or dust exposure to occur.

The S-P-R concept allows for a prediction of the odour or dust impact based on the 'magnitude of source release, the effectiveness of the pathway and sensitivity of the receptor'. GHD completed the following steps in order to complete the S-P-R risk assessment:

– Step 1: Categorise the type of source, pathway and receptor
– Step 2: Estimate the risk of odour or dust exposure
– Step 3: Determine the overall risk of odour or dust amenity impact

Step 1: Categorise the type of source, pathway and receptor

The first step involves categorisation of the type of source (large, medium or small), pathway (highly effective, moderately effective or ineffective) and receptor (high, moderate, medium or low sensitivity). Definitions for each category were sourced from the IAQM guidance along with the EPA guidance.

The guidance defines the following risk factors for odour and dust sources, pathway and receptor sensitivity, to aid in categorisation.

[6] Meeting with EPA, VPA and DoT on 16 March 2021

Source

Factors affecting the source odour and dust potential include:

– Size of source (does it have an EPA licence, large volume source, exposed area or high flow rate)
– Level of control over source (exposed open source, enclosed or controlled source)
– Type of emission (typically offensive odour or particularly fine particle type, courser aggregates stones, or more neutral or “pleasant” odours)
– Frequency of emission (continuous or intermittent).

Note in determining the size of source emphasis has been placed on the level of control in place to minimise emissions and the likelihood of emissions occurring from an upset event.

Pathway

Factors affecting the pathway effectiveness to the receptor are:

– Distance: How far is the source from the receptor
– Meteorology: Particularly high winds direct emissions to receptors or receptors are downwind of source more frequently
    - Odour episodes tend to occur during stable atmospheric conditions (i.e. low wind speeds) which results in poor dispersion and dilution. During these conditions, it is the receptors downwind that will be affected by odour
    - Dust episodes tend to occur during strong winds. During these conditions, it is the receptors downwind that will be affected by dust.
– Terrain: Hilly, valley drainage, flat etc
– Land use: highly built up, mainly low rise residential, or spare open areas
– Level of control over pathway: what mitigation is available at the receptor (design of buildings, outdoor areas, orientation etc)

Receptor

Key considerations include:

– Sensitivity of receptor: how sensitive is the receiving environment with respect to dust or odour impacts
– Compliance history: what do we know about the performance of the site and its history in the local community

Step 2: Estimate the risk of odour or dust exposure

The second step involves using a matrix to determine the risk of odour or dust exposure. This step utilises the categorisation of source and pathway from Step 1.

Step 3: Determine the overall risk of odour or dust impact

The third step involves using a matrix to estimate the overall risk of odour or dust amenity impact on the receptors. This step utilises the risk of odour impact (calculated in Step 2) and the categorisation of the receptor in Step 1.

The overall risk levels can then be considered in the context of sensitive land use implementation.

Description of risk ratings

The assignment of risk levels in the context of land uses that can be considered to be sensitive and non-sensitive is outlined in Table 1.

To assist with formulating the description of risk ratings GHD has utilised the following EPA Publications:

– 1695.1: Assessing and controlling risk: A guide for business, March 2019
– 1643: Odour environmental risk assessment for Victorian broiler farms, January 2017

From Table 1, it can be seen that for areas of medium to low risk the implementation of sensitive uses is acceptable subject to controls being in place for zones of medium risk such as building design controls to reduce amenity impacts. For a moderate or high risk area, sensitive uses are recommended to be prohibited until such time that the industry ceases to operate or controls are implemented at the source and receptor.

Table 1 Description of risk ratings

Risk level	Description
High	Unacceptable level of risk. Industry likely to create some adverse amenity problems. Sensitive uses are recommended to be prohibited until such time that the industry ceases to operate.
Moderate	Unacceptable level of risk. Industry may create some adverse amenity problems. Controls must be put in place at the source and the receptor to reduce to a lower risk level prior to the implementation of sensitive uses.
Medium	Can be acceptable if controls are in place. Industry may create some adverse amenity problems. Attempt to reduce to low risk using controls at receptor prior to the implementation of sensitive uses.
Low	Acceptable level of risk. Industry unlikely to create adverse amenity problems. Sensitive uses can be implemented.

5.1.2 Step 1: Categorise the type of source, pathway and receptor

Table 2 shows the categorisation of the source, pathway and receptor and the reasoning behind GHD's selection for each of the four industries.

Table 2 ***Source pathway receptor model application to the industries***

Industry	Source, Pathway or Receptor	GHD categorisation	Explanation	Relevance to Industry
Citywide	Source	Medium source	Size of source: scheduled premises of odourous nature, however not licenced by EPA; materials usage hundreds of thousands of tonnes/m³ per year; stack, medium sized volume source, area sources of hundreds of m². Type of emission: The compounds involved are moderately odorous, compounds and classed in H4 as moderately offensive (hedonic score of 0 to -2), particles are coarser (sands and fine stone). Level of control: Some mitigation measures in place, but residual odour remains. Frequency: Emission is periodic but regular in frequency.	The Citywide asphalt plant is considered to be a medium size plant compared to other larger asphalt plants in Melbourne doing greater throughput per annum. Sources include tall 18 m stack (increases dilution and dispersion), medium sized volume source (truck loadout), medium sized area sources (raw material bays). The compounds are moderately odourous and classed in H4 *Odour Management* as “Moderately offensive”; or unpleasant (-1.60 hedonic score). The technology/controls are considered ‘best practice’ with an exceptionally high standard of emission control technology when compared to other similar asphalt plants in Victoria – see section 4.1.3. More likely a small source with some residual odour from loadout once controls are taken into account, however GHD has conservatively classed as medium due to residual loadout emissions. All potential upsets identified were deemed to have an unlikely likelihood of occurring - see section 4.1.5. No upsets have been recorded over the last 10 years. More likely a small source given emissions are rare, however GHD has conservatively classed as medium.
	Pathway	Moderate pathway	Distance – receptors are tens to hundreds of metres from sources, separation distance has not been met Meteorology – medium frequency (%) of winds from source to receptor when source is upwind winds are of moderate speed (raised dust) and occasionally stable with little mixing (odour). Terrain and land use: sources on same altitude as receptor, urban area with tall buildings Level of control: apartment blocks (3-4 storeys), with ability to have recirculated cooling/heating systems balconies/openable windows face away from sources, blocking odour or dust sometimes.	It is assumed that proposed sensitive uses in the Precinct will be within the recommended separation distance. The predominant wind directions are north and south, occurring for approximately 15 to 12% of the time, followed by north-northeasterly winds for approximately 8% of the time. High wind speeds (>6 m/s) occur approximately 5% of the time while light winds (<2 m/s) occur approximately 23% of the time. The frequency of strong winds are considered to be low, while the frequency of lights winds is considered to be medium. Typical operations occur between 6:00 am to 3:30 pm avoiding night time poor dispersion conditions which normally result in greater offsite odour impact. Sources at the same altitude as receptors. Stack release promotes good dispersion - increasing the pathway, dilution and dispersion.

Industry	Source, Pathway or Receptor	GHD categorisation	Explanation	Relevance to Industry
				Urban terrain features with tall buildings proposed will affect the emission pathway likely to increase dispersion and dilution. Control at receptor will be possible in the design of the building.
	Receptor	Moderate risk receptor	Sensitivity of receptor: schools/ hospital or apartment buildings, limited outdoor space (no backyards). Compliance history: previous isolated non-compliance/ complaints, localised amenity impacts, short exposure time	Identified nearby receptors include residential buildings, with proposed school and hospital to form part of the future Precinct. Based on the complaint data from 2016, operations are not generating odour or dust complaints in nearby residential areas and at existing receptors within the default buffer. There are currently residential sensitive receptors located approximately 220 m east of the plant.
Holcim	Source	Small source	Size of source: Not licensed by EPA, small site, materials usage hundreds of tonnes/m^3 per year; area sources of tens of m^2. Type of emission: Mild odours, Site is fully sealed. Level of control: highly effective, tangible mitigation measures in place leading to little or no residual odour or dust, releases only due to plant failure, fully sealed site with good housekeeping, enclosed operation with extraction and treatment equipment. Frequency: Emission is rare only occurs if there is a significant upset.	The Holcim concrete batching plant is considered to be a small mobile plant compared to other larger fixed concrete batching plants such as the Holcim plant at Footscray. Sources include small sized area sources (raw material bays). The technology/controls are considered 'best practice' with an exceptionally high standard of emission control technology when compared to other similar concrete batching plants in Victoria – see section 4.2.3. No residual dust emissions expected. All potential upsets identified were deemed to have an unlikely likelihood of occurring - see section 4.2.5. No upsets have been recorded over the past three years. Emissions would only occur if there were a significant upset.
	Pathway	Moderate pathway	Distance – receptors are tens to hundreds of metres from sources, separation distance has not been met Meteorology – medium frequency (%) of winds from source to receptor when source is upwind winds are of moderate speed (raised dust) and occasionally stable with little mixing (odour). Terrain and land use: sources on same altitude as receptor, urban area with tall buildings. Level of control: apartment blocks (3-4 storeys), with ability to have recirculated cooling/heating systems balconies/openable windows face away from sources, blocking odour or dust sometimes.	It is assumed that proposed sensitive uses in the Precinct will be within the recommended separation distance. The predominant wind directions are north and south, occurring for approximately 15 to 12% of the time, followed by north-northeasterly winds for approximately 8% of the time. High wind speeds (>6 m/s) occur approximately 5% of the time while light winds (<2 m/s) occur approximately 23% of the time. The frequency of strong winds are considered to be low, while the frequency of lights winds is considered to be medium. Typical operations occur between 5:00 am to 7 pm avoiding night-time poor dispersion conditions which normally result in greater offsite impact for smaller dust particles. Sources are at the same altitude as receptors.

Industry	Source, Pathway or Receptor	GHD categorisation	Explanation	Relevance to Industry
				Urban terrain features with tall buildings proposed will affect emission pathway likely to increase dispersion and dilution. Control at receptor will be possible in the design of the building.
	Receptor	Moderate risk receptor	Sensitivity of receptor: schools/ hospital or apartment buildings, limited outdoor space (no backyards). Compliance history: previous isolated non-compliance/ complaints, localised amenity impacts, short exposure time	Identified nearby receptors include residential buildings, with a proposed school and hospital to form part of the future Precinct. No dust complaints have been made regarding the plant.
Weston Milling	Source	Small source	Size of source: Not licensed by EPA, small site, materials usage hundreds of tonnes/m^3 per year; area sources of tens of m^2. Type of emission: Mildl odours, Site is fully sealed. Level of control: highly effective, tangible mitigation measures in place leading to little or no residual odour or dust, releases only due to plant failure, fully sealed site with good housekeeping, enclosed operation with extraction and treatment equipment. Frequency: Emission is rare only occurs if there is a significant upset.	The flour mill plant is considered to be a smaller plant compared to other larger plants such as the Allied Mills at Kensington (90,000 t/a vs 164,000 t/a). Sources include small sized volume sources (receival and loadout – within a building). The technology/controls are considered 'best practice' with an exceptionally high standard of emission control technology when compared to other similar flour mills in Victoria – see section 4.3.3. No residual dust emissions are expected. All potential upsets identified were deemed to have an unlikely likelihood of occurring - see section 4.3.5. No upsets have been recorded over the pas eight years. Emissions would only occur if there were a significant upset.
	Pathway	Moderate pathway	Distance – receptors are tens to hundreds of metres from sources, separation distance has not been met Meteorology – medium frequency (%) of winds from source to receptor when source is upwind winds are of moderate speed (raised dust) and occasionally stable with little mixing (odour). Terrain and land use: sources on same altitude as receptor, urban area with tall buildings Level of control: apartment blocks (3-4 storeys), with ability to have recirculated cooling/heating systems balconies/openable windows face away from sources, blocking odour or dust sometimes.	It is assumed that proposed sensitive uses in the Precinct will be within the recommended separation distance. The predominant wind directions are north and south, occurring for approximately 15 to 12% of the time, followed by north-northeasterly winds for approximately 8% of the time. High wind speeds (>6 m/s) occur approximately 5% of the time while light winds (<2 m/s) occur approximately 23% of the time. The frequency of strong winds are considered to be low, while the frequency of lights winds is considered to be medium. Milling occurs 24/7 however truck receival and load out only occurs between 7:00 am to 11:00 pm avoiding night-time poor dispersion conditions which normally result in greater offsite impact for smaller dust particles. Sources are at the same altitude as receptors. Urban terrain features with tall buildings proposed will affect emission pathway likely to increase dispersion and dilution.

Industry	Source, Pathway or Receptor	GHD categorisation	Explanation	Relevance to Industry
				Control at receptor will be possible in the design of the building.
	Receptor	Moderate risk receptor	Sensitivity of receptor: schools/ hospital or apartment buildings, limited outdoor space (no backyards). Compliance history: previous isolated non-compliance/ complaints, localised amenity impacts, short exposure time	Identified nearby receptors include residential buildings, with a proposed school and hospital to form part of the future Precinct. Only one upset resulting in offsite impact has been recorded eight years ago, with measures put in place to avoid this occurring again in the future. Based on the complaint data, operations are not generating dust complaints in nearby residential areas and at existing receptors within the default buffers. There are currently residential sensitive receptors (apartment buildings) located approximately 30 m east of the mill along Munster Terrace.
Irwin Stockfeeds	Source	Small source	Size of source: Not licensed by EPA, small site, materials usage hundreds of tonnes/m^3 per year; area sources of tens of m^2. Type of emission: Mild odours, Site is fully sealed. Level of control: highly effective, tangible mitigation measures in place leading to little or no residual odour or dust, releases only due to plant failure, fully sealed site with good housekeeping, enclosed operation with extraction and treatment equipment. Frequency: Emission is rare only occurs if there is a significant upset.	The plant is considered to be a smaller plant compared to other larger plants such as the Graincorp at Corio (100,000 t/a vs 1,000,000 t/a). Sources include small sized volume sources (receival and loadout). Grate receival area is enclosed with a cover. The outdoor receival area is a small source with grains tipped directly into hopper. Any spills are cleaned up immediately. All other operations occur within an enclosed building. High standard of emission control technology to avoid routine emissions– see section 4.4.3. Cleaning is regularly undertaken. All potential upsets identified were deemed to have an unlikely likelihood of occurring - see section 4.4.5.
	Pathway	Moderate pathway	Distance – receptors are tens to hundreds of metres from sources, separation distance has not been met Meteorology – medium frequency (%) of winds from source to receptor when source is upwind winds are of moderate speed (raised dust) and occasionally stable with little mixing (odour). Terrain and land use: sources on same altitude as receptor, urban area with tall buildings Level of control: apartment blocks (3-4 storeys), with ability to have recirculated cooling/heating systems balconies/openable windows face away from sources, blocking odour or dust sometimes.	It is assumed that proposed sensitive uses in the Precinct will be within the recommended separation distance. The predominant wind directions are north and south, occurring for approximately 15 to 12% of the time, followed by north-northeasterly winds for approximately 8% of the time. High wind speeds (>6 m/s) occur approximately 5% of the time while light winds (<2 m/s) occur approximately 23% of the time. The frequency of strong winds are considered to be low, while the frequency of lights winds is considered to be medium. Sources at the same altitude as receptors Urban terrain features with tall buildings proposed will affect emission pathway likely to increase dispersion and dilution.

Industry	Source, Pathway or Receptor	GHD categorisation	Explanation	Relevance to Industry
				Control at receptor will be possible in the design of the building.
	Receptor	Moderate risk receptor	Sensitivity of receptor: schools/ hospital or apartment buildings, limited outdoor space (no backyards). Compliance history: previous isolated non-compliance/ complaints, localised amenity impacts, short exposure time	Identified nearby receptors include residential buildings, with a proposed school and hospital to form part of the future Precinct. Based on the complaint data, operations are not generating dust or odour complaints in nearby residential areas and at existing receptors within the default buffers. There are currently residential sensitive receptors located adjacent to the site.

5.1.3 Step 2: Estimate the risk of odour or dust exposure

The second step involves using a matrix to determine the risk of odour or dust exposure. This step utilises the categorisation of source and pathway from Step 1. The matrix has been reproduced in Table 3, Table 4, Table 5 and Table 6 for the four industries. The risk of exposure is deemed to be Medium for Citywide and Low for Holcim, Weston Milling and Irwin Stockfeeds.

Table 3 Risk of odour exposure matrix - Citywide

Pathway Effectiveness	Source Odour/Dust Potential		
	Small	Medium	Large
Highly effective pathway	Medium	Moderate	High
Moderately effective pathway	Low	Medium	Moderate
Ineffective pathway	Low	Low	Medium

Table 4 Risk of odour exposure matrix- Holcim

Pathway Effectiveness	Source Odour/Dust Potential		
	Small	Medium	Large
Highly effective pathway	Medium	Moderate	High
Moderately effective pathway	Low	Medium	Moderate
Ineffective pathway	Low	Low	Medium

Table 5 Risk of odour exposure matrix – Weston Milling

Pathway Effectiveness	Source Odour/Dust Potential		
	Small	Medium	Large
Highly effective pathway	Medium	Moderate	High
Moderately effective pathway	Low	Medium	Moderate
Ineffective pathway	Low	Low	Medium

Table 6 Risk of odour exposure matrix – Irwin Stockfeeds

Pathway Effectiveness	Source Odour/Dust Potential		
	Small	Medium	Large
Highly effective pathway	Medium	Moderate	High
Moderately effective pathway	Low	Medium	Moderate
Ineffective pathway	Low	Low	Medium

5.1.4 Step 3: Determine the overall risk of odour or dust impact

The third step involves using a matrix to estimate the overall risk of odour or dust amenity impact on the receptors. This step utilises the risk of odour impact (calculated in Step 2) and the categorisation of the receptor in Step 1. The matrix has been reproduced in Table 7, Table 8, Table 9 and Table 10 for the four industries.

From the results, it can be seen that an overall risk of odour impact on receptors for Citywide is Medium, reducing to Low for Holcim, Weston Milling and Irwin Stockfeeds.

Table 7 Overall risk of Odour/ Dust Impact - Citywide

Risk of Odour Exposure	Receptor Sensitivity			
	Low	Medium	Moderate	High
High Risk of Exposure	Medium	Moderate	Moderate	High
Moderate Risk of Exposure	Low	Medium	Moderate	Moderate
Medium Risk of Exposure	Low	Low	Medium	Moderate
Low Risk of Exposure	Low	Low	Low	Medium

Table 8 Overall risk of Odour/ Dust Impact - Holcim

Risk of Odour Exposure	Receptor Sensitivity			
	Low	Medium	Moderate	High
High Risk of Exposure	Medium	Moderate	Moderate	High
Moderate Risk of Exposure	Low	Medium	Moderate	Moderate
Medium Risk of Exposure	Low	Low	Medium	Moderate
Low Risk of Exposure	Low	Low	Low	Medium

Table 9 Overall risk of Odour/ Dust Impact – Weston Milling

Risk of Odour Exposure	Receptor Sensitivity			
	Low	Medium	Moderate	High
High Risk of Exposure	Medium	Moderate	Moderate	High
Moderate Risk of Exposure	Low	Medium	Moderate	Moderate
Medium Risk of Exposure	Low	Low	Medium	Moderate
Low Risk of Exposure	Low	Low	Low	Medium

Table 10 Overall risk of Odour/ Dust Impact – Irwin Stockfeeds

Risk of Odour Exposure	Receptor Sensitivity			
	Low	Medium	Moderate	High
High Risk of Exposure	Medium	Moderate	Moderate	High
Moderate Risk of Exposure	Low	Medium	Moderate	Moderate
Medium Risk of Exposure	Low	Low	Medium	Moderate
Low Risk of Exposure	Low	Low	Low	Medium

5.1.5 Implication for the Precinct

Figure 5-1 displays the overall risk of odour/dust impact from the four identified industries. The overall risk is considered to apply to the entire recommended separation distance for each industry given that the separation distances are designed to protect against off-site emissions in the event of an upset inclusive of controls - and it is the amenity impacts from upsets that are being assessed. The buffer distances have been scribed from the envelope of potential sources within the premises as per the EPA separation guidelines (Method 1 – Urban method).

Adopting the description of risk ratings outlined in Table 1, it implies that sensitive uses can be implemented within the separation distances of Holcim, Weston Milling and Irwin Stockfeeds. For Citywide, the implementation of sensitive uses can be acceptable if controls are in place.

Examples of such measures include control of air quality emissions through built form interventions, including:

– Limiting 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.

Legend

- Precinct boundary
- Envelope of sources
- Medium risk
- Low risk

Paper Size ISO A4

0 100 200 m

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

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Arden Adverse Amenity Impact Assessment

Source-Pathway-Receptor risk

Project No. 12548247
Revision No. -
Date. 23/04/2021

FIGURE 5-1

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12548247\GIS\Maps\Working\12548247-QGIS_Report figures.qgz
Print Date: 23/04/2021

Data Source: Google Earth Imagery 2021.
Created By: smateria

5.1.6 Summary

The following summary findings are provided:

– The outcome of the S-P-R risk assessment indicates the overall level of risk from each of the four industries varies from Low for Holcim, Weston Milling and Irwin Stockfeeds to Medium for Citywide.
– From information provided by Holcim, GHD understands that the concrete batching plant is a temporary facility which is to be decommissioned at the end of 2022 when it will be no longer required for Metro tunnel construction. Thus, the 100 m separation distance identified, and the subsequent low risk will not apply after 2022.
– The S-P-R assessment focuses on upset events occurring and the emission controls and management procedures in place to mitigate such events from having an impact offsite.
– The overall risk is considered to apply to the entire recommended separation distance for each industry given that the separation distances are designed to protect against off-site emissions in the event of an upset.
– The results indicate that sensitive uses can be implemented within the separation distances of Holcim, Weston Milling and Irwin Stockfeeds.
– For Citywide, the implementation of sensitive uses can be acceptable if controls are in place. Control of air quality emissions through built form is one example.

Note that given the assessment concerns existing industries, empirical observations are possible of what is happening on the ground, within the Precinct, and therefore considerable weight should be given to the observational findings of community-based tools such as complaints analysis and odour surveillance programs. This approach is consistent with the that outlined in the IAQM UK Guidance on the assessment of odour for planning (July 2018), This further evidence is discussed in section 5.2 and 5.3.

5.2 Updated EPA complaint history

In GHD 2019, the EPA provided complaint history for the Precinct and within a 1 km radius from 2012 to 2018. From the data it was concluded that Citywide was alleged to contribute to the highest number of amenity complaints within the Precinct. A total of four dust complaints and six odour complaints were recorded over the period. The only other industry to have registered complaints was Weston Milling which was alleged to have contributed to dust impacts with two complaints in 2013 (most likely due to the upset event discussed in section 4.3.5).

GHD requested EPA to provide an updated complaint history for the last two years. EPA sent through an updated complaint history from 2013 until April 2021[7]. A total of fifteen odour complaints alleging odour from Citywide were provided. Of most interest, is the period from the end of 2018 when Citywide installed the secondary odour extraction system at the truck loadout area. There were only two odour complaints from 2019 and 2020 combined, both of which were located within 35 m and 170 m respectively. With regards to dust there were three complaints attributed to Weston Milling, two for Melbourne Metro Tunnel and one for Irwin Stockfeeds.

From data provided, GHD was unable to verify the sources of the complaints. However, from the existing residential locations within the Precinct there have only been two dust complaints (assumed to be in relation to Weston Miling's upset in 2013 along Muster Terrace), one in relation to Irwin Stockfeeds, no other dust or odour (since 2019) complaints have been recorded in the existing residential locations (see section 2.4 for locations of existing residential receptors). There has also been an increase in sensitive uses in the Precinct with the introduction of the Woolworths development (Corner of Macaulay Road and Vaughan Terrace in North Melbourne) which has not resulted in an increase in complaints. This suggests that the industries are not generating odour or dust reports in nearby residential areas within the recommended separation distances.

[7] Email from Chris Bydder, EPA dated 15 April 2021

5.3 Odour surveillance

Odour surveillance (e.g. is odour detected, how strong and frequently) was conducted to investigate the on ground likelihood of residual odour emissions being detected offsite from the identified industries. Further details of the program are provided below.

5.3.1 Survey methodology

GHD utilised the draft EPA guidance, *Odour surveillance*[8]*,* in order to conduct the odour surveys. GHD conducted the odour surveys in line with the methodology for a Dynamic Downwind Surveillance Assessment. The plume is assessed by:

– *"Starting downwind from the odour source at a predetermined maximum distance. This distance will be based on odour complaint data (where available), or case studies and scientific papers where similar industries have been examined. The assessor should track the odour plume back to the source by crossing the plume. EPA recommends this technique is used for sources with elevated emissions or mixtures of sources.*
– *Starting at the source and then crossing the plume until the end of the plume is reached. EPA recommends this technique is used for large, ground-based areas sources (e.g. landfills, composters etc.)."*

During the field surveys, any detectable odours likely attributable to the identified industries were noted and the following details were recorded and described further below:

– Time
– Location
– Odour intensity
– Odour duration
– Odour characteristic
– Meteorological conditions (wind speed, wind direction, temperature)

Odour intensity

The intensity of the odour provides some understanding of the ambient concentration of odours in the environment. Odour intensity was characterised using the methodology outlined in the EPA Victoria guidance, reproduced in Table 11.

Table 11 Odour intensity descriptors

Odour strength	Description
Obvious	Odour is easy to smell and always noticeable. Odour is also easily recognisable, can be described and may be attributed to a source.
Subtle	Odour can be smelt only when focusing, e.g. by standing still and inhaling slowly into the wind. Odour can be recognised but with some difficulty.
No odour	No odour, or no recognised odour.

Odour duration

If an odour potentially related to the identified industries was detected during the survey, the duration of this odour was also noted, in line with EPA Victorian guidance, reproduced in Table 12.

Table 12 Odour duration descriptors

Description	Duration of odour
Constant (C)	Can smell it constantly (> 80%)
Frequent/Repetitive (F)	On and off with significant/noticeable periods with recognised odour (10–80%)
Transient (T)	On and off (intermittent) with significant / noticeable periods with no odour or no recognised odour (< 10%)

[8] EPA Victoria, *Odour surveillance,* CONSULTATION DRAFT, 2019

5.3.2 Odour survey results

The Draft EPA odour surveillance method section 2.2 Downwind surveillance states:

> ''*surveillance should be repeated a minimum of ten times, if significant variation in plume length is observed during the first 10 rounds of surveillance (+/- 20%) it is recommended that a further ten rounds of surveillance are completed''*

Therefore, in accordance with EPA guidance, GHD undertook 10 odour surveys. The survey observation points were selected based on prevailing wind directions at the time of the survey.

Off-site odour emanating from the identified industries was observed during nine of the ten odour surveys conducted by GHD with the locations shown in Figure 5-2 for all surveys in green, orange and red (based on no odour, subtle and obvious odour respectively).

Odour was observed from two of the identified industries, namely, Citywide and Irwin Stockfeeds. Odour from Citywide was observed in the surrounding area on Arden Street, Green Street, Henderson Street, Laurens Street and Fogarty Street, whereas odour from Irwin Stockfeeds was not observed beyond the property boundary. Therefore, as the VPA is interested in the potential odour impact beyond the site boundary, the focus on this section is on odour attributed to Citywide. A summary of the odour surveys completed in relation to Citywide is shown in Table 13.

Descriptions of the individual surveys with figures outlining the survey routes and observations are provided in Appendix A, and summarised below.

Subtle odour

Subtle odour attributed to Citywide was observed a total of 32 times across the ten surveys. The odour duration was determined to be transient for all instances of odour observed. Subtle odour was observed a maximum distance of 377 m southeast of Citywide on Laurens Street, which occurred during Odour Survey 1, under 1 m/s winds from the northwest.

Obvious Odour

Obvious odour attributed to Citywide was observed a total of 13 times across the ten surveys. The odour duration was determined to be transient for all instances of odour observed. Obvious odour was observed a maximum distance of 152 m east-northeast of Citywide in the North Melbourne Recreation Reserve, which occurred during Odour Survey 7, under calm winds.

Odour observed in close proximity to Citywide was typically observed when asphalt load out operations were occurring. The odour duration was always categorised as transient and this is likely due to the short duration the asphalt is loaded into the trucks before it is covered with tarpaulin. Once the trucks were covered with tarpaulin, the odour typically dissipated.

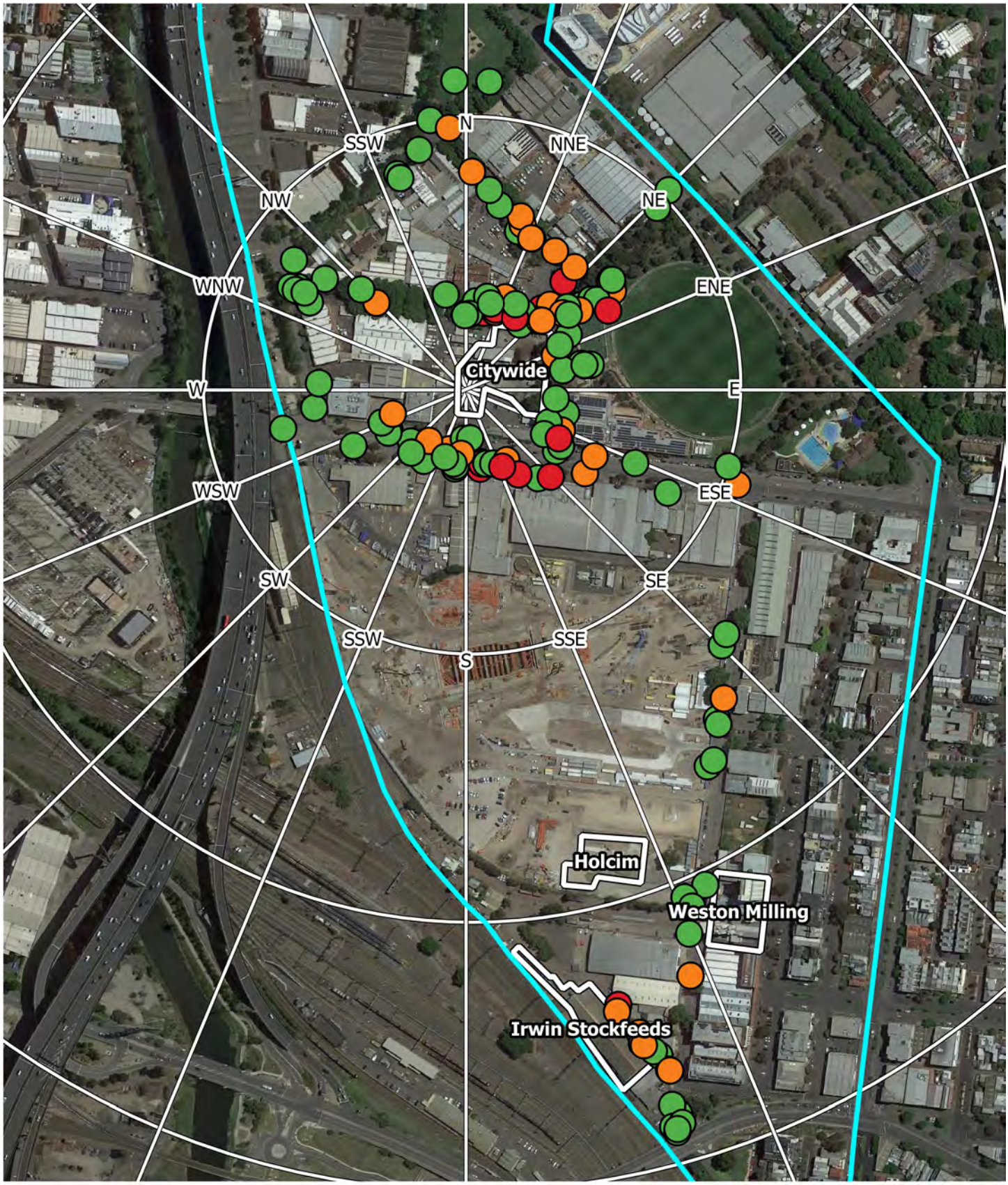
Odour observed further away from Citywide was typically observed when visible pluming from the asphalt plant could be seen. Where this odour was observed (i.e. not at the perimeter of the site) it is possible that some of the diluted plume was reaching ground level. The odour duration was always categorised as transient and this is likely due to the plume meandering inside and outside of the observation point.

No odour

No obvious odours were detected off-site in relation to the other three industries (Holcim, Weston Milling and Irwin Stockfeeds).

Table 13 Summary of odour surveys

Survey number	Wind conditions	Number of locations	Number of locations where odour was observed	Maximum distance subtle asphalt odour was observed from Citywide (m)	Maximum distance obvious asphalt odour was observed from Citywide (m)
1	NE / NW ~1.5. m/s	17	7	377	114
2	NE ~0.5 m/s	7	0	-	-
3	SW ~0.5 m/s	13	2	59	-
4	NE ~0.5 m/s	12	0	-	-
5	WSW ~2 m/s	16	5	248	82
6	SSW ~1.5 m/s	12	4	157	-
7	S / SW ~0.5 m/s	18	10	171	152
8	S / SW ~1 m/s	14	4	168	136
9	N ~4 m/s	11	4	-	75
10	NW ~0.5 m/s	29	10	267	73



Legend

- Precinct boundary
- Envelope of source
- Survey path

Odour intensity

- No odour
- Subtle
- Obvious

Paper Size ISO A4

0 50 100 m

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

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Summary of odour surveys

Project No. 12548247
Revision No. D
Date. 23/04/2021

FIGURE 5-2

Document Path: \\ghdnet\ghd\AU\Melbourne\Projects\31\12548247\GIS\Maps\Working\12548247-QGIS_Odour Surveys.qgz
Print Date: 23/04/2021

Data Source: Google Earth Imagery 2021.
Created By: ylim

5.3.3 Updated risk accounting for empirical evidence

Given the assessment concerns existing industries, considerable weight should be given to the observational findings of community-based tools such as complaints analysis and odour surveillance programs. Thus from the odour surveillance results, GHD considers that where obvious odour is detected off-site the initial risk rating from the S-P-R assessment should increase to the next highest risk category to account for the increase in risk to odour impacts and the possibility of odour complaints. Where subtle odour is detected the initial risk rating from the S-P-R assessment should remain unchanged as GHD does not consider subtle odour to be of significant strength to pose an increase in risk to amenity that would lead to complaints.

Further consideration should also be given to the complaint history, particularly from receptors located within any recommended separation distances. Where the evidence indicates that there is a lack of complaint history, this suggests that the industry is not causing amenity issues and is unlikely to into the future given the previous track record. GHD considers that where there is a lack of complaints, the initial risk rating from the S-P-R assessment should be reduced to a lower risk profile (if greater than low) to reflect the actual risk experienced.

Application to the Precinct

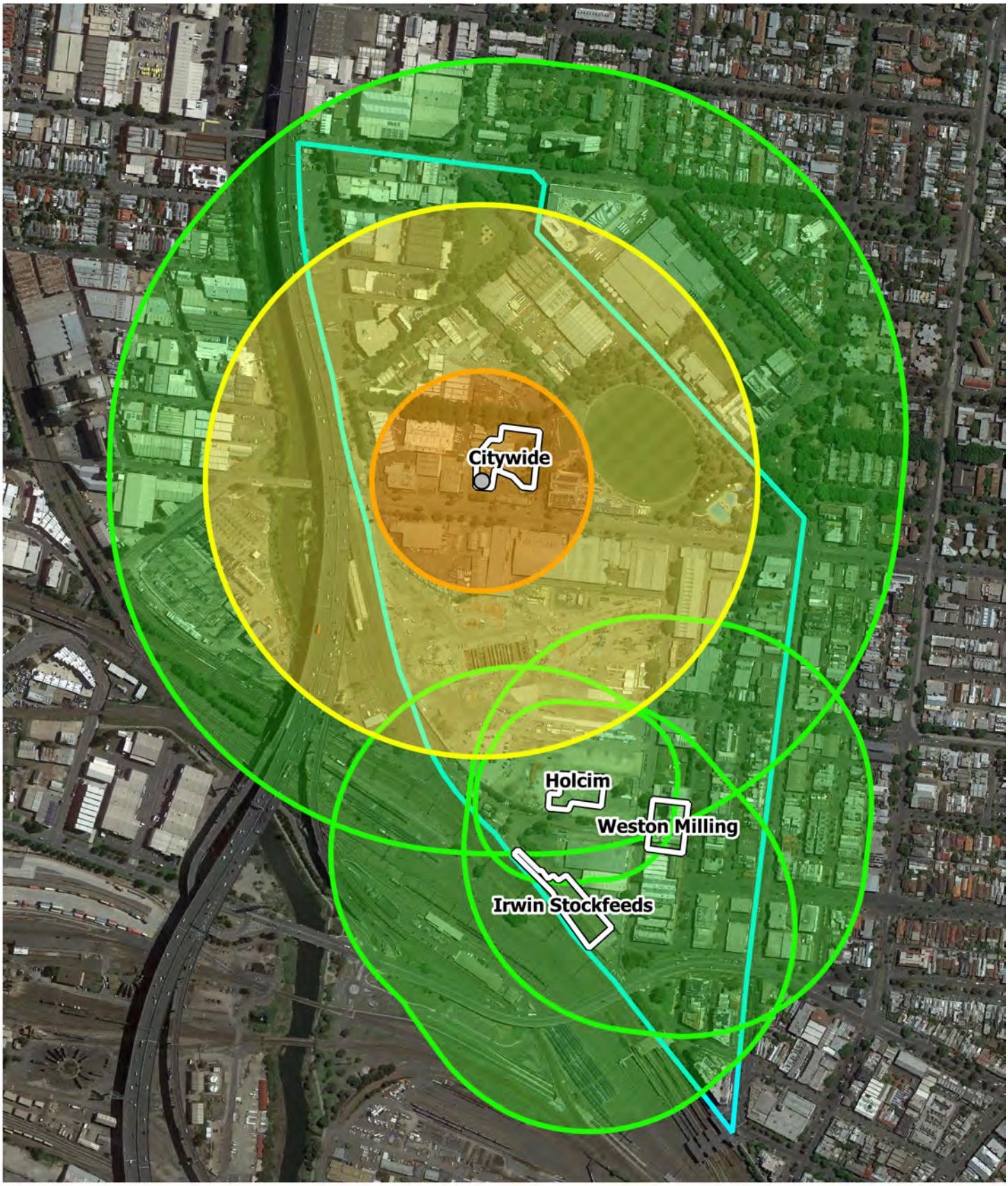
Based on the above, GHD has increased a portion of the medium risk zone to moderate risk for the Citywide facility based on the results of the odour surveillance which detected obvious odour out to a maximum distance of 152 m. This means that the medium risk moves up to a moderate risk based on the odour surveillance results. Note that the risk profile is related to odour and the odour sources at Citywide not the entire source envelope which also includes dust sources. The increase in risk zone has therefore be scribed from the centre point of the odour sources at Citywide.

Beyond 152 m GHD did not detect any obvious odour, with subtle odour being detected out to a maximum distance of 377 m. No change to the S-P-R risk categorisation is required for subtle odour observations, therefore medium risk remains from 152 m to 377 m.

Given no odour was detected beyond 377 m, GHD has reduced the risk categorisation from medium to low beyond 377 m to give a greater weight to the empirical evidence experienced in reality. The reduction to low risk beyond 377 m is also supported by the complaint history, with a lack of complaints from the existing receptors located within the recommended separation distance.

The updated risk accounting for the empirical evidence is shown in Figure 5-3.

No obvious odours were detected off-site in relation to the other three industries (Holcim, Weston Milling and Irwin Stockfeeds) therefore the S-P-R risk categorisation remains unchanged. Given the S-P-R risk categorisation is low for these three industries, GHD has left the risk unchanged at low even with the lack of complaints from within the separation distances.



Legend

- Precinct boundary
- Envelope of sources
- Centre point of odour sources
- Moderate risk
- Medium risk
- Low risk

Paper Size ISO A4

0 100 200 m

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

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Arden Adverse Amenity Impact Assessment

Updated risk accounting for empirical evidence

Project No. 12548247
Revision No. -
Date. 11/08/2021

FIGURE 5-3

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Print Date: 11/08/2021

Data Source: Google Earth Imagery 2021.
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5.4 Meteorology

5.4.1 Prevailing winds

High quality meteorological data (five years (2013 – 2017)) at hourly intervals from the Footscray automatic weather station (AWS), operated by the EPA, was used for this assessment. The Footscray AWS is located approximately 5.6 km from the Precinct. The features of particular interest in this assessment are: (i) the prevailing wind directions and (ii) the relative incidence of more stable light wind conditions (< 2 m/s) and (iii) the relative incidence of strong winds (>6 m/s).

A distinction can be made for fugitive deposited dust entrained in strong winds (greater than 6 m/s), as opposed to dust emissions from process sources where the emission rate is independent of local wind conditions (light stable winds).

Figure 5-4 shows the annual wind rose measured at Footscray between 6:00 am to 4:00 pm. The wind rose during these hours was selected as these hours are the typical operational hours of Citywide and are therefore the hours where odour is most likely to be observed within the Precinct. As Citywide rarely operate overnight, the likelihood of observing asphalt odour overnight is considered low, and therefore these wind conditions have not been considered.

The predominant wind directions are north and south, occurring for approximately 15 to 12% of the time, followed by north-northeasterly winds for approximately 8% of the time. High wind speeds (>6 m/s) occur approximately 6% of the time while light winds (<2 m/s) occur approximately 23% of the time. The frequency of strong winds is considered to be low, therefore it is very unlikely that an upset condition occurring at the industries would coincide with a strong wind speed. With respect to the frequency of light winds the odour surveillance assesses the additional risk.

Further detail on the local meteorology was previously provided in GHD 2019.

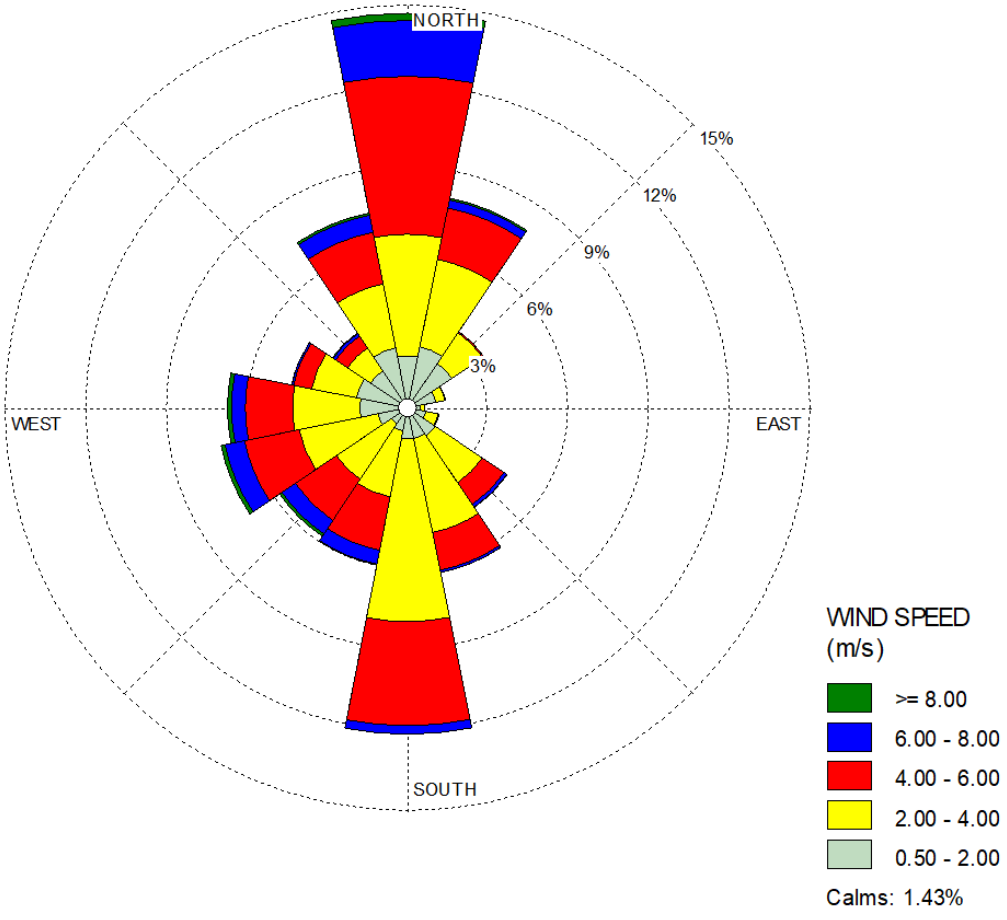

Figure 5-4 Annual wind rose – Footscray (6:00 am to 4:00 pm)

5.4.2 Directional buffer

GHD 2019 also utilised section 9 of the EPA separation distance guideline which allows for site-specific variation on the basis of topographical or meteorological features which will affect dispersion of industrial residual air emissions in the form of a 'directional buffer'.

The 'directional buffer' adapts the default radial buffer to take account of the directions of good and poor dispersion but keeps the overall area of the buffer constant. The results from GHD 2019 resulted in an extension of the recommended separation distance in north-northwest and south-southeast directions with a contraction to the west.

Note that the directional buffers presented in GHD 2019 were scribed from the property boundary given the uncertainty regarding the individual sources at the time of the assessment (undertaken as a conservative approach). The 'directional buffers' also included all hours of the day including night-time when the industries are unlikely to be operating (in particular Citywide with operations from 6 am to 3.30 pm). Accordingly, GHD considers the results to be conservative. We recommend that the odour surveillance results be used instead to account for local meteorology.

5.4.3 Implication for the Precinct

No further adjustments due to meteorology have been made to the distances informing the zones of risk, given that they have already accounted for local wind regimes through the odour surveillance campaign. A conservative approach has been adopted taking the maximum distance detected to inform the zones of risk.

5.5 Cumulative Impacts

The EPA Separation distance guideline does not seek to recommend specific separation distances for any cumulative impacts resulting from the co-location of like industries. However, where a cluster of industries of the same type exists (in this case overlapping separation distances), consideration of cumulative impacts may be necessary. GHD considers that cumulative impacts would be a critical issue in the event each industry had significant routine emissions. However, given each of the industries reviewed have an unlikely likelihood of an upset occurring leading to adverse amenity offsite in conjunction with a low to medium risk from the S-P-R assessment, it is GHD's opinion that there are no additional risks posed due to the overlap of separation distances. Further, from the complaint history data (section 5.2), there is a lack of complaints in relation to dust and odour from the existing residents located within the recommended buffers. This suggests that adverse amenity impacts individual or cumulative are unlikely.

5.6 Summary

From the risk assessment presented in this chapter, we conclude that there are a number of factors that are likely to result in a variation to the recommended separation distances in accordance with the agent of change principle. These key factors include:

– The high standard of emission control technology at the respective operations
– The highly unlikely likelihood of IRAEs occurring at the industries (i.e. at such a frequency of less than once in every five years (e.g. once in every eight years or greater))
– The Source-Pathway-Receptor outcomes
– Odour surveillance outcomes
– Lack of complaints from the surrounding residents within the separation distances

Both consequence and likelihood of a release scenario should be considered when contemplating buffer or impact zones.

In addition to likelihood, the frequency and duration of plausible upset scenarios should be considered. From GHD's experience when developing process-specific buffers[9] an acceptable frequency of impact needs to be determined. As part of the frequency determination the impact return interval **I** (i.e. how often the upset occurs) is required to be set. An **I** less than once per year would not be acceptable, while **I** greater than 10 years results in increased buffers just to accommodate a once in 10 years odour impact.

A good analogy is that of a flooding overlay for a 1 in 100 year average recurrence interval (to be considered as part of designs/developments) as damage to property and possible loss of life is a consequence. Whereas exposure to odour or dust is a nuisance only, so a much reduced value for **I** is appropriate and avoids unnecessarily sequestering land from sensitive land uses. GHD has found that using a value of **I** = 5 years leads to buffer distances that are consistent with the default values in the EPA buffer guideline.

The duration of the upset/malfunction event also needs to be determined as well as the upset odour emission rate (OER upset) multiplier to apply to the odour emission rate (OER normal) values before the process-specific buffer can be modelled. In this particular case GHD does not know what the factor of increase will be in emission rates from an upset so modelling of a process- specific buffer cannot be undertaken. However if the history of upsets occur at a frequency less than say once in every five years (e.g. once in every 10 years), then setting a process-specific buffer to protect for such an event would be unnecessary in any event.

We therefore consider that sensitive uses could be implemented within the areas designated as low risk as outlined in Figure 5-3. Further with the appropriate controls in place at the receptor (through built form) sensitive uses could be implemented within the areas designated medium risk.

5.6.1 Supporting evidence

A variation in separation distances is not uncommon and with an example being that agreed to by EPA Victoria for 142 Ashely Road, Maidstone[10]. In this case EPA agreed on a reduced buffer from 1,000 m down to 500 m based on limited, alleged odour reports in the direction of the proposed land for sensitive use development.

It is further noted the default 1,000 m buffer was already densely occupied by dwellings and that it was the responsibility of the industry to address its immediate neighbours in compliance with its EPA Licence.

It was also noted the industry had been largely successful in mitigating odour problems on its site and noted that they had not pursued an Environmental Significance Overlay (ESO) to protect the site operations from future encroachment.

The question of whether the Amendment will negatively impact the industries' operations was posed by the Panel. It was concluded that the industries' submission 'has not evidenced any impact that arises on account of the Amendment that are over and above the existing spatial constraints on that site'.

In conclusion the Panel found that there was no basis to restrict the allowable (sensitive) uses on the subject site to take account of the proximity to the existing industry.

[9] T. Pollock, A. Lewis, A Method to determine site-specific buffer distances for upsets/malfunctions in industrial premises
[10] Planning Panel Report - Maribyrnong Planning Scheme Amendment C124, 7 December 2018

6. Future land use planning considerations

6.1 Transitioning of the Industry

It is assumed that the development of the Precinct will occur incrementally over time, and therefore it is important that management of the transition from existing to proposed land uses minimises short term impacts of non-compatible uses. The risk assessment presented in this report outlines the areas that may be more suitable for the introduction of sensitive uses to manage the risk to adverse amenity.

Given the Precinct is planned to transition from industrial to predominantly mixed land use, the separation distance may be reduced with agreement of the EPA, with regards to the risk to adverse amenity identified within this assessment. The transition provisions can be used to sequence any proposed sensitive land use development within the existing separation distance.

From information provided to GHD, we understand that Holcim is a temporary facility only which is likely to be de-commissioned by the end of 2022 when no longer required for Metro tunnel construction. Thus, this implies that the 100 m separation distance identified for Holcim will not be required after 2022 and potentially sooner with agreement from the EPA. GHD also understands that the Weston Milling site plan to one day re-locate and leave the current site, however no time lines were provided. With these factors in mind, sensitive land use and associated development within the existing separation distance may be acceptable to the EPA based on the sites potential for low risk to off-site amenity impacts.

GHD notes that Citywide have no current plans to leave the area but are committed to continual improvements. From the risk assessment findings for Citywide (a combination of moderate, medium and low) there are areas within the current separation distance that sensitive land use development which may be acceptable to the EPA, with the appropriate controls in place.

6.2 Interface land uses

Section 3.4 discuses interface land uses which describes land uses that can be located within the separation distances (between industrial land uses and sensitive land uses). Accordingly, areas where a high or moderate risk of adverse amenity is considered, these interface land uses are recommended to be considered. Table 5 of the EPA separation distance guideline provides examples of interface land uses and their suitability (to be encouraged, considered or prevented). The EPA cite the following examples to be encouraged:

– “agriculture
– car parks
– cinema-based entertainment facilities
– emergency services facilities
– natural systems
– offices
– research centres
– service stations and veterinary clinics”

Examples of interface land uses to be encouraged which may be relevant to the Precinct include commercial uses, recreation and conservation and public open spaces. Interface land uses will assist to reduce odour and dust adverse amenity dispersing from the industry to the sensitive receptor in the unlikely event of an upset at the industry.

6.3 Planning controls

Planning controls are recommended to manage the risk of adverse amenity impacts to support the introduction of sensitive uses while the Precinct is in transition.

Such planning interventions follow.

6.3.1 Setback Strategy

Separating odour and/ or dust producing activities from sensitive areas using a setback strategy (e.g. using interface land uses 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 moderate and high risk areas. It is these areas which indicate where the establishment of sensitive uses should be avoided to reduce potential adverse amenity issues. Based on the risk assessment, this report has highlighted areas of moderate risk which may have a detrimental impact on the amenity of proposed sensitive uses. It is considered that the location of sensitive uses within these areas could raise the following two problems:

1. A risk to future sensitive uses being subjected to unacceptable odour and dust during either routine or upset events or in certain other circumstances (amenity impacts).
2. The encroachment of sensitive uses on the existing industry 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 where appropriate and opportunities exist.

GHD therefore considers that the areas of low and medium risk to be more suitable for the introduction of sensitive uses (subject to mitigation measures being implemented at the receptor for the medium risk areas).

Figure 5-3 should be used to guide the setback strategy.

6.3.2 Staged development

A staged development approach to the greatest extent possible is recommended as the area is predominantly held in private ownership, so that sensitive uses cannot develop within high or moderate risk areas until the industry adequately reduces the off-site impacts or transitions out of the area (refer to Figure 5-3). Planning policy and controls may be introduced to support this approach and put the onus on ensuring appropriate separation rests with the encroaching sensitive land use. GHD recommends that the State Government contact those industries placing significant constraints on the Precinct in order to better understand timeframes before moving out and in turn inform a Precinct staging plan. This should enable the transition of land use from industrial to sensitive land use over an appropriate period of time. Any plans should also consider the impact that removing the industry may have on other areas or infrastructure projects.

6.3.3 Control of air quality emissions through built form

To minimise the possibility of odour or dust adverse amenity on proposed sensitive uses within the Precinct a number of mitigation measures can be dealt with at the design phase including:

– Limiting the exposure of air emissions to residential openable windows/balconies. This can be dealt with in the design and orientation of buildings through the following 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

These mitigation measures are recommended for all areas designated as medium or higher risk prior to the implementation of sensitive uses (refer to Figure 5-3).

6.3.4 Implementation of application requirements for sensitive uses

Given that the VPA is seeking to introduce sensitive land uses within the separation distances of the four constraining industries, application requirements are recommended to be implemented into the Precinct Structure Plan or planning scheme to appropriately facilitate sensitive uses within the separation distances and manage the risk of adverse amenity. Such application requirements could be implemented within proposed zoning controls (or schedule within).

The requirement would apply to any application to develop land for a sensitive use which includes:

Sensitive uses

- *accommodation*
- *residential premises*
- *child care centre*
- *pre-schools*
- *primary schools*
- *education centres*
- *hospitals*
- *place of assembly*
- *aged care facility*

The following requirement is recommended for further consideration:

Application requirement:

While the industries continue to operate, an application to use or develop land for a sensitive use which includes accommodation, residential premises, child care centres, pre-schools, primary schools, education centres, hospitals, place of assembly and aged care facility within the buffers as shown in Figure 5-1 must be accompanied by the following information:

- *An odour/dust risk assessment in accordance with EPA Publication 1518 – Recommended separation distances for industrial residual air emissions, March 2013 or as Amended, prepared by a suitably experienced and qualified person to the satisfaction of the responsible authority, in consultation with the Environment Protection Authority.*

Before deciding on an application, the responsible authority must consider, as appropriate:

- *The impacts of uses with adverse amenity potential on a proposed use or development for a sensitive use where the land to which the application applies is within the buffer for the identified industries.*

Referral Requirement:

Applications for a sensitive use that fall within a buffer must be referred to the Environmental Protection Authority (EPA) for comment.

6.3.5 Odour/dust risk assessment criteria

The following section outlines the criteria to be provided within the odour/dust risk assessment which must accompany an application to use or develop land for a sensitive use (as described above).

Odour/dust risk assessment criteria:

The odour/dust risk assessment must include the following:

Operational odour/ dust analysis

A review of the current operations and technology of the industries including what odour/dust emission controls, monitoring and management procedures are in place to mitigate offsite odour and dust impacts. An assessment against current best practice also recommended (see EPA Publication 1517 – Demonstrating best practice).

Odour/ dust source assessment

Characterisation of odour and dust sources to provide information on source emission rates. (if available, reference facilities or literature can be utilised).

Siting Review

Assessment of the sensitive receptor location in relation to the separation distance, the nature of the receptors and environmental factors such as local meteorology and topographical features. The frequency of winds placing the sensitive use at risk (downwind wind conditions) of impact from odour/dust impact should also be assessed.

Source-Pathway- Receptor Assessment

A qualitative risk-based assessment Source-Pathway-Receptor (S-P-R) concept.

The S-P-R concept should address the following aspects:

– *Source potential*
  - *Magnitude of source*
  - *Level of control*
  - *Type of emission (i.e. odour detection threshold, hedonic tone)*
  - *Frequency of emission*
– *Exposure pathway between the source and sensitive locations*
  - *Distance: How far is the receiving environment from the source.*
  - *Meteorology: Wind patterns directing emissions towards the receiving environment more frequently, or there are stable conditions.*
  - *Terrain & Built Form: i.e Hills, valleys, vegetation, barriers, buildings etc.*
  - *Level of control over pathway*
– *Receptor*
  - *Sensitivity of the receiving environment*
  - *History of complaints or non-compliance, or well-known contentious issue or sector*

Odour field assessment (for odour sources only)

An odour surveillance campaign to survey odour levels in the field arising from the existing industrial premises. The assessment is to be conducted in accordance with the EPA Victoria Odour Surveillance Guidance. The survey campaign should be conducted over a number of weeks to capture a variety of different weather conditions and operating conditions. A minimum of 10 odour surveys is required.

Transitioning of industry

If existing industry has formally indicated that it will transition out of an area over a specified timeframe, then this provision can be used to sequence any proposed sensitive use development within the existing buffers.

Risk assessment outcomes

From the results of the risk assessment, areas of medium to low risk would be acceptable to implement sensitive uses subject to controls in place for zones of medium risk such as building design controls. For moderate areas, sensitive uses are not recommended until controls are implemented at source and receptor. For high-risk areas, sensitive uses are recommended to be prohibited until such time that the industry ceases to operate.

Appendices

Appendix A

Odour survey results

Details of the ten odour surveys conducted by GHD is provided within this section alongside figures outlining the survey routes and locations odour was observed.

Survey 1

Odour Survey 1 was conducted under winds from the east, with light wind speeds ranging from 1 to 3.5 m/s. The survey commenced at Clayton Reserve on Gracie Street and proceeded southwest onto Langford Street and then east on Green Street. No odour was detected during the survey around the north and east borders of Citywide. Subtle transient asphalt odour was detected at the south east border of Citywide when the wind shifted to be from the north and northwest. It was noted that the plant appeared to be operating at the time.

Obvious transient asphalt odour was detected at the intersection of Arden Street and Fogarty Street, under winds from the northwest, whilst a plume was observed venting from the stack. Observation points taken along the intersection of Laurens Street and Queensberry Street detected subtle transient asphalt odour, approximately 377 m from Citywide. Further observation points along Laurens Street, at Irwin Stockfeeds observed subtle grain odour.

Survey 2

No odour was detected during Odour Survey 2. The survey was conducted under calm wind speeds of 0.5 m/s from the north-northeast. Observation points were taken around the border of Citywide along Arden Street, Langford Street, Fogarty Street and Green Street. Visible pluming from the Citywide stack was noted during the survey along the southern border of Citywide and however no asphalt loading was observed to occur.

Survey 3

Odour Survey 3 was conducted under calm winds ranging from 0 to 0.5 m/s, from the south to southwest directions. The survey commenced at Railway Place and Miller Street park and proceeded north along Laurens Street. Subtle grain/municipal waste was detected at Irwin Stockfeeds. Subtle transient asphalt odour was detected south of Citywide. No load out was occurring at the time, however it was noted that it had previously occurred as trucks were exiting the site.

Survey 4

No asphalt odour was detected during Odour Survey 4. The survey was conducted under calm wind speeds between 0 to 1 m/s from the northeast. The observation points were taken around the border of Citywide along Arden Street, Langford Street, Fogarty Street and Green Street. Truck filling from the load out area was observed however no odour was detected. Subtle transient grain odour was detected at Irwin Stockfeeds.

Survey 5

Odour Survey 5 was conducted under winds ranging from 1 to 3 m/s from the southeast. The survey commenced at the intersection of Langford Street and Green Street, and then proceeded to Gracie Street. Very faint (subtle), transient asphalt odour was detected at the intersection of Gracie Street and Henderson Street. The survey continued southeast along Henderson Street where the wind direction was noted to change to be from the west-southwest. On Green Street, visible plume being emitted from the Citywide asphalt plant stack was observed to be heading in the direction of the odour survey (placing the observation points downwind) and the asphalt odour became more obvious, however remained transient. No further odour was detected during the survey which continued west on Laurens Street.

Survey 6

Odour Survey 6 was conducted under light winds ranging from 1 to 2 m/s. Subtle transient asphalt odour was detected on Henderson Street, where winds were recorded to be from the south-southwest. The survey then proceeded north to Gracie Street and returned to Fogarty Street through Henderson Street where very faint (subtle) transient asphalt odour was again observed. No visible plume emanating from the asphalt stack was observed. No odour was detected along Arden Street, at the southern border of Citywide.

Survey 7

Odour Survey 7 was conducted under calm winds from the south to southwest directions. Obvious transient asphalt odour was first detected at the corner of Green Street and Fogarty Street. The intensity decreased to subtle at observation points along the same streets. Further observation points taken along Henderson Street also recorded subtle transient asphalt odour where it was noted that plume was observed to be emanating from the stack in the direction of the observation points (i.e. placing them down wind).

Obvious transient asphalt odour was observed on the reserve located behind the North Melbourne Recreation Centre as well as directly north of Citywide on Green Street where visible pluming was observed at the time of the survey.

Survey 8

Odour Survey 8 was conducted under calm winds ranging from 0.5 to 2.5 m/s from the south to southwest directions. The survey commenced at Railway Place and Miller Street park and then proceeded north along Laurens Street. Subtle grain odour was detected at Irwin Stockfeeds. The survey then travelled west on Arden Street and up Fogerty Street. Subtle transient asphalt odour was then detected north of Citywide along Green Street and on the reserve located behind the North Melbourne Recreation Centre. Obvious transient odour was detected at the intersection of Henderson Street and Fogarty Street.

Survey 9

Odour Survey 9 was conducted under winds ranging from 3 to 5 m/s from the north. The survey commenced at Railway Place and Miller Street park and proceeded north along Laurens Street. Subtle transient grain odour was observed at Irwin Stockfeeds. Obvious transient asphalt odour was observed directly south of Citywide along Arden Street and it was noted that load out of asphalt into trucks was occurring. No odour was detected along Langford Street, Green Street and Fogarty Street.

Survey 10

Odour Survey 10 was conducted under calm winds ranging from 0 to 0.5 m/s from the northeast. The survey commenced at the corner of Arden Street and Fogarty Street and continued around the perimeter of Citywide. Subtle transient asphalt odour was observed along Green Street where it was noted that there was visible plume being emitting from the asphalt plant stack. The odour intensity at this observation point increased to obvious later on in the survey. No odour was observed on Henderson Street or at the reserve located behind the North Melbourne Recreation Centre.

Subtle transient asphalt odour was observed along Arden Street, south of Citywide. Further observation points on Laurens Street recorded obvious and subtle transient grain odour at Stockfeeds.

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 75 150 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 1

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FIGURE A1

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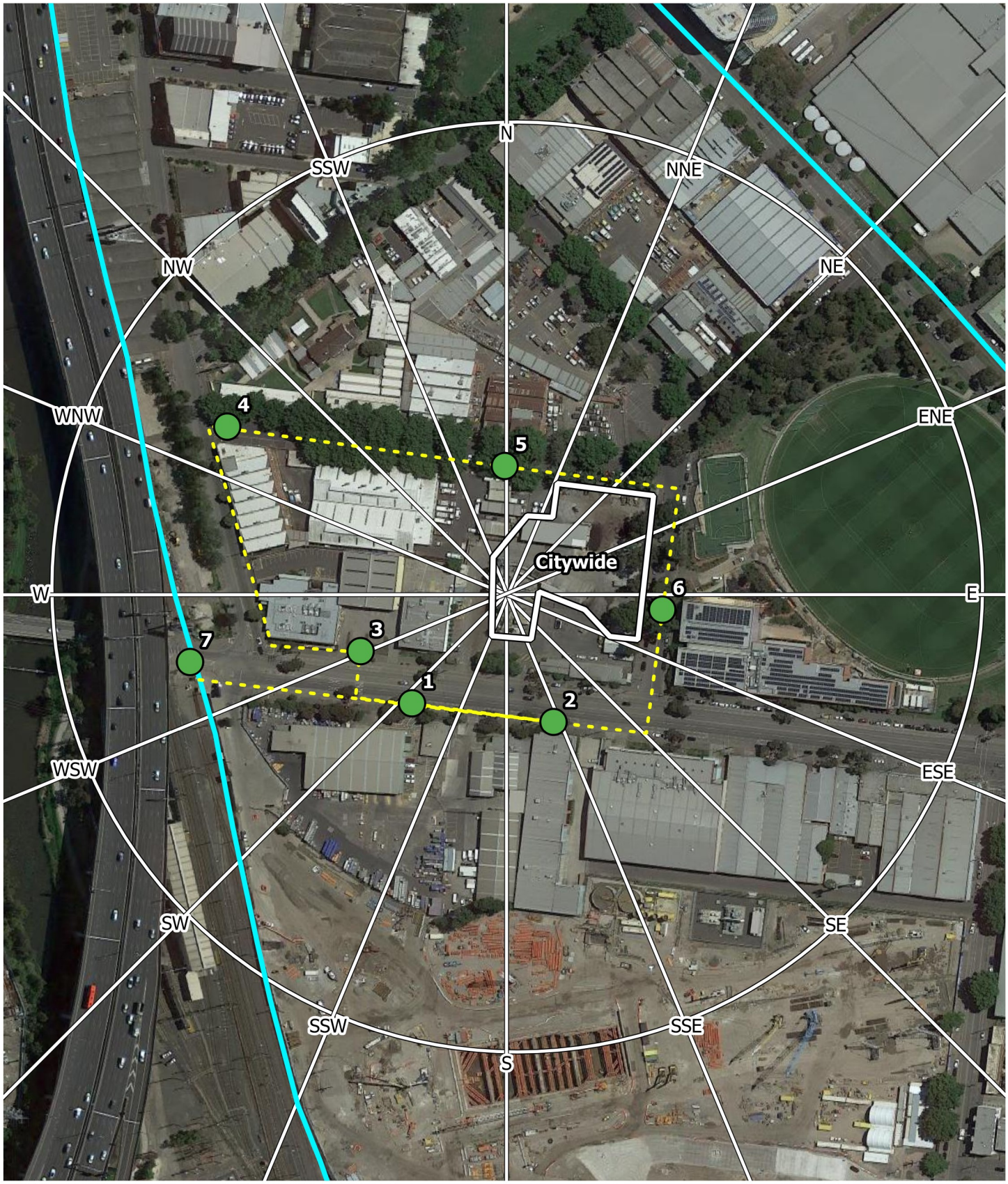

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 50 100 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 2

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FIGURE A2

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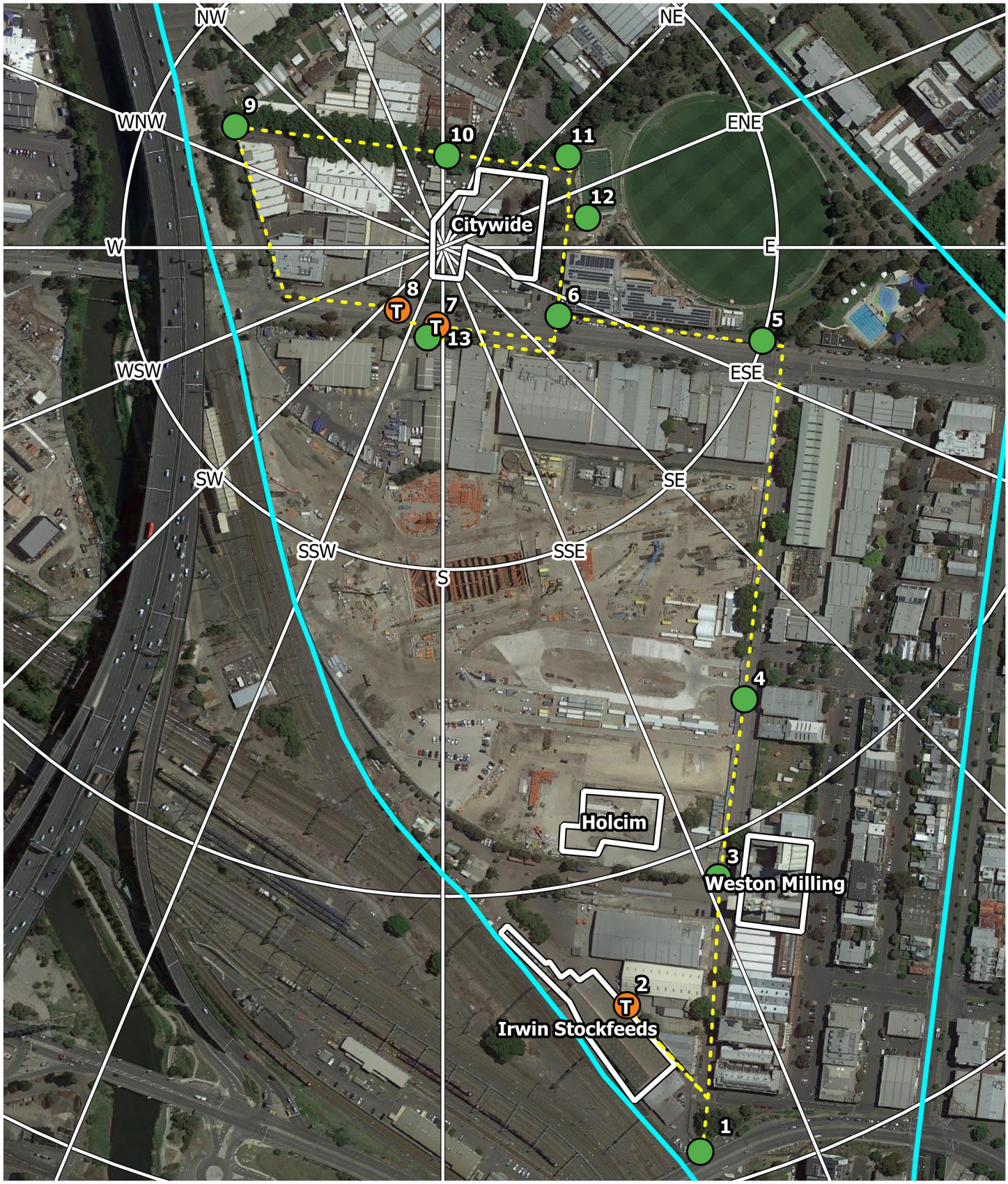

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 75 150 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 3

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FIGURE A3

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Print Date: 23/04/2021

Data Source: Google Earth Imagery 2021.
Created By: ylim

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 75 150 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 4

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FIGURE A4

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Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 75 150 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 5

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FIGURE A5

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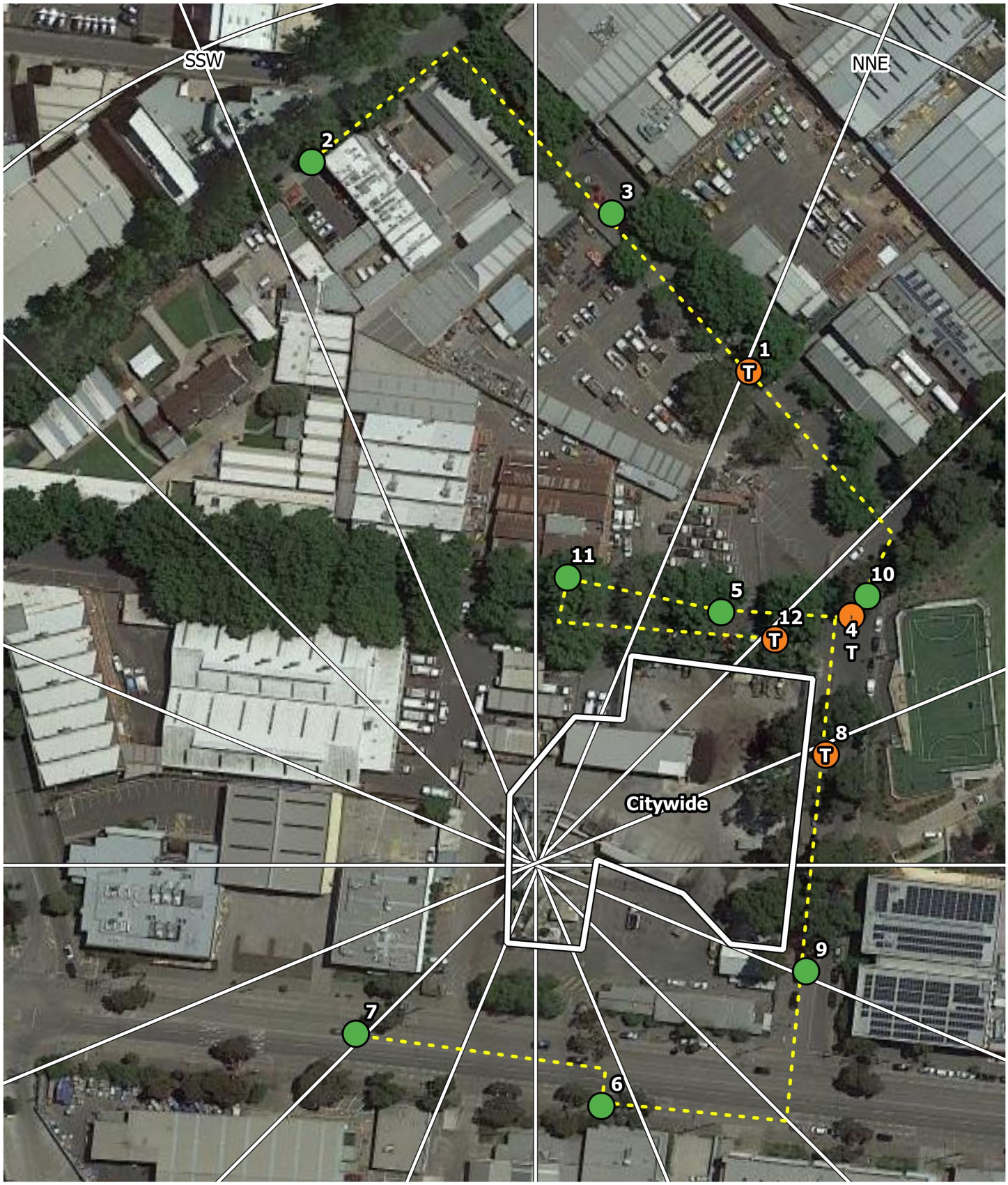

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 25 50 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 6

Project No. **12548247**
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FIGURE A6

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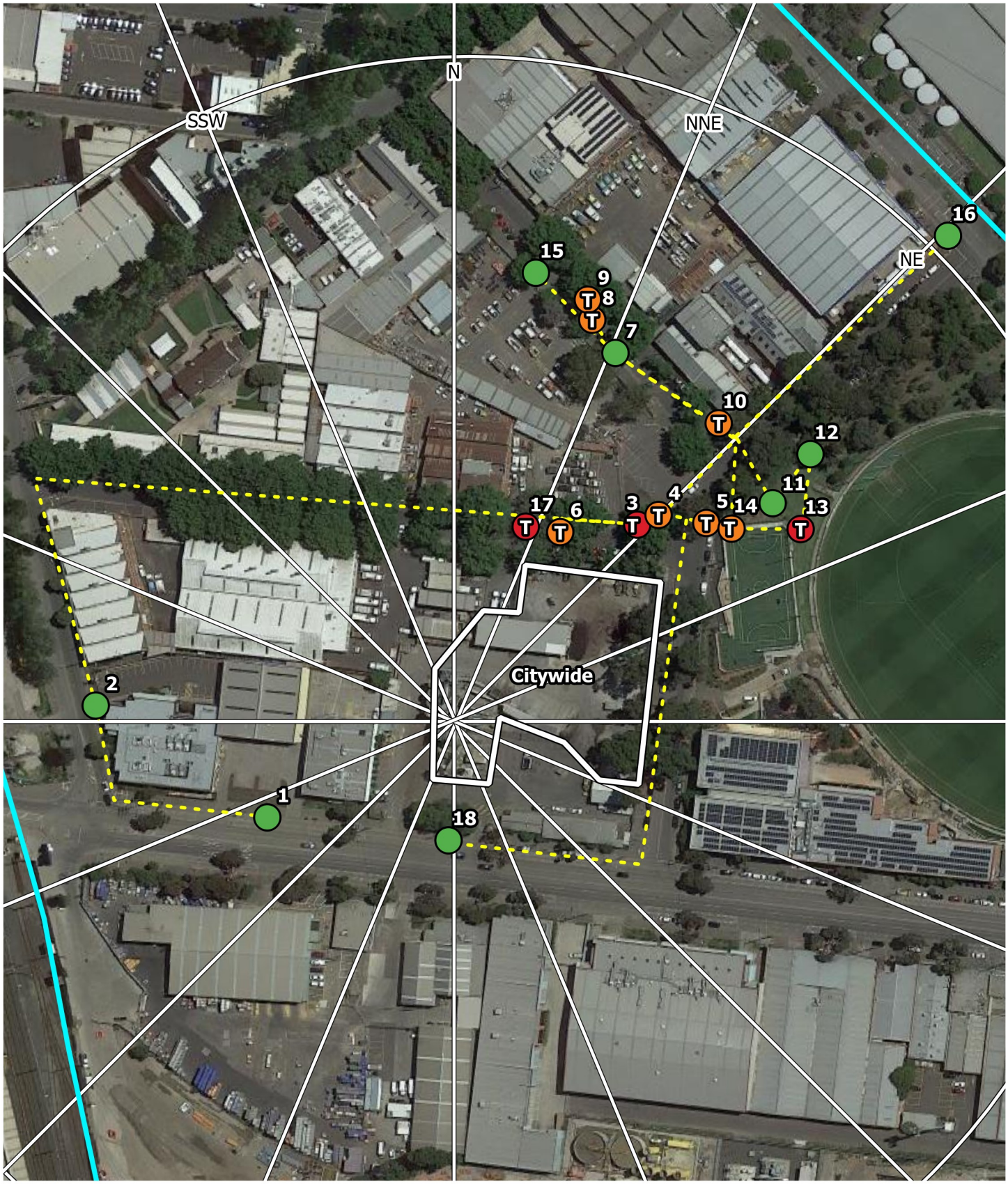

Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 25 50 m

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

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Arden Adverse Amenity Impact Assessment

Odour survey 7

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Date. **23/04/2021**

FIGURE A7

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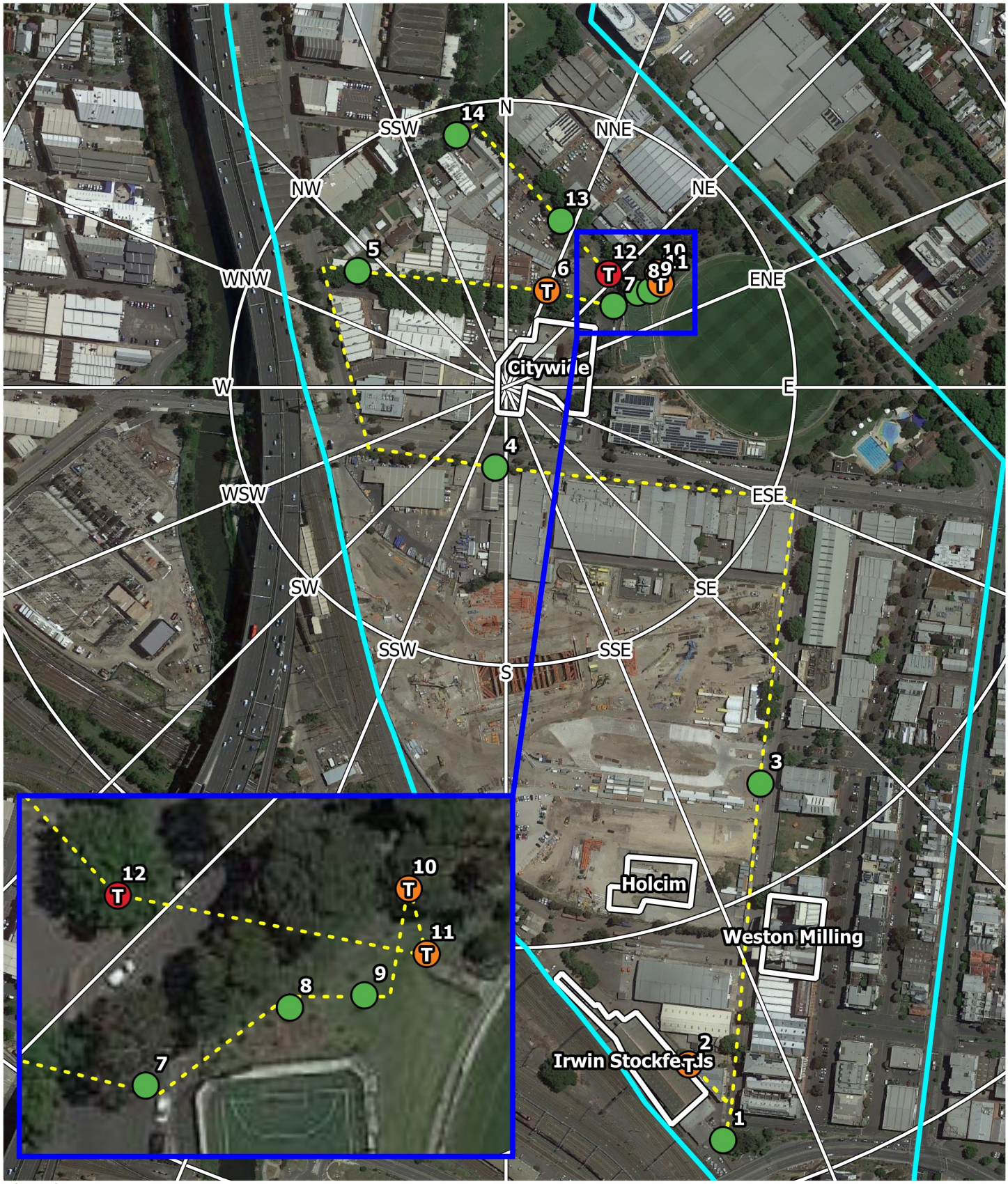
Print Date: 23/04/2021

Data Source: Google Earth Imagery 2021.
Created By: ylim



Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
No odour
Subtle
Obvious

Odour duration
C Constant
F Frequent/Repetitive
T Transient

Paper Size ISO A4

0 75 150 m

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

N

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Victorian Planning Authority

Arden Adverse Amenity Impact Assessment

Odour survey 8

Project No. **12548247**
Revision No. **B**
Date. **23/04/2021**

FIGURE A8

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Legend

Precinct boundary
Envelope of source
Survey path

Odour intensity
- No odour
- Subtle
- Obvious

Odour duration
- C Constant
- F Frequent/Repetitive
- T Transient

Paper Size ISO A4

0 75 150 m

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

N

GHD

Victorian Planning Authority

Arden Adverse Amenity Impact Assessment

Odour survey 9

Project No. **12548247**
Revision No. **C**
Date. **23/04/2021**

FIGURE A9

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Legend

- Precinct boundary
- Envelope of source
- Survey path

Odour intensity
- No odour
- Subtle
- Obvious

Odour duration
- C Constant
- F Frequent/Repetitive
- T Transient

Paper Size ISO A4

0 75 150 m

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

Victorian Planning Authority

Arden Adverse Amenity Impact Assessment

Odour survey 10

Project No. **12548247**
Revision No. **D**
Date. **23/04/2021**

FIGURE A10

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