Victorian Planning Authority

East Village Buffer Impact Assessment

November 2017

Executive summary

GHD has been engaged by the Victorian Planning Authority (VPA) to prepare an Impact Assessment Report for the proposed East Village Structure Plan in Bentleigh East.

The focus of the assessment was to review the existing land use of the East Village precinct and consider air quality (dust and odour), noise and vibration impacts of existing uses on the site and implications for the future urban renewal of the site.

Based on a site inspection, desktop investigations and analysis of EPA data and complaint history, there are no significant current constraints to the future development of the land in relation to dust, odour and air emissions.

The site inspection did identify two noise sources which should be considered as the development of the structure plan progress being:

- Electrical substation – 246a East Boundary Road, East Bentleigh

The existence of an electrical substation on site which has the potential to result in adverse noise impacts upon the future amenity of sensitive uses. The transformer, as an existing structure within an industrial estate does not need to comply with the SEPPN – 1 noise criteria. It is understood that the substation will remain throughout the precinct development, and there is no obligation for the substation asset owner to comply with the SEPP N-1 noise policy for any future sensitive receiver built within the vicinity.

- Traffic noise from North Road

It is considered that traffic noise associated with North Road and East Boundary Road is the primary background noise contributor within the vicinity of the precinct.

As such, traffic noise is considered to represent a risk to the amenity of future sensitive uses within the site.

Further investigation and noise monitoring would be required to characterise the traffic noise impact levels, in particular during the night-time period.

Table of contents

Table index

Figure index

Appendices

1. Glossary of terms

Term	Definition
AQMS	Air Quality Monitoring Station, capable of recording wind speed, wind direction, temperature and wind variability.
A standard design treatment for noise	A prescribed building construction method based on the known performance of the construction materials adopted including documentation, plans and product certification specifying the level of sound attenuation performance of the materials used for the relevant level of noise exposure.
Background Noise Level	For a day, evening or night period means the arithmetic average of the L_{A90} levels for each hour of that period for which the commercial, industrial or trade premises under investigation normally operates. The background level shall include all noise sources except noise from commercial, industrial or trade premises which appear to be intrusive at the point where the background level is measured.
dB	Unit of measurement for Sound Pressure Level known as a decibel.
dB(A)	'A-weighted' decibel measurement. Developed in the 1930s as a way to represent the sound frequency sensitivity of the human ear.
C_{tr}	Spectrum adaptation term. A value added to an Rw value to account for variations in the spectrum.
De-rating	Decreasing the original set of parameters, for example, a buffer zone distance, through determining the actual impacts that operational conditions of a process will have on the area.
Default buffer (separation) distance	The minimum distance as specified in EPA guidelines from the source of an industry emission (dust or odour) required to minimise impact in the event of a process malfunction at the source. Buffer distances are specified for a range of industries and the distance is selected based on EPA experience with upsets/malfunctions for those industries.
Drainage flows	The flow of air down drainage lines (river valleys, stream lines etc). Outside daylight hours, these flows generally have high stability, so that any contaminant released into such flows will be poorly dispersed.
EPA	Environment Protection Authority.
Encumbered land	Land that is constrained for development purposes.
Fugitive emissions	Emissions of gases or vapours due to leaks and other unintended releases of gases. The sources of fugitive emissions can be myriad and are hard to capture.
Ground borne vibration	Ground borne vibration is vibration transmitted from source to receiver via the medium of the ground.
GHD	GHD Pty Ltd
Interim criteria	Criteria relating to that specific point in time.
$L_{A90\ (Time)}$	The A-weighted arithmetic average sound pressure level that is exceeded for 90 percent of the time over which a given sound is measured. This is considered to represent the background noise.
$L_{A10\ (Time)}$	The A-weighted arithmetic average of the sound pressure level that is exceeded for 10 percent of the measurement period. This is considered representative of the average maximum noise.
$L_{Aeq\ (Time)}$	Equivalent sound pressure level is the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. This is considered representative of the ambient noise.
$L_{Amax\ (Time)}$	The maximum A-weighted sound pressure level over a specified period of time.

Term	Definition
$L_{Amin\ (Time)}$	The minimum A-weighted sound pressure level over a specified period of time.
Nuisance	A negative effect of a process or action that has the potential to cause inconvenience or annoyance to a person.
OU	Odour units, whereby one odour unit corresponds with the concentration of an odorant or blend of odorants that can be detected by 50% of a panel of people selected to be representative of the general population.
PEM	Protocol for Environmental Management, as incorporated in the State Environment Protection Policy (Air Quality) for Victoria, which sets out a methodology to assess potential impacts from mining and extractive industries.
PPV	Peak particle velocity. Current practices for assessments of the risk of structural damage to buildings use measurements of peak particle velocity (PPV) in millimetres per second.
Reverse amenity issues	Reverse amenity refers to the situation where sensitive land uses threaten to encroach into the buffer of an existing industry premises.
RMS	Root mean square
R_w	Weighted Sound Reduction Index. A single number descriptor facilitating comparison of the performance of different partitions measured in a laboratory, derived from a curve fitting technique to measure data of calculated 1/3 octave band centre frequency transmission loss (TL) data for the partition between 100 Hz and 3150 Hz
SEPP N-1	State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1.
Sensitive land use – EPA definition	A sensitive land use can be defined as any dwelling; caretakers house; library; educational institution; religious facility; childcare centre; kindergarten; hospital; surgery or other medical institution including an institutional home; informal outdoor recreation sites, commercial and/or retail activity (such as any, hotel, motel, caravan park or tourist establishment).
Sensitive receiver (noise)	Noise sensitive area, as defined under the SEPP N-1, means : - *That part of the land within the apparent boundaries of any piece of land which is within a distance of 10 m outside the external walls of any of the following buildings – Dwelling (except caretaker's house) and residential building.* - *That part of the land within the apparent boundaries of any piece of land on which is situated any of the following buildings which is within a distance of 10 m outside the external walls of any dormitory, ward or bedroom of such buildings – caretaker's house, hospital, hotel, institutional home, motel, reformative institution, tourist establishment, work release hostel.*
Short-term vibration	Vibration that occurs so infrequently that it does not cause structural fatigue nor does it produce resonance in the structure.
Sound Pressure Level (SPL)	The Sound Pressure level is the change in air pressure above and below the average atmospheric pressure (amplitude) cause by a passing pressure wave; this is then converted to decibels and can be abbreviated as SPL or L_p.
Sound Power Level (PWL)	This is defined as the average rate at which sound energy is radiated from a sound source and is measured in watts (W). The Sound Power Level can be abbreviated as PWL or L_w.
Throughput	The secondary and waste effects as a result of a process of production.
TSP	Total Suspended Particles; the mass concentration of all particles of contaminants (aerosols) in the air typically less than 40 µm in aerodynamic odour.

Term	Definition
Upset conditions	Upset conditions refers to unintended emissions which do not occur under routine operations. Upsets may occur due to extreme weather conditions, mechanical breakdowns/malfunctions or operational failures.
VDV	Vibration dose value. As defined in BS6472:1992, the vibration dose value is given by the fourth root of the integral of the fourth power of the frequency weighted acceleration.
Vibration	The variation of the magnitude of a quantity which is descriptive of the motion or position of a mechanical system, when the magnitude is alternately greater and smaller than some average value or reference. Vibration can be measured in terms of its displacement, velocity or acceleration. The common units for velocity are millimetres per second (mm/s).
Wake influences	Disturbed air downwind from a building or similar structure affecting the free stream wind direction, speed and turbulence.

2. Introduction

2.1 Study objective

GHD Pty Ltd (GHD) has been engaged by the Victorian Planning Authority (VPA) to prepare an Impact Assessment Report to inform the preparation of the East Village Structure Plan in Bentleigh East.

The study area comprises land with a 500m catchment of the East Village precinct boundary (Refer to Figure 1) to investigate uses that may cause adverse amenity impacts on proposed uses based on the draft urban structure.

This Impact Assessment identifies sources of potential adverse amenity impacts in relation to the noise, dust, odour and air emissions from within and the study area that may continue to operate over the short, medium and in some cases long term.

The VPA, in consultation with the Glen Eira City Council is developing a structure plan for the East Village Precinct. Due to the precinct being in multiple ownership it is assumed that the future redevelopment of the land will be staged over a period of time and there is potential for existing industrial uses to the site may pose constraints over the future configuration of land uses.

The East Village precinct is currently occupied by a number of industrial and commercial uses and has been identified as suitable for mixed use purpose.

The establishment of compatible land uses and / or accommodating industrial uses in contemporary cities is an increasingly significant issue to urban planning 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 buffer areas of existing industries which may result in unachievable or commercially unreasonable constraints being imposed upon industries to mitigate the impacts at the source (‘reverse amenity’).

The preparation of an Impact Assessment Report assists in understanding the current constraints for urban renewal development and inform the future structure plan.

2.2 Scope of assessment

The objective of this commission is to conduct necessary technical investigations, in relation to noise and odour/ dust and to prepare an Impact Assessment Report. The findings of this report will be used by the VPA to inform a precinct design that will respond to the constraints on future land use posed by the potential ongoing operation of existing industries.

Following a desktop assessment and site inspection, GHD identified the existing industries within the investigation area that may result in an amenity impact.

2.3 Limitations and assumptions

This report has been prepared by GHD for Victorian Planning Authority and may only be used and relied on by Victorian Planning Authority for the purpose agreed between GHD and the Victorian Planning Authority as set out in 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. 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, including the Environmental Protection Authority, 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.

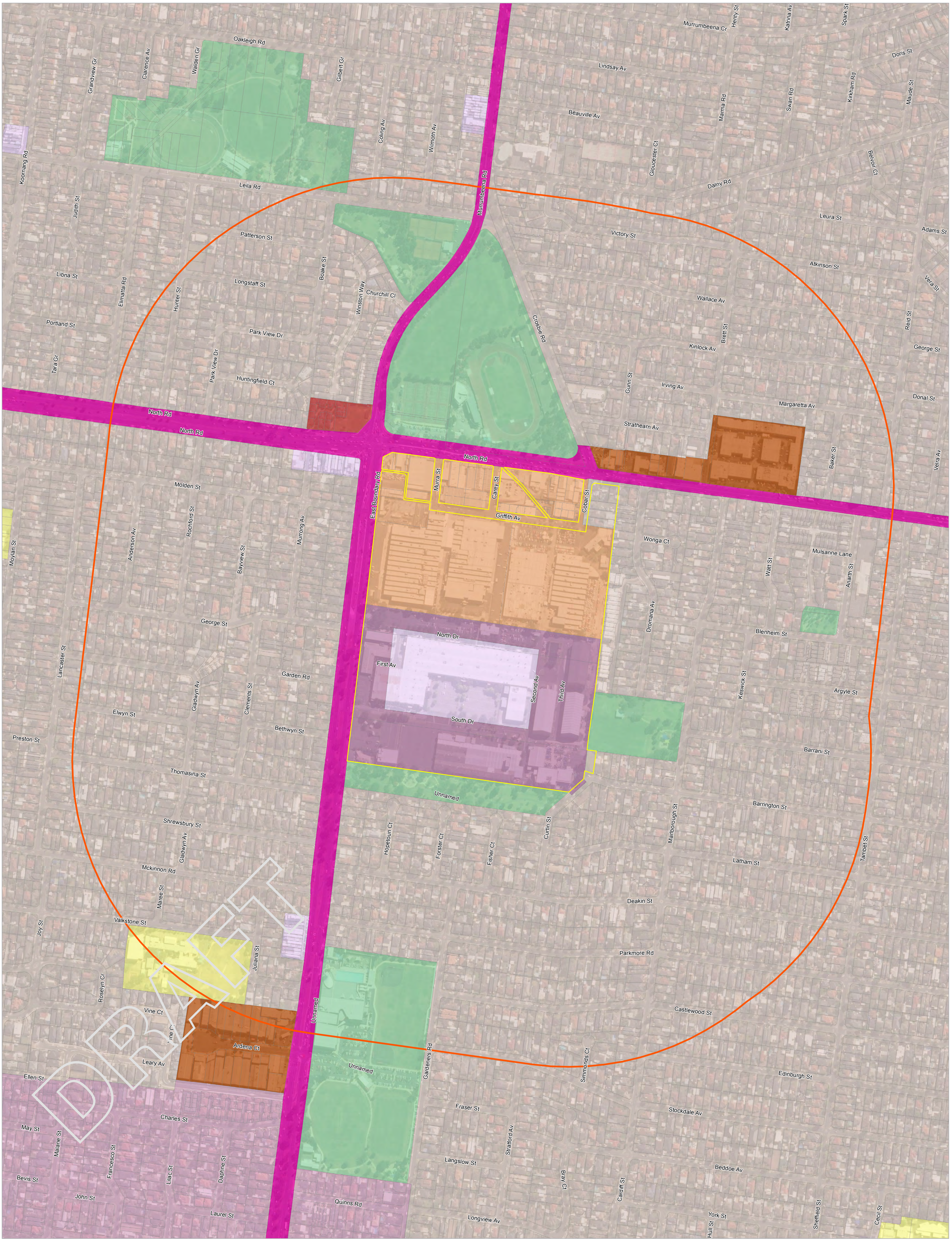
Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) 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.

3. Precinct description

3.1 Investigation Area

The Investigation Area used to inform this assessment is land within a 500 metre catchment of the site as shown in Figure 1 below.



Legend

- Study area
- 500m study area buffer
- Parcel

Planning zone

- Commercial 1
- Commercial 2
- General Residential
- Industrial 1
- Industrial 3
- Mixed Use
- Neighbourhood Residential
- Public Park and Recreation
- Public Use
- Road – Category 1

Paper Size ISO A1

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Victorian Planning Authority

East Village Buffer Impact Assessment

Planning Zones and Study Area

Project No. 31-35578
Revision No. B
Date 24/10/2017

FIGURE 1

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Print date: 24 Oct 2017 - 11:55

3.2 Precinct Context

The East Village Strategic Site is a 24 hectare site within the City of Glen Eira, approximately 14 km from the Melbourne Central Business District (CBD).

The East Village precinct is generally rectangular and bounded by North Road (north), East Boundary Road (west), Virginia Park (south) and adjoins residential zoned land to the east.

The land is currently zoned Industrial 1 (IN1Z) for the northern half of the subject land and Commercial 1 Zone (C1Z) and Commercial 2 Zone (C2Z) land for the southern half of the site. The Commercial 1 Zone (C1Z) is surrounded by Commercial 2 Zoned (C2Z) land.

The IN1Z land is occupied by a number of small factory buildings fronting North Road Griffin Avenue (to the south). The commercial zoned land is occupied by larger warehouse buildings and tenanted by a number of business for varying commercial and industrial uses.

The surrounding area is surrounding by the following zones/ land uses:

North	Opposite the site across North Road is Duncan Mackinnon Reserve which is zoned Public Park and Recreation Zone (PPRZ). To the north west (across North Road) is a small section of Mixed Use Zoned (MUZ) land which is partly occupied by a number of townhouses (west) and partly vacant on Murrumbeena Road and North Road. To the north east the land is zoned Industrial 3 (IN3Z) and occupied by light industrial factories.
South	Virginia Park Reserve is located to the south (PPRZ)
East	Marlborough Street Reserve adjoins the site to the east of the subject land
West	Opposite the site to the west the land is zoned Neighbourhood Residential (NRZ1). A small shopping strip is zoned Commercial 1 (C1Z) fronting North Road. To the south on East Boundary Road is a small section of Industrial 3 zoned (IN3) land and Commercial 1 Zone.

4. Existing planning and land use context

4.1 Land use planning

The State Planning Policy Framework (SPPF) includes a number of references to planning for the location of potentially conflicting land uses and their relationship to each other.

The following clauses are relevant to this study, where policy seeks to address land use conflict between industrial and sensitive land uses.

Clause 10 establishes the operation of the SPPF and seeks to ensure that the objectives of planning Victoria (as set out in Section 4 of the Planning and Environment Act 1987) are fostered through appropriate land use policies and practices, which integrate relevant environmental, social and economic factors in the interests of net community benefit and sustainable development.

The clause notes that planning and responsible authorities should endeavour to integrate the range of policies relevant to the issues to be determined and balance conflicting objectives in favour of net community benefit and sustainable development for the benefit of present and future generations.

With the objectives of the local government under the Local Government Act 1989, municipal planning authorities are required to identify the potential for regional impacts in their decision making and coordinate strategic planning with their neighbours and other public bodies to achieve sustainable development and effective and efficient use of the resources.

Clause 11 relating to settlement seeks to anticipate and respond to the needs of existing and future communities through appropriately zoned and serviced land for housing, employment, recreation and open space, commercial and community facilities and infrastructure. This clause also seeks to prevent environment problems created by siting incompatible land uses close together. This identifies the need to focus investment and growth in places of state significance including the National Employment and Innovation Clusters (NEIC). Clause 11 also seeks to facilitate the orderly development of urban areas and the preparation of a hierarchy of structure plans or precinct structure plans.

Clause 13 considers environmental risks including reference to land use separation and protection of sensitive uses from adverse impacts from other land uses.

Clause 13.03 – 1 seeks to ensure that potentially contaminated land is suitable for its intended future use and development, and that contaminated land is used safely.

4.1.1 Nosie Guidelines

Clause 13.04 seeks to ensure that development is not prejudiced and community amenity is not required by noise emissions, using a range of building design, urban design and land use separation techniques as appropriate to the land use functions and character of the area. The policy considers the following policy guidelines (as considered relevant to this study).

- *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (in metropolitan Melbourne).*
- *A Guide to the Reduction of Traffic Noise (VicRoads 2003).*

4.1.2 Air Emissions Guidelines

Clause 13.04 – 2 relating to air quality and seeks to assist the protection and improvement of air quality. This clause seeks to ensure, wherever possible, that there is suitable separation between land uses that reduce amenity and sensitive land uses.

The policy considers the following policy guidelines (as considered relevant to this study).

- *State Environment Protection Policy (Air Quality Management).*
- *Recommended Buffer Distances for Industrial Residual Air Emissions (Environmental Protection Authority, 1990) in assessing the separation between land uses that reduce amenity and sensitive land uses.*

Clause 17 relating to economic development seeks to provide for a strong and innovative economy. This clause seeks for Planning to contribute to the economic well-being of communities and the State as a whole by supporting and fostering economic growth and development by providing land, facilitating decision and resolving land use conflicts, so that each district may build on its strengths and economic potential.

Clause 17.02 relating to industry seeks to ensure availability of land for industry. Strategies include:

- *Protect and carefully plan existing industrial areas to, where possible, facilitate further industrial development.*
- *Provide an adequate supply of industrial land in appropriate locations including sufficient stocks of large sites for strategic investment.*
- *Protect industrial activity in industrial zones from the encroachment of unplanned commercial, residential and other sensitive uses which would adversely affect industry viability.*
- *Encourage industrial uses that meet appropriate standards of safety and amenity to locate within activity centres.*
- *Avoid approving non-industrial land uses, which will prejudice the availability of land for future industrial requirements, in identified industrial areas.*

The policy considers the following policy guidelines.

- *Recommended Buffer Distances for Industrial Residual Air Emissions (Environmental Protection Authority, 1990) in assessing the separation between land uses that reduce amenity and sensitive land uses.*

4.1.3 Clause 52.10 – Uses with adverse amenity impacts

Where there is an industrial use proposed on a land parcel, then the Particular Provisions of Clause 52.10 apply for specified uses with adverse amenity potential. However, for the concept plan it is noted that the proposed zone seeks to apply a Comprehensive Development Zone (CDZ) which is not a 'residential zone' and does not trigger consideration of buffer distances under clause 52.10 – uses with adverse amenity impacts.

As the CDZ is not a 'Residential Zone', the application of Clause 52.10 does not apply and has not been considered as part of this Impact Assessment Report.

Relevant EPA policies and guidelines have been considered in the preparation of this study.

5. Identification of relevant existing industries

5.1 Industry identification

Site inspections of the site and the surrounding area were conducted on 26 September 2017. The site inspection was supplemented in this review by aerial photography using Google Earth and Google Street View.

Various existing industries were identified within the subject study area. These are detailed in the following sub-sections.

5.1.1 Existing industries

The identified industries within and surrounding the precinct (within a 500 m radius) are listed in Table 1. The table identifies the company, their operations, address, type of potential sources of emission and the primary concern for this assessment. Refer to Figure 2 for map locations of these identified industries.

Table 1 Identified Industries

	Industry	Address	Potential Sources	Primary Concern
1	Transformer	246A East Boundary Road, East Bentleigh		Noise
2	Wilson Storage	928 North Road, East Bentleigh	Trucks	Noise
3	Ever Solar	236 – 262 East Boundary Road, East Bentleigh	Trucks	Noise
4	Trelleborg Marine Systems	236 – 262 East Boundary Road, East Bentleigh	Trucks	Noise
5	Visionstream	236 – 262 East Boundary Road, East Bentleigh	N/A	N/A
6	Officeworks Customer Service Centre	236 East Boundary Road, East Bentleigh	N/A	N/A
7	Virginia Park Child Care Association Inc.	232 East Boundary Road, East Bentleigh	N/A	N/A
8	Guardian Childcare & Early Learning Centre - Bentleigh East	236 East Boundary Road, East Bentleigh	N/A	N/A
9	Existing stormwater ponds	Within Precinct	N/A	N/A
10	Chassis Brakes International[1]	246 East Boundary Road, Bentleigh East	Brake manufacturing	Air emissions, Noise
11	Showb's Swiss Bakery	28 – 30/ 993 North Road, East Bentleigh	Production of baked products	Odour
12	Oasis Bakery	9/993 North Road, East Bentleigh	Production of baked products	Odour

[1] Will be permanently closing in 2017 see- http://www.eastvillagemasterplan.com.au/current-precinct/

	Industry	Address	Potential Sources	Primary Concern
13	Charlies Cookies	225 East Boundary Road, East Bentleigh	Production of baked products	Odour

No facilities within a 500 m radius of the site were identified to hold an EPA licence to discharge to air for dust or odour.

5.1.2 Complaint history

The previous performance of all the industries is a relevant consideration in establishing if there are any existing issues with respect to offsite odour, dust or noise impacts. In conducting the assessment, emphasis was placed on establishing the past performance of each industry with respect to off-site odour, dust or noise, as gauged by the incidence of complaints lodged with the City of Glen Eira or EPA.

Council Data

Council provided list of all dust, odour and noise complaints relevant to the area for the period January 2012- September 2017. In total there have been two noise complaints sourced to the site both in 2012, while there has been one odour complaint also sourced to the site in 2015.

EPA - Odour

EPA has provided GHD a map and list of all odour complaints surrounding the site between January 2012 and September 2017. GHD has presented all complaints within a 500 m radius from the boundary of the site.

Significantly, the number of odour complaints received by EPA has decreased over the period, with a peak of 3 complaints in 2013 reducing to 1 complaint in both 2015 and 2016. Four of the odour complaints have been registered from residential premises to the north and east, while one was made from within the site. It is not known what the source of the complaints were.

A summary of complaints received by EPA is provided in Figure 2 and Appendix A.

Based on the data provided GHD concludes that there are no ongoing offsite odour issues that impact the precinct or within 500 m of the site.

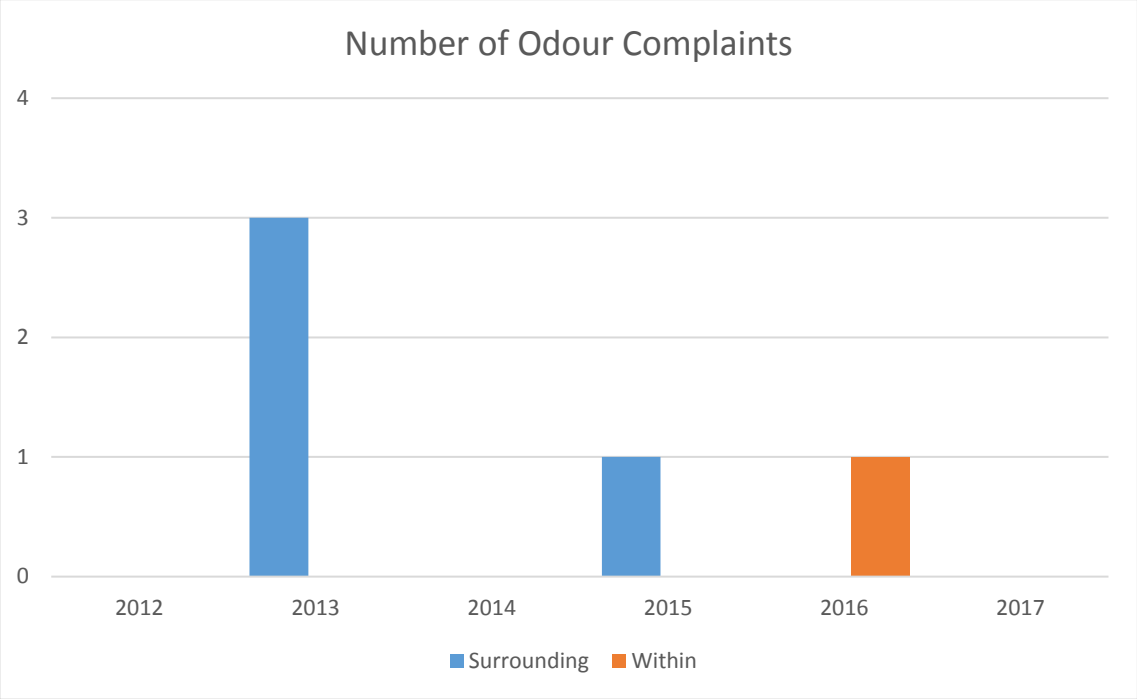


Figure 2 Summary of Odour Complaints

Dust Complaint History

EPA has provided GHD a map showing the approximate locations and list of all dust complaints surrounding the site between January 2012 and September 2017. GHD has assessed and reported all complaints from a 500 m radius from the boundary of the site. There has been just one dust complaint received by EPA in the area surrounding the site since 2012 recorded in 2017. There has been no dust complaints made from the within the site. It is unknown what the source of the complaints were.

A summary of complaints received by EPA is provided in Figure 3 and Appendix B.

Based on the data provided GHD concludes that there are no ongoing offsite dust issues that impact the precinct or within 500 m of the site.

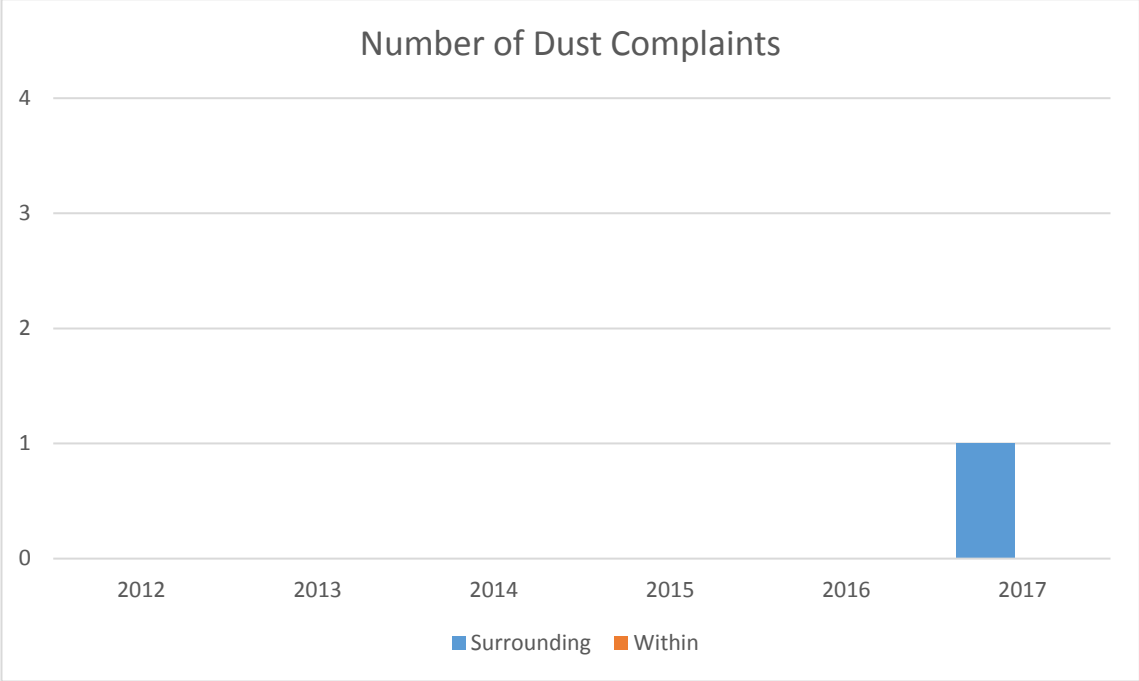


Figure 3 Summary of Dust Complaints

Noise

Figure 4 shows that there has been two noise complaints from the surrounding area (500 m radius from the boundary of the site) since 2012, while there has been two noise complaints from within the site. It is unknown what the source of the complaints were.

Based on the data provided GHD concludes that there are no ongoing offsite noise issues that impact the precinct or within 500 m of the site. This should be read in conjunction with Section 8 – Noise Assessment which investigates further noise sources within the Precinct.

A summary of complaints received by EPA is also provided in Appendix C.

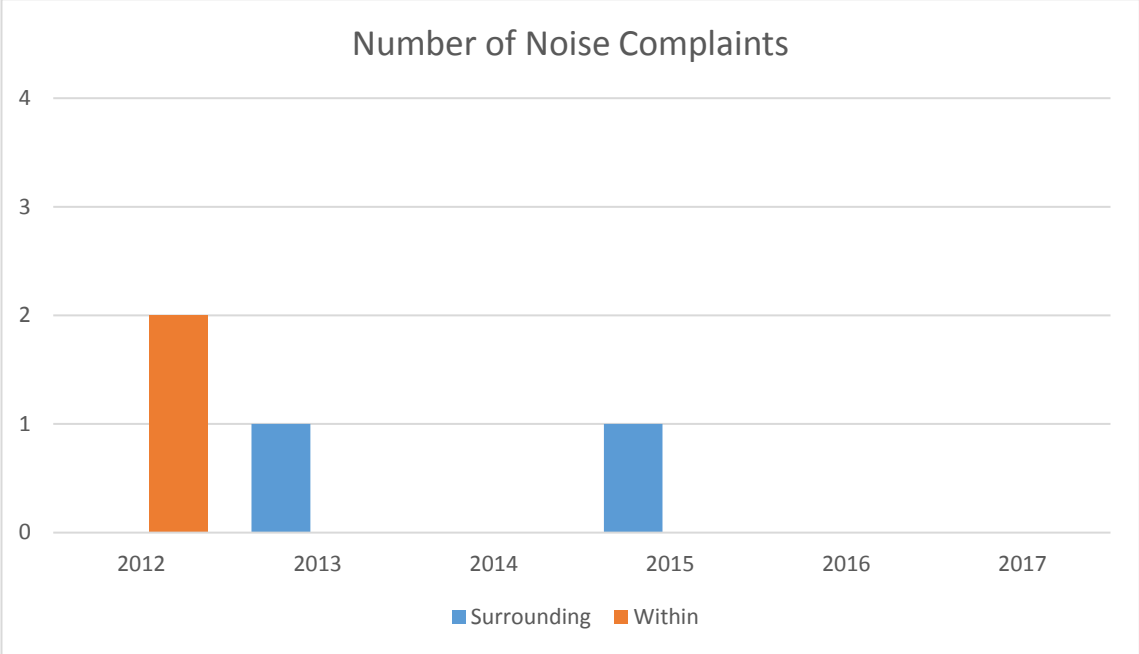


Figure 4 Summary of Noise Complaints

5.1.3 History of EPA breaches

No data was provided by EPA regarding any EPA breaches for industries within the site or within a 500 m radius from the boundary of the site.

6. Buffer distance guidelines

6.1 The importance of buffer distances

Guidance on the extent of buffer distances from industrial activities can be obtained from both the Victorian Planning Provisions (VPP) contained in the Glen Eira Planning Scheme, various State Environmental Protection Policies (SEPP's), and Victorian EPA published guidelines.

6.2 Buffer distance guidance from relevant planning scheme provisions

Two classes of buffer / separation distance guidelines are relevant in the context of planning in Victoria.

In the case of an existing industrial use, the use of zoning mechanisms (i.e. industrial zones or the Special Use Zones (SUZ)) or planning overlays (i.e. an Environmental Significance Overlay), allow for industrial activities with potential off-site impacts to be identified and, where required, separation distances between the industrial emission point and nearest proposed sensitive land uses to be defined. The EPA[2] separation distances should be considered when preparing a planning scheme, planning scheme amendment or planning permit application.

The EPA separation distances are recommendations only (guidelines) and cannot be enforced without implementation in the planning scheme.

In the case of a proposed industrial use, a separation distance between potentially incompatible uses can be implemented through the Planning Scheme (rezoning via a Planning Scheme Amendment), or thorough conditions of approval in relation to a planning permit application.

6.3 Buffer distance guidance from SEPP provisions and EPA guidelines

A separation distance is used to provide separation of sensitive land uses (i.e. residential, schools, hospitals and recreation reserves) from existing industrial premises with the potential for off-site emissions (odour or dust) that can cause disamenity in the event of an upset/malfunction.

Under routine operations, SEPP (AQM) objectives should be met and odour/dust impacts should be confined on-site by the implementation of environmental management practices. 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.

The purpose of the EPA separation distance guidelines is to provide recommended minimum separation distances between odour or dust emitting industrial land uses and sensitive land uses. Accordingly, the relevant sections of the guideline for this assessment are to:

- Provide clear direction on which land uses require separation
- Inform and support strategic land use planning decisions
- Prevent new sensitive land uses from impacting on existing industrial 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.

[2] EPA Victoria Publication 1518 dated March 2013

The buffers are to be scribed as per EPA Guidelines Method 1 (Urban method). This method requires that the separation distance be measured from the activity boundary of the industry to the property boundary of the sensitive land use, i.e. this activity boundary of the industry is a convex polygon containing the activities of the industry.

Note that noise, vibration, ambient and hazardous air pollutants and light spill are not considered in the separation guideline. Other regulations, polices and guidance relevant to the consideration of land use separation for protection from the above impacts include:

- State Environment Protection Policy Air Quality Management (SEPP-AQM)
- State Environment Protection Policy (Control of Noise from Commence, Industry and Trade) No. N-1)
- Land Use Planning Near Major Hazard Facilities, WorkSafe, 2010
- Victoria Planning Provisions (VPPs), Department of Planning and Community Development
- EPA Victoria: State Environment Protection Policy – Control of Noise from Commerce, Industry and Trade No. N-1 (SEPP N-1)
- EPA Victoria: State Environment Protection Policy – Control of Music Noise from Public Premises No. N-2 (SEPP N-2)
- EPA Victoria: Noise Control Guidelines Publication 1254 (2008)
- Victorian Government: Passenger Rail Infrastructure Noise Policy (April 2013)
- Australian Standards AS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors
- Australian Standards AS 3671:1989 Acoustics – Road Traffic Noise Intrusion, Building Site and Construction
- Australian Standards AS 2631.2:2014 – Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration – vibration in buildings (1 Hz to 80 Hz)
- Australian Standard 2436:2010 – Guide to noise and vibration control on construction, demolition and maintenance sites
- Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting

6.3.1 Default buffer distances

In this case, the EPA Victoria (EPA) recommended separation distance guidelines that apply to existing industries in the vicinity of the subject site are the relevant current guidelines to apply with respect to the future planning of sensitive land uses.

EPA has published[3] recommended separation distances for selected industry categories (EPA Guidelines) that replace the earlier buffer guideline. Separation distances can be used to define zones of land off-site from the industry premises, which are constrained from development for sensitive land uses.

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

The East Village Precinct currently comprises a mixture of industrial and commercial premises. The facilities identified as having a potential for offsite odour and/or dust impacts were:

- A number of auto facilities (repair shops) were identified to be located within the project precinct. Potential emissions to air would be odorous VOCs from solvents, fuel emissions from standing cars such as diesel and petrol emissions of (VOCs, CO, NOx and SO2) and spray painting of vehicle panels. Most auto repair centres have spray booths with vents and stacks leading to the roof, which would treat emissions via a filter or wet scrubber. Generally, these activities were observed to be located indoors and anticipated to have low odour impact risk to the precinct.
- Chassis Brakes International (brake manufacturer) is currently the largest single use in the precinct, however it is understood that the business will be permanently closed in 2017[4]. A single stack was identified on the roof which would likely be for the emission of treated emissions via a filter or wet scrubber.

Outside of the precinct within the 500 m radius the following facilities were identified as having a potential for offsite odour and/or dust impacts were:

- Schwob's Swiss Bakery
- Oasis Bakery
- Charlie's Cookies

Odour from Charlie's Bakery was identified outside the premises along East Boundary Road during the site inspection. This odour was characterised as sweet and pleasant and not deemed offensive.

Table 2 identifies the recommended buffer distances as specified in the Victorian EPA guidelines for those industries with the potential for off-site emissions (odour or dust) within the study area. The potential for a buffer reduction is also assessed and what future actions may be applied to potentially reduce the buffer.

Table 2 Default EPA Buffers for Industries within and surrounding the site

Company	Industry Class	EPA Default Buffer (m)	Potential for a buffer reduction	Future actions to potentially reduce the buffer
Auto Dealerships/Repairs	N/A	N/A	N/A	None
Schwob's Swiss Bakery	Bakery	100	Yes	Size of the plant (throughput)
Oasis Bakery	Bakery	100	Yes	Size of the plant (throughput)
Charlie's Cookies	Bakery	100	Yes	Size of the plant (throughput)
Chassis Brakes International	N/A	N/A	Yes	Transition out of area

6.4 Potential Buffer Constraints

Figure 5 shows that no buffers were identified to pose a constraint to the site.

[4] http://www.eastvillagemasterplan.com.au/current-precinct/

Schwob's Swiss Bakery

Oasis Bakery

Charlie's Cookies

DRAFT

Study area

Default buffer sites

100m default buffers

Paper Size ISO A3

0 50 100 150

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Victorian Planning Authority

East Village Buffer Impact Assessment

Default EPA Buffers

Project No. 31-35578
Revision No. A
Date 25/10/2017

FIGURE 5

G:\31\35578\GIS\Maps\Working\002_DefaultBuffers_A3P_RevA.mxd

Created by: savenables

6.5 Available Buffer for the Site

The potential for future industries to pose air quality constraints on the site is remote, in part because the residential zoned land in all directions will constrain any industry requiring a significant buffer (>100 m).

6.6 Consideration for site-specific variation to default buffers

The EPA allows for site-specific variation to the default buffer distance for a given industry and identifies six criteria to consider in Table 4 of the guideline. These criteria are addressed below.

- Transitioning of the industry – If the industry has any plans to transition out of the area a reduced buffer can be negotiated for those industries.
- Plant equipment and operation – If the plant has a high standard of emission technology or has evidence of no upset or malfunctions occurring then a reduced buffer would be more appropriate.
- Environmental risk assessment (ERA) – An ERA would need to be completed to assess this option, this will require specific knowledge of process operations and emission rates.
- Size of the plant – If the throughput is small for the particular industry compared to large examples within their industry then it would be possible to de-rate the buffers based on throughput.
- Topography or meteorology – Meteorology can be used to produce directional buffers in for all the identified constraining industries nearby.
- Likelihood of IRAEs – The likelihood of residual emissions from the identified industries would need to be assessed once specific operational information was obtained regarding their operations including how frequently upset conditions occur and the assessment would rely on a detailed complaint history from the residential area encompassed within the default buffer.

It is likely that some of the factors listed above could vary a default buffer, if specific operational details about the industry is known – however as no buffer constraints were identified then the consideration for site specific variation to default buffers was not required.

7. Meteorology

7.1 Wind Pattern

Local wind climate largely determines the pattern of off-site odour and dust impact. The characterisation of local wind patterns requires accurate site-representative hourly recordings of wind direction and speed over a period of at least a year.

Data Source

The nearest meteorological data available is from a Bureau of Meteorology weather station at Moorabbin Airport (approximately 7 km to the southeast of the site), with the period August 2009 to July 2010 being utilised.

The site prevailing meteorology can be defined by a full data set of Moorabbin Airport meteorological data (these include cloud cover observations for determination of stability used for dispersion modelling). Manual three-hourly cloud observations at Moorabbin Airport have been superseded by automated cloud observations using a ceilometer. Automatic weather station data from the Bureau of Meteorology (site id=086077) were obtained inclusive of temperature, wind speed and direction and cloud cover. The annual period of August 2009 to July 2010 was selected as this was after the installation of the ceilometer in 2004. This annual period had average rainfall within 10 percent of the annual median and avoids the very wet period of the 2010-2012 La Nina event. The cloud cover data was used to derive hourly atmospheric stability according to the Turner Workbook Method as defined by the United States Environmental Protection Agency (US EPA). Atmospheric mixing heights were calculated conservatively as just the mechanical mixing height using the algorithms from the New South Wales Approved methods.

The effect of wind on dispersion patterns can be examined using the general wind climate and atmospheric stability class distributions. The general wind climate at a site is most readily displayed by means of wind rose plots, giving the incidence of winds from different directions for various wind speed ranges.

The features of particular interest in this assessment are: (i) the prevailing wind directions and (ii) the relative incidence of more stable light wind conditions and (iii) good dispersion conditions winds over 5 m/s.

Wind Roses

Annual Average: The wind rose in Figure 6 shows proportions of wind strengths (colour scale) from various directions (16-point compass) – the direction indicated showing that winds blow from that direction. The prevailing wind direction is north, with the strongest winds also from this direction (cyan colour), and the lightest wind speed ranging below four metres per second are possible from most directions with the exception of north-east through to east.

Seasonal Variation: Figure 7 shows the seasonal wind roses, which show the following features:

- The annual wind roses show a high incidence of north and south westerly winds
- Annual average wind speed is 4.8 m/s
- There is a significant incidence of northerly winds in winter
- The incidence of south-westerly winds is highest in summer reflecting the sea breeze
- Easterly winds are rare in all seasons
- The greatest amount of light winds less than 2 m/s is from the north, east and southeast
- Poor dispersion would be projected towards the south, west and northwest.

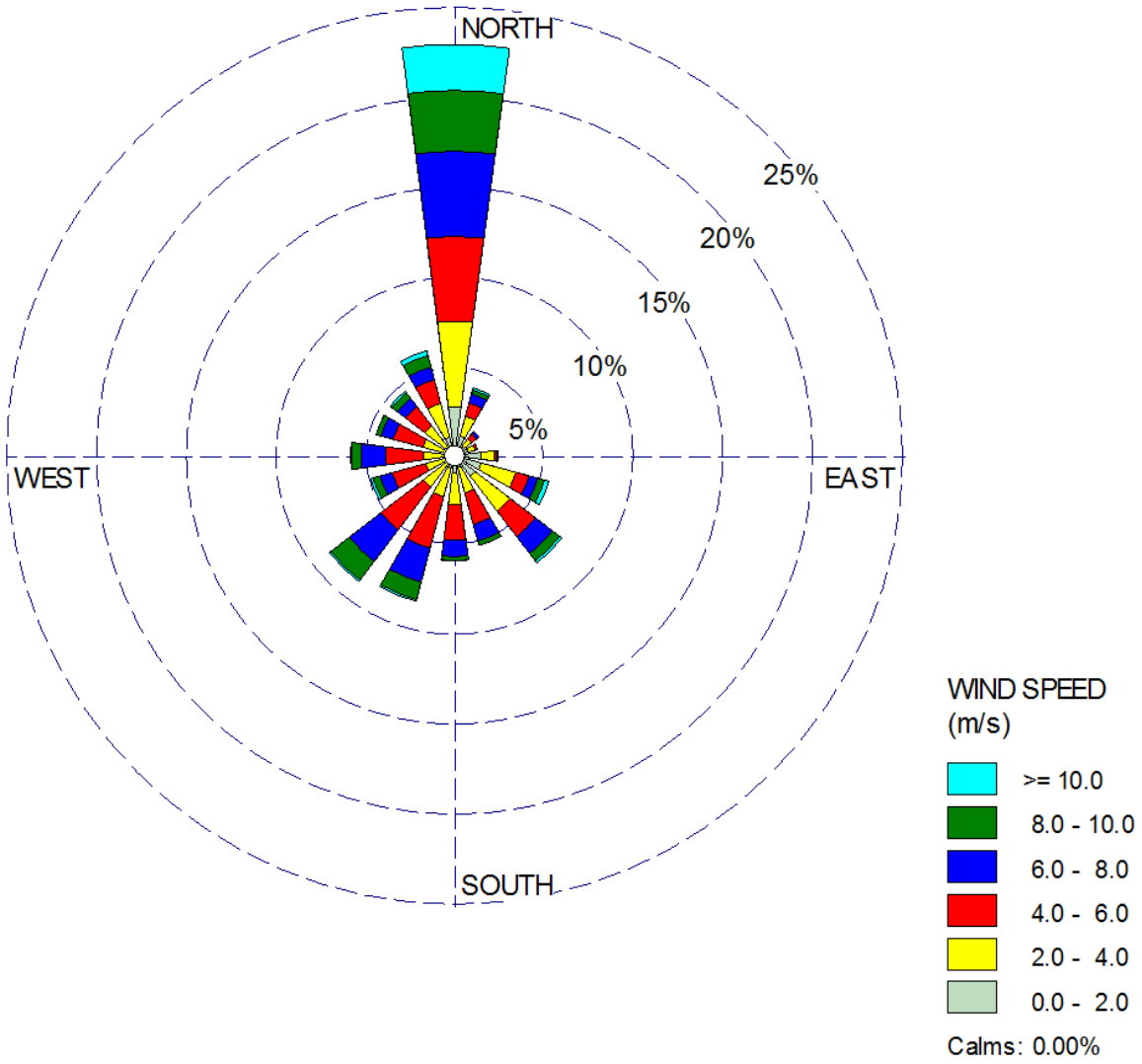
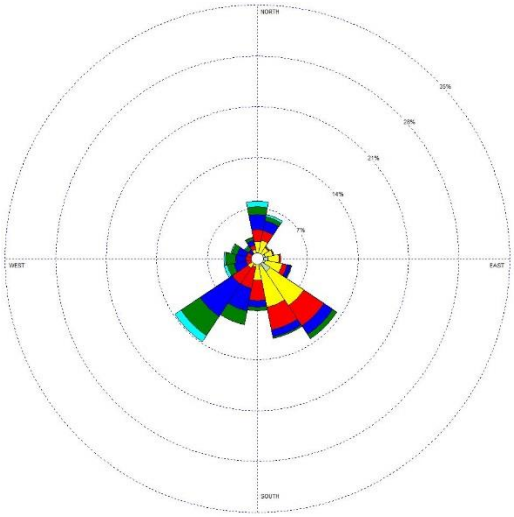
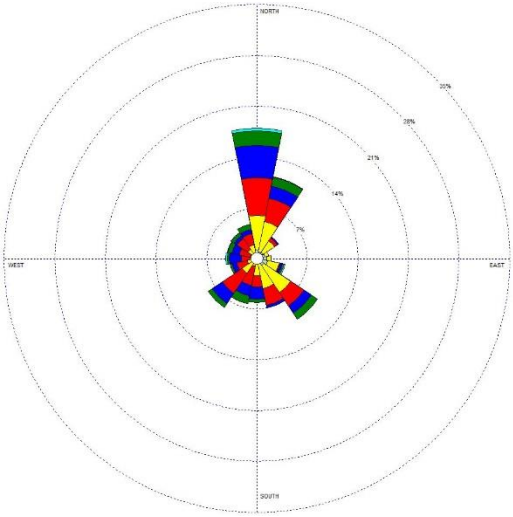


Figure 6 Annual Wind Rose for Moorabbin Airport

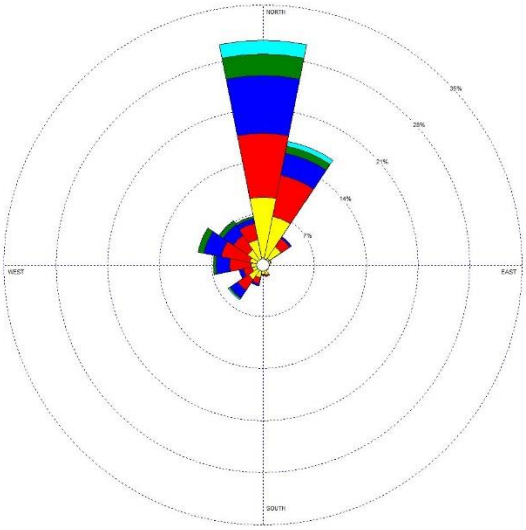
Summer



Autumn



Winter



Spring

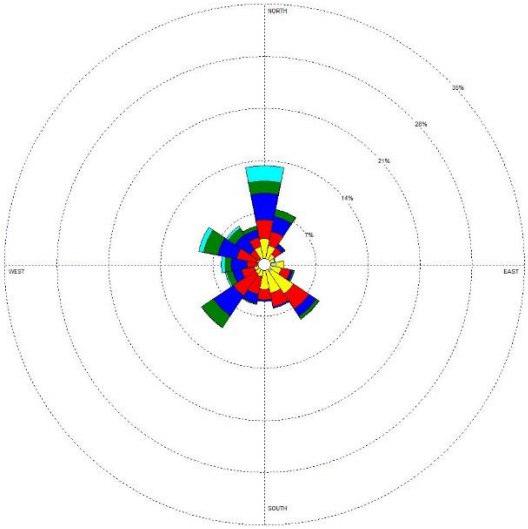


Figure 7 Seasonal Wind Roses for Moorabbin Airport

8. Noise assessment

The industries as well as transportation activities within the vicinity of the project site have the potential to generate environmental noise and vibration amenity impacts onto the proposed development precinct.

The purpose of this assessment is to undertake a preliminary study of potential noise and vibration impacts associated with the proposed East Village Structure Plan in Bentleigh East.

A preliminary noise and vibration impact study has been conducted based on the following scope of work:

- Review of relevant project information and relevant policies, standards and guidelines.
- Initial desk top review to identify potential external noise sources surrounding the site as well as key environmental noise catchment areas and sensitive receivers from aerial photography.
- Conducted an inspection to investigate any noise and vibration sources surrounding the Site, which may potentially cause intrusive noise and vibration impacts to the proposed development. Also identified any noise sensitive receivers within the surrounding area which may be impacted by the operational noise emission from the proposed development.
- Description of baseline environmental acoustic conditions based on the above site inspection, including the identified surrounding industrial activities and traffic noise.
- Establish indicative project noise criteria with consideration to the following policy and standards:
  - State Environment Protection Policy – *Control of Noise from Commerce, Industry and Trade No. N-1* (SEPP N-1) 1989.
  - Victoria Planning Schemes Clause 55.07-6 (Noise impacts) and Clause 58.04-3 (Noise impacts).
  - Victorian Government Planning Practice Note 83 – *Assessing external noise impacts for apartments* (August 2017).
  - Australian Standards AS 2107-2016 – *Acoustics – Recommended design sound levels and reverberation times for building interiors*.
- Provision of qualitative discussion on the potential noise and vibration impact to the site and the associated impact risk.
- Provision of in-principle noise and vibration mitigation measures, as necessary, to minimise the likelihood of impact on, as well as to preserve the amenity of the proposed development precinct.
- Provision of recommended further noise and vibration assessment work, as necessary.

8.1 What is Noise

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

Noise sources can contain certain characteristics, such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content. There is evidence to suggest that it can cause greater annoyance than other noise at the same noise level (NSW INP, 2000).

8.1.1 Tonal Noise

Tonal noise as defined by the NSW Industrial Noise Policy (INP) is as follows: "*A noise containing a prominent frequency and characterised by a definite pitch*". Tonal noise is generally generated from rotating parts or equipment such as compressor, fan blades, engine pistons, etc.

8.1.2 Impulsive Noise

Impulsive noise as defined by the NSW INP (2000) is as follows: "*A noise having a high peak of short duration or a sequence of such peaks*". Impulsive noise could be generated from sudden activities, such as gunshots, punch press, heavy material dropped at height, blasting, pulse cleaning system, etc.

8.1.3 Intermittent Noise

Intermittent noise as defined by the NSW INP (2000) is as follows: "*A noise level where is suddenly drops to that of the background noise several times during the assessment period, with a noticeable change in noise level of at least 5 dB*". Intermittent noise could be generated from machinery that operate in cycles, such as vehicles and rail pass by.

8.1.4 Dominant Low-Frequency Noise (Infrasound)

Low-frequency noise as defined by the NSW INP (2000) is as follows: "*A noise containing major components within the low frequency range (20 Hz – 250 Hz) of the frequency spectrum*". Low frequency noise could be generated from typical large diesel engines in trains, ships and power plants, since the noise characteristic emanating from these sources is hard to muffle and spreads easily in all directions.

Overall, some or all of the above noise characteristics may occur as a result of the various range of industrial and transportation activities within and nearby the East Village Structure Plan. The potential primary noise sources within and nearby the East Village Structure Plan precinct have been identified in Section 8.2.2.

8.2 Existing conditions

8.2.1 Local noise and vibration sources

An inspection of the site and the surrounding area was conducted on 26 September 2017. The site inspection was supplemented in this review by aerial photography using Google Earth and Google Street View.

The East Village Precinct currently comprises a mixture of industrial and commercial premises. Some of the identified major industrial and commercial facilities, which may have a potential for noise impacts include:

- Auto facilities and various commercial, business, offices and light industry were identified to be located within the project precinct. Generally, these activities were observed to be located indoors and anticipated to have low to medium noise impact risk to the precinct.

  GHD observed during the inspection that there were minimal heavy vehicle movements associated with these facilities. Hence, heavy vehicle noise emissions is not expected to cause significant impact within the precinct.

  In addition, Chassis Brakes International is currently the largest single use in the precinct, however it is understood that the business will be permanently closed in 2017[5].

[5] http://www.eastvillagemasterplan.com.au/current-precinct/

- Electrical substation located at 246A East Boundary Road, observed to contain transformer noise emission with prominent tonal noise, which is anticipated to have medium noise impact to the precinct.
- Car parking facility associated with the existing commercial/industrial premises.

Other than from the above industries, ambient noise environment within the East Village precinct was predominantly dominated by traffic noise associated with North Road, involving several heavy vehicles pass-by movements, as well as East Boundary Road

8.2.2 Potential local primary vibration sources

Based on GHD site inspection as well as aerial photography review of the identified industrial and commercial facilities, it is anticipated that there would not be significant vibration impact into the East Village precinct.

Vibration from heavy vehicles associated with North Road and E Boundary Road may generate vibration impact to the nearby receivers within the precinct.

GHD observed that there were no local neighbouring activities that have the potential to cause significant vibration impact to the development.

8.2.3 Existing noise sensitive receivers

Aerial photography and on-site inspections were used to assess the existing sensitive receivers within as well as nearby the development precinct that may potentially be impacted by the noise emanating from the development site.

The identified existing noise sensitive receivers within the development precinct are detailed below:

- Residential dwellings located along Cobar Street.
- Virginia Park Child Care Centre (232A E Boundary Rd)

The identified existing noise sensitive receivers located nearby the development precinct are predominantly residential dwellings situated around the west, south and east sides of the precinct boundary.

8.3 Legislation, policy and guidelines

8.3.1 Industrial commercial noise policy and regulation

The Victorian Government provides guidance on operational noise levels for industry and commercial premises in Victoria through the use of one mandatory policy for metropolitan areas and one guideline for regional areas as follows:

- *State Environment Protection Policy – Control of Noise from Commerce, Industry and Trade No. N-1* (SEPP N-1) (Victorian Government, 1989) for metropolitan areas throughout Victoria, see below for further detail.
- *Noise from Industry in Regional Victoria (NIRV): Recommended Maximum Noise Levels From Commerce, Industry and Trade Premises in Regional Victoria* (EPA publication 1411) (EPA Victoria, 2011)

The SEPP N-1 policy is applicable for industry located in a *Major Urban Area (MUA)* with the potential to impact nearby sensitive receivers. A '*Major Urban Area*' is defined as:

- *The part of Melbourne that is within the SEPP N-1 boundary (see* Figure 8*), or*

- *The part of Melbourne that extends beyond the SEPP N-1 boundary, but is within the Planning Urban Growth Boundary (UGB) (refer to* Figure 8*)*

The areas outside the MUA boundaries are managed by the NIRV guideline. The NIRV guideline is applicable for industry located in a *Rural Area*, with the potential to create noise impacts at nearby sensitive receiver locations. A *'Rural Area'* is defined as:

- *Land that is not within a 'Major Urban Area', including land in cities or towns with a population below 7,000 and rural locations outside 'Major Urban Areas.'*

In addition, NIRV makes provision for land located outside the SEPP N-1 boundary that has a population greater than 7000 to be assessed against the SEPP N-1 methodology.

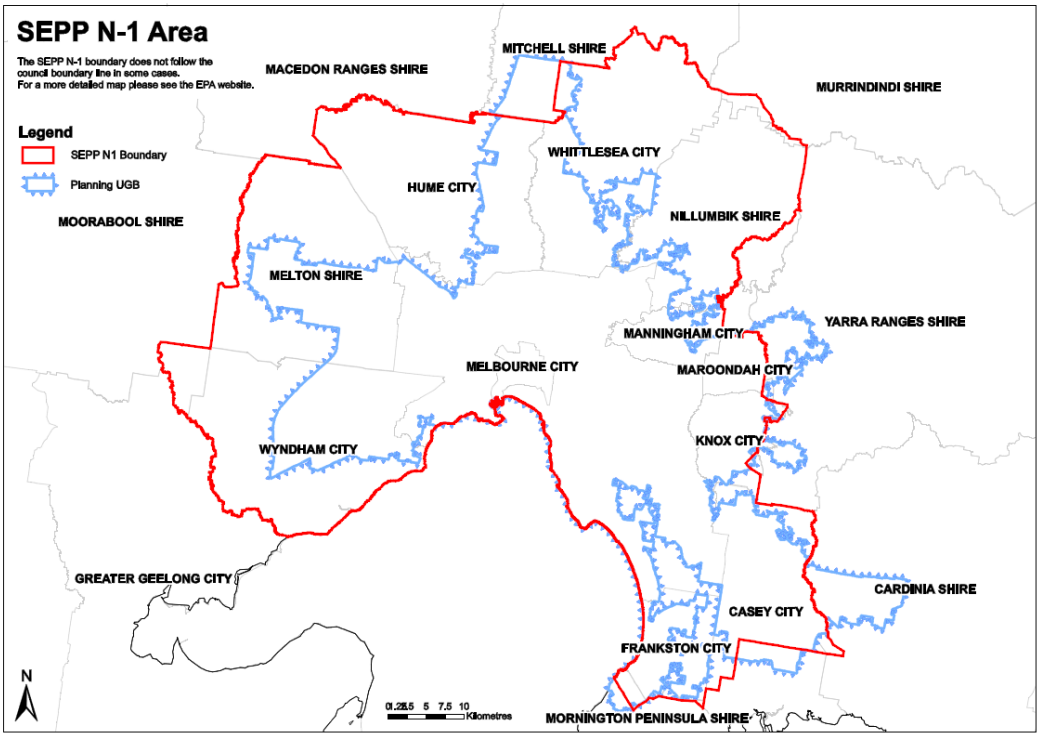


Figure 8 Areas covered by SEPP N-1 and planning UGB (EPA Victoria, 2011)

The Project site is located under the Glen Eira City Council, which is located within the *SEPP N-1 Boundary* and *Melbourne Urban Growth Boundary*. Hence, noise emanating from the site shall be assessed in accordance with the SEPP N-1 policy.

8.3.1.1 State environment protection policy No. N-1 (SEPP N-1)

Noise from industry or commerce within Melbourne's Planning UGB is managed using the SEPP N-1. The SEPP N-1 manages the impact of noise on residential and other noise-sensitive uses and should be applied when siting or designing new or expanded industry or plant and when government authorities are assessing applications for new and expanding industry.

SEPP N-1 sets the maximum noise limit allowed in a noise sensitive area emanating from commercial/industrial premises depending on the time of day, evening, or night; land use zoning; and existing background noise levels.

The first step in assessing the noise limit is to calculate the prescribed upper noise limit (Zoning Level or Zoning Limit) for the particular land use in line with Schedule B2 of the SEPP N-1. Once the zoning level has been developed, the background level is assessed as to whether the background levels are neutral (i.e. not significantly higher or lower than the zoning level) or otherwise. If the background level is neutral, the noise limit adopted is the zoning level. If, on the

other hand, the background level is found to be significantly lower or higher than the zoning level then the noise limit is reduced or increased accordingly.

Tonality, impulsiveness and intermittency noise characteristics may be considered as intrusive or dominant noise characteristics. SEPP N-1 requires any tonality, impulsiveness and/or intermittency noise characteristics emanating from the development precinct to be adjusted and assessed for compliance assessment against the SEPP N-1 noise criteria.

8.3.2 Local live music entertainment venue

8.3.2.1 State environment protection policy No. N-2 (SEPP N-2)

GHD assumes that there is a potential for music entertainment venues, such as cafes, bars, etc to be permitted (i.e not prohibited) as part of the East Village precinct future development plan.

Noise impact from musical entertainment venue is managed using the *State Environmental Protection Policy (Control of Music Noise from Public Premises) No. N-2* (Victorian Government, 1989). SEPP N-2 manages the impact of music noise on residential and other noise-sensitive uses and should be applied when siting or designing new or expanded musical entertainment venue and when government authorities assess applications for the development. Under this policy, the music noise assessed includes noise from music sources, noise from human voices and activities within the premises that are associated with the music sources.

The noise limit at nearby sensitive receivers prescribed under the SEPP N-2 has been summarized in Table 3 below.

Table 3 SEPP N-2 Noise Limit

<table>
<tr><th rowspan="2">Period[a]</th><th colspan="3">Indoor Venues</th><th colspan="2">Outdoor Venues</th></tr>
<tr><th>for ≥10 yearly operation</th><th>for <10 yearly operation</th><th>Base Noise Limit
dB(A)</th><th>Outdoor Measurement Point
dB(A)</th><th>Indoor Measurement Point
dB(A)</th></tr>
<tr><td>Day/ Evening Period
(L_{Aeq})</td><td>L_{A90} + 5 dB(A)</td><td>L_{A90} + 8 dB(A)</td><td>32</td><td rowspan="2">65</td><td rowspan="2">55</td></tr>
<tr><td>Night Period
(L_{OCT10})</td><td>L_{OCT90} + 8 dB</td><td>L_{OCT90} + 11 dB</td><td><table><tr><td>63Hz</td><td>125Hz</td><td>250Hz</td><td>500Hz</td><td>1kHz</td><td>2kHz</td><td>4kHz</td></tr><tr><td>40</td><td>30</td><td>20</td><td>20</td><td>15</td><td>10</td><td>10</td></tr></table></td></tr>
</table>

[a] The allowable operating times for the outdoor venues is prescribed in Table 4. The operating period for the indoor venues vary according to the number of operations per week and the day of the week on which an operation occurs (refer to Table 5).

The allowable operating times and operating periods for the above venues have been prescribed under the SEPP N-2 and are summarised in Table 4 and Table 5 below.

Table 4 SEPP N-2 Outdoor Venue Prescribed Operating Times

Venues	Operating Times	
	for duration of operation less or equal than five (5) hours	for duration of operation greater than five (5) hours
Outdoor Venues	12 PM to 11 PM	12 PM to 10 PM

Table 5 SEPP N-2 Indoor Venue Prescribed Operating Period

Venues	Number of Operations Per Week	Day	Operating Period	
			Day/Evening time	Night-time
Indoor Venues	One	Friday	9 AM to 12 PM	12 PM to 9 AM
		Saturday	10 AM to 12 PM	12 PM to 10 AM
		Sunday	11 AM to 10 PM	10 PM to 11 AM
		Other	9 AM to 11 PM	11 PM to 9 AM
	Two or three	Thursday	9 AM to 11 PM	11 PM to 9 AM
		Friday	9 AM to 11 PM	11 PM to 9 AM
		Saturday	10 AM to 11 PM	11 PM to 10 AM
		Sunday	11 AM to 10 PM	10 PM to 11 AM
		Other	9 AM to 10 PM	10 PM to 9 AM
	More than three	Saturday	10 AM to 10 PM	10 PM to 10 AM
		Sunday	12 AM to 9 PM	9 PM to 12 AM
		Other	9 AM to 10 PM	10 PM to 9 AM

8.3.3 Fixed domestic plant noise

Noise from fixed domestic plant associated with the development must comply with the requirements of the *Environmental Protection (Residential Noise) Regulation 2008* (EPA, 2008) which sets out provisions for control of noise from domestic appliances such as air-conditioning and heating equipment. The regulation only prescribed allowable hours of operation for the purpose of determining unreasonable noise for the purposes of Section 48A(5) of the *Environment Protection Act 1970* (EPA, 1970).

Group 3 of Schedule 6 under the regulation shows the prescribed hours of operation for air-conditioners and domestic heating equipment, detailed in Table 6.

Table 6 EPA Residential Noise Regulation – Prohibited times for fixed domestic plant

Group	Prescribed items	Prohibited hours
3	A domestic air conditioner or evaporative cooler, heat pump, swimming pool pump, spa pump, water pump other than a pump being used to fill a header tank, domestic heating equipment (including central heating and hot water systems) and a domestic vacuum cleaner.	Monday to Friday: before 7 am and after 10 pm. Weekends and public holidays: before 9 am and after 10 pm.

Note that it is not always practical to turn-off air-conditioning or heating units during night-time period. If air-conditioning or heating units noise was inaudible inside habitable room in any other premises, then the requirements of Section 48A(5) of the *Environment Protection Act 1970* would be satisfied. This is in line with Clause 1 of the Environment Protection Authority (EPA) Publication 1254 – *Noise Control Guidelines* (EPA, October 2008).

Further, Clause 1 of the EPA Publication 1254 makes provisions for control of noise associated with fixed domestic plant and are summarised in Table 7.

Table 7 EPA Publication 1254 – Noise guidelines for fixed domestic plant

Operation period	EPA Publication 1254 noise requirements
Day and evening	Where noise from any fixed domestic plant is audible beyond the boundary of the residential premises on which the plant is situated, the intrusive noise shall not exceed the background noise level by more than 5 dB at the measurement position.
Night	Noise from any fixed domestic plant must not be audible within a habitable room of any other residence (regardless of whether any door or window giving access to the room is open) during prohibited hours prescribed by the *Environment Protection (Residential Noise) Regulations 2008*. The following **prohibited hours** apply to air conditioners, swimming pool and spa pumps, ducted heating systems and the like: • 10 pm — 7 am Monday—Friday. • 10 pm — 9 am weekends & public holidays.

Noise from fixed domestic plant and equipment associated with individual dwelling should be designed to satisfy the requirements in Table 7.

8.3.4 Victoria Planning Provisions (VPP) – Clause 55.07-6 and Clause 58.04-3

The Victorian Planning Provisions (VPP) Clause 55.07-6 and Clause 58.04-3 specify indoor noise levels that should be met for an apartment development within a *noise influence area*.

Further, the Victoria State Government – Department of Environment, Land, Water and Planning (DELWP) has recently released practice note for *Assessing External Noise Impacts a for Apartments – Planning Practice Note 83* (August 2017) to provide guidance about the operation of the VPP Clause 55.07-6 and Clause 58.04-3.

Based on the draft Concept Plan it is assumed that there will be high density residential premises as part of the proposed East Village precinct development.

Apartment building located within the *noise influence area* should be designed to comply with Table 8.

Table 8 VPP Clause 55.07-6 Noise influence area and indoor design noise criteira

Noise source	Noise influence area	Indoor noise criteria
Zone interface		Not greater than 35 dB(A) for bedrooms, assessed as an $L_{Aeq,8hr}$ from 10pm to 6am. Not greater than 40 dB(A) for living areas, assessed $L_{Aeq,16hr}$ from 6am to 10pm.
Industry	300 metres from the industrial 1, 2 and 3 zone boundary	
Roads		
Freeways, tollways and other roads carrying 40,000 Annual Average Daily Traffic Volume	300 metres from the nearest trafficable lane	
Railways		
Railway servicing passengers in Victoria	80 metres from the centre of the nearest track	
Railway servicing freight outside Metropolitan Melbourne	80 metres from the centre of the nearest track	

Noise source	Noise influence area	Indoor noise criteria
Railway servicing freight in Metropolitan Melbourne	135 metres from the centre of the nearest track	

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

8.3.5 Indoor sound levels – AS/NZS 2107

The East Village precinct development proposes to have a mix of housing types, local gathering places, community facilities, offices, shopping and school.

The maximum external noise intrusion into the indoor spaces of the building is recommended to comply with Australian Standard AS/NZS 2107:2016 "*Acoustics – Recommended design sound levels and reverberation times for building interiors*" (AS/NZS 2107: 2016).

Table 9 below details some of the typical recommended internal spaces design sound levels from the external noise intrusion. Any external building elements should be designed to comply with the recommended internal design sound levels below. Internal spaces not mentioned in Table 9 should be designed to comply with AS/NZS 2107:2016.

Table 9 Typical Recommended design internal sound levels – AS/NZS 2107:2016

Designated area	Recommended design indoor acoustic performance	
	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
Houses and apartments in inner city areas or entertainment districts or near major roads		
Sleeping areas (night time)	35 to 40	--
Living areas	35 to 45	--
Apartment common areas (e.g. foyer, lift lobby	45 to 50	--
Houses and apartments in suburban areas or near minor roads		
Sleeping areas (night time)	30 to 35	--
Living areas	30 to 40	--
Apartment common areas (e.g. foyer, lift lobby	45 to 50	--
Hotels and Motels		
Sleeping areas (Hotels and motels in inner city areas or entertainment districts or near major roads)	35 to 40	--
Sleeping areas (Hotels and motels in suburbs or near minor roads)	30 to 35	--
Foyers and recreation aresa	45 to 50	Refer to Note 1 of the AS 2107:2016
Washrooms and toilets	45 to 50	--
Educational Buildings		
Conference rooms	35 to 40	0.6 to 0.7

Designated area	Recommended design indoor acoustic performance	
	Design sound level ($L_{Aeq,t}$) range	Design reverberation time (T) range, s
Lobbies, corridor	< 50	< 0.8
Lecture theatres without speech reinforcement	30 to 35	Curve 3 of the AS 2107:2016 Appendix A.
Libraries (General areas)	40 to 50	< 0.6
Office areas	40 to 45	0.4 to 0.7
Teaching spaces (Primary School)	35 to 45	Curve 3 of the AS 2107:2016 Appendix A.
Teaching spaces (Secondary Schools)	35 to 45	Curve 3 of the AS 2107:2016 Appendix A.
Indoor Sports Buildings		
General indoor sports (with coaching)	< 45	Curve 4 of the AS 2107:2016 Appendix A.
Office Buildings		
General office areas	40 to 54	0.4 to 0.6
Private offices	35 to 40	0.4 to 0.6
Board and conference rooms	30 to 40	0.6 to 0.8
Lobbies, corridor	45 to 50	< 1.0

Note that AS/NZS 2107:2016 is not intended for use in evaluating occupancy noise, transient or variable noises, such as:

- Aircraft noise (see AS 2021);
- Construction noise such as jackhammers and pile-drivers (see AS 2436);
- Railway noise (see AS 2377);
- Crowd noise, e.g. from parades and sporting events;
- Emergency vehicle audible warning devices; and
- Industrial and commercial noise

8.3.6 Construction Noise Criteria

A part of the proposed East Village precinct developments and infrastructures, construction noise would need to be managed. The EPA *Noise Control Guideline* (Publication 1254) (EPA Victoria, 2008) makes provision for the control of construction noise. These guidelines place no restriction on construction noise during *normal working hours (07:00 to 18:00 Monday to Friday, and 07:00 to 13:00 Saturday)*, but require construction noise during the evening and night time to be managed. The construction noise guideline summary is as below:

Normal working hours

The EPA Publication 1254 guideline place no restriction on construction noise during *normal working hours*. However, it requires that noise management and mitigation measure be implemented to minimise the construction noise impact.

The period for *normal working hours* is defined as the following:

- 7.00 am to 6.00 pm, Monday to Friday; and
- 7.00 am to 1.00 pm, Saturdays.

Weekend/Evening working hours

Noise levels at any residential premises should not exceed background noise by:

- 10 dB(A) or more for **up to** 18 months after project commencement;
- 5 dB(A) or more **after** 18 months,

During the hours of:

- 6.00 pm to 10.00 pm, Monday to Friday;
- 1.00 pm – 10.00 pm, Saturdays; and
- 7.00 am – 10.00 pm, Sundays & public holidays.

Night period

Noise should be inaudible within a habitable room of any residential premises during the hours of:

- 10.00 pm to 7.00 am, Monday to Sunday.

The EPA Publication 1254 and EPA *Environmental Guidelines for Major Construction Sites* (Publication 480) (EPA Publication 480, 1996) provide general mitigation measures that need to be considered.

8.3.7 Specific Noise Characteristics

Where a noise source contains certain characteristics, such as tonality, impulsiveness, intermittency and irregularity, there is evidence to suggest that it can cause greater annoyance than other noise at the same noise level. The Victorian Government, through SEPP N-1, sets out the corrections to be applied for tonal, impulsive, and intermittent noise.

8.3.8 Low Frequency Noise

In the absence of a Victorian guideline, the NSW *Industrial Noise Policy* (NSW INP, 2000) is considered to address noise sources with inherent dominant infrasound or (very) low frequency noise characteristics. Industrial operations may have the potential to generate low frequency noise components below 200 Hz. The procedure for the initial screening to determine if a more detailed assessment is required is as follows:

- If the dB(Linear) measurement exceeds the dB(A) measurement by more than 15 dB, a one-third octave band measurement in the frequency range 20 to 200 Hz should be carried out.

The correction specified in the INP is to be added to the measured or predicted noise levels at the receiver before comparison with the criteria. Correction of 5 dB is to be applied if the difference between the measurements of C-weighted and A-weighted levels over the same period is 15 dB or more.

8.3.9 Vibration Criteria

This section discusses the vibration criteria applicable to the East Village precinct development.

8.3.9.1 Human comfort

In the absence of any Victorian guidelines, human comfort vibration criteria have been set with consideration to the NSW EPA *Environmental Noise Management – Assessing Vibration: A Technical Guideline (AVTG)* (NSW EPA, February 2006). British Standard 6472:2008, *Guide to Evaluation of Human Exposure to Vibration in Buildings Part 1: Vibration Sources Other than Blasting* (BS 6472, 2008) is recognised by the NSW EPA AVTG as the preferred standard for assessing 'human comfort'.

BS 6472:2008 is commonly recognised in Australia as the preferred standard for assessing human comfort criteria for residential receptors. Table 10 includes the acceptable values of vibration dose for residential receptors during daytime and night-time periods.

These values represent the best judgement available at the time the standard was published and may be used for both vertical and horizontal vibration, providing that they are correctly weighted. Because there is a range of values for each category, it is clear that the judgement can never be precise.

Table 10 Vibration dose value (VDV) ranges and probabilities for adverse comment to intermittent vibration ($m/s^{1.75}$)

Location	Low probability of adverse comment[a]	Adverse comment possible	Adverse comment probable[b]
Residential buildings 16 hours day (7.00 am to 11.00 pm)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hour night (11.00 pm to 7.00 am)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Notes:
[a] Below these ranges adverse comment is not expected.
[b] Above these ranges adverse comment is very likely.

BS 6472 outlines vibration limits which would cause minimal adverse reactions from the occupant and does not consider the short term duration under a typical construction projects. Hence, whilst the assessment of response to vibration in BS 6472 is based on VDV, for construction related vibration, it is considered more appropriate to provide guidance in term of peak particle velocity (PPV) in millimetres per second, since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage.

BS 5228-2:2009 *Code of Practice for Noise and Vibration on Construction and Open Sites – Part 2: Vibration* (BS 5228.2, 2009) recommends that the guidance values presented in Table 11 are more appropriate for construction works as it is easier to assess the intermittent vibration criteria against peak value rather than a dose value. BS 5228.2 also recognises that higher vibration levels are tolerable for short term construction projects as undue restriction on vibration levels can substantially prolong construction works and result in greater annoyance.

Humans are capable of detecting vibration at levels which are well below those causing risk of damage to a building. The degree of perception for humans is suggested by the vibration level categories given in BS 5228-2:2009, as shown in Table 11.

Table 11 Guidance on the effects of vibration levels (BS 5228.2)

Approximate vibration level	Typical degree of perception
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Based on the Table 8, the guidance vibration level of 0.14 mm/s may at times be considered too low for peak intermittent vibration impact in general residential premises. In setting the lower threshold limit for the vibration level between 0.14 and 0.3 mm/s, reference to the AVTG Appendix C daytime vibration criteria for continuous vibration in residences and other sensitive receivers has been made and summarised in Table 12. Note that PPV continuous vibration limit is generally deemed to be more stringent than intermittent vibration limit, and hence compliance with continuous vibration limit is in Table 12 is expected to not cause any perceptible vibration such that it leads to an adverse complaint.

Table 12 Human comfort criteria for exposure to continuous vibration (AVTG)

Place	Time	Assessment criteria (peak particle velocity – mm/s)	
		Preferred	Maximum
Critical working areas (e.g. hospital	Day or Night-time	0.14	0.28
Residences	Daytime	0.28	0.56
	Night-time	0.20	0.40
Offices	Day or Night-time	0.56	1.1
Workshops	Day or Night-time	1.1	2.2

8.3.9.2 Structural damage

Currently, there is no Australian Standard that sets the criteria for the assessment of building or other structural damage caused by vibration. Australian Standard 2436:2010 – *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;* does refer to the control of vibration in Section 4.8.1. The supplied information in AS 2436 is general in nature and refers to other standards and guidelines if a more detailed assessment is required, i.e. quantification of vibration exposure. British Standard BS 7385.2:1993 – *Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Ground Borne Vibration* and British Standard BS 5228.2:2009 – *Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 Vibration*; are referenced in AS 2436 as being able to supply detailed vibration quantification.

Additional to the detailed British Standards, the German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of Vibration on Structures* (German Standards, 1999) provides more stringent vibration criteria as opposed to BS 7385.2:1993 for above ground structures, but less stringent criteria for below ground structures when compared to BS 5228.2:2009. Therefore, a

combination of the German and British Standards is recommend, in the absence of specific criteria being supplied by the asset owner.

Table 1 of Section 5 of DIN 4150.3:1999 presents guideline values for the maximum absolute value of the velocity "*at the foundation and in the plane of the highest floor of various types of building. Experience has shown that if these values are compiled with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible."*

Measured values exceeding those listed in Table 13"*… does not necessarily lead to damage; should they be significantly exceeded, however further investigations are necessary."*

Table 13 Guidance values for short term vibration on structures

Line	Type of structure	Guideline values for velocity v(t)[a] (mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[b]
At grade structures (DIN 4150.3:1999)				
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10

[a] The term vi refers to vibration levels in any of the x, y or z axis..

[b] Where frequencies are above 100 Hz the values given in this column may be used as minimum values.

Vibration due to construction processes also has the potential to affect services such as buried pipes, electrical and telecommunication cables. German Standard DIN 4150.3:1999 also provides guidance on safe vibration levels for buried pipe work. DIN 4150.3:1999 details the limits for short-term vibration, as presented in Table 14. The levels apply on the wall of the pipe. For long-term vibration the guideline levels presented in Table 14 *should be halved*, as per Section 6.3 of the DIN 4150.3:1999.

For electrical and telecommunication cables buried under the ground, Banora Point Upgrade Alliance project (BPUA, 2011) report suggests that companies such as Telstra would require maximum allowable ground vibration of not more than 50 mm/s (PPV) for its services like Copper Cable and Optical Fibre. However, the contractor shall confirm with the relevant Providers the specific vibration limit of the buried electrical and telecommunication services that may be subject to vibration impact of the Project.

Table 14 Guidance Values for Short Term Vibration on Buried Pipes

Pipe Material	Guideline Values for Velocity Measured on the Pipe (mm/s)
Steel (including welded pipes)	100
Clay, concrete, reinforced concrete, metal (with or without flange)	80
Masonry, plastic	50

8.4 Discussion of potential impact

8.4.1 Traffic noise

It is observed that traffic noise associated with North Road and East Boundary Road was considered as the primary background noise contributor within the vicinity of the precinct.

GHD site inspection observed that a number of heavy vehicle movements were present along these roads (while noting that there was minimal heavy traffic within the existing industrial precinct).

As such, traffic noise is considered to represent a significant risk to the proposed development. However, further investigation and noise monitoring would be required to characterise the traffic noise impact levels, in particular during the night-time period.

Detailed traffic noise intrusion assessment and building acoustic treatment requirement has not been undertaken due to the preliminary stage and qualitative nature of the assessment. However, the DELWP practice note *Assessing External Noise Impacts a for Apartments – Planning Practice Note 83* (PPN 83) (August 2017) provides guidance on the *standard design treatment for noise* for residential sensitive receivers potentially located within 300 m from the nearest trafficable lane of a freeways, tollways and other roads carrying 40,000 Annual Average Daily Traffic (AADT) Volume.

Indicative traffic volume data was sourced from VicRoads Open Data Site, and summarised in Table 15 below.

Table 15 North Rd and E Boundary Rd VicRoads traffic data (VicRoads, 2017)

Road adjacent to development site	Flow	Percentage of heavy vehicle	AADT volume	Total AADT volume
North Road	East bound	6%	19,000	38,000
North Road	West bound	6%	19,000	
E Boundary Rd	North bound	7%	9,300	21,300
E Boundary Rd	South bound	7%	1,200	

Table 15 indicates that the AADT volumes for both roads are less than 40,000, and therefore the development would be exempted from the PPN 83 requirements for road noise. However, it is noted that the AADT volume associated with North Road is close to 40,000.

Notwithstanding the North Rd 2,000 AADT volume short than the minimum trigger volume in PPN 83, the PPN 83 *standard design treatment for road noise* has been discussed in this report to provide preliminary guidance on the likely building acoustic treatment for residential premises to be located within the *road noise influence area*, in anticipating potential increase in traffic volumes for future years.

Chart 1 of the PPN 83 provides Noise Exposure Category (reproduced in Figure 9), which corresponds to the acoustic design treatment packages in Appendix 1 in the note.

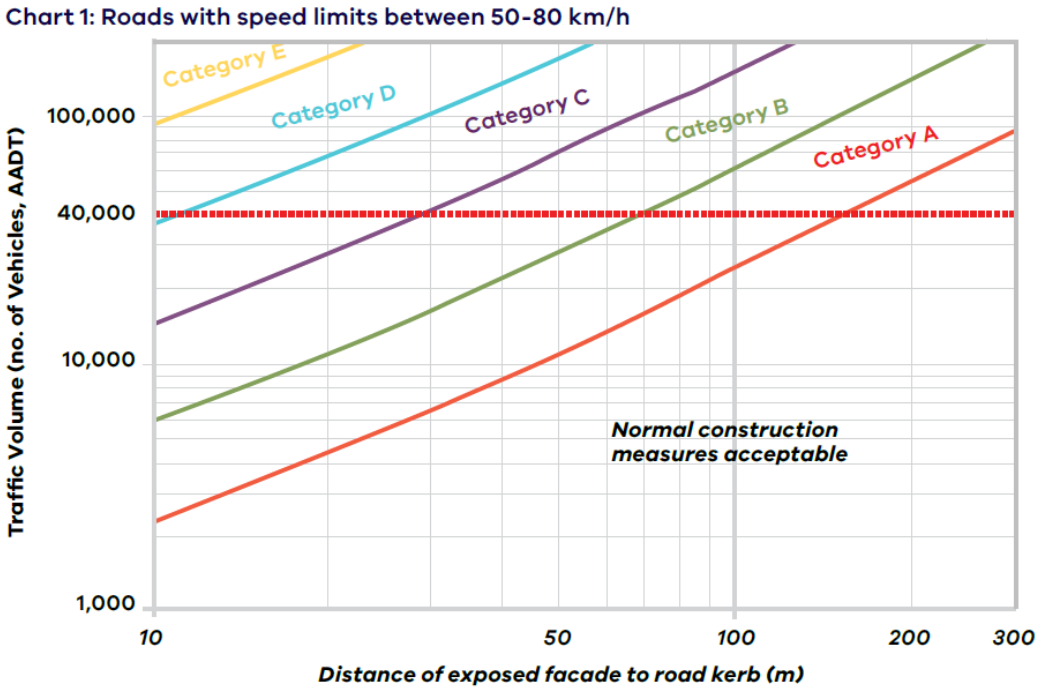


Figure 9 Noise Exposure Category with road speed limits between 50 – 80 km/h

North Road has a speed limit of 70 km (sign posted). Based on this, potential residential development situated within 300 m from North Road's nearest trafficable lane falls under Noise Exposure Category between A and B.

In addition, it is also recommended that traffic noise associated with E Boundary Rd be assessed to determine potential noise impact to the precinct development.

Other receivers such as offices would also be needed to be assessed against traffic noise intrusion to preserve the indoor workplace amenity during the business hours. Australian Standards AS/NZS 2107:2016[6] – *Acoustics – Recommended design sound levels and reverberation times for building interiors* may be used as a guide in assessing external noise intrusion into noise sensitive spaces, such as meeting rooms and offices (refer to Section 8.3.5).

Standard design treatment for noise

This section addresses the standard design treatment for noise in accordance with the PPN 83 for residential receivers.

When applying standard design treatments, all external windows and doors should be fitted with suitable proprietary acoustic seals supported by manufacturer's performance certification from a NATA accredited laboratory (or international equivalent).

Note that this design treatment is provided for information or guidance purposes only. The actual building construction acoustic treatment should be confirmed upon more detailed acoustic assessment and on-site noise monitoring.

More general noise mitigation strategies have been provided in Section 8.4.5 for considerations.

[6] *Although AS/NZS 2107:2016 specifically excludes it use for the assessment of traffic noise intrusion.*

Table 16 Specified Rw + Ctr values for facades features in different noise exposure categories

Façade type	Total window area as % of floor area	Rw + Ctr rating Exposure category A	Rw + Ctr rating Exposure category B
Wall	N/A	45	50
Floor	N/A	45	50
Roof	N/A	45	45
Door (non-glazed)	N/A	30	35
Bedroom Windows	< 20%	28	31
	≥20% but <40%	31	34
	≥40% but <60%	34	37
	≥60% but <80%	37	40
	≥80% but <100%	40	Note 1
	≥100% but <120%	Note 1	Note 1
	≥120%	Note 1	Note 1
Living Zone Windows	< 20%	25	28
	≥20% but <40%	28	31
	≥40% but <60%	31	34
	≥60% but <80%	34	37
	≥80% but <100%	37	40
	≥100% but <120%	40	Note 1
	≥120%	Note 1	Note 1

Note 1: A standard design treatment for noise is not available. A design must demonstrate compliance with the specific noise levels set out in the standard through an acoustic report.

Table 17 Construction responses for solid facades

Façade type	Acceptable construction responses for solid facades	
	Exposure category A	**Exposure category B**
Wall	**Cement**	
	125 mm concrete panel **OR** 100 mm concrete panel with 13 mm cement render or 13 mm plasterboard to each face.	100 mm concrete panel with 70 mm timber studs (or 64 mm metal studs) spaced 25 mm from the concrete panel with 50 mm glass/rock wool insulation of 11 kg/m^3 and two layers of 13 mm plasterboard **OR** 125 mm concrete panel with 70 mm timber studs (0r 64 mm metal studs) spaced 25 mm from the concrete panel

Façade type	Acceptable construction responses for solid facades	
	Exposure category A	**Exposure category B**
		with 50 mm glass/rock wool insulation of 11 kg/m^3 and 13 mm plasterboard **OR** 150 mm (or thicker) concrete panel.
	Brick	
	1 x 150 single brick wall with at least 13 mm render or plasterboard to each face **OR** 2 x 110 mm double brick wall with 50 mm cavity and resilient wall ties.	1 x 90 mm single brick wall with 70 mm timber studs spaced 25 mm from the brick wall, 75 mm glass/rock wool insulation of 11 kg/m^3 or 75 mm polyester insulation of 14 kg/m^3 with 10 mm plasterboard. **OR** 1 x 110 mm single brick wall with 70 mm timber studs spaced 20 mm from the brick wall (or 64 mm metal studs), 50 mm glass/rock wool insulation of 11 kg/m^3 and 13 mm plasterboard. **OR** 1 x 110 mm single brick wall with 13 mm thick render on the outside face with 70 mm timber studs (or 64 mm metal studs) spaced 20 mm from the brick wall, 50 mm glass/rock wool insulation of 11 kg/m^3 and 13 mm plasterboard to the inside face. **OR** 2 x 110 mm double brick wall with 50 mm cavity, resilient wall ties and at least 13 mm thick render or plasterboard to each face. **OR** 2 x 110 mm double brick wall with 50 mm cavity, resilient wall ties and 50 mm of glass/rock wool insulation of 11 kg/m^3 or 50 mm of polyester insulation of 20 kg/m^3. **OR** 2 x 110 mm brick wall with 50 mm cavity with resilient wall ties and 50 mm of glass/rock wool insulation of 11 kg/m^3 in the wall cavity; and with 50 mm batten and 13 mm plasterboard to the inside face of the brick wall.
	Lightweight	
	9.5 mm hardboard, or 9 mm fibre cement sheeting, or 11 mm fibre cement weatherboard cladding with resilient steel channels on 90 mm timber studs, 75 mm glass/rock wool insulation of 11 kg/m^3 or 75 mm polyester insulation of 14 kg/ m^3	75 mm autoclaved aerated concrete panel with 9 mm fibre cement sheet to the outside face, 70 mm metal studs (or 64 mm metal studs) spaced 20 mm from the concrete with 75 mm glass/ rock wool

Façade type	Acceptable construction responses for solid facades	
	Exposure category A	Exposure category B
	and two layers of 16 mm fire rated plasterboard.	insulation of 11 kg/m^3 and 13 mm fire rated plasterboard.
Floor	100 mm dense suspended concrete slab **OR** 19 mm tongue and groove boards with: • Timber joists not less than 175 mm x 50 mm; • 75 mm of glass/ rock wool insulation of 11 kg/m^3 between joists, laid on 10 mm plasterboard; • 25mm glass/rock wool insulation of 11kg/m3 laid over entire floor (including top of joists) and secured to battens (75mm x 50mm); and • Assembled flooring laid over the joists but not fixed to then, with battens laying between the joists.	Concrete slab directly on ground. **OR** 150 mm (or thicker) dense suspended concrete slab.
Roof	150 mm (or thicker) suspended concrete slab with 28 mm metal furring channels, 30 mm glass/rock wool insulation of 11 kg/m^3 (or 30 mm polyester insulation of 14 kg/m^3) and 10 mm plasterboard. **OR** Metal deck roof with 165-210 mm glass/rock wool insulation of 7 kg/m^3 (or 185-210 mm polyester insulation of 10 kg/m^3) with two layers of 13 mm fire rated plasterboard fixed to furring channels.	
Door (non-glazed)	40m m solid core door with full perimeter acoustic seals. **OR** 40-45 mm solid core door with 6.38 laminated glass inserts and full perimeter acoustic seals.	45 mm solid core door with full perimeter acoustic seals.

Table 18 Acceptable Construction responses for glazed facades

Façade type	Total window area as % of floor area	Acceptable construction responses for solid facades	
		Exposure category A	Exposure category B
Bedroom windows	<20%	4-6 mm single glazing. **OR** 6 mm/12 mm air/6 mm double glazing.	6.38-10.38 mm laminated single glazing. **OR** 10 mm/ 12 mm air/ 4 mm double glazing.
	≥20% but <40%	6.38-10.38 mm laminated single glazing. **OR** 10 mm/ 12 mm air/ 4 mm double glazing.	10.5 mm acoustic laminated glazing. **OR** 10 mm/ 12 mm air/ 6 mm double glazing.
	≥40% but <60%	10.5 mm acoustic laminated glazing.	5 mm/100 mm air/ 5 mm double glazing.

Façade type	Total window area as % of floor area	Acceptable construction responses for solid facades	
		Exposure category A	Exposure category B
		OR 10 mm/12 mm air/6 mm double glazing.	
	≥60% but <80%	5 mm/100 mm air/ 5 mm double glazing.	5 mm/100 mm air/ 5 mm double glazing (or alternatives, e.g. 8.5 mm Hush/ 16 mm air/ 12.5 mm Hush double glazing).
	≥80% but <100%	5 mm/100 mm air/5 mm double glazing (or alternatives, e.g. 8.5 mm Hush/ 16 mm air/ 12.5 mm Hush double glazing).	Note 1
	≥100% but <120%	Note 1	Note 1
Living zone windows	<20%	4-6 mm single glazing.	4-6 mm single glazing. **OR** 6 mm/12 mm air/6 mm double glazing.
	≥20% but <40%	4-6 mm single glazing. **OR** 6 mm/12 mm air/6 mm double glazing.	6.38-10.38 mm laminated single glazing. **OR** 10 mm/12 mm air/4 mm double glazing.
	≥40% but <60%	6.38-10.38 mm laminated single glazing. **OR** 10 mm/12 mm air/4 mm double glazing.	10.5 mm acoustic laminated glazing. **OR** 10 mm/12 mm air/6 mm double glazing.
	≥60% but <80%	10.5 mm laminated acoustic glazing. **OR** 10 mm/12 mm air/6 mm double glazing.	5 mm/100 mm air/5 mm double glazing.
	≥80% but <100%	5 mm/100 mm air/5 mm double glazing.	5 mm/100 mm air/5 mm double glazing (or alternatives, e.g. 8.5 mm Hush/ 16 mm air/ 12.5 mm Hush double glazing).
	≥100% but <120%	5 mm/100 mm air/5 mm double glazing (or alternatives, e.g. 8.5 mm Hush/ 16 mm air/ 12.5 mm Hush double glazing.	Note 1
	≥120% but <140%	Note 1	Note 1

Note 1: A standard design treatment for noise is not available. A design must demonstrate compliance with the specified noise levels set out in the standard through an acoustic report

8.4.1 Industrial/commercial noise

Daytime site observations indicated that noise associated with surrounding industries or commercial activities is generally sourced from auto facilities and various other commercial business or offices. As previously mentioned, these activities were observed to be located indoors and anticipated to have low to medium noise impact risk to the precinct.

Chassis Brakes International is currently the largest single use in the precinct, however it is understood that the business will be permanently closed in 2017.

Notwithstanding this finding, these auto facilities may comprise of fixed mechanical plant and equipment attached, such as rooftop air-conditioning units or fans, heavy vehicle operations or any noise activity that may have the potential to pose medium to high noise impact to the proposed nearby sensitive receivers. Further, some areas of the East Village precinct overlap with the 300 m noise influence area buffer of the surrounding industrial zones premises (refer to Figure 10). It is recommended that further investigation be undertaken for these premises. Assessment of surrounding industrial noise impacting the development should comply with the recommended VPP Clause 55.07-6 indoor sound levels criteria (Section 8.3.4).

In addition, noise emissions from any centralised mechanical services equipment associated with the proposed future development situated within the precinct, at any residence affected by noise from the facility, will be required to comply with the SEPP N-1 noise policy criteria.

For multi tenancy residential development, noise from mechanical services plant that is managed under a body corporate would generally be covered by the SEPP N-1 noise policy.

8.4.2 Electrical substation noise

Electrical substation located at 246A East Boundary Road, observed to contain transformer noise emission with prominent tonal noise.

Tonal noise characteristics from a transformer equipment would generally be in the 80 Hz, 100 Hz or 200 Hz frequency, and could cause annoyance on the nearby sensitive receivers at both outdoor and indoor amenities.

Transformer operational noise associated with new substation installed within the vicinity of a residential premises will generally need to comply with the SEPP N-1 noise policy, via background noise monitoring and noise impact modelling exercise.

However, in this case, it is understood that the existing substation will remain throughout the precinct development, and hence would not be the obligation for the substation asset owner to comply with the SEPP N-1 noise policy for any future sensitive receiver built within the vicinity.

Discussion with the substation asset owner may need to be undertaken in providing effective as well as agreed noise mitigation measures for the electrical substation, as necessary.

Typical noise mitigation measures for transformer noise from a substation facility would generally be noise barrier around the transformer unit (control at source strategy). However, this would depend on the transformer design and limitations, as well as asset owner permission.

Note that elevated receivers located nearby the substation may not experience the benefit of this noise mitigation strategies (unless fully enclosed transformer acoustic treatment) as effectively as those located at ground floor, due to more direct noise pathways between source-to-receiver.

Should control at source noise mitigation strategy not be possible or practicable, it is not uncommon that the indoor amenity of sensitive receivers subject to substation operational noise be acoustically treated using control at receiver strategy, via building acoustic treatment.

However, the limitation of this strategy is that it would not preserve the outdoor amenity of the receiver unless a combination control such as noise control at transmission be implemented.

Other receivers such as offices would also be needed to be assessed against extraneous noise intrusion to preserve the indoor workplace amenity during its operating hours. Australian Standards AS/NZS 2107:2016[7] – *Acoustics – Recommended design sound levels and reverberation times for building interiors* may be used as a guide in assessing external noise intrusion into noise sensitive spaces, such as meeting rooms and offices (refer to Section 8.3.5).

General noise mitigation measures have been provided in Section 8.5 of this report.

8.4.3 Car parking sites

Site observations indicated the car parking facilities associated with various commercial and industrial facilities are present within the precinct, and has the potential to generate noise impacts at the within the precinct. Noise associated with vehicle manoeuvring activities is generally considered to represent a low risk of potential impact, however, impulsive noise due to engine start and vehicle door closing may cause annoyance or even sleep disturbance to receivers potentially located nearby the site. It is recommended that background noise as well as proposed precinct development layout be assessed to minimise or avoid any potential annoyance due to the operation of surrounding car parking sites.

8.4.4 Miscellaneous noise

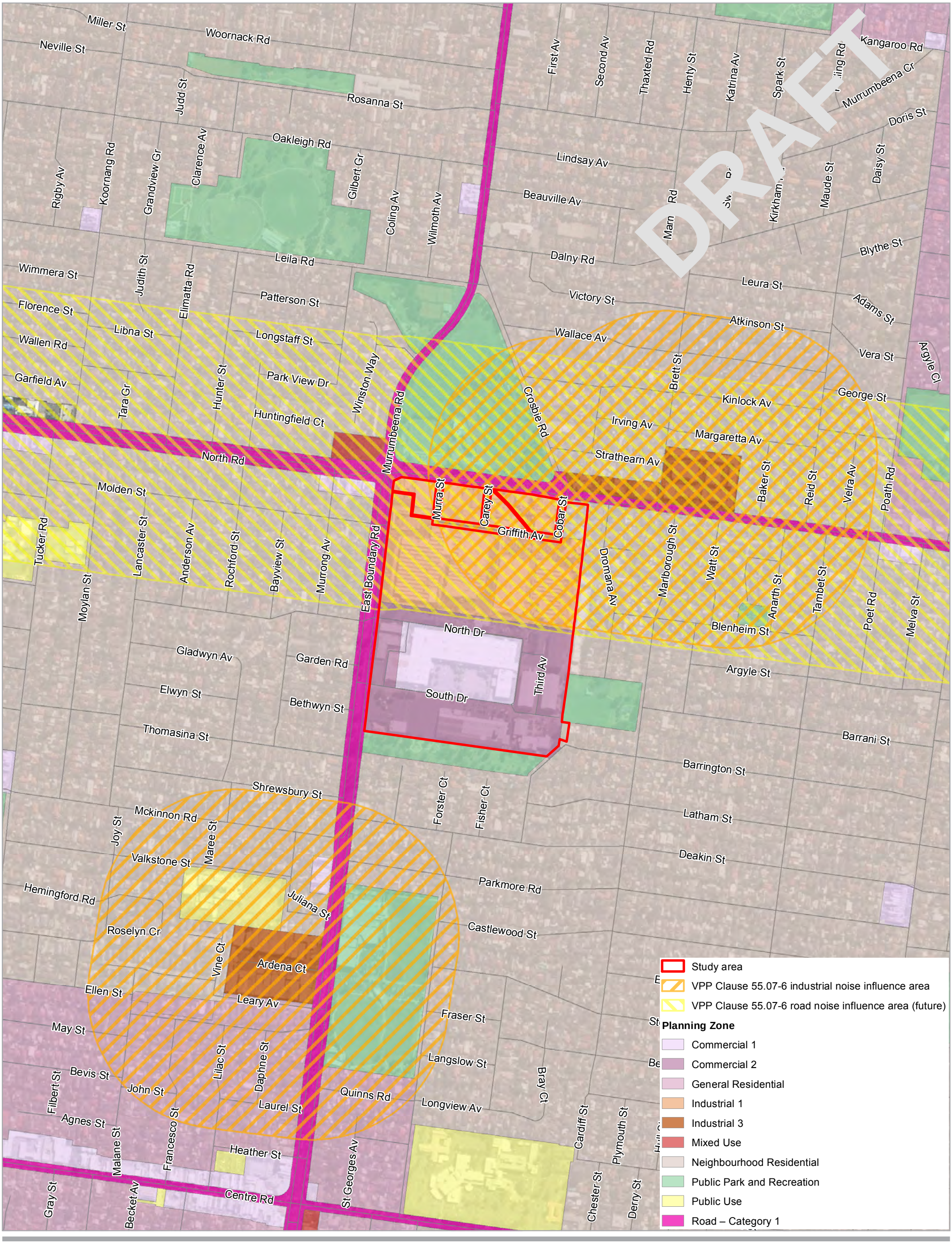
Miscellaneous noise sources that have the potential to occur in the vicinity of the development may include noise associated with the existing Virginia Park child care centre, which may potentially include sources such as child patron noise, outdoor activities, vehicle associated with drop off and pick up. Again, it is recommended that further investigation be undertaken to characterise potential noise impact characteristics emanating from the child care centre.

8.4.5 Noise complaint history

Refer to Section 5.1.2 for noise complaint history within the vicinity of the development site. In total there have been two noise complaints sourced to the site both in 2012. Based on the data provided GHD concludes that there are no ongoing offsite noise issues that impact the precinct or within 500 m of the site.

A summary of complaints received by EPA is also provided in Appendix C.

[7] *Although AS/NZS 2107:2016 specifically excludes it use for the assessment of industrial or commenrcial noise intrusion.*



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Victorian Planning Authority

East Village Buffer Impact Assessment

Noise influence area boundary
VPP Clause 55.07-6

Project No. 31-35578
Revision No. A
Date 25/10/2017

FIGURE 10

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8.4.6 Vibration impact

Construction activities potentially occur during the future development of the East Village precinct. Some construction equipment can generate high vibration levels and need to be assessed to minimise potential adverse impacts on the surrounding sensitive receivers.

Energy from construction equipment is transmitted into the ground and transformed into vibrations, which attenuate with distance. The magnitude and attenuation of ground vibration is dependent on:

- The efficiency of the energy transfer mechanism of the equipment (i.e. impulsive, reciprocating, rolling or rotating equipment)
- The frequency characteristics of the vibrations produced
- The impact medium stiffness (where vibrations are passing through)
- The type of wave (surface or body)
- The ground type and topography (i.e. transmissivity and trough isolation effects)

The EPA Victoria – *Environmental Guidelines for Major Construction Sites (*Publication 480, 1996) advise that nuisance and building damage from ground vibration is unlikely to occur if the operation is conducted at distances greater than 50 m.

The predicted ground vibrations at various distances are shown in Table 19 for typical construction equipment.

Note that these values in Table 19 are indicative only, and should only be used for guidance purposes. Project specific construction vibration should be assessed subject to more detailed information.

Table 19 Predicted typical construction equipment vibration levels (mm/s PPV)

Plant item[8]	Human perception preferred criteria (mm/s PPV) *(maximum criteria)*		Predicted ground vibration (mm/s PPV)				
	Day	Night	10 m	50 m	100 m	200 m	500 m
15 t roller	0.28 *(0.56)*	0.2 *(0.4)*	7.5	0.7	0.2	0.1	<0.1
Dozer	0.28 *(0.56)*	0.2 *(0.4)*	3.3	0.3	0.1	<0.1	<0.1
7 t compactor	0.28 *(0.56)*	0.2 *(0.4)*	6.0	0.5	0.2	0.1	<0.1
Excavator[9]	0.28 *(0.56)*	0.2 *(0.4)*	3.6	0.3	0.1	<0.1	<0.1
Grader[10]	0.28 *(0.56)*	0.2 *(0.4)*	2.0	0.2	0.1	<0.1	<0.1

Typical vibration from heavy trucks passing over normal road surface generate low vibration levels in the range of 0.01 – 0.2 mm/s at the building's footings located 10-20 m from the roadway. Generally, ground vibration from trucks is usually imperceptible in nearby buildings.

[8] NSW RTA Environment noise management manual

[9] The predicted ground vibration values were based on data stipulated in:Cenek.P.D, et al. *Ground vibration from road construction* (May 2012) Research paper.

[10] Tynan, A.E. Ground Vibrations. Damaging effects to Buildings. Australian Road Research Board 1973

The rattling of windows or the like is sometimes more likely to be caused by airborne low-frequency noise radiation (infrasonic) from truck exhaust or bodies. While this may cause concern to residents, the phenomenon is no different from those caused by adverse weather condition (e.g. wind).

Existing operation from the commercial/industrial within the precinct is not expected to cause significant vibration impact within the precinct. However, it is suggested that existing as well as any future industry specific vibration assessment be undertaken within the precinct to ensure no significant vibration impact occurs.

8.5 General noise and vibration mitigation strategies

The noise mitigation strategies could generally be divided into four different areas, namely (from the most preferred to least preferred rankings) (NSW INP, 2000):

- *Land-use Controls* (separating the location of noise-producing activities from sensitive areas);
- *Control at Source* (reduce the noise output of the source to provide protection surrounding environment);
- *Control in Transmission* (reduce noise level at the receiver but not necessarily the environment surrounding the source, e.g. noise barrier, etc.); and
- *Receiver Control* (localised acoustic treatment at sensitive receiver).

8.5.1 Land-use Controls

There are several strategies involved in using the Land-use Control measures.

- **Setbacks strategy** (e.g. Open space design adjacent to noisy industries, busy road and/or railway corridor to provide noise reduction through setback distances to residential uses);
- **Setback distances** between the noise source and the noise sensitive receiver could be one of the treatments in reducing the noise exposure level at the proposed precinct development. Setback strategy would also be effective in mitigating ground-borne vibration impact from nearby vibration sources;
- **Building locations and height controls.** For example, higher rise buildings could be located adjacent to primary noise sources to provide noise shielding effect to residential uses or the overall precinct;
- **Expansion of cycle and pedestrian facilities**, to discourage the use of motor vehicles and encourage the use of bicycles, scooters or walking, which would result in less noise emission within the area; and
- **Impose acoustic control planning conditions on new developments.** This could be in the form of council's planning permit conditions for specific acoustic treatment on noise sensitive developments.

8.5.2 Control at Source

There are several strategies involved in using the Control at Source measure.

- Promoting the use of low pavement surfaces on new roads within the East Village precinct development. The type of road surface has a significant effect on the level of noise generated by the tyre/road interface. Austroads Technical Report "*Austroads Review Report: Traffic Noise/Long-life Surfacings*" (Austroads, January 2011) provides relative noise emission levels of conventional road surfacings in Australia, based on studies conducted by (Campbell & Isles, 2001), (Parnell, 2006) and (Samuels, 2008) (refer to Table 20).

Table 20 Relative noise emission levels of conventional surfacings in Australia

Surfacing type	Noise level variation dB(A)		
	Traffic Noise	Individual vehicles pass-by noise	
		Cars	Trucks
Size 14 single/single seal	+4.0	+4.0	+4.0
Size 7 single/single seal	+1.0	-	-
Portland cement concrete (PCC) tyned and dragged	0 to +3.0	+1.0 to +3.5	=1.0 to +1.0
Cold overlay	+2.0	+2.0	+2.0
Dense Graded Asphalt (DGA)	0	0	0
Portland Cement Concrete (PCC): exposed aggregate	-0.5 to -3.0	-0.1	-6.7
Stone Mastic Asphalt (SMA)	-2.0 to -3.5	-2.2	-4.3
Open Graded Asphalt (OGA)	0 to -4.5	-0.2 to -4.2	-4.9

In general, seal surfacings would not be recommended for low noise surfacings purposes as they tend to generate higher traffic noise levels compared to asphalt surfacings. Similarly to concrete surfacings, they tend to generate higher noise levels than asphalt surfacings. However, there are a number of surface treatments that could be applied to reduce road noise levels, such as tyning or hessian dragging in a longitudinal direction to improve pavement unevenness (Austroads, January 2011).

Moreover, ageing of pavement and its construction quality could affect the noise performance. Austroads Research Report: "Austroads Research Report: Modelling, Measuring and Mitigating Road Traffic Noise. AP-R277/05" (Austroads, 2005) has mentioned that "It should also be noted that the noise generation characteristics of surfacings changes over time in particular as the wear, weathering and roughness of the road changes. In addition, noise generated from open graded asphalt pavement types will also increase as the voids within the surface become clogged over time. As an example, (Dash, Bryce, Moran, & Samuels, 2001) indicate that the clogging of surface voids in open-graded asphalt may lead to noise level increases of around 4 dB(A)." Table 21 details the change in acoustic performance of road pavement due to ageing.

Table 21 Change in acoustic performance due to aging

Road surface	Noise level variation dB(A)		
	When fresh	Several years old	Change
mom sprayed seal	+4	+2	-2
Dense Graded Asphalt (DGA)	0	+1	+1
Open Graded Asphalt (OGA)	-4	-2	+2

- Installation of traffic calming schemes, such as speed humps, runabouts, etc. Austroads Research Report (Austroads, 2005) has provided factors to consider in designing traffic calming schemes, which are detailed in Table 22.

Table 22 Factors to consider in design of traffic calming schemes (Austroads, 2005)

Factor	Consideration
Distance between devices	Distance between traffic calming devices should promote constant speed along the road. Acceleration followed by braking and swerving can increase community annoyance where devices are spaced too far apart.
Height of device	Raised devices, such as mid-block platforms and speed humps have strong traffic calming effects. However, the height of the device can limit its effectiveness. A 3 cm increase in height can provide the equivalent noise increase of moving the device 40 m closer to the noise receiver.
Chicanes	Chicanes can reduce speed annoyance, however they do not reduce the sense of danger that a calming device should achieve. This is mostly a result of noise generated by swerving and acceleration.
Roundabouts	Roundabouts generally provide the greatest benefit in noise reduction. Noise from roundabouts appears to create less community annoyance than other traffic calming devices.
Mid-block platforms	Mid-block platforms are not effective at reducing speed annoyance. Squeaking noise, caused mostly by the vertical displacement of the device, tends to increase noise annoyance at sensitive receivers. This can be reduced by keeping the device height lower than 75 mm.
Speed humps	Speed humps have noticeably lower annoyance levels than mid-block platforms, although device height should be lower than 75 mm to minimise potential annoyance.
Driver behaviour	Implementation of traffic calming devices should be aimed for the minority of drivers who ‘challenge’ devices, as these drivers create the most noise. Measures that reduce line of sight may be more effective than those that create a vehicle disturbance.
Traffic volume and mix	Traffic volume and mix, particularly at night time (between 10:00 pm – 7:00 am) may affect noise annoyance to sensitive receivers. Unladen heavy vehicles and light trucks crossing these devices can cause sleep disturbance in the early morning hours.
Pavement surface	Contrasting pavement surfaces such as cobblestones or rumbled pavements, often used to highlight devices, can increase the noise at the tyre/road interface.
Emergency vehicle access	It should be noted that emergency vehicle access and response time must be carefully considered when designing and installing calming devices. Emergency vehicles, particularly ambulances, have more difficulty with vertical devices such as speed humps than with horizontal devices such as chicanes.

- Traffic management to reduce the need for multiple heavy vehicle deliveries to one location; and
- Acoustic treatment to specific noise sources from specific nearby industry.

8.5.3 Control in Transmission

The noise reduction strategy used to control in noise transmission generally involves the installation of noise barriers. Noise barriers may include an existing feature, such as:

- An elevated road or a natural slope (e.g. earth mound);
- A purpose designed feature such as a solid boundary fence;
- A purpose designed feature of the building, such as a partially enclosed carport; and
- A purpose designed building which acts as a barrier block.

Figure 11 and Figure 12 below illustrates different noise barrier configurations, sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008).

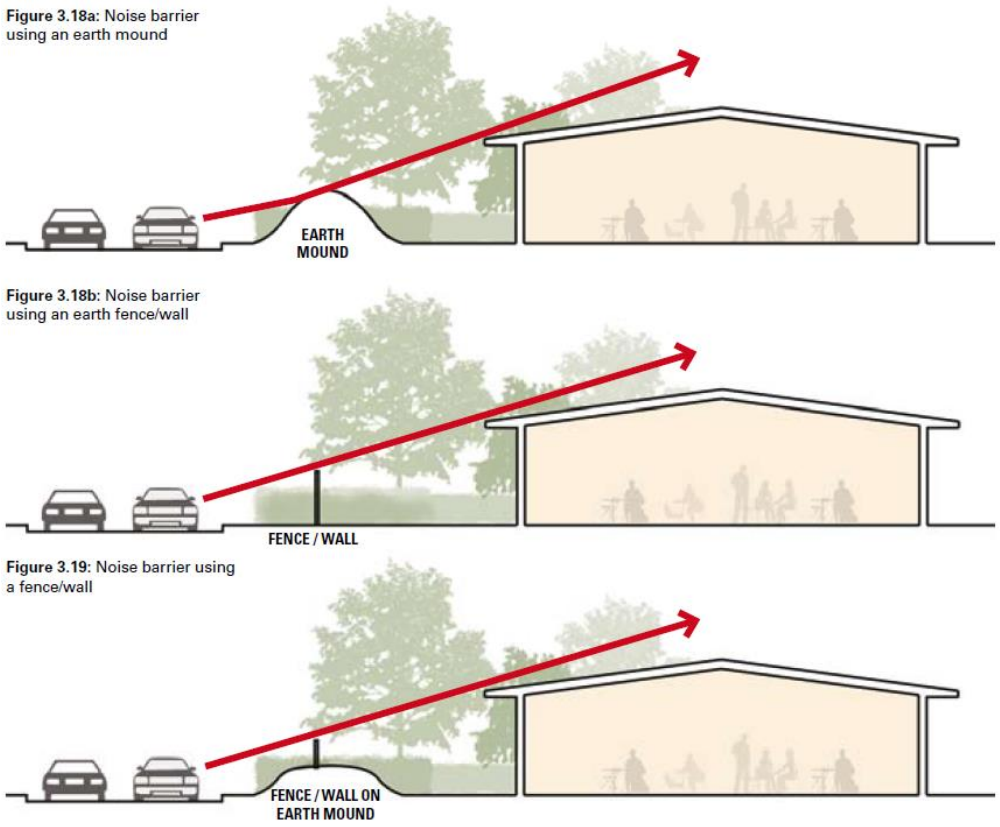

Figure 11 Noise Barrier Features (NSW DoP, 2008)

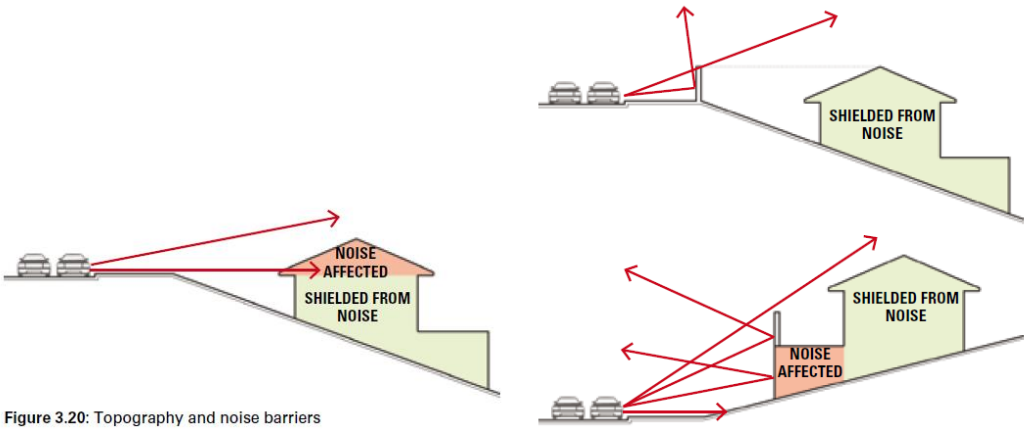

Figure 3.20: Topography and noise barriers

Figure 12 Noise Barrier Features (NSW DoP, 2008)

The barrier should be installed in a manner such that it covers the noise sources from direct line-of-sight to the sensitive receptors. In general, the barrier should provide sufficient screening to avoid direct line-of-sight between the shielded noise sources and the protected sensitive receptors. Noise barriers would not be effective in reducing noise impacts if the line of sight from the noise source to the residence is not reduced. Hence, it may not be practical to install a noise barrier for elevated sensitive receivers.

8.5.4 Receiver Control

There are several strategies involved in using the Receiver Control measure:

- Building orientation layout. This involves configuring the development's floor plan to have sleeping areas/habitable areas facing away from the noise sources. Figure 13 and Figure 14 illustrate samples of building orientation layout strategies to minimise local noise intrusion, which is sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008);

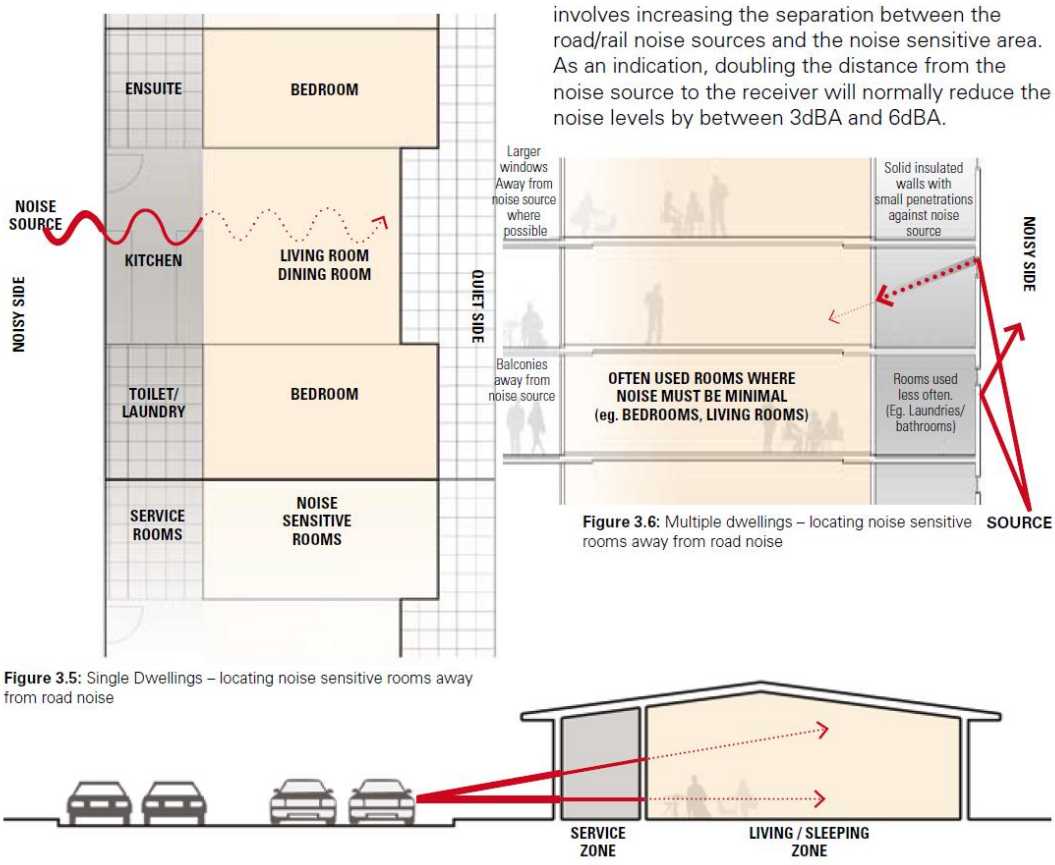

Figure 3.5: Single Dwellings – locating noise sensitive rooms away from road noise

Figure 3.6: Multiple dwellings – locating noise sensitive rooms away from road noise

Figure 13 Sample of Building Layout Strategies 1(NSW DoP, 2008)

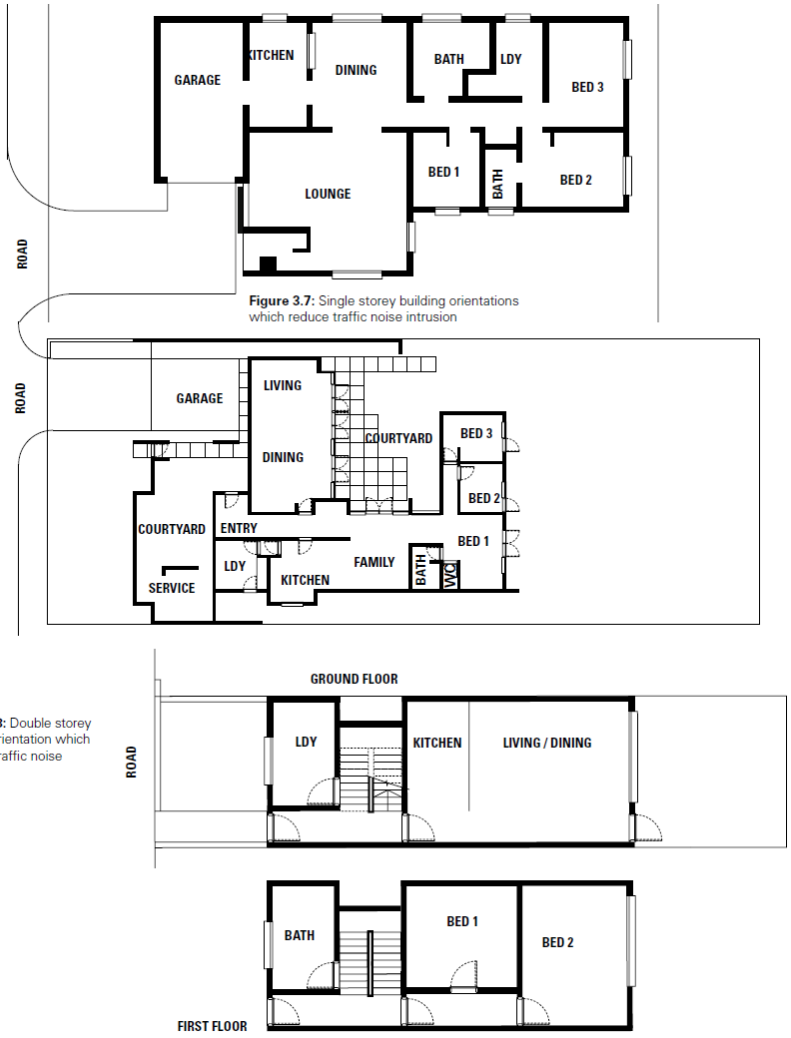

Figure 14 Sample of Building Orientation Layout Strategies 2 (NSW DoP, 2008)

- Balustrade/balcony design/configuration to avoid direct line of sight from the balcony to the noise sources (this shall be confirmed following the design of the development and landscape layout). Figure 15 below illustrates samples of balustrade/balcony design strategies to minimise local noise intrusion, which is sourced from NSW Department of Planning "*Development near rail corridors and busy roads – Interim guideline*" (NSW DoP, 2008); and

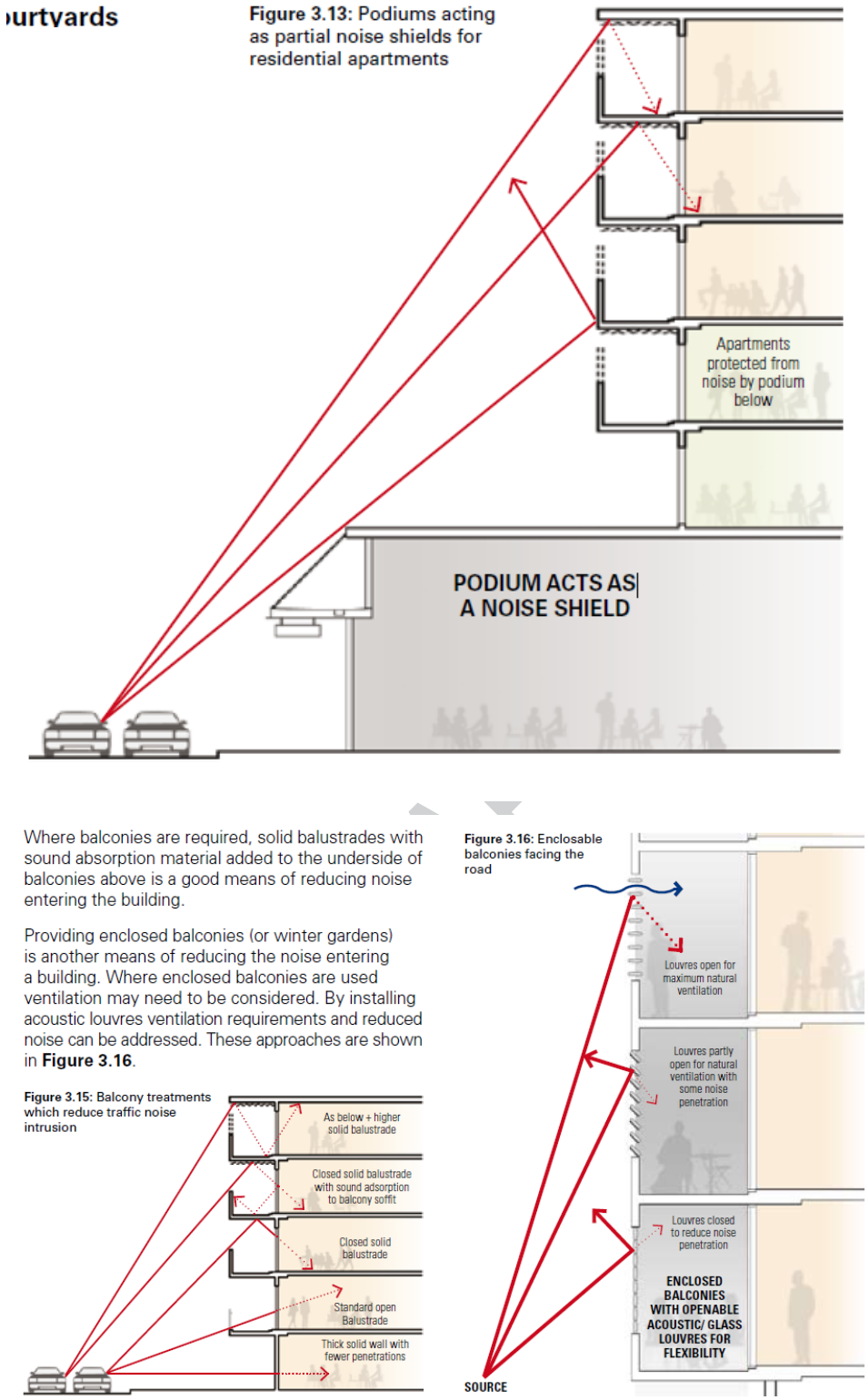

Figure 15 Sample of Balustrade/Balcony Design Strategies (NSW DoP, 2008)

- Building façade acoustic treatment. External traffic noise intrusion is typically transmitted into the building via lightweight façade elements such as glass, doors, lightweight walls, lightweight roofs, etc., as well as any grille openings. Subject to more detailed traffic noise assessment, these light weight façade elements of the proposed building enveloped potential situated within the project site may need to be acoustically treated to preserve indoor amenity of the building occupants, such as below:

– Minimise lightweight external wall construction facing the dominating noise sources;
– Thicker glazing construction for the window façade;
– Minimise window size and maximise masonry external wall construction;
– Minimise the use of openable window construction; and
– Configure any discharge/intake duct grill layout (above ceiling level) facing away from the noise sources.

The purpose of treating the building envelope is to reduce the internal noise only when the external noise criteria cannot be achieved. The Australian standard *AS3671:1989 – Acoustics – Road traffic noise intrusion – Building siting and construction* (Standards Australia, 1989) provides a procedure for determining appropriate treatments that correspond to the noise reduction required for internal noise levels.

AS3671 refers to Australian Standard AS2107-2000 (now superseded with AS2107:2016) as the appropriate standard that recommends design objective noise limits for acoustic environments within occupied spaces.

In addition, THE DELWP practice note *Assessing External Noise Impacts a for Apartments – Planning Practice Note 83* (PPN 83) (August 2017) also provides guidance on the indoor sound levels within residential apartments situated within the *noise influence area*. This has been indicatively discussed in the previous section of this report.

In principle, noise inside a building can be reduced if the building envelope has high sound reduction. Heavy, dense materials such as masonry or brick walls are better for sound reduction. However, lightweight solutions can also be effective in reducing noise. These include double-stud, staggered-stud or resilient-stud systems that have external layers of cement sheet or similar and internal layers of plasterboard with acoustic insulation in the cavity.

Noise from traffic may enter a room through the roof, external walls, windows and external doors.

Windows and doors are often the weakest point in sound insulation. Measures such as thicker glass, laminated glass or double glazing and acoustically sealing windows (permanent or openable) are techniques for noise reduction. Louvre windows are less effective in noise reduction when compared to solid single and double glazing acoustically sealing windows. Depending on the noise reduction required, window size and effectiveness of acoustic seals, louvre windows could be considered as construction component.

Note that mohair/brush/weatherpile type seals are **not** acceptable for acoustically rated partitions (windows, doors, etc.). All acoustic seals required shall be compressible bulb or rubber type seals. It is essential to ensure that all installed seals are fully engaged around the perimeter of the partition frame.

Solid-core doors are the most effective for external doors. Gaps and openings around both doors and windows should be well sealed acoustically.

Table 23 shows the noise reduction possible by introducing thicker glass, types of seals, or double glazing sourced from Austroads (Austroads, 2005). Note that no additional noise reduction is achieved when any type of window is open. The internal noise design objective can only be achieved when the windows remain closed. To maintain internal design objectives at all times would require ventilation to rooms by means other than through openable windows. Alternative ventilation may include "borrowed" natural ventilation from other rooms with less exposure to traffic noise or a mechanically ventilated system.

Table 23 Noise reduction possible based on window type and thickness

Noise reduction possible dB(A)	Type and thickness of glazing	Type of window
5 to 15	Any type of window when open	
Single Glazing: Closed		
Up to 20	3 mm glass	Openable, no seals
Up to 25	3 mm glass	Fixed, permanent seals
Up to 25	4 mm glass	Openable, weather stripped
Up to 30	6 mm glass	Openable, acoustic seals or fixed, permanent seals
Up to 35	12 mm glass	Openable, acoustic seals or fixed, permanent seals
Double Glazing: Closed (100 mm separation)		
Up to 30	4 mm + 4 mm glass	Openable, acoustic seals or fixed, permanent seals
Up to 35	6 mm + 6 mm glass	Openable, acoustic seals or fixed, permanent seals
Up to 40	6 mm + 6 mm glass	Fixed, permanent seals

Source: (Austroads, 2005).

8.5.5 Vibration control

General construction vibration mitigation controls include the followings as applicable:

- Use smaller capacity vibratory rollers.
- Consider the use of static rollers as opposed to vibratory roller, where possible.
- Sequence operations so that vibration intensive activities to not occur simultaneously.
- Where possible, locate vibration intensive activities as far away from sensitive areas as possible.
- Where work is required within the EPA Pub 480 buffer distance of 50 m, it is recommended that potentially impact receivers be informed of the nature of works, duration and contact details.
- Dilapidation survey should be undertaken at all potentially impacted receivers within 50 m of construction works prior to commencement (and after) of vibration generating works.

8.6 Potential constraints to the mitigation strategies

The following details the identified potential key constraints for noise mitigation measures in the East Village Precinct.

- Established existing industries with private ownerships – Control at Source mitigation strategy may be a challenge;
- Land-use Controls mitigation strategy through setback distances could compromise land value and land utilisation;
- While noise from industries and transportation are typically addressed separately, cumulative impacts may be a concern for precinct users, in terms of perception;

- Noise control in transmission, through the installation of noise barriers, could have some limitations as follows:
  - – Noise barriers are not effective to reduce transmission to receivers on a high rise buildings overlooking a road;
  - – Noise barriers generally creates perceptions such as view restriction, confinement feeling, loss of air circulation, loss of sunlight and lighting and could potentially increase local crime due to visual shielding; and
- Noise control at individual receivers may involve substantial acoustic treatment along with the associated cost.

8.7 Recommended Further Work and Investigation (Noise)

This section discusses some recommended future key actions, in principle, to address potential noise and vibration impact to the East Village Precinct.

- Undertake a detailed noise survey in the subject area, including on-site attended and unattended noise monitoring to determine the characteristics of the existing background/ambient (including traffic and electrical substation) noise levels. The findings of this assessment would then inform the configuration and design detail of the immediately surrounding land.
- Based on the measurements and detailed East Village development precinct design layout, environmental noise impacts from existing operations could be assessed against the applicable Standards and Statutory Requirements;
- Based on the noise survey results, confirm noise specific criteria for East Village precinct;
- Based on the monitoring/ modelling results and knowledge of the subject area, identify cost-effective mitigation measures and possible recommendations for ensuring compliance and amenity preservation.

9. Conclusion and recommendations

9.1 Future land use planning considerations

9.1.1 Future Land Use Interfaces

GHD has identified the existing industrial operations surrounding the precinct and have highlighted those industries with the potential to impose adverse amenity impacts.

However, as the precinct transitions from industrial to mixed use and residential there are a number of unknown elements in respect of amenity and sensitivity which will be tested differently as existing industrial uses may continue to operate within the precinct.

It is considered that the potential for future industrial uses to adversely affect the future development of the precinct is limited, in part because the residential zoned land surrounding the precinct in all directions will constrain any industry requiring a significant buffer (>100 m).

Furthermore, the ability for industrial uses to operate within the future East Village Precinct will be subject to the requirements and drafting of the Comprehensive Development Zone (CDZ).

9.1.2 Air emissions

Using the EPA recommended separation distance guidelines GHD, has assessed all the default buffers for the identified potential odour and dust emitting sources and no buffer constraints were identified.

Given no buffer constraints were identified then the consideration for site specific variation to default buffers was not required.

9.1.3 Electrical substation

In relation to the existing electrical substation, it is anticipated that the substation will remain as the precinct develops and there is no obligation for the asset owner to comply with SEPP N-1 noise policy for any future sensitive receiver (sensitive use) built within the future East Village Precinct.

In the first instance it is recommended that a discussion with the substation asset owner be progressed while the concept plan is under preparation.

Typical noise mitigation measures for transformer noise from a substation facility, would generally include a ‘control at source strategy’ and comprise a noise barrier around the transformer unit. However, this would depend on the transformer design and limitations and permission from the asset owner.

Should a ‘control at source’ noise mitigation strategy not be possible or practicable, it is not uncommon that the indoor amenity of sensitive receivers subject to substation operational noise be acoustically treated using control at receiver strategy, via building acoustic treatment (double glazed windows, orientation of habitable rooms away from the noise source). However, the limitation of this strategy is that it would not preserve the outdoor amenity of the receiver unless a combination of controls such as noise control at transmission be implemented.

9.1.4 Road traffic

Notwithstanding the North Rd 2,000 AADT volume short than the minimum trigger volume in PPN 83, the PPN 83 *standard design treatment for road noise* has been discussed in this report to provide preliminary guidance on the likely building acoustic treatment for residential premises to be located within the *road noise influence area*, in anticipating potential increase in traffic volumes for future years.

9.1.5 Complaint history

Overall, from the EPA complaint data, the residents surrounding the precinct do not appear to be adversely affected by odour, dust or noise. Over the past 5 years there has a total of 6 odour complaints, 6 noise complaints and one dust complaint from a residential premises within a 500m radius from the precinct.

9.1.6 Final recommendation

It is recommended that further acoustic modelling be undertaken to inform the further refinement design on the Structure Plan in relation to the electrical substation (within the precinct) and vehicle traffic from North Road.

Appendices

Appendix A – Complaints figure for odour

Study area

500m study area buffer

Number of complaints (2012 on)

1

2

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Victorian Planning Authority

East Village Buffer Impact Assessment

Odour Complaints (EPA)
(by meshblock)

Project No. 31-35578
Revision No. A
Date 25/10/2017

APPENDIX A

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Data source: DELWP, Vicmap data, 2017; EPA, complaints data, 2017; GHD, buffer data, 2017; Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: savenables

Appendix B – Complaints figure for dust

Study area

500m study area buffer

Number of complaints (2012 on)

1

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Victorian Planning Authority

East Village Buffer Impact Assessment

Dust Complaints (EPA)
(by meshblock)

Project No. 31-35578
Revision No. A
Date 25/10/2017

APPENDIX B

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Appendix C – Complaints figure for noise

Study area

500m study area buffer

Number of complaints (2012 on)

1

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Victorian Planning Authority

East Village Buffer Impact Assessment

Noise Complaints (EPA)
(by meshblock)

Project No. 31-35578
Revision No. A
Date 25/10/2017

APPENDIX C

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	A McKenzie	B George				30/10/17

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