SUBURBAN RAIL LOOP EAST

SRL East Draft Structure Plan

# Noise and Vibration Technical Report

More Homes For Victorians

VICTORIA State Government

# Suburban Rail Loop

## PREPARED FOR SUBURBAN RAIL LOOP AUTHORITY

## SRL EAST DRAFT STRUCTURE PLAN – NOISE AND VIBRATION TECHNICAL REPORT

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# Glossary and abbreviations

| TERM | DEFINITION |
|---|---|
| AADT | Annual Average Daily Traffic |
| ACZ | Activity Centre Zone |
| AEO | Airport Environs Overlay |
| AHD | Australian Height Datum |
| AHU | Air Handling Unit |
| AJM-JV | Aurecon Jacobs Mott MacDonald Joint Venture |
| ANEF | Aircraft Noise Exposure Forecast |
| AS | Australian Standard |
| ASHP | Air Source Heat Pump |
| CA | Commonwealth Area |
| CASA | Civil Aviation Safety Authority |
| CCZ | Capital City Zone |
| CDZ | Comprehensive Development Zone |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| CZ | Commercial Zone |
| dB | Decibel(s) |
| dB(A) | A-weighted decibel |
| DDO | Design and Development Overlay |
| DTP | Department of Transport and Planning |
| EES | Environment Effects Statement |
| EPA Victoria | Environment Protection Authority Victoria |
| ERS | Environment Reference Standard |
| FZ | Farming Zone |
| GED | General Environmental Duty |
| GWAZ | Green Wedge A Zone |
| GWZ | Green Wedge Zone |
| HGV | Heavy goods vehicle |
| HVAC | Heating, Ventilation, Air Conditioning |
| Hz | Hertz |
| INZ | Industrial Zone |
| km | Kilometre(s) |
| $L_{Aeq, T}$ | The A-weighted equivalent noise level over a period of time (T). |
| $L_{Amax}$ | The highest time-weighted sound level measured during a period. |
| LDRZ | Low Density Residential Zone |
| LGA | Local Government Area |
| m | Metre(s) |
| MUZ | Mixed Use Zone |
| NRZ | Neighbourhood Residential Zone |
| PA | Public Address |
| PCRZ | Public Conservation and Resource Zone |

| TERM | DEFINITION |
|---|---|
| PDZ | Priority Development Zone |
| PPRZ | Public Park and Recreation Zone |
| Plan Melbourne | *Plan Melbourne 2017-2050* |
| PSA | Planning scheme amendment |
| PRINP | Passenger Rail Infrastructure Noise Policy |
| PUZ | Public Use Zone |
| PZ | Port Zone |
| RAZ | Rural Activity Zone |
| RCZ | Rural Conservation Zone |
| RDZ | Road Zone |
| RLZ | Rural Living Zone |
| Regulations | Environment Protection Regulations 2021 (Victoria) |
| SRL | Suburban Rail Loop |
| SRLA | Suburban Rail Loop Authority |
| SRL East (the Project) | Suburban Rail Loop East |
| Structure Plan Area | The extent of the land in each suburb around the SRL East stations to which the Structure Plan applies. |
| Study Area | The area 1 km around the Structure Plan Area used to identify sources of noise and vibration in this assessment. |
| SUZ | Special Use Zone |
| TZ | Township Zone |
| UFZ | Urban Floodway Zone |
| UGZ | Urban Growth Zone |
| VDV | Vibration Dose Value |
| VPPs | Victoria Planning Provisions |

# Executive summary

As part of the Suburban Rail Loop (SRL) East project, Draft Structure Plans (Structure Plans) are being prepared for the suburbs surrounding the new underground stations at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill.

The Structure Plans will set a vision and framework to guide growth and change in each suburb, while protecting and preserving the features that people love about them now.

This Noise and Vibration Technical Report will inform the development of the Structure Plans.

## NOISE AND VIBRATION

Noise and vibration have the potential to impact human health, well-being and amenity of occupants of future sensitive land uses within the SRL East Structure Plan Areas, including residential, aged care, education and health land uses. Depending on the type of noise and exposure, some of the adverse effects include sleep disturbance, cardiovascular diseases, difficulty concentrating and impaired communication. Understanding and managing noise and vibration impacts is crucial for maintaining human health, amenity and the wellbeing of people within these areas.

The assessment for this technical report follows a high-level qualitative approach. The assessment identifies areas where existing noise and vibration sources may influence the environment in the SRL East Structure Plan Areas, and where potential impacts need to be addressed with appropriate planning controls on future sensitive development.

## ASSESSMENT CRITERIA

Legislation, policy and guidance for the assessment that were relevant to noise and vibration within each of the SRL East Structure Plan Areas were identified and applied. To develop a high-level qualitative risk assessment, the key criteria used to consider risks and define influence areas included the following:

- The Victoria Planning Provisions contained in the municipal planning schemes applicable to the locations of the SRL East Structure Plan Areas as follows:
    - » Clause 55.07-7 Noise impacts, Standard B41(Apartment Developments)
    - » Clause 58.04-3 Noise impact, Standard D16 (Amenity Impacts)
    - » Clause 53.06 Live Music Entertainment
- EPA Victoria Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* for guidance on designated types for Land Use Zones identified in the SRL East Structure Plan Areas, with a focus on industrial and commercial land uses.
- EPA Publication 1254.2: *Noise control guidelines* for helicopter noise.

Note that the assessment was not limited to the above listed criteria, and other relevant documents as outlined in Section 4 were considered for the risk assessment and mitigation. This included consideration of the General Environmental Duty and the provisions for unreasonable noise under the *Environment Protection Act 2017*.

## FINDINGS

To inform structure planning in the SRL East Structure Plan Areas, noise and vibration influence areas were defined based on the existing conditions. These influence areas were defined for existing noise and vibration sources in and around the SRL East Structure Plan Areas and include industrial land uses, and transportation sources such as road and rail traffic. In the Clayton and Monash Structure Plan Areas, influence areas were also derived for emergency helicopters operated by the Victorian Heart Hospital and Monash Children's Hospital. The predicted noise and vibration associated with the operation of the SRL East underground railway was also considered.

The assessment concluded that identified influence areas for noise and vibration do not constrain development of sensitive uses in the SRL East Structure Plan Areas. However, sensitive development will need to be planned appropriately to accommodate the existing noise and vibration emissions, in particular in the influence areas. This can be achieved by applying appropriate planning controls, consistent with the Environment Protection Act 2017, the Environment Reference Standard, Environment Protection Regulations 2021 and municipal planning schemes. The controls should require proponents and responsible authorities to consider strategic layout of sensitive developments in noise influence areas and acoustic mitigation that complies with relevant legislative and policies. The assessment provides a summary of the applicable planning requirements for each type of source which are required for any new sensitive developments in Victoria.

## RECOMMENDATIONS

### Structure planning

Based on the assessment, recommendations were developed to inform the development of Structure Plans. The recommendations aim to provide guidance for planners and developers of future sensitive land uses, within the identified influence areas, to avoid or minimise noise and vibration impacts so far as reasonably practical.

1. It is considered that noise and vibration risks in the SRL East Structure Plan Areas can generally be adequately addressed by applying controls that already exist in municipal planning schemes, as per the Victoria Planning Provisions. The planning schemes require that an acoustic assessment is completed for any residential sensitive development proposed within a noise and vibration influence area. The acoustic assessment should consider layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) to ensure compliance with relevant noise or vibration requirements.

Areas where specific consideration beyond the planning scheme requirements is recommended are:

2. Sensitive developments near existing industrial land uses: No agent of change process exists for new sensitive development near existing industrial land uses under the existing planning schemes or legislation. Consideration should be given to identifying when new residential land uses are intended to be proposed closer than existing sensitive uses to existing industrial zones, and these are planned to be located within an influence area for industrial noise. In these cases, future sensitive development should be designed to accommodate existing industrial noise emissions to ensure that noise levels at the sensitive use comply with the noise limits set as per the Environment Protection Regulations to avoid introducing a new compliance burden on existing industrial uses. Consideration of layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) would be in most cases sufficient to ensure compliance.

3. External impacts from road and rail traffic: as the existing VPPs do not set out a specific external noise requirement for sensitive land uses from road and rail traffic noise and prescribe criteria for internal noise levels only (in clause 55.07 and clause 58.04), future developments should demonstrate consideration and implementation of good design practices to protect human health, well-being and amenity in external areas so far as reasonably practicable.

4. Road noise: Consideration should be given to requiring residential development within 150m of Blackburn Road, Burwood Highway and Canterbury Road in the Monash, Burwood and Box Hill Structure Plan Areas, respectively, to comply with the noise levels specified in the current Planning Schemes for apartments in clauses 55.07-7 and 58.04-3. Consideration of layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) would be in most cases sufficient to ensure compliance.

5. Helicopter noise: Consideration should also be given to incorporating a requirement for sensitive development within the helicopter noise influence areas in the Clayton and Monash Structure Plan Areas to address emergency helicopter noise, as this is not currently addressed in the municipal planning schemes. This assessment recommends guidance to consider the potential impacts from this source and indoor noise criteria to guide the acoustic mitigation design. This is considered appropriate to guide the planning requirements for sensitive developments in the SRL East Structure Plan Areas in the helicopter noise influence areas identified in this assessment. The nature and character of helicopter noise, such as tonality, impulsiveness and intermittency require consideration when assessing the impacts from this source and developing the mitigation design. Consideration of specific acoustic mitigation (Section 6.4.3) alongside layout design strategies (Section 6.4.1) would be in most cases sufficient to manage the noise impacts from this source.

6. Siren noise: Consideration should be given to requiring sensitive development within the defined influence area of 250m to address the potential effects of emergency vehicle siren noise on the amenity of occupants in proximity to emergency services. Fire stations are in the Cheltenham and Box Hill Structure Plan Areas and hospitals with ambulance vehicles in the Clayton, Monash and Box Hill Structure Plan Areas. Consideration of specific acoustic mitigation (Section 6.4.3) alongside layout design strategies (Section 6.4.1) would be in most cases sufficient to manage the noise impacts from these sources.

7. Construction noise: The Structure Plans should consider active construction sites when sequencing construction of new sensitive developments to avoid or manage potential cumulative impacts from noise and vibration from multiple construction sites at existing sensitive locations in the SRL East Structure Plan Areas. This assessment provides recommendations to identify potential risk areas. Suitable planning and sequencing, alongside management and mitigation measures via Construction Management Plans are generally expected to address the impact from this temporary source.

### Other opportunities

This section sets out other opportunities that are considered as complementary to any requirements of Structure Plans for new sensitive development within the noise and vibration influence areas. They are general best practice, reinforcing the current applicable legislative requirements for planning. While it is not considered necessary for these to be included in the Structure Plan they could be provided as accompanying recommendations to help achieve the Structure Plan vision and objectives.

#### RESIDENTIAL SENSITIVE DEVELOPMENT

Other opportunities for allocating land for residential land uses, including aged care and hotel accommodation, within the noise and vibration influence areas are:

- Developers should consider the proximity of any new sensitive development to existing sources of noise and vibration at the planning stage, to evaluate the degree of acoustic mitigation needed through both strategic layouts of the development and physical constructions as well as the associated costs. The closer to the source, the higher the extent of acoustic mitigation that is likely to be required.

- The areas where there is the potential for a cumulative impact requires careful consideration and developers should engage an acoustic consultant to provide advice when planning developments in these areas. This applies where one or more influence areas overlap with each other.

- Developers should demonstrate careful consideration has been given to the location and orientation of external areas in new residential developments and/or the inclusion of physical noise mitigation measures such as noise barriers to reduce external noise levels so far as reasonably practicable, consistent with the objectives of the General Environmental Duty. This is particularly relevant for development in the four first rows of houses within the noise influence areas identified for roads and rail corridors.

- Developers should demonstrate that the design of the development also provides appropriate internal acoustic amenity within the noise and vibration influence areas. Typically, this would involve submission of an acoustic report as part of the town planning application demonstrating that the noise provisions of the planning schemes and vibration impacts have been addressed.

## OTHER SENSITIVE DEVELOPMENTS

Guidance for non-residential sensitive developments within noise and vibration influence areas:

- Developers should demonstrate that careful consideration has been given to the location and orientation of external areas that may be noise sensitive. These are any outdoor areas in educational facilities, medical treatment areas of hospitals and community facilities, such as outdoor play areas in schools and passive recreation areas in community sport centres.

- Developers should demonstrate the design of the development achieves appropriate internal acoustic amenity, through an acoustic report that demonstrates the design complies with recommended internal noise levels of AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors.*

- In relation to vibration, developments with equipment sensitive to vibration, should incorporate the necessary measures in their design to address the vibration arising from the operation of SRL East. These measures will depend on the specific nature of the use, and would be a matter for the developer of these uses. Usually, sensitive equipment would be present in research or health facilities.

# 1 Introduction

The Suburban Rail Loop (SRL) is a transformational project that will reshape Melbourne's growth in the decades ahead. It will better connect Victorians to jobs, retail, education, health services and each other – and help Melbourne evolve into a 'city of centres'.

SRL will deliver a 90-kilometre rail line linking every major train service from the Frankston Line to the Werribee Line via Melbourne Airport.

SRL East from Cheltenham to Box Hill will connect major employment, health, education and retail destinations in Melbourne's east and south east. Twin 26-kilometre tunnels will link priority growth suburbs in the municipalities of Bayside, Kingston, Monash and Whitehorse.

SRL East Structure Plan Areas will surround the six new underground stations at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill.

## 1.1 Purpose of this report

This SRL East Draft Structure Plan – Noise and Vibration Technical Report will inform the development of the Draft Structure Plans (Structure Plans) to guide land use planning and development in the SRL East Structure Plan Areas.

The report describes the existing noise and vibration conditions in each SRL East Structure Plan Area and associated Study Area.

A risk assessment of the existing noise and vibration sources is conducted, with definition of influence areas, risk controls and mitigation strategies to inform the planning of future land use for sensitive developments in the Structure Plans.

Recommendations to consider when developing the Structure Plans are made, with the objective to minimise and manage negative impacts of change and to maximum potential for positive change.

## 1.2 Project context

Construction of the SRL East underground stations is underway at Cheltenham, Clayton, Monash, Glen Waverley, Burwood and Box Hill. This provides an opportunity to enhance the surrounding neighbourhoods. SRL East will support thriving and sustainable neighbourhoods and communities that offer diverse and affordable housing options, with easy access to jobs, transport networks, open space, and community facilities and services.

A vision has been developed in consultation with the community and stakeholders for the SRL East Structure Plan Area and surrounds. The visions set out the long-term aspirations for these areas, ensuring they are ready to meet the needs of our growing population.

Figure 1.1 shows SRL East in the context of the entire SRL project and Melbourne's rail network.

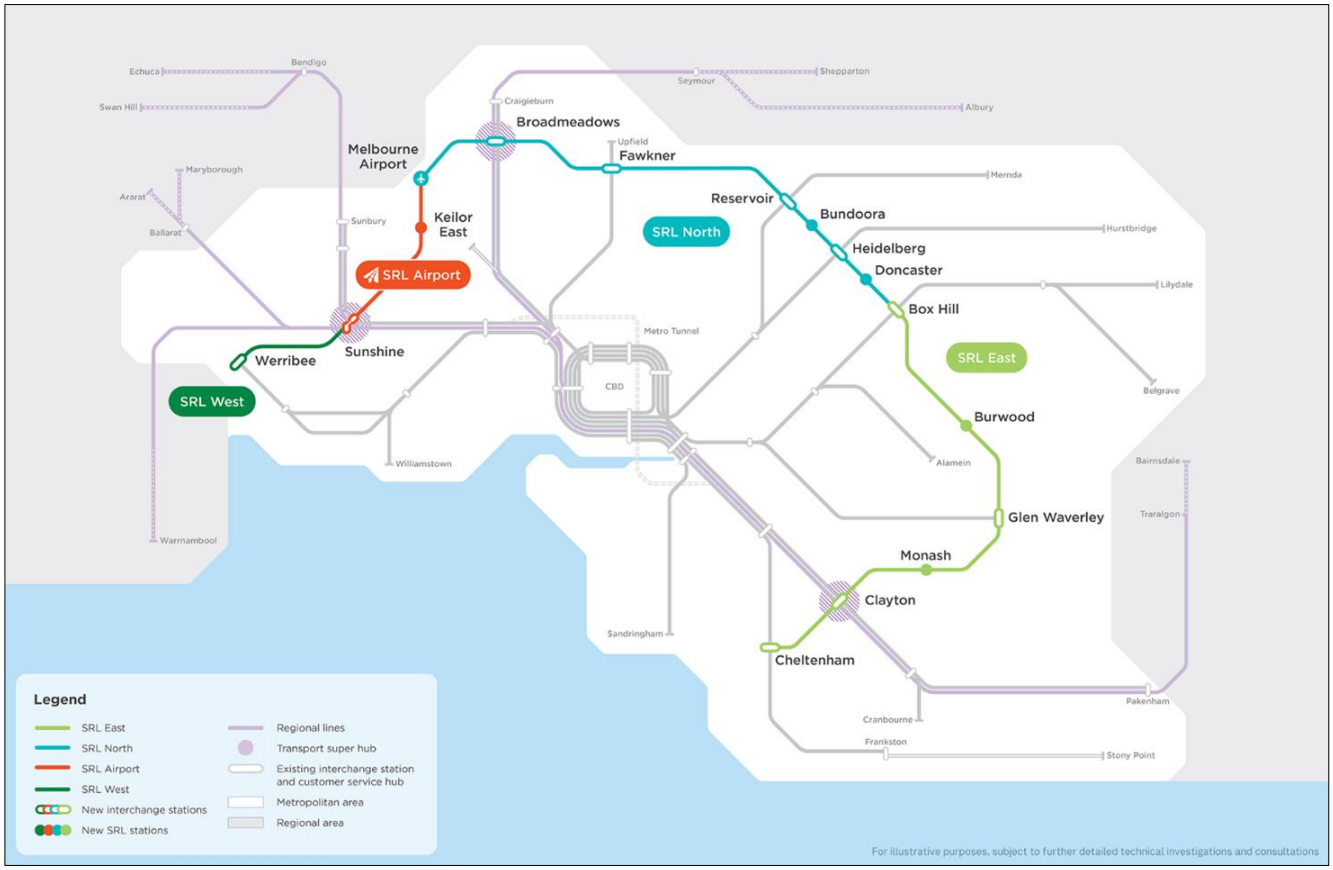


**FIGURE 1.1 SRL EAST CONTEXT IN MELBOURNE'S RAIL NETWORK**

## 1.3 Structure planning

Structure Plans have been prepared for defined areas surrounding the new SRL East stations to help deliver the Precinct Vision developed for each SRL East neighbourhood.

The Structure Plans cover defined Structure Plan Areas for SRL East that can support the most growth and change. These areas cover a walkable catchment that extends from the SRL East station entrances. Additional places are included within each defined area as required to make planning guidance more robust and effective, and to align with each community's aspirations and current and future needs.

A Structure Plan is a blueprint to guide how an area develops and changes over a period of time. Structure Plans describe how future growth within the area will be managed in an appropriate and sustainable way to achieve social, economic and environmental objectives. The plans cover a wide range of matters, such as transport connections and car parking, housing and commercial development, community infrastructure, urban design, open space, water and energy management, climate resilience and sustainability.

By tailoring planning decisions to reflect the needs of a defined area, Structure Plans give effect to the policies and objectives set for these areas and cater for changing community needs. They also provide certainty for residents, businesses and developers by identifying the preferred locations and timing of future land uses, development and infrastructure provision.

Structure Plans take a flexible and responsive approach that enables places to evolve over time.

Planning scheme amendments will be required to implement the Structure Plans into the planning schemes of the cities of Bayside, Kingston, Monash and Whitehorse.

## 1.4 Structure of the report

- **Section 1** provides the background and context of the technical assessment.
- **Section 2** explains the methodology for the technical assessment.
- **Section 3** presents the six SRL East Structure Plan Areas and defines noise and vibration Study Areas.
- **Section 4** summarises legislation, policies and other documents relevant to the assessment.
- **Section 5** describes the existing potential sources of noise and vibration in each SRL East Structure Plan Area and associated Study Area.
- **Section 6** sets out the findings of the noise and vibration risk assessment considering influence areas and associated areas of potential risk, risk controls and risk mitigation strategies to inform land use planning for future sensitive development in each SRL East Structure Plan Area.
- **Section 7** sets out the recommendations that should be considered when developing the Structure Plans and provides opportunities for actions beyond the scope of structure planning.

This technical report includes the following Appendices:

- **Appendix A** details the relevant planning legislation, policy and guidance that supports Section 4.
- **Appendix B** details the relevant noise policies in the planning schemes that supports Section 4.
- **Appendix C** details the existing conditions that supports Section 5.

# 2 Methodology

The methodology for this technical assessment involved the following steps:

- Study Areas around each SRL East Structure Plan Area were established for the assessment of noise and vibration (see Section 3).
- Review and consideration of legislation, policies and other relevant documents relating to noise and vibration relevant to the assessment, and to land use planning and development in the SRL East Structure Plan Areas (see Section 4, Appendix A and Appendix B).
- Existing potential noise and vibration sources in each Study Area were identified (see Section 5).
- Potential noise and vibration risks were assessed to inform the Structure Plans (see Section 6). This included.
    - » Assessing the influence of existing noise and vibration sources and defining influence areas for noise and vibration within the SRL East Structure Plan Areas
    - » Identifying appropriate controls to respond to the risk of noise and vibration, including planning controls and risk mitigation related to building design strategies for future sensitive development in the SRL East Structure Plan Areas
    - » Identifying noise and vibration risks from SRL East in the SRL East Structure Plan Areas
    - » Assessing the residual risks considering the identified risk controls and risk mitigation strategies.
- Based on the assessment, recommendations were developed to avoid, minimise or manage potential negative impacts relating to noise and vibration, and to maximise potential for positive change in the SRL East Structure Plan Areas (See Section 7).

## 2.1 Approach to risk-based assessment

The assessment focused on the potential noise and vibration risks that could affect future sensitive development in the SRL East Structure Plan Areas. Developments with the potential to be affected by noise and vibration include future residential land uses, as well as other sensitive land uses such as aged care, education and health.

Residential land uses for the assessment were considered to be dwellings and any other types of accommodations including aged care facilities, wards at hospitals, hotels, motels, specialist disability accommodation facilities, corrective institutions, tourist accommodations, retirement villages and residential villages. Other sensitive uses include educational facilities, medical treatment areas of hospitals and other types of community facilities where there is no overnight accommodation. These sensitive uses are defined under the Environment Protection Regulations 2021.

A risk-based approach was adopted for the assessment of future sensitive developments in the SRL East Structure Plan Areas. The risk rankings shown in Table 2.1 were defined for the purposes of the assessment. These are qualitative and based on professional judgement and experience.

**TABLE 2.1 ADOPTED RISK RANKINGS**

| RISK RANKING | RISK DEFINITION |
|---|---|
| Negligible | ▪ There are negligible noise and vibration risks identified since the external acoustic environment is anticipated to be consistent with the Environment Reference Standard (ERS) values, objectives and indicators.<br>▪ Natural ventilation with openable windows is feasible whilst maintaining appropriate internal acoustic amenity without any need for specific building design strategies. |
| Low | ▪ Noise and vibration risks are identified but can be addressed though the implementation of typical mitigation strategies via strategic building layout and/or standard building constructions.<br>▪ While the external acoustic environment may not align with the ERS guideline values, objectives and indicators at all times, areas with external acoustic amenity are able to be provided through the use of building layout strategies.<br>▪ Provision of natural ventilation with openable windows can be achieved most of the time while maintaining appropriate internal acoustic amenity. |
| Medium | ▪ Noise and vibration risks are identified but can be addressed though the implementation of typical mitigation strategies via a combination of strategic building layout and acoustically designed building constructions.<br>▪ The external acoustic environment does not align with the ERS guideline values, objectives and indicators at all times, but limited areas of external acoustic amenity are able to be provided through the use of building layout strategies.<br>▪ Provision of natural ventilation with openable windows is limited to specific areas of developments, and acoustic building constructions are required for other areas to maintain appropriate internal acoustic amenity. |
| High | ▪ Significant noise and vibration risks are identified and require careful control though the implementation of significant mitigation strategies via a combination of strategic building layout and acoustically designed building constructions.<br>▪ The external acoustic environment does not align with the ERS guideline values, objectives and indicators, and it is not possible to achieve areas of external acoustic amenity at sensitive land uses.<br>▪ Provision of natural ventilation with openable windows is not possible, and significant acoustic building constructions are required for other areas to maintain appropriate internal acoustic amenity. |

## 2.2 Stakeholder engagement

This technical report builds on previous consultation undertaken for the feasibility, design development and environmental and planning approval phases of the project. The structure planning process has involved comprehensive and robust conversations with the community, councils, key institutions and other stakeholders on the proposed visions and precinct key directions for the SRL East Structure Plan Area and surrounds. For

further information please refer to the SRL Structure Planning Engagement Reports available on the SRL website (https://bigbuild.vic.gov.au/library/suburban-rail-loop/reports/engagement-reports).

Table 2.2 summarises the stakeholder engagement conducted and how it has informed the preparation of this technical report. Feedback on the technical advice of this report was obtained through targeted consultation including direct engagement in a meeting with the EPA, followed by written feedback on review of draft reports.

**TABLE 2.2 STAKEHOLDER ENGAGEMENT**

| STAKEHOLDER | DATE | MATTERS DISCUSSED/ ISSUES RAISED | OUTCOME |
|---|---|---|---|
| **All SRL East Structure Plan Areas** | | | |
| EPA Victoria, specialist acoustic advisors | 13 February 2024 | Workshop presentation covering the noise and vibration assessment presented in this technical report. EPA Victoria provided feedback on the methodology, recommending that additional consideration be given to the ERS values, opportunities to allow for a suitable acoustic environment in outdoor areas and natural ventilation, and cumulative impacts. | This technical report has incorporated the EPA feedback received during the workshop presentation. |
| EPA Victoria, specialist acoustic advisors | Report provided to EPA on 26 March 2024.<br><br>Comments received by AJM-JV on 3 June and 1 July 2024 | Draft revision of this technical report provided for feedback. Key parts of EPA Victoria feedback were that consideration should be given to the potential for noise from emergency vehicles and extended construction works, unreasonable noise factors and noise character. | This technical report addresses the EPA written comments by elaborating on the matters raised. |

## 2.3 Consulted data sources

The assessment is risk-based and qualitative, conducted through a desktop study. Data sources included:

- Structure Plan Areas defined for SRL East (11 April 2024)
- Rail and Infrastructure boundaries defined for SRL East (May 2023)
- Public Transport Victoria (PTV) data on the location of transportation sources (bus, train and tram routes)
- Department of Transport and Planning (DTP) Traffic Volume Open Data Hub tool to identify existing traffic volumes and forecast traffic volume growth for freeways and arterial roads1
- DTP Principal Freight Network to identify rail corridors with freight train operation2
- VicPlan land zoning and cadastral information to identify existing land uses and relevant Design and Development Overlay (DDO) and Buffer Areas Overlay (BAO) areas[3]

[1] https://vicroadsopendata-vicroadsmaps.opendata.arcgis.com/datasets/traffic-volume/explore?location=-37.818758%2C145.124950%2C18.24

[2] https://dtp.vic.gov.au/about/planning/transport-strategies-and-plans/principal-freight-network#maps

[3] https://mapshare.vic.gov.au/vicplan/

- The Victorian Gambling and Casino Control Commission's (VGCCC) interactive Licensed Venues Map to locate venues with potential for outdoor live music4
- Publicly available data from existing businesses websites
- SRL East Environment Effects Statement (November 2021)5
- Publicly available aircraft noise contours of Moorabbin Airport6
- Aerial maps (Open Street and Google maps).

## 2.4 Assumptions and limitations

The following assumptions and limitations apply to this Noise and Vibration technical assessment:

- A conservative approach was adopted to identify noise and vibration influence areas. This is based on available information on the existing conditions, current planning policies for each Local Government Area (LGA), relevant legislation and guidance, professional judgement and the following considerations:
  - » It is assumed that all existing developments with noise and/or vibration sources (such as industrial, commercial) comply with their obligations at existing sensitive land uses.
  - » Source descriptions are based on the Aurecon Jacobs Mott Macdonald Joint Venture (AJM-JV) understanding, considering the type of source, typical operations, and available data.
- Noise from the following sources is not within the scope of any Victorian noise regulation:
  - » Sirens from ambulance or emergency services – this assessment provides recommendations for any potential sensitive developments adjacent to existing emergency services.
  - » Tram operations – not considered for this assessment
  - » Tram bells and train horns – not considered for this assessment.
- Noise and vibration from construction sites are temporary, and this high level risk assessment provides recommendations for the structure plans to consider potential cumulative impacts on existing sensitive locations in the SRL East Structure Plan Areas. However, information on the locations and sequencing of individual proposals in the Structure Plans is not available at this early planning stage. As individual developments are planned, they must minimise noise and vibration impacts from construction works so far as reasonably practicable, consistent with the requirements of the Environment Protection Act, including consideration of potential cumulative effects.
- Site reconnaissance to the SRL East Structure Plan Areas was undertaken on 26 June 2024 to confirm the desktop analysis for the identification of existing sources of noise and vibration.
- No baseline noise and vibration surveys were undertaken.
- No noise and vibration modelling were conducted.

[4] https://geomaps.vgccc.vic.gov.au/Liquor/

[5] https://srleastees.vic.gov.au/#/

[6] https://www.moorabbinairport.com.au/-/media/project/moorabbin-airport/files/about-us/planning/moorabbin-airport-2021-master-plan---approved-(2).pdf

# 3 SRL East Structure Plan Areas

This section defines the SRL East Structure Plan Area in each SRL East neighbourhood.

## 3.1 Study Areas

Study Areas were established for the noise and vibration assessment.

The basis of the Study Areas was the SRL East Structure Plan Areas, plus a 1-kilometre radius around them.

A 1-kilometre radius was selected as it is considered sufficient to identify all noise and vibration sources with the potential to influence the environment in the SRL East Structure Plan Areas.

## 3.2 Cheltenham Structure Plan Area

The Cheltenham Structure Plan Area surrounds the SRL station at Cheltenham in the cities of Kingston and Bayside.

The Cheltenham Structure Plan Area is generally bordered by residential land north of Stayner Grove and Alison Street to the north, residential land east of Chesterville Road to the east, Park Road to the south and Middleton Street and Worthing Road to the west.

The Cheltenham Structure Plan Area is intersected by the Nepean Highway and the Frankston Line.

The Cheltenham Structure Plan Area and the 1-kilometre radius Study Area is shown in Figure 3.1 .


**FIGURE 3.1 CHELTENHAM STRUCTURE PLAN AREA AND STUDY AREA**

## 3.3 Clayton Structure Plan Area

The Clayton Structure Plan Area surrounds the SRL station at Clayton in the cities of Monash and Kingston.

The Clayton Structure Plan Area is generally bordered by North Road / Wellington Road to the north, Ormond Road to the west, residential lots between Alward Avenue and Murdock Street, and parts of the Cranbourne / Pakenham Line to the south, and Kombi Road and Buckland Street to the east.

Dandenong Road is a major road, running in a north-west to south-east alignment through the edge of the Clayton Structure Plan Area. The existing Cranbourne / Pakenham Line intersects the Clayton Structure Plan Area in an east-west alignment.

The Clayton Structure Plan Area and the 1-kilometre radius Study Area is shown in Figure 3.2.

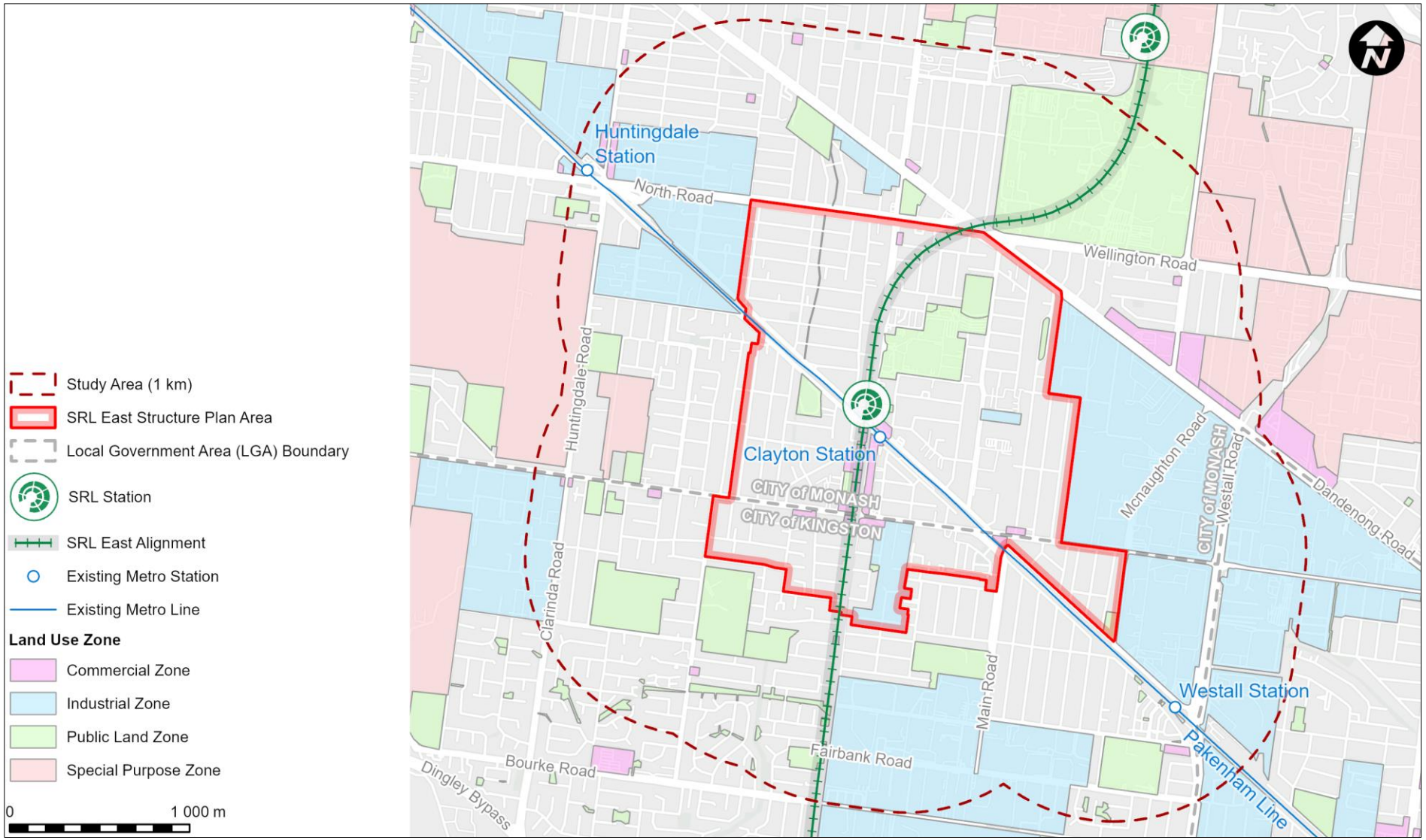


**FIGURE 3.2 CLAYTON STRUCTURE PLAN AREA AND STUDY AREA**

## 3.4 Monash Structure Plan Area

The Monash Structure Plan Area surrounds the SRL station at Monash in the City of Monash.

It is generally bordered by Wellington Road and Princes Highway to the south, Gardiner Road and residential properties between Clayton Road and Dover Street to the west, land north of Ferntree Gully Road to the north and a reservation for a future road, which forms a natural barrier to properties to the east.

Monash University Clayton campus is located in the Monash Structure Plan Area.

The Monash Structure Plan Area and the 1-kilometre radius Study Area is shown in Figure 3.3.

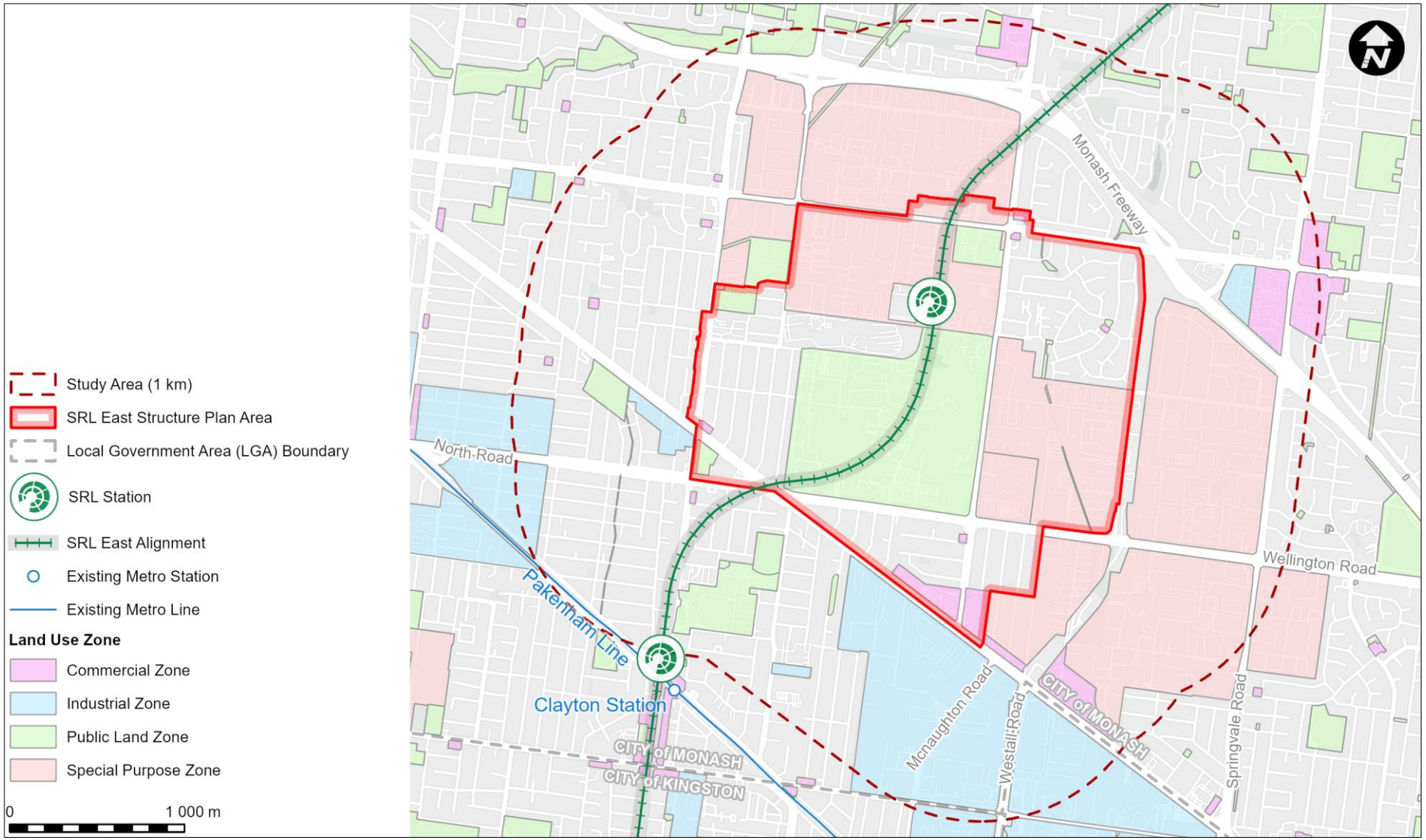


**FIGURE 3.3 MONASH STRUCTURE PLAN AREA AND STUDY AREA**

## 3.5 Glen Waverley Structure Plan Area

The Glen Waverley Structure Plan Area surrounds the SRL station at Glen Waverley in the City of Monash.

It is generally bordered by residential properties along Madeline Street to the north, Danien Street and The Outlook to the east, Waverley Road to the south and Kinnoull Grove and Rose Avenue to the west.

Coleman Parade and the existing Glen Waverley Line intersect the centre of the Glen Waverley Structure Plan Area in an east-west alignment.

Key arterial roads include Springvale Road which intersects the Glen Waverley Structure Plan Area in a north-south alignment, and High Street Road and Waverley Road.

The Glen Waverley Structure Plan Area and the 1-kilometre radius Study Area is shown in Figure 3.4.

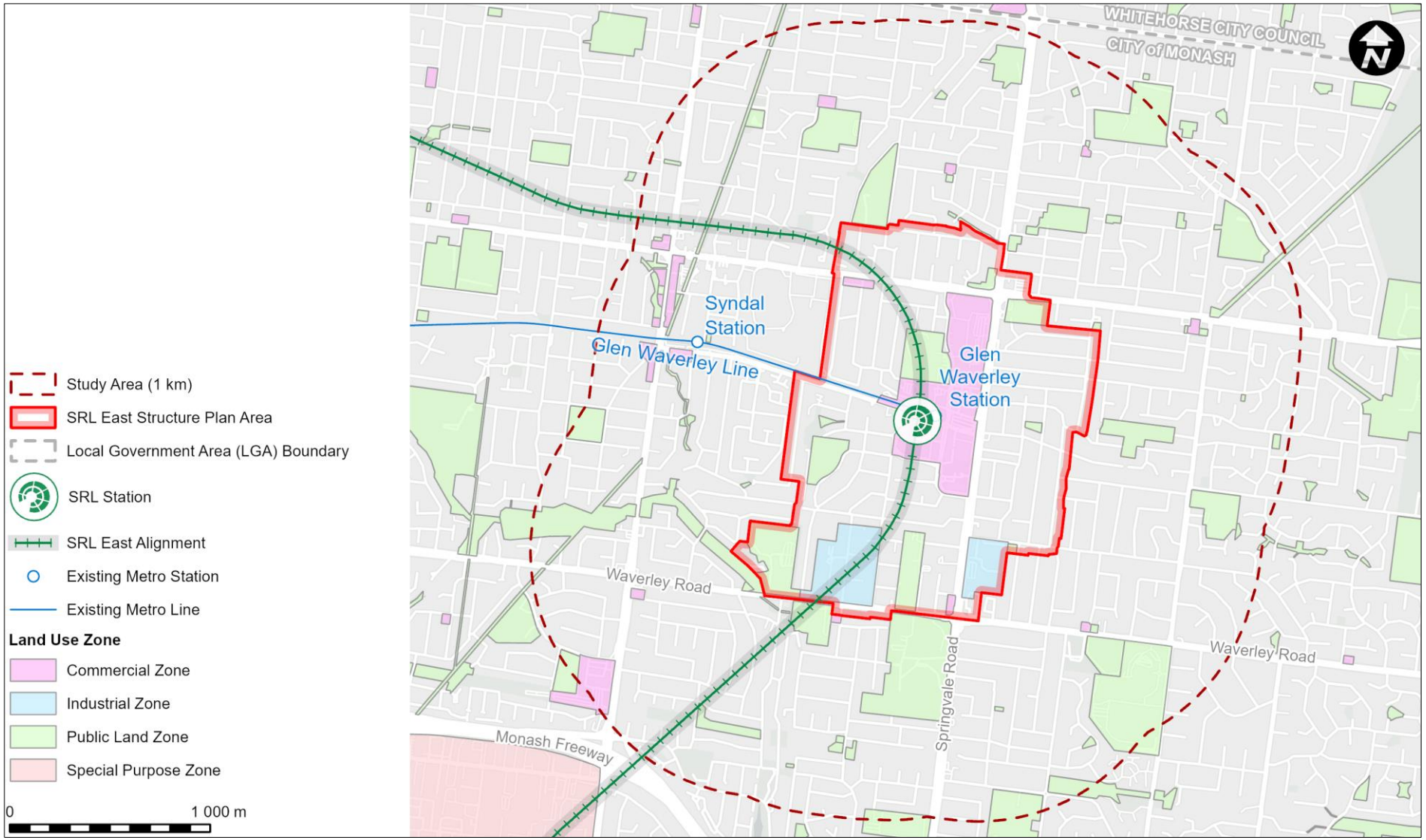


**FIGURE 3.4 GLEN WAVERLEY STRUCTURE PLAN AREA AND STUDY AREA**

## 3.6 Burwood Structure Plan Area

The Burwood Structure Plan Area surrounds the SRL station at Burwood. The Burwood Structure Plan Area is mainly located in the City of Whitehorse, with the southern portion south of Highbury Road extending into the City of Monash.

The Burwood Structure Plan Area is generally bounded by Uganda Street, Deakin University, Inverness Avenue, Bronte Avenue and Yarra Bing Crescent to the north, Andrews Street, Wridgway Avenue, Prospect Street and Huntingdale Road to the east, Zodiac Street, Ashwood Drive, Carmody Street and Barlyn Road to the south and Sixth Avenue, Evans Street, Warrigal Road, Parer Street and Meldan Street to the west.

Burwood Highway intersects the centre of the Burwood Structure Plan Area in an east-west alignment.

Deakin University Burwood campus is located in the Burwood Structure Plan Area.

The Burwood Structure Plan Area and the 1-kilometre radius Study Area is shown in Figure 3.5.

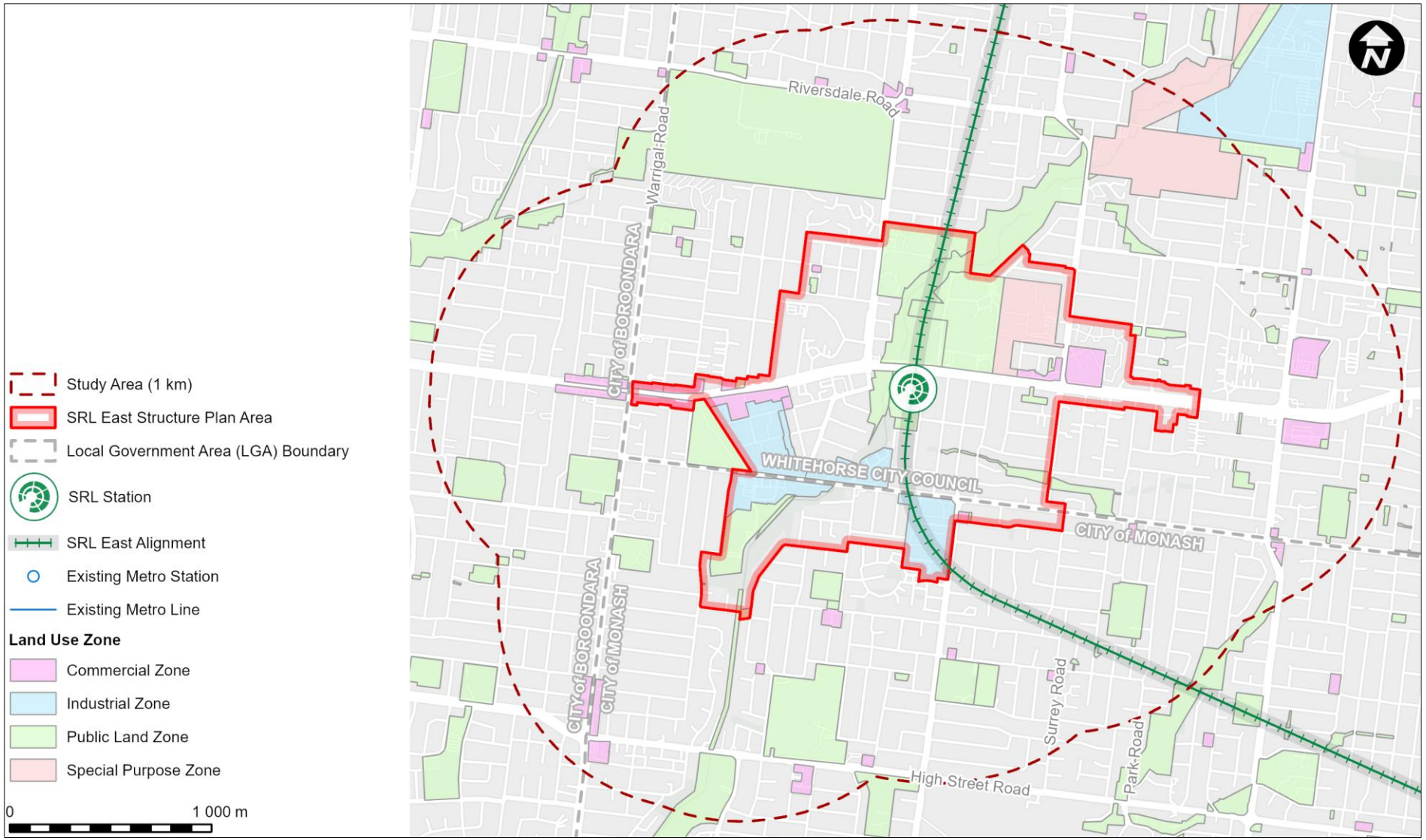


**FIGURE 3.5 BURWOOD STRUCTURE PLAN AREA AND STUDY AREA**

## 3.7 Box Hill Structure Plan Area

The Box Hill Structure Plan Area surrounds the SRL station at Box Hill in the City of Whitehorse.

It is generally bordered by Severn Street and McKean Street to the north, Clota Avenue and Laburnum Street to the east, slightly west of Elgar Road to the west and Canterbury Road to the south.

Whitehorse Road / Maroondah Highway and the existing Belgrave / Lilydale Line intersect the centre of the Box Hill Structure Plan Area in an east-west alignment. The main road corridors include Whitehorse Road, Elgar Road and Station Street.

The Box Hill Structure Plan Area and the 1-kilometre radius Study Area are shown in Figure 3.6.

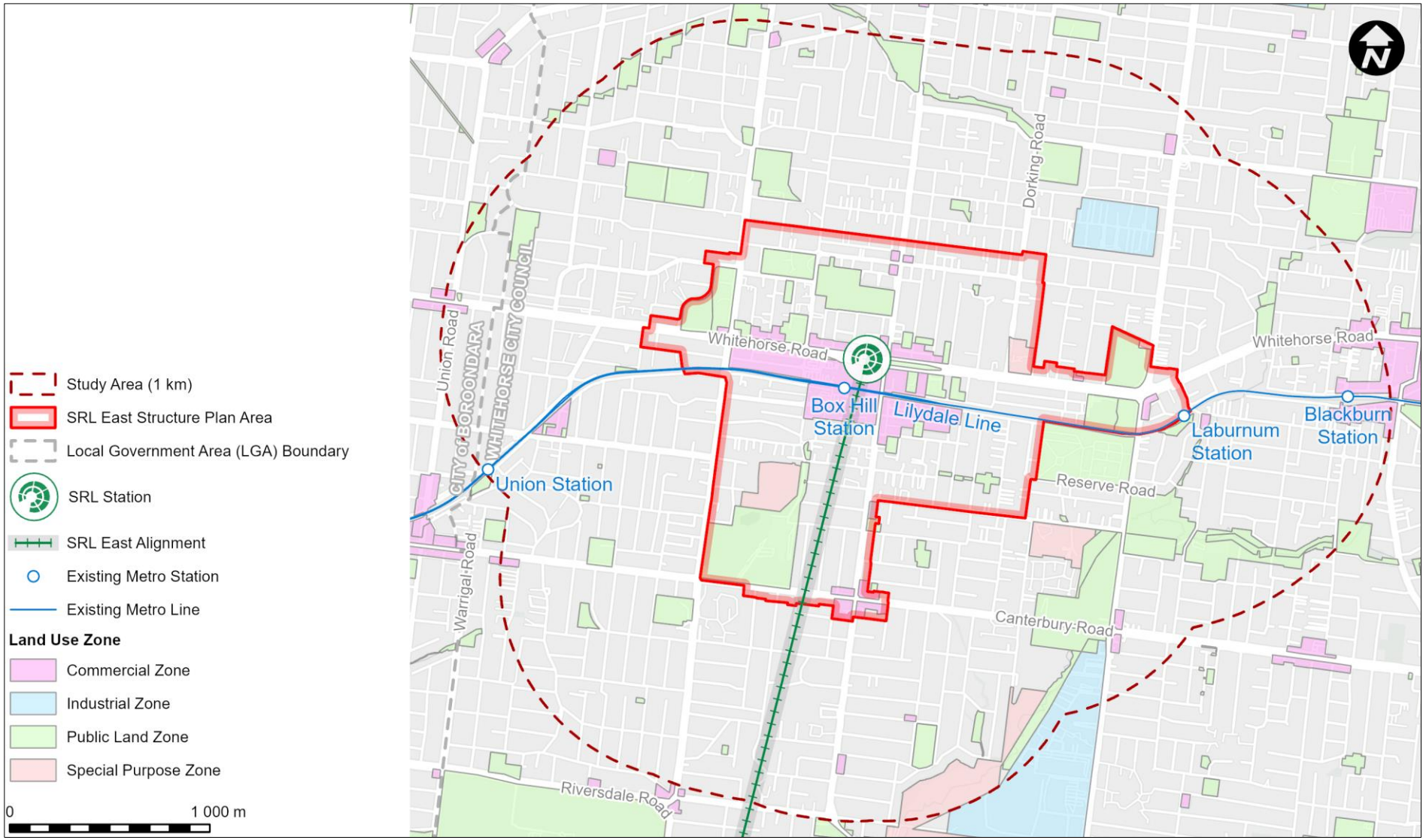


**FIGURE 3.6 BOX HILL STRUCTURE PLAN AREA AND STUDY AREA**

# 4 Legislative and policy context

This section summarises legislation, polices and other documents relevant to the technical assessment, and to land use planning and development in the SRL East Structure Plan Areas.

## 4.1 Legislation, policy and guidelines

Table 4.1 presents a summary of the relevant legislation, policy and guidelines considered for the assessment. Detailed information on each document is provided in Appendix A.

**TABLE 4.1 SUMMARY OF RELEVANT LEGISLATION, POLICY AND GUIDELINES**

| DOCUMENT | DESCRIPTION |
|---|---|
| ***Legislative Framework*** | |
| *Planning and Environment Act 1987* (Vic) | The *Planning and Environment Act 1987* (Vic) establishes the statutory framework for Victoria's planning system. The planning system and planning schemes are tools that enable land use strategies to be implemented and effect positive change to the built environment. |
| *Environment Protection Act 2017* (Vic) | The primary legislation underpinning this assessment is the *Environment Protection Act 2017* (Vic) (the Act) and the subordinate legislation established under this Act. Under the Act, the General Environmental Duty and unreasonable noise are the primary considerations that apply to the assessment of noise.<br>The General Environmental Duty requires anyone conducting an activity that poses risks to human health and the environment from pollution or waste (including noise and vibration), to avoid or minimise those risks, so far as reasonably practicable.<br>The Act also prohibits Unreasonable noise. The Act provides a definition for unreasonable noise in two parts. Part (a) of the definition states that noise that is unreasonable with regard to:<br>• Its volume, intensity or duration<br>• Its character<br>• The time, place and other circumstances in which it is emitted<br>• How often it is emitted<br>• Any prescribed factor.<br>Part (b) of the definition states that noise is Unreasonable noise if it is prescribed to be so. Under the Environment Protection Regulations, noise that exceeds the noise limits established in accordance with EPA Victoria Publication 1826.4 *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) is prescribed to be Unreasonable noise.<br>Unreasonable noise occurs if noise meets the requirements of Part (a) and/or Part (b) of the definition under the Act. |

| DOCUMENT | DESCRIPTION |
|---|---|
| *Environment Protection Regulations 2021*(Vic) | The *Environment Protection Regulations* 2021 (Vic) are a subordinate instrument of the Environment Protection Act. The Regulations set out a noise framework for residential, commercial, industrial and trade premises, as well as entertainment venues, for which the assessment of noise must be carried out in accordance with the Noise Protocol.<br>The Regulations define 'Noise sensitive areas', which are used in this assessment to identify noise sensitive receivers in land uses. The requirements set out in the Regulations, are used in this assessment to summarise the planning requirements for new sensitive land uses in proximity to commercial, industrial or entertainment venues, where applicable.<br>In general, the Regulations prescribe noise limits that apply to noise sources. That is, they impose an obligation on emitters of noise rather than on new sensitive land uses. The assessment provides recommendations to consider existing noise emissions to prevent a new compliance burden being placed on existing noise sources. In the case of live music entertainment venues, an additional obligation exists under the planning framework that any residential land uses proposed within 50 metres are designed to accommodate the existing noise emissions of the venue. |
| *Environment Reference Standard 2022* (Vic) | The Environment Reference Standard (ERS) is a subordinate instrument made under the Environment Protection Act. The ERS supports the protection of the environment from pollution and waste by providing a benchmark to assess and report on environmental conditions. The ERS identifies environmental values of the ambient sound environment and defines indicators and objectives to measure those values. These are not enforceable compliance limits. Rather, risks of harm to human health and the environment from pollution and waste must be minimised as far as reasonably practicable, in accordance with the GED. The protection of the ERS values is considered as part of the planning requirements in this assessment, applicable to any new sensitive land uses. |
| ***Noise policy and guidance for different noise sources*** | |
| Commercial, industrial, trade premises and entertainment venues:<br>EPA Publication 1826.4: *Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues 2021* (Vic) (Noise Protocol) | The Noise Protocol sets methodologies for establishing noise limits for operational noise sources related to commercial, industrial, trade premises and entertainment venues activities, and for assessing noise levels against the noise limits. The Environment Protection Regulations require compliance with the noise limits defined by the Noise Protocol, with exceedances resulting in prescribed unreasonable noise as defined by the Environment Protection Act.<br>The Noise Protocol requirements are relevant for any new sensitive development in proximity to existing businesses in the SRL East Structure Plan Areas.<br>Part I of the Noise Protocol also sets out adjustments for the character of the noise that must be considered when assessing noise from a commercial, industrial or trade premisses, where the character is determined to be present or audible at the sensitive receiver location. The following temporal and spectral characteristics of the noise need to be considered:<br>• Tonality<br>• Impulsiveness<br>• Intermittency<br>Part II of the Noise Protocol requires low frequency noise analysis for the assessment of music and entertainment venues.<br>Annex A of the Noise Protocol designates a type for each of the land use zones codes, which include the areas covered by the SRL East Structure Plan Areas and have been considered in the assessment to assist the evaluation of potential impacts from existing land uses with noise sources. Quieter land zone uses are assigned to type 1 while type 2 and type 3 are land uses considered to have noise emitting sources. These are:<br>• Type 1: residential, rural and open spaces<br>• Type 2: commercial, business and light industry<br>• Type 3: general industry and major roads |
| Road traffic noise:<br>VicRoads *Requirements of Developers – Noise Sensitive Uses 2004* (Vic) | VicRoads provides guidelines that must be referred to by new sensitive developments adjacent to State-controlled freeways where the Department of Transport and Planning (DTP) is a referral authority. While this guideline has been considered it is not incorporated within the recommendations of this assessment as there are no State-controlled freeways that may influence the SRL East Structure Plan areas. |

| DOCUMENT | DESCRIPTION |
|---|---|
| Railway Noise:<br>*Passenger Rail Infrastructure Noise Policy 2013* (Vic) (PRINP) | The Victorian Passenger Rail Infrastructure Noise Policy (PRINP) provides recommended criteria for new residential developments exposed to rail noise. The criteria act as a threshold which, when exceeded, triggers investigation of potential mitigation measures. The PRINP is triggered when there is statutory approval required for:<br>• Construction of new passenger rail infrastructure<br>• Redevelopment of existing passenger rail infrastructure<br>• A change in land use adjacent to the rail corridor – which is the relevant to this assessment.<br>The implementation of the PRINP is not mandatory in all instances, but planning authorities must have regard to it as early as possible in the development of a relevant planning scheme amendment relating to land near an existing or planned rail corridor. |
| Aircraft Noise:<br>Australian Standard 2021: *Acoustics – Aircraft Noise Intrusion Building Siting and Construction 2015* (AS 2021:2015), Aircraft Noise Exposure Forecast (ANEF) contours and Airport Environs Overlay (AEO) | The Airport Environs Overlay (AEO) is an overlay that is part of the Victorian Planning Provisions (VPPs), which implements the airport's Aircraft Noise Exposure Forecast (ANEF) contours and the land use recommendations of the AS 2021:2015.<br>The AS 2021:2015 provides guidance on the interpretation of ANEF contours that can be referred to by planning authorities when considering applications for new sensitive land use development in the vicinity of an airfield.<br>This is relevant to the assessment, where aircraft noise might be perceived in the SRL East Structure Plan areas and the noise influence from existing airports has been assessed based on available ANEF contours. |
| Helicopter Noise:<br>EPA Publication 1254.2: *Noise control guidelines 2021* (Vic) and AS 2021:2015 | Helicopter noise is relevant for this assessment where helipads operate in the Clayton and Monash Structure Plan areas. These are associated with emergency helicopter operations from the Victorian Heart Hospital and Monash Children's Hospital.<br>EPA Publication 1254.2: *Noise control guidelines 2021* (Vic) provides guidance to municipal officers to assist with addressing possible noise nuisance and for resolving complaints or preventing a possible noise nuisance. Section 16 of the guidelines provides the external noise level criteria, which should be satisfied at the nearest affected buildings.<br>It is noted the *Noise control guidelines* do not apply to the helipads identified within the SRL East Structure Plan Areas due to their need for emergency operation. For this assessment, the *Noise control guidelines* were considered to provide guidance on the risk associated with noise impacts for new sensitive uses near the helipads and the criteria provides guidance for developers to assist with the acoustic mitigation design to manage the potential noise impacts from this source.<br>AS 2021:2015 *Aircraft noise intrusion – Building siting and construction* sets out maximum internal noise levels for aircraft flyovers, including helicopter flyovers, at residential land uses. The guideline criteria set out in the AS 2021:2015 are considered relevant guidance for developers to assist with the acoustic mitigation design. The criteria are not mandatory unless specified in a planning regulation or approval. |
| Construction Noise:<br>EPA Publication 1834: *Civil construction, building and demolition guide 2023* (Vic) | The EPA Publication 1834: *Civil construction, building and demolition guide 2023* (Vic) that provides guidance on construction noise management to the construction industry. EPA Publication 1834 is not a compliance document but is intended to assist in contributing to the state of knowledge that duty holders should consider in meeting the GED. As such, it provides a framework for managing construction noise impacts.<br>This is relevant to this assessment since existing and future construction sites, including the SRL East sites, have the potential to be in proximity to construction sites related to the structure plans. Thus, potential for cumulative impacts from multiple construction sites on existing sensitive locations in the SRL East Structure Plan Areas should be a consideration at early planning stages to understand the risks associated with construction noise and vibration and to take reasonably practicable steps to minimise those risks with reference to the EPA Publication 1834. This is expected to assist the Structure Plans delivery program and their contractors with fulfilling the GED in relation to this source. |
| Vibration (Human comfort):<br>Department of Environment and Conservation: *Assessing Vibration: a technical guideline 2006* (NSW) and<br>British Standard 6472: *Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting 2008* (BS 6472-1:2008). | While vibration is subject to the General Environmental Duty under the Environment Protection Act, no specific vibration criteria apply in Victoria and, thus, reference has been made to relevant vibration criteria from the Department of Environment and Conservation: *Assessing Vibration: a technical guideline 2006* (NSW), which sets out assessment methodologies in general accordance with the BS 6472-1:2008.<br>The relevant criteria are considered to provide guidance for developers for the mitigation design of new sensitive developments in proximity of sources of vibration in the SRL East Structure Plan Areas, where train pass-bys are identified as the existing source of vibration, relevant to this assessment. |

## 4.2 Planning scheme policies and provisions

The SRL East Structure Plan Areas are spread across four different LGAs, each covered by planning scheme policies. This section summarises policies relevant to each LGA relating to noise and vibration, including those shared across all planning schemes as part of the Victoria Planning Provisions (VPPs), along with any specific provisions adopted within each LGA planning scheme.

### 4.2.1 VICTORIA PLANNING PROVISIONS

The VPPs are established under Part 1A of the Planning and Environment Act as a state-wide reference document or template from which a planning scheme or planning scheme provision must be sourced or constructed.

Table 4.2 lists the VPPs relevant to noise and vibration and their objectives. These clauses apply equally to each SRL East Structure Plan Area as they are contained in the relevant LGA planning scheme. Appendix B provides further detail on each clause.

**TABLE 4.2 VICTORIA PLANNING PROVISIONS RELEVANT TO NOISE AND VIBRATION**

| VPP CLAUSE | OBJECTIVE / DESCRIPTION |
|---|---|
| Clause 13.05-1S Noise Management (Noise) | To assist the management of noise effects on sensitive land uses. |
| Clause 13.07-3S Live music (Amenity, Human Health and Safety) | To encourage, create and protect opportunities for the enjoyment of live music. |
| Clause: 18.02-7S Airports and airfields | To strengthen the role of Victoria's airports and airfields within the state's economic and transport infrastructure, guide their siting and expansion, and safeguard their ongoing, safe and efficient operation. |
| Clause 45.02 Airport Environs Overlay | To identify areas which are or will be subject to high levels of aircraft noise, including areas where the use of land for uses sensitive to aircraft noise will need to be restricted. |
| Clause 53.06 Live Music Entertainment | To protect live music entertainment venues from the encroachment of noise sensitive residential uses and ensure that noise sensitive residential uses are protected from unreasonable levels of live music and entertainment noise.<br>Planning Practice Note 81 (PPN81): *Live music and entertainment noise* provides guidance about the operation of clause 53.06 (Live Music and Entertainment Noise). |
| Clause 55.04-8 Noise impacts (Amenity impacts, two or more dwellings on a lot and residential buildings) | To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources. Standard B24 provides considerations for locations of noise sources in relation to sensitive uses. |
| Clause 55.07-7 Noise impacts (Apartment Developments) | To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources. Standard B41 defines noise influence area and indoor noise level criteria (refer to Table 4.3).<br>Planning Practice Note 83 (PPN83): Assessing external noise impacts for apartments (2017) provides guidance about the operation of this clause 55.07-7 (Noise impacts) and the below listed clause 58.04-3 (Noise impacts) for apartment developments, with considerations and requirements for new residential developments within the noise influence areas. (refer to Table 3.6). |
| Clause 58.04-3 Noise impacts (Amenity impacts, Apartment Developments) | To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources. Standard D16 defines noise influence area and indoor noise level criteria (refer to Table 4.3). |

For this technical assessment, the criteria for noise influence area (as set out in Table B.1 in Appendix B) is integrated into a single table alongside the criteria for indoor noise level design in Table 4.3. This is in line with the information set out in the following policies (also listed in Table 4.2 above), considered most relevant to this assessment:

- Clause 55.07-7 Noise impacts, Standard B41 (Apartment Developments)
- Clause 58.04-3 Noise impact, Standard D16 (Amenity Impacts).

**TABLE 4.3 NOISE INFLUENCE AREA AND INDOOR DESIGN NOISE CRITERIA – PLANNING SCHEMES**

| NOISE SOURCE | NOISE INFLUENCE AREA[1] | INDOOR NOISE LEVEL CRITERIA[2] |
|---|---|---|
| **Zone interface** | | Buildings within a noise influence area should be designed and constructed to achieve the following noise levels:<br><br>- Not greater than 35 dB(A) for bedrooms, assessed as a Laeq,8hr from 10pm to 6am.<br><br>- Not greater than 40 dB(A) for bedrooms, assessed as a Laeq,16 hr from 6pm to 10pm. |
| Industry | 300 m from the Industrial 1, 2 and 3 zone boundary | |
| **Roads** | | |
| Freeways, tollways and other roads carrying 40,000 Annual Average Daily Traffic Volume | 300 m from the nearest trafficable lane | |
| **Railways** | | |
| Railway servicing passengers in Victoria | 80 m from the centre of the nearest track | |
| Railway servicing freight outside metropolitan Melbourne | 80 m from the centre of the nearest track | |
| Railway servicing freight in metropolitan Melbourne | 135 m from the centre of the nearest track | |

[1] The noise influence area should be measured from the closest part of the building to the noise source.

In addition, the following other noise influence areas were considered:

- 50 metres around any live music entertainment venue, in line with the clause 53.06 Live Music Entertainment part of the VPPs (refer to Appendix B)
- 250 metres around any heliports, in line with Section 16 of the Noise control guidelines (EPA Publication 1254.2. Refer to Appendix A), and the influence area described by Design and Development Overlays (DDO) boundaries that correspond to light path protection
- 150 metres around any roads carrying an AADT of 20,000 vehicles or more with 10 per cent of the traffic being heavy vehicles. While this is half the threshold of AADT of 40,000 vehicles under the planning schemes, it has been applied as a threshold to this study based on professional judgement, as an additional separation distance to account for any potential noise and vibration risks to human health, well-being and amenity from road traffic noise that is not currently accounted for in the VPPs.

### 4.2.2 KINGSTON PLANNING SCHEME

Of the local planning schemes relevant to this technical assessment, only the City of Kingston sets additional requirements beyond those in the VPPs to manage noise amenity from existing noise sources when planning new noise sensitive developments. The Kingston Planning Scheme applies to the eastern portion of the Cheltenham Structure Plan Area and a portion of the Clayton Structure Plan Area.

Table 4.4 summarises the Kingston Planning Scheme policies relevant to noise and vibration. Appendix B provides further detail on these clauses.

**TABLE 4.4 KINGSTON PLANNING SCHEME POLICIES RELEVANT TO NOISE AND VIBRATION**

| CLAUSE | OBJECTIVE / DESCRIPTION |
|---|---|
| Clause 02.03-3 Environmental risks and amenity (Strategic directions) | To ensure the use and development of land around Moorabbin Airport is sensitive to the long-term operation of the airport. |
| Clause 02.03-8 Transport (Strategic directions) | To set out strategic directions for transport planning of Kingston's transport network. |
| Clause 13.05-1L Noise abatement – Kingston | To encourage the inclusion of acoustic attenuation measures for new housing within the Activity Centre Zone, Commercial 1 Zone and Mixed Use Zone areas, to mitigate adverse amenity impacts of non-residential uses. |
| Clause: 18.02-7L-02 Noise abatement – Moorabbin Airport environs | To facilitate use and development of land that is compatible with the operation of the Moorabbin Airport in respect to the impact of aircraft noise on sensitive uses. |
| Schedule 24 to clause 43.02 Design and Development Overlay | Future development should incorporate the recommendations set out in the report(s) prepared pursuant to the noise and vibration related requirements of this Schedule to the satisfaction of the responsible authority. |

## 4.3 Other considerations

This section discusses aspects not directly covered in the planning framework or the guidelines identified above that may need consideration to address any potential noise and vibration impacts at future sensitive developments within the SRL East Structure Plan Areas.

The existing Victorian and municipal planning scheme provisions described above are considered generally sufficient for managing the risk of noise impacts at future sensitive land uses in the SRL East Structure Plan Areas. However, the following two aspects are considered relevant to future development of the SRL East Structure Plan Areas, but are not explicitly covered by existing legislation, policy or additional guidelines:

1. Reverse sensitivity risks associated with the development of new sensitive land uses nearer to existing industrial uses than existing sensitive land uses

2. Noise in external areas of sensitive uses from arising from road and rail traffic.

A recommended approach to addressing any potential noise impacts is outlined in this section to minimise the risk associated with noise impacting on future sensitive development so far as reasonably practicable.

### 4.3.1 INDUSTRIAL NOISE

While clause 55.07-7 and clause 58.04-3 of the VPPs take industrial noise into account (refer to Section 4.2.1), the design criteria requirement is an indoor design criterion that is inconsistent with the noise limits outlined in the Environment Protection Regulations. A new residential development that complies with the VPP provisions, specifically the internal noise level criteria, may still be exposed to existing industrial noise that is above the applicable external noise limits set under the Regulations. This is because there is no agent of change principle for industrial noise in the Regulations.

The outcome of the above is that there is a potential risk that the burden of complying with the external noise limits will be transferred to the existing industrial use(s), which could be deemed to be producing prescribed unreasonable noise when the new sensitive use is occupied. These industries will then be obligated to reduce their noise emissions to accommodate the new sensitive use, which may constrain their operations. It is noted that this risk applies where new residential development is located closer to the industrial use than existing

residential areas, as the industrial use would already have obligations to comply with the applicable noise limits at existing residential areas under the Regulations.

In the context of SRL East structure planning, the following approach is proposed to address potential noise impacts at any new sensitive development proposed in proximity to existing industrial premises:

- The influence area(s) where a new sensitive development should consider controlling external industrial noise levels to achieve the noise limits set under the Regulations would remain consistent with the 300 metres around existing industrial land uses defined as per the VPPs (as per clause 55.07 and clause 58.04, in Table 4.3). This distance is considered sufficient in the context of the SRL East structure planning to manage external noise emission risks from the industrial uses that have been identified within the Study Areas.

- Within the 300 metre noise influence area, it is only relevant to consider those areas around the industrial land use zone where new noise-sensitive uses are planned to be introduced closer than existing noise-sensitive uses. This is because there is an obligation on existing industrial uses to comply with noise limits at these existing noise-sensitive uses. These areas are therefore anticipated to be a subset of the influence areas around industry.

- Within this subset, a requirement would be established for developers to undertake an acoustic assessment to demonstrate the proposed design ensures noise emissions from existing industry comply with the Regulations at the sensitive development site, such that there is no additional compliance burden imposed upon the existing industrial use.

It is noted the above is not a mandatory requirement under existing Victorian legislation or policy. However, for Planning Scheme Amendments that aim to rezone for residential use adjacent to existing industrial land uses, it is a common approach adopted by planning authorities to manage this risk.

### 4.3.2 EXTERNAL IMPACTS FROM ROAD AND RAIL TRAFFIC

The existing VPPs do not set out a specific external noise requirement for sensitive land uses from road and rail traffic noise, rather only prescribing criteria for internal noise levels (as per clause 55.07 and clause 58.04 of the VPPs, refer to Table 4.3). Planning Practice Note 83: *'Assessing external noise impacts for apartments'* was introduced into the VPPs in 2017 to support clause 55.07 and clause 58.04, sets requirements for residential developments relating to environmental noise arising from external noise sources. However, the Practice Note addresses external noise issues that may arise by requiring development of appropriate building façade mitigation to achieve the internal noise criteria. While appropriate internal acoustic amenity is achieved, there is a risk that external acoustic impacts may not be minimised so far as reasonably practicable.

The Environment Reference Standard is relevant in this case as it sets out indicators and objectives to protect the environmental values of the (external) ambient sound environment, which are specific to land uses, including residential and other sensitive uses (refer to Table A.3 and Table A.4 in Appendix A). Although the ERS is not a compliance standard, it may be taken into account by relevant planning authorities to evaluate the likelihood for noise impacts at the planning proposal location.

Note that whilst the Environment Reference Standard uses long-term average noise metrics for the indicators and objectives (i.e. $L_{Aeq,16h}$ and $L_{Aeq,8h}$. Refer to Appendix B) these metrics are limited in their ability to reflect the risk associated with transient, intermittent and/or low frequency noise. Therefore, due consideration to noise that may have specific characteristics not addressed by the Environment Reference Standard values such as tonality, impulsiveness, intermittency, or high energy in the low-frequency range, as required by the General Environmental Duty.

In the context of SRL East structure planning, the following approach is proposed:

- Identify influence areas that would be limited to the four first rows of new housing alongside the road or rail corridor. This reflects the extent to which external impacts from road and rail traffic are typically a concern, which would be those areas close to existing major roads and railways. At distances further than this, noise levels are anticipated to be reduced to below the ERS objective levels due to the shielding effects of intervening buildings given the nature of planned development within the SRL East Structure Plan Areas.

- Establish planning control requirements for developers to protect external human health, well-being and amenity. The emphasis is on good practice design considerations for developments that reflect the approach of minimising negative impacts from external noise levels so far as reasonably practicable, rather than establishing objective external noise limits that are unlikely to be able to be practically achieved in all instances (for example at multi-storey residential developments). Developers should demonstrate that appropriate consideration has been given to the location and orientation of external areas within the development and/or the inclusion of physical noise mitigation measures such as noise barriers to limit external noise levels so far as reasonably practicable as possible, consistent with the objectives of the General Environmental Duty.

It is noted that the existing planning framework already requires the consideration and implementation of good design practices to protect human health, well-being and amenity in external areas through the VPPs. Therefore no additional planning interventions are anticipated with this process. However, including the specific influence areas where external amenity risks associated with road and rail traffic have been identified in this report is intended to highlight areas where the requirement to demonstrate compliance with this external amenity aspect of the VPPs is most critical.

# 5 Existing conditions

This section summarises the existing conditions relevant to noise and vibration for each Study Area.

Appendix C lists in detail the identified existing noise and vibration sources in each Study Area, which includes sources both in the SRL East Structure Plan Area, and those within the Study Area (but outside the SRL East Structure Plan Area).

This section does not intend to provide an assessment of the acceptability of noise emissions from identified noise and/or vibration sources in each SRL East Structure Plan Area. It is assumed that current emissions comply with their requirements for the surrounding sensitive land uses (refer Section 2.4 for the assumptions and limitations). Rather, existing sources are identified to provide context for this technical assessment in understanding the existing sound environment in the Study Areas, based on the current land uses, and forms the basis to define the noise and vibration influence areas in Section 6.

## 5.1 All Study Areas

Existing sources of noise and vibration that are relevant to all Study Areas around the SRL East Structure Plan Areas are related to:

- Businesses: existing commercial and industrial businesses are identified with their relevant land use zone, which relates to a designated Type in the Noise Protocol. Noise emissions from existing businesses are likely from commercial and light industrial activities (such as car repair services, printing services and small-scale manufacturing) involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, heating, ventilation and air conditioning plant). Music entertainment venues are also a consideration, although pubs with outdoor live music were not identified in the SRL East Structure Plan Areas. No significant vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Areas.

- Transportation: these are noise sources associated with road and rail operations, and vibration sources associated with rail operation. Existing traffic flows for freeways and arterial roads are reported using the data from the VicRoads Traffic Volume Open Data Hub tool to identify traffic volumes and define noise influence areas. Forecast traffic volume growth factors from the VicRoads Traffic Volume Open Data Hub tool were also used to identify where traffic volumes may increase sufficiently within the next 10 years to trigger a noise influence area.

Consideration was also given to potential future noise sources. There is no proposed application of the Buffer Area Overlay (BAO) in any of the SRL East Structure Plan Areas currently under consideration or which have been approved by the relevant councils, indicating there are no approved developments associated with significant future business (being built or yet to be built) that would constitute noise and/or vibration sources of relevance to the Structure Plans. Consequently, the existing conditions assessment in this section is based on existing operating sources.

Other than SRL East, no significant planned road or rail upgrades were identified within the SRL East Structure Plan Areas and Study Areas that would alter the outcomes of this assessment. Intersection upgrades and level crossing removals that may occur would not be expected to create a significant enough change to alter the influence areas in a manner that would change any recommendations in this report. Noise and vibration from SRL East is discussed in Section 6.5.

Noise and vibration emissions from activities at existing construction sites, including the SRL East sites, is acknowledged in all the SRL East Structure Plan Areas. Construction noise and vibration from the SRL East is discussed in Section 6.5. These emissions result from the use of fixed and mobile plant and equipment and have the potential to impact nearby future sensitive land uses. Given the temporary nature of these sources, the locations of these sites are not identified, as they might not be relevant when the new sensitive developments are occupied. However, consideration is given to potential cumulative noise and vibration impacts from multiple construction sites at existing sensitive uses due to construction works related to the structure plans in combination with other construction works in the SRL East Structure Plan Areas (in Section 6), with recommendations to identify and address the associated risks (in Section 7).

The following sub-sections provide a high level summary of each Study Area, with more detailed information provided in Appendix C. The identified sources of relevance for this assessment are further investigated and assessed in Section 6.

## 5.2 Cheltenham Study Area

The Cheltenham Study Area is located in the cities of Kingston and Bayside. The eastern portion of the Study Area to the east of the rail line is in the City of Kingston, and the western portion of the Study Area to the west of the rail line is in the City of Bayside.

There are industrial land uses concentrated to the north-east of the Cheltenham Structure Plan Area and significant green areas of golf courses adjacent to the south. Commercial areas are concentrated alongside Highett Road and Nepean Highway, east of the existing Southland Station, with the Hampton East Activity Centre Area to the south-east of the Cheltenham Structure Plan Area, allocated within the Bayside Planning Scheme for mixed use. Areas to the north-west, west and east of the Cheltenham Structure Plan Area are generally used for residential land uses, with small scattered local commercial areas. Moorabbin Airport is located approximately 2 kilometres south-east and outside of the Cheltenham Structure Plan Area and Study Area.

In addition to the noise sources that affect all SRL East Structure Plan Areas, siren noise is present in the Cheltenham Study Area. The Highett Fire Station (at 150 Wickham Road) is located within the Cheltenham Structure Plan Area and uses emergency services vehicles.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Cheltenham Study Area. Commercial and industrial land use zones related to the businesses identified in the Cheltenham Study Area are shown in Figure 3.1 .

## 5.3 Clayton Study Area

The Clayton Study Area is located in the cities of Monash and Kingston. At the core of the Clayton Structure Plan Area is the main commercial strip running along Clayton Road, with the existing Clayton Station at the northern end of the commercial strip. The Monash Hospital complex including the Monash Children's Hospital and the Monash Medical Centre are located in the centre of the Clayton Structure Plan Area in a Public Land Zone (PUZ2). There are significant areas of industrial land uses surrounding the Clayton Structure Plan Area to the south and south-east, with other smaller industrial areas within the Clayton Structure Plan Area.

In addition, siren and helicopter noise are present in the Clayton Study Area. The Monash Children's Hospital is located within the Clayton Structure Plan Area and the Victorian Heart Hospital is located within the Study Area

but outside the Clayton Structure Plan Area. They operate emergency service vehicles (ambulances) and have a heliport for emergency services.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Clayton Study Area. Commercial and Industrial land use zones related to the businesses identified in the Clayton Study Area are shown in Figure 3.2.

## 5.4 Monash Study Area

The Monash Study Area is located in the City of Monash. It contains significant areas allocated to Special Purpose Zones associated with the Monash Technology Precinct (SUZ6), where commercial and industrial businesses are identified. There is also a large Public Land Zone allocated to education (PUZ2) for the Monash University Clayton campus. Both areas are located at the centre of the Monash Structure Plan Area, with the surrounding areas containing residential and scattered small commercial zones. There are considerable areas of industrial and moderate amount of commercial land uses alongside Princes Highway to the south of the Monash Structure Plan Area.

In addition, siren and helicopter noise is present in the Monash Study Area. The Victorian Heart Hospital is located within the Monash Structure Plan Area and the Monash Children's Hospital is located within the Study Area but outside the Clayton Structure Plan Area. They operate emergency service vehicles (ambulances) and have a heliport for emergency services.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Monash Study Area. Commercial and industrial land use zones related to the businesses identified in the Monash Study Area are shown in Figure 3.3.

## 5.5 Glen Waverley Study Area

The Glen Waverley Study Area is located in the City of Monash. It is predominantly residential with a main commercial area surrounding the existing Glen Waverley Station and small light industrial areas to the south of the Glen Waverley Structure Plan Area.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Glen Waverley Study Area. Commercial and industrial land use zones related to the businesses identified in the Glen Waverley Study Area are shown in Figure 3.4.

## 5.6 Burwood Study Area

The Burwood Study Area is located in the cities of Monash and Whitehorse. It is predominantly residential with a considerable industrial area located in the south-west of the Burwood Structure Plan Area. Commercial businesses of small to medium size are also present in the Burwood Structure Plan Area, and Deakin University Burwood campus is located at the north of the Burwood Structure Plan Area.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Burwood Study Area. Commercial and

industrial land use zones related to the businesses identified in the Burwood Study Area are shown in Figure 3.5.

## 5.7 Box Hill Study Area

The Box Hill Study Area is located in the City of Whitehorse. It is predominantly residential, with areas of small and medium-sized commercial and light industrial zones.

In addition, siren noise is present in the Box Hill Study Area. The Fire Rescue Victoria Fire Station 20 (at 1052 Maroondah Highway/Whitehorse Road) and Box Hill Hospital (at 8 Arnold Street) are in the Box Hill Structure Plan Area, which use emergency services vehicles.

Refer to Appendix C for the identified businesses with potential noise sources and for the existing sources of noise and vibration from transport and civil infrastructure identified in the Box Hill Study Area. Commercial and industrial land use zones related to the business identified in the Box Hill Study Area are shown in Figure 3.6.

## 5.8 Interdependencies

The *SRL East Structure Plan – Aviation and Airspace Technical Report* (AJM-JV, 2025) reviews the airspace constraints from helipads and aviation services within the SRL East Structure Plan Areas and should be referred to for more information on maximum development heights allowable within each airspace. This is relevant to the Clayton and Monash Structure Plan Areas that each contain a heliport, and the Cheltenham Structure Plan Area which is located approximately 2 kilometres to the north-west of Moorabbin Airport.

This report considered forecast traffic volume growth factors available for roads within the SRL East Structure Plan Areas from the VicRoads Traffic Volume Open Data Hub tool to identify where traffic volumes may increase sufficiently within the next 10 years to trigger a noise influence area (refer to Appendix C). The relevant SRL East Structure Plan - Transport Technical Report should be referred to for more information on anticipated changes in traffic associated with the introduction of new developments within the SRL East Structure Plan Areas.

SRL East is a major rail development project that is currently under construction, and which has been considered as a future operational source of noise and vibration in this assessment. Refer to Section 6.5 for further information on the assessment of SRL East.

# 6 Findings: Noise and vibration risk assessment

This section assesses the influence of existing noise and vibration sources in the SRL East Structure Plan Areas covering:

- Rationale for noise and vibration influence areas around different source types (Section 6.1).
- Definition of noise and vibration influence areas across each SRL East Structure Plan Area (Section 6.2).
- Risk controls for structure plans in the form of planning considerations for new sensitive development within the defined influence areas (Section 6.2.7).
- Risk mitigation strategies for new sensitive development based on best practice acoustic design and mitigation measures that developers could use to address any risks (Section 6.4).
- The influence of SRL East in the SRL East Structure Plan Areas (Section 6.5).
- Assessment of residual risks (Section 6.6).
- Summary of the risk assessment findings (Section 6.7).

## 6.1 Influence area extents

### 6.1.1 NOISE

#### 6.1.1.1 Industrial land uses and transportation noise sources

The influence areas from industrial land uses and transportation noise sources in the Study Area have been assessed using the guidance established in the planning schemes, as defined in the VPP (refer to Section 4.2.1). Influence areas from these sources for each SRL East Structure Plan Area are discussed in Section 6.2.

#### 6.1.1.2 Noise sources in commercial and other types of land uses

The planning schemes do not set influence areas for less significant land use types such as commercial land uses. As such, the influence from existing noise sources at these land uses has been assessed with consideration of the guidance provided in the Noise Protocol (refer to EPA Victoria Publication 1826.4).

Appendix C details the identified commercial and other land uses in each SRL East Structure Plan Area.

Table 6.1 lists the Noise Protocol designated type for the identified land uses with existing noise sources in the SRL East Structure Plan Areas that are not industrial type land uses. The Noise Protocol designated type provides an indication of the likely noise environment based on the land use zone, with type 1 characterising the quietest land uses, followed by type 2 and type 3 (refer to Noise Protocol in Appendix A).

## TABLE 6.1 NOISE PROTOCOL DESIGNATED TYPES FOR ZONES AND RESERVATIONS IN MAJOR URBAN AREAS WITHIN THE STUDY AREAS

| NAME | LAND ZONE CODE | LAND USE ZONE | NOISE PROTOCOL DESIGNATED TYPE |
|---|---|---|---|
| ***Cheltenham Study Area*** | | | |
| Activity Centre Zone | ACZ1 | Activity Centre Zone: Cheltenham | 2 |
| Commercial areas identified (as per Table C.1) | C1Z | Commercial 1 Zone | 2 |
| | C2Z | Commercial 2 Zone | 3 |
| ***Clayton Study Area*** | | | |
| Monash Hospital complex | PUZ3 | Public Use Zone: Health & Community | 2 |
| Commercial areas identified (as per Table C.3) | C1Z | Commercial 1 Zone | 1 |
| | C2Z | Commercial 2 Zone | 3 |
| ***Monash Study Area*** | | | |
| Monash Technology Precinct | SUZ6 | Special Use Zone in Monash Planning Scheme | 2 |
| Australian Synchrotron | SUZ5 | Special Use Zone in Monash Planning Scheme | 2 |
| Notting Hill Hydroelectric Power Plant | PUZ1 | Public Use Zone: Service & Utility | 2 |
| Monash University Clayton campus | PUZ2 | Public Use Zone: Education | 1 |
| Monash Hospital complex | | | 1 |
| Monash Recycling & Waste Centre | PUZ6 | Public Use Zone: Local Government | 2 |
| Notting Hill Community Hall | | | 2 |
| Commercial areas (as per Table C.5) | C1Z | Commercial 1 Zone | 1 |
| | C2Z | Commercial 2 Zone | 3 |
| ***Glen Waverley Study Area*** | | | |
| Mt View Mini Hydroelectric Power Plant | Mt View Mini Hydroelectric Power Plant | Mt View Mini Hydroelectric Power Plant | Mt View Mini Hydroelectric Power Plant |
| Commercial areas identified (as per Table C.7) | Commercial areas identified (as per Table C.7) | Commercial areas identified (as per Table C.7) | Commercial areas identified (as per Table C.7) |
| ***Burwood Study Area*** | | | |
| Deakin University Burwood campus | PUZ2 | Public Use Zone: Education | 1 |
| | SUZ1 | Private Education Centres and Places of Worship | 1 |
| RSPCA Burwood East | MUZ | Mixed Use Zone | 2 |
| The Besen Centre | SUZ1 | Private Education Centres and Places of Worship | 1 |
| Commercial areas identified (as per Table C.9) | C1Z | Commercial 1 Zone | 2 |
| | C2Z | Commercial 2 Zone | 3 |

| NAME | LAND ZONE CODE | LAND USE ZONE | NOISE PROTOCOL DESIGNATED TYPE |
|---|---|---|---|
| ***Box Hill Study Area*** | | | |
| Box Hill Hospital | Box Hill Hospital | Box Hill Hospital | Box Hill Hospital |
| Box Hill City Oval and Box Hill Pavilion | Box Hill City Oval and Box Hill Pavilion | Box Hill City Oval and Box Hill Pavilion | Box Hill City Oval and Box Hill Pavilion |
| Box Hill Town Hall | Box Hill Town Hall | Box Hill Town Hall | Box Hill Town Hall |
| East Box Hill Cricket Club | East Box Hill Cricket Club | East Box Hill Cricket Club | East Box Hill Cricket Club |
| Box Hill RSL Sub-Branch | Box Hill RSL Sub-Branch | Box Hill RSL Sub-Branch | Box Hill RSL Sub-Branch |
| Commercial areas identified (as per Table C.11) | Commercial areas identified (as per Table C.11) | Commercial areas identified (as per Table C.11) | Commercial areas identified (as per Table C.11) |

Activities in land use zones with a Noise Protocol designated type 1 typically have minimal noise emissions, particularly as these zones already house existing sensitive land uses that must be accommodated.

Noise from activities in land use zones designated as type 2 or type 3 in Table 6.1 are commercial or mixed-use zones. These are considered unlikely to have a significant noise influence within the SRL East Structure Plan Areas, particularly as they are located close to existing transportation or industrial sources that would control the noise environment in the influence areas.

For the reasons above, influence areas have not been defined for the land use zones listed in Table 6.1, consistent with the approach in the VPPs.

#### 6.1.1.3 Emergency helicopter noise

Noise influence areas have also been defined for emergency helicopter use within the Clayton and Monash Structure Plan Areas. The rationale for the influence areas for emergency helicopter use is discussed in Section 4.2.1, with further discussion for each area in Section 6.2.3 and Section 6.2.2 respectively. Planning controls (in Section 6.2.7) and specific acoustic mitigation (in Section 6.4.3) alongside layout design strategies (in Section 6.4.1) are recommended to manage potential impacts from this source.

#### 6.1.1.4 Emergency siren noise

Noise from sirens used by emergency vehicles, including ambulances and fire trucks is also a consideration for the structure plans. Although an influence area is not considered appropriate for this type of source, the risks are addressed through planning controls (in Section 6.2.7) and specific acoustic mitigation (in Section 6.4.3) alongside layout design strategies (in Section 6.4.1). Fire stations are identified in the Cheltenham and Box Hill Structure Plan Areas and hospitals in the Clayton, Monash and Box Hill Structure Plan Areas.

#### 6.1.1.5 Construction noise

Noise and vibration from active construction sites should be considered in the sequencing in which the construction programmes will occur for the developments proposed as part of the Structure Plans to avoid cumulative impacts from multiple construction sites on existing sensitive locations in the SRL East Structure Plan Areas. This includes any construction works related to the urban renewal and other types of proposed developments such as residential and educational related to the Structure Plans.

At this early planning stage, there is limited information on the locations and sequencing of new sensitive developments within the SRL East Structure Plan Areas, to determine how construction of these developments

overlap with active construction sites in these areas. As such, this assessment does not define influence areas for this source but recommends using a 300 metre radius around any active construction site to identify potential risk areas.

### 6.1.2 VIBRATION

The planning schemes do not provide guidance on vibration influence areas for human comfort. Considering the sources identified within the Study Areas, vibration from rail transportation may impact on sensitive uses albeit only within relatively proximity to rail lines.

Based on prior experience, vibration from rail lines is unlikely to be a concern at a distance of more than 20 metres from a passenger rail line in Melbourne and, therefore, a 20 metre influence area has been established around passenger rail lines for vibration.

Vibration influence areas around roads are not defined, because while heavy vehicle traffic on uneven road surfaces can cause vibration, this is not expected to be constant or of a regular occurrence to result in vibration levels that exceed the VDV criteria listed in Table A.8 (in Appendix A), and impact sensitive uses in proximity.

## 6.2 Areas of potential risk

Areas of potential noise and vibration risk are limited to the influence areas of each identified source type within the larger Study Area, specifically where the influence area interfaces with a SRL East Structure Plan Area.

Noise and vibration sources outside the SRL East Structure Plan Areas but within the Study Areas (as identified in Appendix C), are only deemed relevant when an influence area from a source outside the SRL East Structure Plan Area extends into the SRL East Structure Plan Area. This is because the Structure Plans for future development focus on the SRL East Structure Plan Areas. Where influence areas fall outside the SRL East Structure Plan Areas these are not considered in further for a risk assessment.

### 6.2.1 CHELTENHAM STRUCTURE PLAN AREA

Noise and vibration influence areas in the Cheltenham Structure Plan Area and Study Area are shown in Figure 6.1.

The noise influence areas in Figure 6.1 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3)
- Roads – a noise influence area of 300 metres around the existing roads with traffic flows of 40,000 AADT or higher (Nepean Highway)
- Live music with outdoor noise emissions – a noise influence area of 50 metres around live music entertainment venues with external noise emissions (Tudor Inn, at 1281 Nepean Highway).
- Passenger Railway – noise influence areas of 80 metres around the existing rail line (Frankston Rail Line)
- Freight Railway (servicing in Metropolitan Melbourne) – a noise influence area of 135 metres around the existing rail line (Frankston Rail Line)

The influence area for live music falls outside the Cheltenham Structure Plan Area and, therefore, is not relevant for further consideration in the assessment.

Noise influence areas for industry, roads and rail, shown in Figure 6.1, are concentrated on the north, east and south-eastern portions of the Cheltenham Structure Plan Area and Study Area.

The influence area of road traffic noise covers 35.7 per cent of the area within the Cheltenham Structure Plan Area. The influence area for industry covers 3.7 per cent and the influence area for rail covers 8.9 per cent (as worst case covered by freight rail). Combined, the influence areas cover 44.7 per cent of the Cheltenham Structure Plan Area. Note that some influence areas overlap and, thus this combined percentage accounts for this to avoid double counting areas.

Vibration influence areas in Figure 6.1 relate to:

- Passenger and Freight Railway – vibration influence area of 20 metres around the existing rail line (Frankston Rail Line)

The influence area for vibration covers 4.2 per cent of the Cheltenham Structure Plan Area and is mostly limited to the boundaries of the rail corridor and the first row of housing alongside the Frankston Rail Line. Vibration influence in the Cheltenham Structure Plan Area is therefore minimal.

While aircraft noise might be perceived in the Cheltenham Structure Plan Area, there are no airports near or within the Cheltenham Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

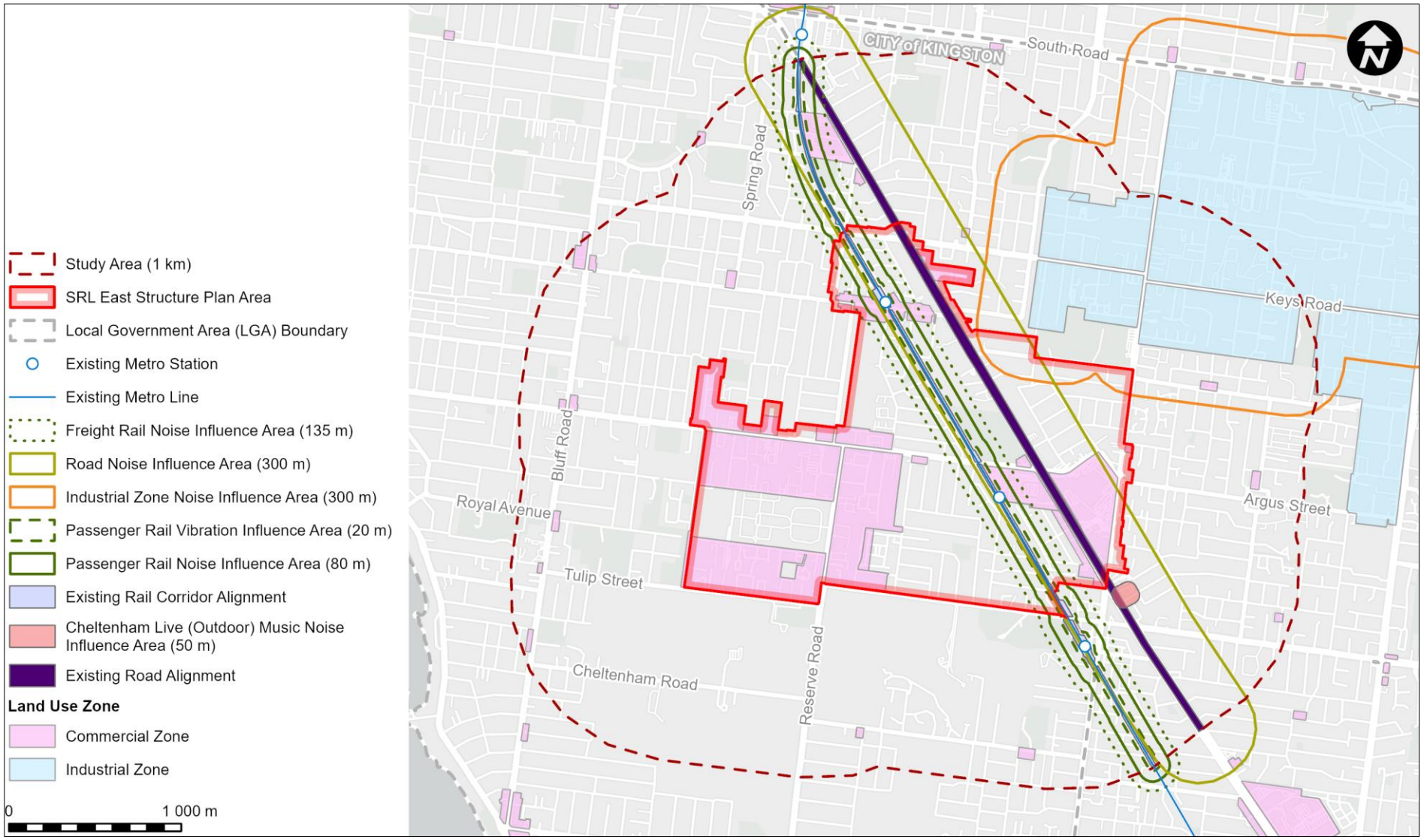


**FIGURE 6.1 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE AND VIBRATION IN THE CHELTENHAM STUDY AREA**

### 6.2.2 CLAYTON STRUCTURE PLAN AREA

Noise and vibration influence areas in the Clayton Structure Plan Area and Study Area are shown in Figure 6.2.

The noise influence areas in Figure 6.2 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3)
- Roads – noise influence area of 300 metres around the existing roads with traffic flows of 40,000 AADT or higher (Princes Highway, North/Wellington Road, Westall Road)
- Heliports – noise influence areas of 250 metres around identified heliports (Victorian Heart Hospital at Monash University Clayton campus, and Monash Children's Hospital)
- Passenger Railway – noise influence area of 80 metres around the existing rail line (Pakenham / Cranbourne Line)
- Freight Railway (servicing metropolitan Melbourne) – noise influence area of 135 metres around the existing rail line (Pakenham / Cranbourne Line).

The noise influence area for industry shown in Figure 6.2 covers 47.5 per cent of the area within the Clayton Structure Plan Area, primarily concentrated in the east and south-eastern portion of the Clayton Structure Plan Area and Study Area, with a small area in the north-west, mostly outside the Clayton Structure Plan Area. The noise influence area for roads covers 16.1 per cent of the Clayton Structure Plan Area, running along the northern and eastern portions of the Clayton Structure Plan Area and Study Area, and overlaps with industrial and commercial land use zones in the eastern and north-western portions of the Study Area, mostly outside the Clayton Structure Plan Area. The noise influence area for rail covers 18.8 per cent of the Clayton Structure Plan Area (as worst-case considering freight rail). The helicopter noise influence area, around the heliport located within the Clayton Structure Plan Area, covers 5.8 per cent. Combined, the noise influence areas cover 77 per cent of the Clayton Structure Plan Area. Note that some influence areas overlap, and thus this combined percentage accounts for this to avoid double counting areas.

Vibration influence areas in Figure 6.2 relate to:

- Passenger and Freight Railway – vibration influence area of 20 metres around the existing rail line (Pakenham / Cranbourne Line)

The influence area for vibration covers 4.5 per cent of the Clayton Structure Plan Area and is mostly limited to the boundaries of the rail corridor and the first row of housing alongside the Pakenham / Cranbourne Line. Vibration influence in the Clayton Structure Plan Area is therefore minimal.

Guidance provided in the EPA *Noise control guidelines* for helicopter noise was considered, which suggests that the recommended noise level criteria can typically be met by a separation distance of up to 250 metres between the landing site and residential premises (refer to Helicopter Noise in Appendix A). A noise influence area of 250 metres around the helipad on rooftop was therefore applied to identify areas where helicopter noise may have an impact.

In addition to the noise influence areas around the heliports, the assessment also considered areas covered by the defined alignment of the approach and departure flight paths, as specified by the Design and Development

Overlays (DDO)[7] in the Monash planning scheme[8]. Figure 6.3 shows the noise influence areas of 250 metres around the existing heliports (also shown in Figure 6.2), along with the DDO boundaries as follows:

- Flight path protection DDO14 (inner) and DDO15 (outer) are associated with the helicopters used by the Monash Children's Hospital in Clayton, located within the Clayton Structure Plan Area.

- Flight path protection DDO17 (inner) and DDO18 (outer) are associated with the helicopters used by the Victorian Heart Hospital at Monash University Clayton campus in Monash, located within the Study Area to the north-east, but outside the Clayton Structure Plan Area, with the DDO covering a minimal area within the Clayton Structure Plan Area.

The DDO boundaries for the flight path protection at the Victorian Heart Hospital and Monash Children's Hospital, as shown in Figure 6.3, represent the areas that helicopters are expected to fly over at heights of 128 metres and 92.6 metres (which are the helipad heights at each hospital, respectively), reaching approximately 170 metres and 130 metres (respectively) during landing and take-off. Noise emissions are most likely to impact the areas directly below and adjacent to the flight paths. The DDO areas related to helicopter noise from the two heliports cover 15.6 per cent of the Clayton Structure Plan Area.

While other aircraft noise might be perceived in the Clayton Structure Plan Area, there are no airports near or within the Clayton Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

[7] VicPlan land zoning and cadastral information: https://mapshare.vic.gov.au/vicplan/

[8] https://planning-schemes.app.planning.vic.gov.au/Monash/ordinance/43.02-s18

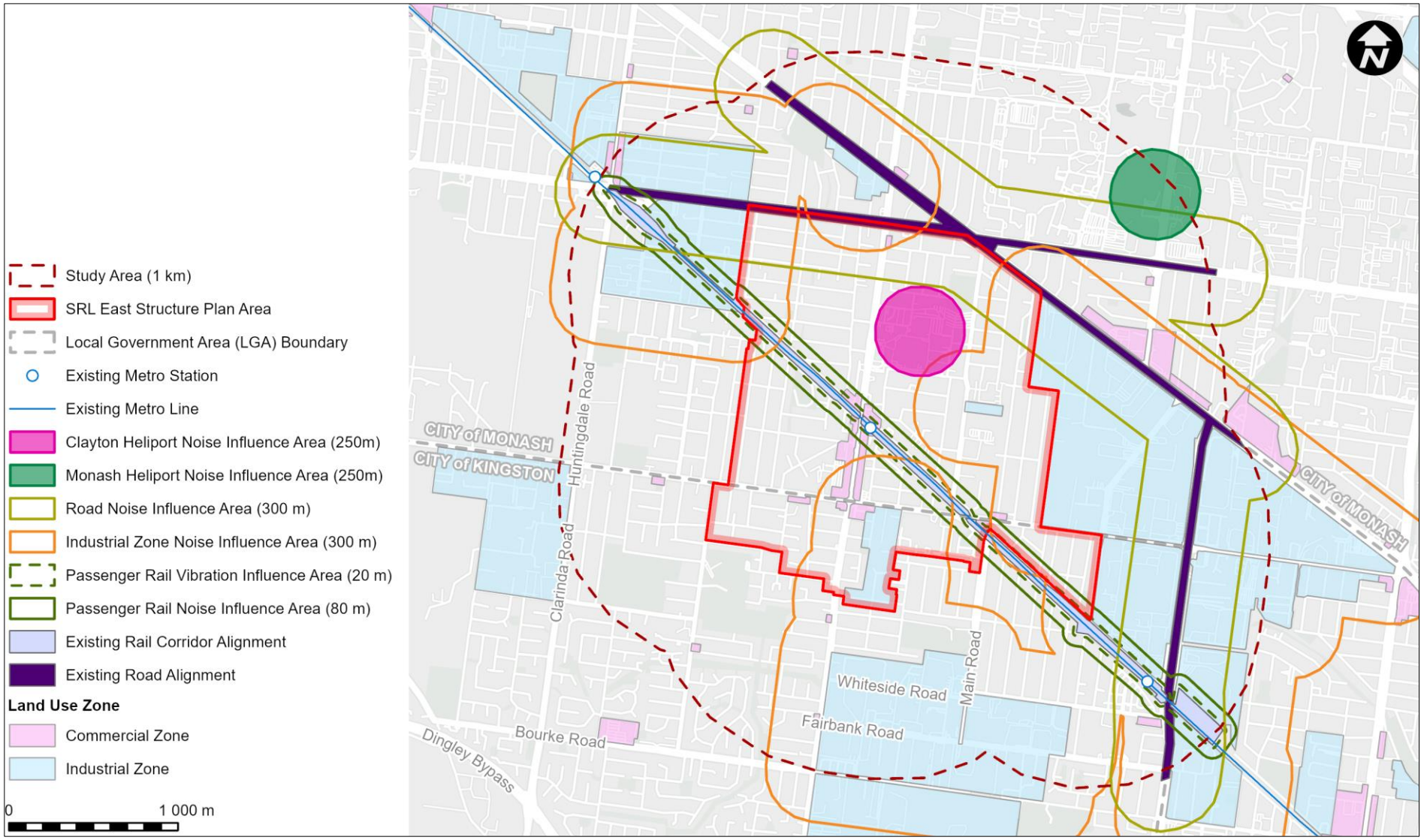


**FIGURE 6.2 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE AND VIBRATION IN THE CLAYTON STUDY AREA**

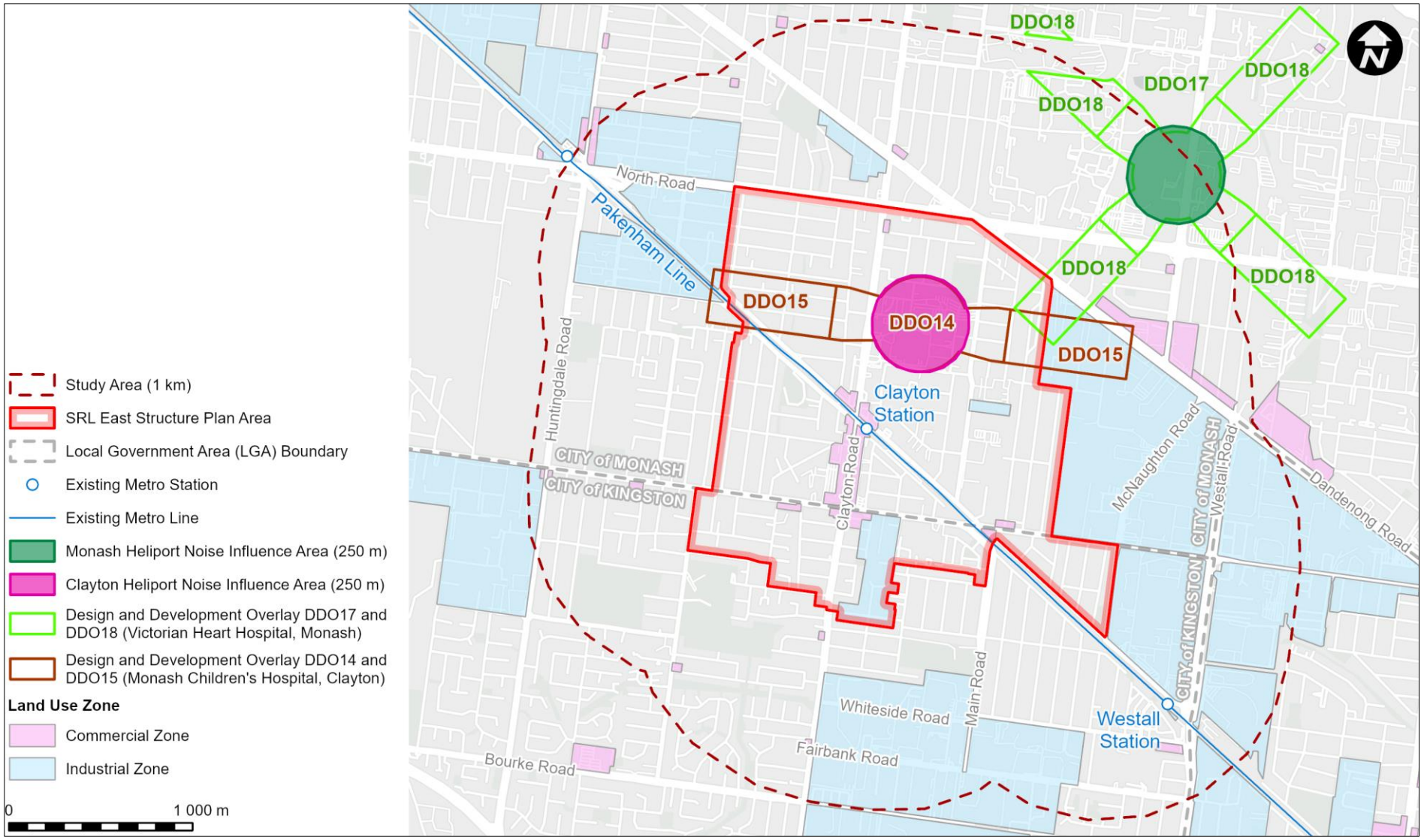


**FIGURE 6.3 NOISE INFLUENCE AREAS AND DDO BOUNDARIES FROM EXISTING HELIPORTS IN THE CLAYTON STUDY AREA**

### 6.2.3 MONASH STRUCTURE PLAN AREA

Noise and vibration influence areas in the Monash Structure Plan Area and Study Area are shown in Figure 6.4.

The noise influence areas in Figure 6.4 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3)
- Roads – noise influence areas of 300 metres around the existing roads with traffic flows of 40,000 AADT or higher (Monash Freeway, Princes Highway and North/Wellington Road)
- Heliports – noise influence areas of 250 metres around identified heliports (Victorian Heart Hospital at Monash University Clayton campus, and Monash Children's Hospital).

The noise influence area for industry shown in Figure 6.4 covers 9.7 per cent of the area within the Monash Structure Plan Area, primarily concentrated in the south-western portion of the Study Area and Structure Plan Area, with a small area in the north-east, mostly outside the Monash Structure Plan Area. The noise influence area for roads covers 33.9 per cent of the Monash Structure Plan Area, running along the northern and north-eastern portions of the Study Area, and overlaps with industrial and commercial land use zones in the south-west, mostly outside the Monash Structure Plan Area. The helicopter noise influence area, around the heliport located within the Monash Structure Plan Area, covers 4.9 per cent of the Monash Structure Plan Area. Combined, the noise influence areas cover 37.3 per cent of the Monash Structure Plan Area. Note that some influence areas overlap, and thus this combined percentage accounts for this to avoid double counting areas.

A noise influence area around Springvale Road with an AADT of 41,000 vehicles has not been considered. This is because the road lies outside the Monash Structure Plan Area, and only forms the edge of the eastern boundary of the Study Area. With an influence area extending 300 metres, this area is still beyond the Monash Structure Plan Area, and therefore not relevant. Also, the two way AADT of Blackburn Road exceeds the more conservative investigation threshold of 20,000 AADT used in this report (refer to Section 4.2.1) and has therefore been considered for risk controls in Section 6.3.7.

Guidance provided in the EPA Victoria *Noise control guidelines* for helicopter noise was considered, which suggests that the recommended noise level criteria can typically be met by a separation distance of up to 250 metres between the landing site and residential premises (refer to Helicopter noise in Appendix A). A noise influence area of 250 metres around the helipad on rooftop located within the Study Area was therefore applied to identify areas where helicopter noise may have an impact.

In addition to the noise influence areas around the heliports, the assessment also considered areas covered by the defined alignment of the approach and departure flight paths, as specified by the Design and Development Overlays (DDO)[9] as per the Monash planning scheme[10]. Figure 6.5 shows the noise influence areas of 250 metres around the existing heliports (also shown in Figure 6.4), along with these DDO boundaries as follows:

- Flight path protection DDO17 (inner) and DDO18 (outer) are associated with the helicopters used by the Victorian Heart Hospital at Monash University Clayton campus in Monash, located within the Monash Structure Plan Area.
- Flight path protection DDO14 (inner) and DDO15 (outer) are associated with the helicopters used by Monash Children's Hospital in Clayton, located within the Study Area to the south-west, outside the Monash Structure Plan Area. The DDO14 and DDO15 cover a minimal area within the Monash Structure Plan Area.

[9] VicPlan land zoning and cadastral information: https://mapshare.vic.gov.au/vicplan/

[10] https://planning-schemes.app.planning.vic.gov.au/Monash/ordinance/43.02-s18

The DDO boundaries for the flight path protection at the Victorian Heart Hospital and Monash Children's Hospital, as shown in Figure 6.5, represent the areas that helicopters are expected to fly over at heights of 128 metres and 92.6 metres (which are the helipad heights at each hospital, respectively), reaching approximately 170 metres and 130 metres (respectively) during landing and take-off. Noise emissions are most likely to impact the areas directly below and adjacent to the flight paths. The DDO areas relating to helicopter noise from the two heliports cover 23.2 per cent of the Monash Structure Plan Area.

There are no passenger or freight rail lines in the Study Area and no influence areas for vibration are identified within the Monash Structure Plan Area.

While other aircraft noise might be perceived in the Monash Structure Plan Area, there are no airports near or within the Monash Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

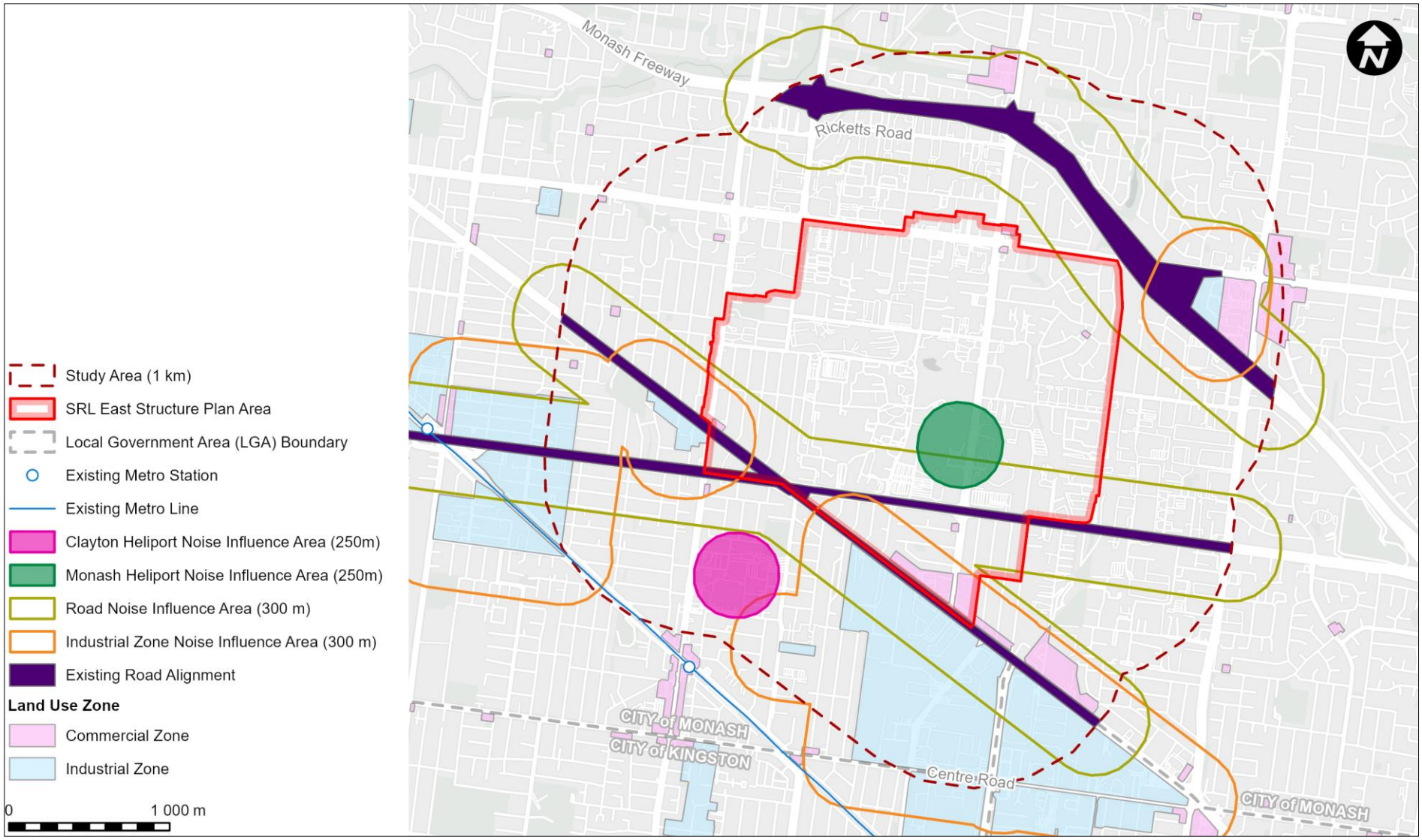


**FIGURE 6.4 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE AND VIBRATION IN THE MONASH STUDY AREA**

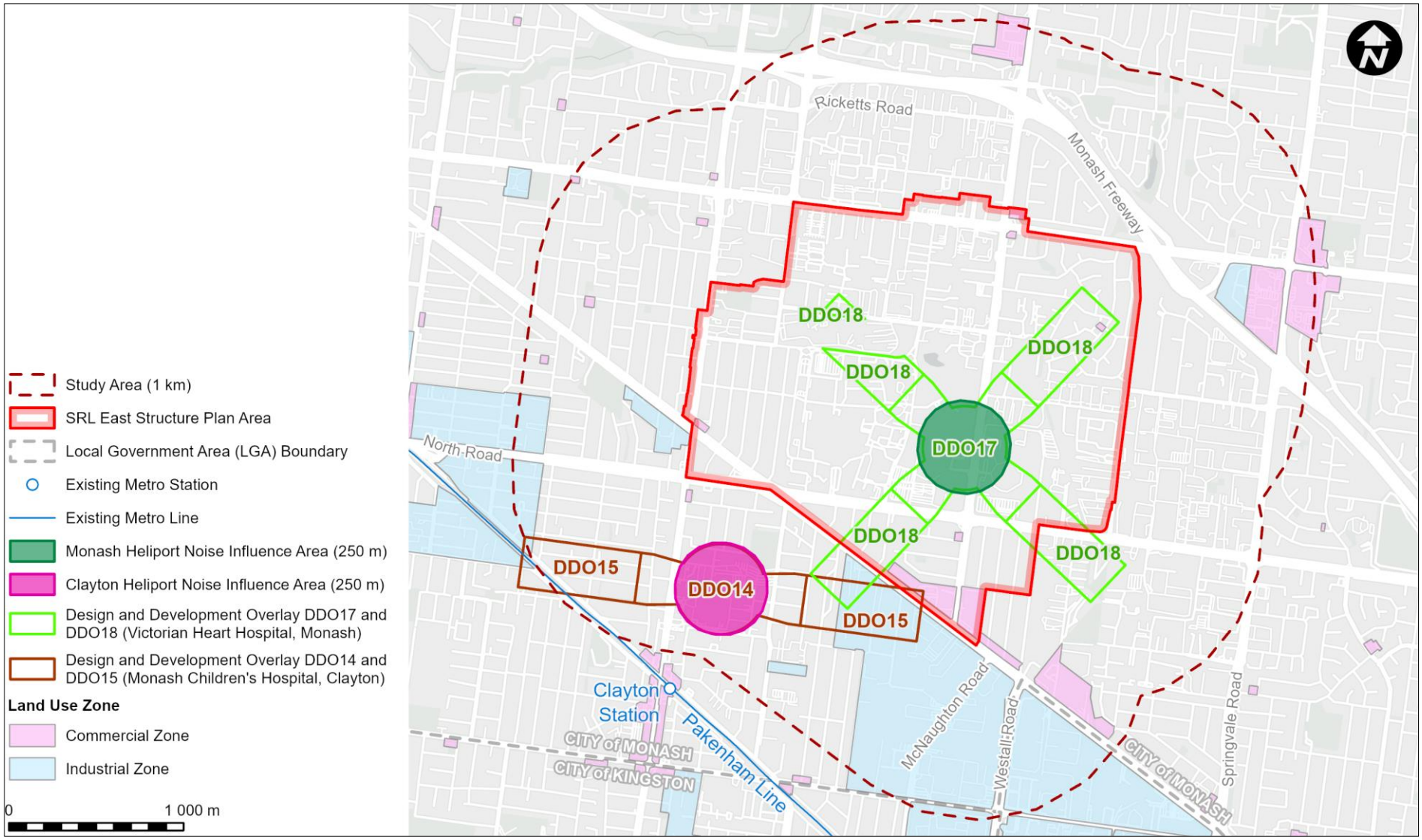


**FIGURE 6.5 NOISE INFLUENCE AREAS AND DDO BOUNDARIES FROM EXISTING HELIPORTS IN THE MONASH STUDY AREA**

### 6.2.4 GLEN WAVERLEY STRUCTURE PLAN AREA

Noise and vibration influence areas in the Glen Waverley Structure Plan Area and Study Area are shown in Figure 6.6.

The noise influence areas in Figure 6.6 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3)
- Roads – noise influence area of 300 metres around the existing roads with traffic flows of 40,000 AADT or higher (Springvale Road)
- Passenger Railway – noise influence areas of 80 metres around the existing rail line (Glen Waverley Line).

The industry noise influence areas are located to the south of the Glen Waverley Structure Plan Area and cover 35.6 per cent of the area within the Glen Waverley Structure Plan Area. The road noise influence area cuts across the middle of the Glen Waverley Structure Plan Area from north to south and covers 43.8 per cent. The rail noise influence area covers 3.5 per cent and is located on the western area. Combined, these influence areas cover 67.6 per cent of the Glen Waverley Structure Plan Area. Note that some influence areas overlap, and thus this combined percentage accounts for this to avoid double counting areas.

Vibration influence areas in Figure 6.6 relate to:

- Passenger Railway – vibration influence area of 20 metres around the existing rail line (Glen Waverley Line)

The vibration influence area covers 1.2 per cent of the Study Area and is mostly limited to the boundaries of the rail corridor and the first row of housing alongside the rail corridor. Vibration influence in the Glen Waverley Structure Plan Area is therefore minimal. There are no freight rail lines identified in the Study Area.

While aircraft noise might be perceived in the Glen Waverley Structure Plan Area, there are no airports near or within the Glen Waverley Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

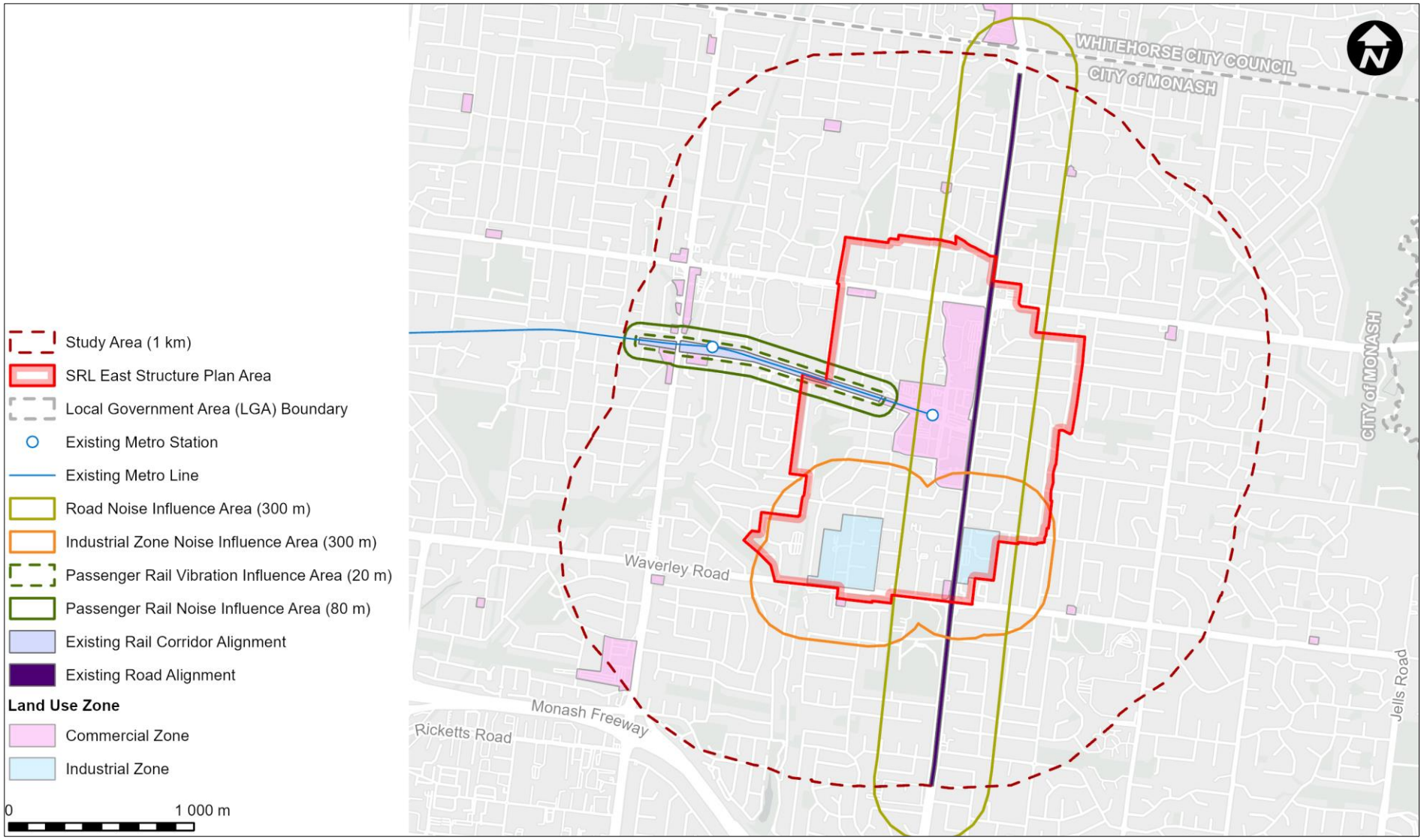


**FIGURE 6.6 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE AND VIBRATION IN THE GLEN WAVERLEY STUDY AREA**

### 6.2.5 BURWOOD STRUCTURE PLAN AREA

Noise and vibration influence areas in the Burwood Structure Plan Area and Study Area are shown in Figure 6.7.

The noise influence areas in Figure 6.7 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3 and IN3Z designated type 2).

The influence areas for industrial noise, shown in Figure 6.7, are concentrated in the south-western area of the Burwood Structure Plan Area, with a smaller influence area on the north-eastern boundary of the Study Area.

The influence areas for industrial noise cover 44.2 per cent of the area within the Burwood Structure Plan Area.

Noise influence areas around roads are not defined since traffic volumes on major roads in the Burwood Study Area fall below the 40,000 AADT threshold established in the Whitehorse and Monash Planning Schemes. However, the two way AADT of Burwood Highway exceeds the more conservative investigation threshold of 20,000 AADT used in this report (refer to Section 4.2.1) and has therefore been considered for risk controls in Section 6.3.7.

No passenger or freight railways are identified in the Study Area and no influence areas for vibration are identified within the Burwood Structure Plan Area.

While aircraft noise might be perceived in the Burwood Structure Plan Area, there are no airports near or within the Burwood Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

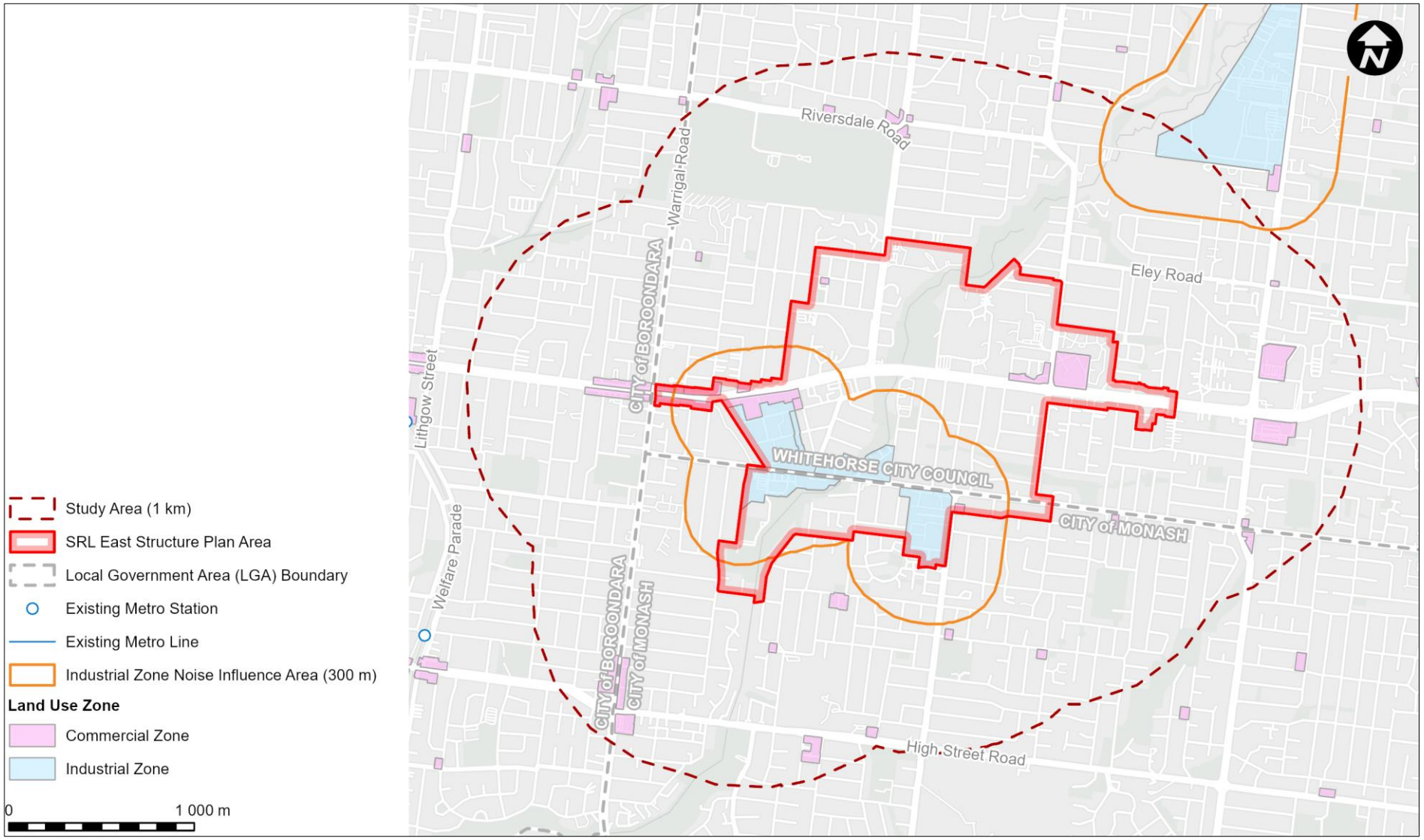


**FIGURE 6.7 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE IN THE BURWOOD STUDY AREA**

### 6.2.6 BOX HILL STRUCTURE PLAN AREA

Noise and vibration influence areas in the Box Hill Structure Plan Area and Study Area are shown in Figure 6.8.

The noise influence areas in Figure 6.8 relate to:

- Industry – noise influence areas of 300 metres around the boundaries of existing industry in identified designated land use zones (IN1Z with Noise Protocol designated type 3 and IN3Z designated type 2).
- Passenger Railway – noise influence areas of 80 metres around the existing rail line (Belgrave / Lilydale Line).

Noise and vibration influence areas shown in Figure 6.8 are located on the north-east and south-east quarters of the Study Area, with the rail corridor running across the middle from west to east, covering Box Hill and a portion of Box Hill North.

The industry noise influence area covers 9.8 per cent of the area within the Box Hill Structure Plan Area. The rail noise influence area covers 11.9 per cent. These influence areas do not overlap and, combined, they cover 21.6 per cent of the Box Hill Structure Plan Area.

Noise influence areas around roads are not defined since traffic volumes on major roads in the Box Hill Study Area fall below the 40,000 AADT threshold established in the Whitehorse Planning Scheme. However, the two way AADT of Canterbury Road exceeds the more conservative investigation threshold of 20,000 AADT used in this report (refer to Section 4.2.1) and has therefore been considered for risk controls in Section 6.3.3.

Vibration influence areas in Figure 6.8 relate to:

- Passenger Railway – vibration influence areas of 20 metres around the existing rail line (Belgrave / Lilydale Line)

The vibration influence area covers 4 per cent of the Box Hill Structure Plan Area and is limited to the rail corridor boundaries and the first row of housing alongside the corridor. Vibration influence in the Box Hill Structure Plan Area is considered to be minimal. There are no freight rail lines identified in the Study Area.

While aircraft noise might be perceived in the Box Hill Structure Plan Area, there are no airports near or within the Box Hill Structure Plan Area and Study Area that represent a risk, as these areas are located outside any ANEF contour (refer to Aircraft Noise in Appendix A).

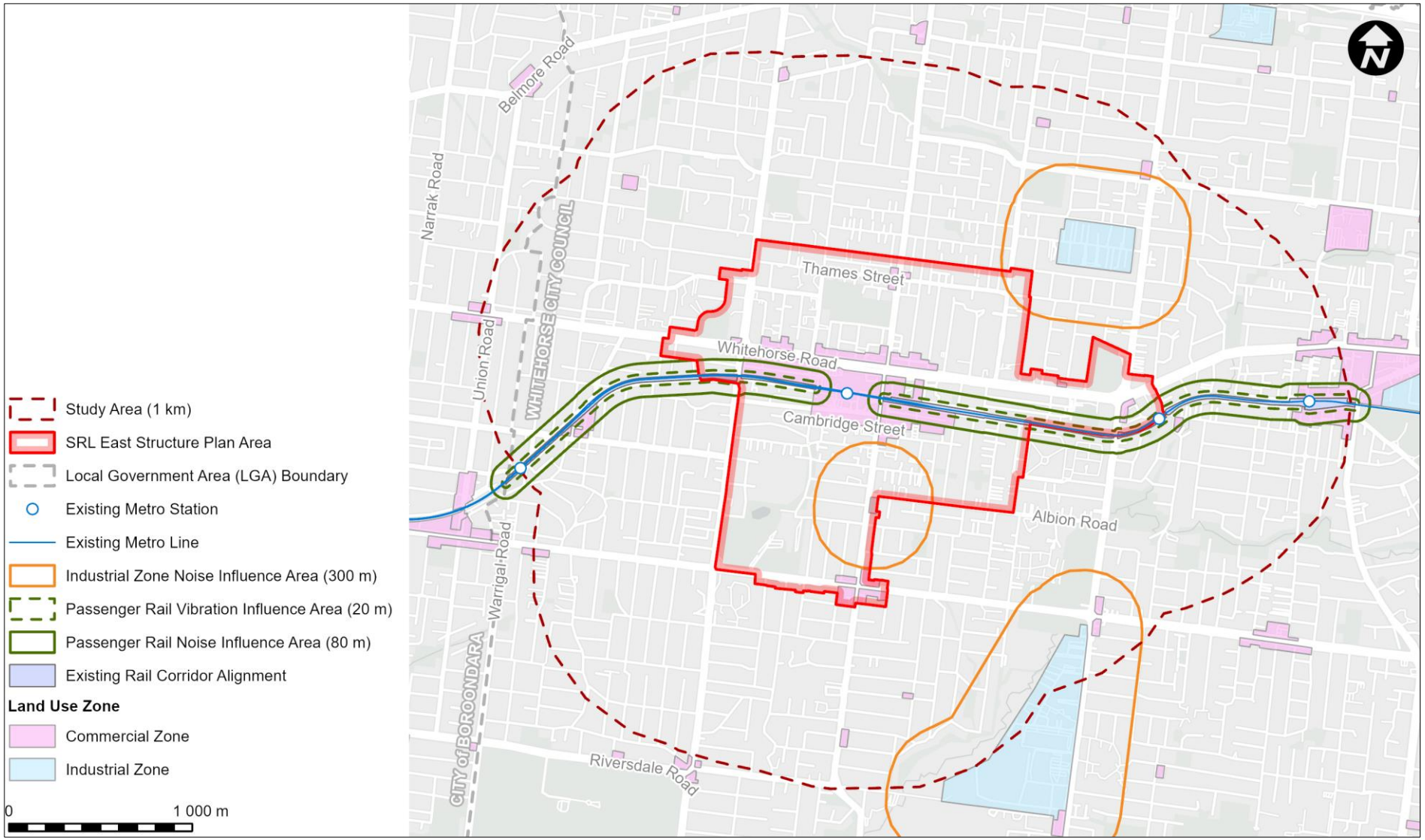


**FIGURE 6.8 INFLUENCE AREAS FROM EXISTING SOURCES OF NOISE AND VIBRATION IN THE BOX HILL STUDY AREA**

### 6.2.7 SUMMARY

Table 6.2 shows the percentage of area covered by the noise and vibration influence areas identified within each SRL East Structure Plan Area (in Section 6.2). Where a percentage is not provided, it indicates that an influence area for that source is not present in that SRL East Structure Plan Area.

**TABLE 6.2 SUMMARY OF INFLUENCE AREAS IDENTIFIED IN THE SRL EAST STRUCTURE PLAN AREAS**

| SOURCE | PERCENTAGE OF SRL EAST STRUCTURE PLAN AREA COVERED BY INFLUENCE AREA | | | | | |
|---|---|---|---|---|---|---|
| | CHELTENHAM | CLAYTON | MONASH | GLEN WAVERLEY | BURWOOD | BOX HILL |
| Industrial noise | 3.7 % | 47.5 % | 9.7 % | 35.6 % | 44.2 % | 9.8 % |
| Road traffic noise | 35.7 % | 16.1 % | 33.9 % | 43.8 % | - | - |
| Helicopter noise: Heliport | - | 5.8 % | 4.9 % | - | - | - |
| Helicopter noise: DDO boundary (flightpath) | - | 15.6 % | 23.2 % | - | - | - |
| Freight rail noise | 19.3 % | 18.8 % | - | - | - | - |
| Passenger rail noise | 12.1 % | 12.0 % | - | 3.5 % | - | 11.9 % |
| Rail vibration | 4.2 % | 4.5 % | - | 1.2 % | - | 4.0 % |
| *Total covered by all influence areas* [1] | 44.7 % | 77.0 % | 48.6 % | 67.6 % | 44.2 % | 21.6 % |
| *Cumulative influence area* [2] | 17.8 % | 21.1 % | 16.3 % | 16.6 % | - | 4.0 % |
| *Sources in cumulative area* | Rail noise and vibration, Road and Industry noise | Rail noise and vibration and Road, Industry and Helicopter noise | Road, Industry and Helicopter noise. | Rail noise and vibration and Road and Industry noise | - | Rail noise and vibration |

[1] Influence areas overlap in some of the SRL East Structure Plan Areas. This combined percentage accounts for the overlap to avoid double counting areas.

[2] Area covered by two or more influence areas overlapping in a single region.

Note that there are no influence areas around entertainment venues that fall within any of the SRL East Structure Plan Areas.

## 6.3 Risk controls for Structure Plans

Noise and vibration from existing sources with identified influence areas have the potential to impact future sensitive land uses in the surrounding area. Planning considerations and requirements are identified in this section that are considered appropriate to address any noise and vibration impacts at these locations.

### 6.3.1 OVERVIEW

From an overall perspective, it is not considered that the development of sensitive land uses in the six SRL East Structure Plan Areas would be restricted by the noise and vibration influence areas. The influence areas

indicate regions where appropriate design practices must be implemented to reduce the risk associated with noise and vibration, but it is considered that this can generally be achieved through application of the planning controls already contained within the planning schemes. This also applies to other noise sources discussed in this assessment that do not have defined the influence areas.

### 6.3.2 PLANNING CONTROLS APPLICABLE TO ALL SRL EAST STRUCTURE PLAN AREAS

Table 6.3 summarises the sizes for influence areas considered with the associated Planning Scheme and other applicable legislative requirements for residential development, for each type of source identified in the SRL East Structure Plan Areas.

**TABLE 6.3 PLANNING REQUIREMENTS FOR RESIDENTIAL DEVELOPMENT WITHIN INFLUENCE AREAS**

| SOURCE | INFLUENCE AREA | REQUIREMENTS FOR RESIDENTIAL DEVELOPMENT |
|---|---|---|
| Industrial noise | 300 m around industrial land uses | - Comply with indoor noise criteria in the relevant Planning Scheme, as per VPPs (in Table 4.3) [1]<br>- Consider impacts from this noise source with reference to the Noise Protocol – Part I (EPA Publication 1826.4, in Appendix A), as required by the Environment Protection Regulations. |
| Road traffic noise | 300 m around triggered roads | - Comply with indoor noise criteria in the in the relevant Planning Scheme, as per VPPs (in Table 4.3) [1] |
| Helicopter noise | 250 m around heliports and areas within DDO 14, 15, 17 and 18 boundaries | - Consider guideline indoor noise criteria for helicopter flyover in AS 2021:2015 (in Table A.6 in Appendix A) [2].<br>- Consider impacts from this noise source with reference to the *Noise control guidelines* for helicopter noise (EPA Publication 1254) (in Appendix A) [2] |
| Freight rail noise | 135m around rail corridor | - Comply with indoor noise criteria in the relevant Planning Scheme, as per VPPs (in Table 4.3) [1]<br>- Comply with indoor $L_{max}$ noise criteria consistent with industry standards for the type and frequency of freight train movements in each specific case.<br>- Consider impacts from this noise source with reference to the Victorian PRINP investigation thresholds (in Table A.5 in Appendix A) |
| Passenger rail noise | 80 m around rail corridor – noise | - Comply with indoor noise criteria in the relevant Planning Scheme, as per VPPs (in Table 4.3)[1]<br>- Consider impacts from this noise source with reference to the Victorian PRINP investigation thresholds (in Table A.5 in Appendix A). |
| Rail vibration | 20 m around (passenger and freight) rail corridors | - The GED under the Environment Protection Act requires consideration. No specific criteria apply in Victoria.<br>- Consider ground-borne vibration guideline criteria for human comfort in residential buildings (in Table A.8 in Appendix A). |

[1] The criteria apply in clause 55.07-7 Noise impacts, Standard B41 (Apartment Developments) and clause 58.04-3 Noise impacts, Standard D16 (Amenity Impacts). Refer to Section 4.2.1.

[2] Note that while these are not mandatory for emergency operations but have been considered in this assessment to provide guidance. Incorporating controls for emergency helicopter noise in the design is best practice and will help manage potential noise impacts.

Planning requirements for new sensitive development on land within the influence areas shown in Section 6.2 are listed as follows. Note that these apply predominantly to residential type land uses, including aged care and hotel accommodation. There are not any Victorian legislative or policy requirements related to the design of noise and vibration levels specific to other noise-sensitive developments to address potential noise and vibration impacts at these uses. However, the recommendations for all new sensitive development presented in Section 7 are applicable to noise sensitive areas related to other developments such as health and education. There are

also guidelines which address noise and vibration for schools and hospitals that are widely used in planning in Victoria. These are also discussed in Section 7:

- Demonstrate the suitability of land to be developed for future sensitive uses at the town planning phase, though an acoustic assessment, with consideration and recommendation of mitigation measures to ensure compliance with relevant environmental requirements. This process would be implemented in a manner consistent with the existing planning schemes as documented within the VPPs.

- The acoustic assessments for any new noise sensitive developments at the town planning stage need to consider the following:
    - » Demonstrate how noise and vibration has been minimised so far as reasonably practicable as required by the *Environment Protection Act 2017* and the General Environmental Duty (GED). This includes minimising the risk of noise intrusion at a new development site, but also the risk of noise emission from any new developments to adjoining areas.
    - » Strategies to reduce the risk of unreasonable noise from noise sources affecting sensitive areas, in particular from noise sources that are not subject to assessment against the noise limits under the Regulations. This is helicopter noise and emergency services siren noise near emergency vehicle facilities (at hospitals and fire stations). Taking into account its volume, intensity duration and character and considering the context in which the noise is emitted and how often it is emitted, in accordance with the Environmental Protection Act 2017.
    - » Comply with relevant requirements in the Planning Schemes policies, as per the VPPs and the Environment Protection Regulations. These are summarised in Table 6.3 and include requirements to strategically layout a building to minimise risks to external acoustic amenity, human health, well-being.
    - » For residential land uses, including aged care, implement appropriate acoustic design to minimise impacts from noise so far as reasonably practicable, such as measures outlined in the *Apartment Design Guidelines for Victoria 2021* and PPN83: *Assessing external noise impacts for apartments 2017*, both of which are part of the Planning Schemes, as per the VPPs.
    - » Consider the character of the noise. Noise with specific temporal and spectral qualities may lead to greater annoyance compared with constant, broadband, or steady noise types. In the context of the sources, with influence areas identified in the SRL East Structure Plan Areas, this is relevant to:
    - – Industrial noise may exhibit tonality, impulse and indeterminacy characteristics that need to be considered as part of the Noise Protocol assessment requirements, as per the Environment Protection Regulations
    - – Railway noise and emergency helicopter noise are typically transient, characterised by individual pass-by events that may exhibit impulse and intermittency characteristics, especially when the train passes over joints or crossings. The $L_{Amax}$ indicator must therefore be considered when assessing railway noise, to ensure impacts are appropriately managed, particularly to prevent sleep disruption at night at future residential uses and to safeguard other environmental values outlined in the Environment Reference Standard.

- Any residential uses intended to be proposed closer than existing near the existing industrial areas, or any planning scheme amendments (if any) that seek rezoning for residential land uses, need to demonstrate compliance with the relevant Planning Scheme provisions as detailed in Table 6.3, and accommodate existing industrial noise to ensure that external noise compliance is achieved as per the Regulations.

In addition, siren noise from emergency services should be considered. The noise from sirens is not within the scope of any Victorian noise regulation. However, in preparing the SRL East Structure Plans we recommend that regard be had to protecting the environmental values defined in the ERS at any future sensitive uses developed in the vicinity of a hospital or a fire station, where there is a potential risk of exposure to siren noise. This is addressed in the relevant SRL East Structure Plan Areas in Section in Section 6.2.7 and Section 6.4.

Although construction noise and vibration are temporary sources, consideration should be given to potential construction noise and vibration cumulative impacts from any active construction sites within 300m of the any construction sites related to developments part of the structure plans, with reference to the EPA Publication 1834: *Civil construction, building and demolition guide 2023* (Vic) (refer to Appendix A) and the construction noise and vibration management plans in place for the relevant construction sites. Considering this risk at the early stages of planning for developments proposed in the structure plans is expected to assist fulfilling the requirements *Environmental Protection Act 2017* in relation to this source. Where necessary, apply planning controls and determine suitable management and/or mitigation measures to address potential risks from cumulative construction noise and vibration at existing sensitive locations in the SRL East Structure Plan Areas.

### 6.3.3 CHELTENHAM STRUCTURE PLAN AREA

The cumulative impact of multiple noise or vibration sources in a single area intended to be developed for sensitive uses need to be considered when assessing the impacts and designing mitigation, taking into account all relevant requirements (as per Section 6.3.2) regarding specific sources with influence areas at the Cheltenham Structure Plan Area (as per Table 6.2). This applies to the following:

- Areas that fall within two or more influence areas including industry, road and/or rail noise influence areas. This is the case for areas alongside Nepean Highway and the Frankston Line, which are parallel to each other (at an approximate distance of 250 metres), crossing the Cheltenham Structure Plan Area from north-west to south-east (refer to Figure 6.1).

Planning requirements for new sensitive development in proximity to other noise sources not considered by the influence areas, specific to Cheltenham Structure Plan Area, are listed as follows:

- Although siren noise from emergency services is not within the scope of any Victorian noise regulations, consideration should be given during planning to require acoustic mitigation for new sensitive developments in proximity to existing Highett Fire Station (at 150 Wickham Road) identified within Cheltenham Structure Plan Area. This should be addressed through the application of specific acoustic mitigation (refer to Section 6.4.3). The character of siren noise, such as tonality, impulsiveness and intermittency should be also considered in the acoustic mitigation design.

### 6.3.4 CLAYTON STRUCTURE PLAN AREA

The cumulative impact of multiple noise or vibration sources in a single area intended to be developed for sensitive uses need to be considered when assessing the impacts and designing mitigation, taking into account all relevant requirements (as per Section 6.3.2) for the noise and vibration sources with defined influence areas (as per Table 6.2). This applies to the following:

- Areas that fall within two or more influence areas including industry, road, rail and/or helicopter noise influence areas. This occurs at most of the areas in the Clayton Structure Plan Area (refer to Figure 6.2 and Figure 6.3), except for the portion in the south-western quarter.

Planning requirements for new sensitive development in proximity to other noise sources not considered by the influence areas, specific to Clayton Structure Plan Area, are listed as follows:

- Although siren noise from emergency services is not within the scope of any Victorian noise regulations, consideration should be given during planning to require specific acoustic mitigation for new sensitive developments near the Monash Children's Hospital, identified within the Clayton Structure Plan Area. Siren noise source falls within the defined influence area around the hospital's heliport, as both siren and helicopter noise are linked to the hospital's emergency services. As such, it is appropriate to consider the defined influence area of 250 metres around the heliport (refer to Section 6.4.3) for mitigation requirement as part of the planning controls. It is noted that this would be addressed through the application of specific acoustic mitigation for helicopter noise, which is also a similar short-term but potentially loud noise source, with consideration given to the characteristics of siren noise, including tonality, impulsiveness and intermittency.

### 6.3.5 MONASH STRUCTURE PLAN AREA

The cumulative impact of multiple noise or vibration sources in a single area intended to be developed for sensitive uses within the Monash Structure Plan Area need to be considered when assessing the impacts and designing mitigation, taking into account all relevant requirements (as per Table 6.3) for the noise and vibration sources with defined influence areas (as per Section 6.3.2). This applies to the following:

- Areas that fall within two or more influence areas including industry, road and/or helicopter noise influence areas. This is the case for most of the southern portion of the Monash Structure Plan Area in areas alongside Princes Highway and North/Wellington Road (refer to Figure 6.4 and Figure 6.5).

Planning requirements for new sensitive development in proximity to other noise sources not considered by the influence areas, specific to Monash Structure Plan Area, are listed as follows:

- While an influence area is not required under the Planning Scheme around Blackburn Road within the Monash Structure Plan Area, this road has considerable current traffic flows (two-way AADT of 30,000 vehicles, with 9 per cent being heavy vehicles) that exceed the investigation threshold adopted for this report (refer to Section 4.2.1). A noise influence area of 150m is therefore recommended for this road, and new residential development within this influence area should meet the noise standards for residential development in the existing Planning Schemes that apply to 40,000 AADT roads. This means demonstrating through an acoustic assessment that the requirements for road traffic noise in Table 6.3 are met.

- Although siren noise from emergency services is not within the scope of any Victorian noise regulations, consideration should be given during planning to require specific acoustic mitigation for new sensitive developments near the Victorian Heart Hospital, identified within the Monash Structure Plan Area. Siren noise falls within the defined influence area around the hospital's heliport, as both siren and helicopter noise are linked to the hospital's emergency services. As such, it is appropriate to consider the defined influence area of 250m around the heliport (refer to Section 6.4.3) for mitigation requirement as part of the planning controls. It is noted that this would be addressed through the application of specific acoustic mitigation for helicopter noise, which is also a similar short-term but potentially loud noise source, with consideration given to the specific noise characteristics of siren noise, including tonality, impulsiveness and intermittency.

### 6.3.6 GLEN WAVERLEY STRUCTURE PLAN AREA

The cumulative impact of multiple noise or vibration sources in a single area intended to be developed for sensitive uses within the Glen Waverley Structure Plan Area need to be considered when assessing the impacts and designing mitigation, taking into account all relevant requirements (as per Section 6.3.2) for the noise and vibration sources with defined influence areas (as per Table 6.2). This applies to the following:

- Areas which fall within industry and road noise influence areas (refer to Figure 6.6). This is the case for the areas in the south-eastern portion of the Glen Waverley Structure Plan Area.

- The section of the Glen Waverley Structure Plan Area where both railway noise and vibration need to be considered.

Other noise sources not considered by the influence areas are not identified in the Glen Waverley Structure Plan Area.

### 6.3.7 BURWOOD STRUCTURE PLAN AREA

Planning requirements for new sensitive development in proximity to other noise sources not considered by the influence areas, specific to Burwood Structure Plan Area, are listed as follows:

- While an influence area is not required under the Planning Scheme around existing roads in the Burwood Structure Plan Area, Burwood Highway has considerable current traffic flows (two-way AADT of 36,000 vehicles, with 5 per cent being heavy vehicles) that exceed the investigation threshold adopted for this

report. A noise influence area of 150m is therefore recommended for this road, and new residential development within this influence area should meet the noise standards for residential development in the existing Planning Schemes that apply to 40,000 AADT roads. This means demonstrating through an acoustic assessment that the requirements for road traffic noise in Table 6.3 are met.

Areas of cumulative noise or vibration influence are not found in the Burwood Structure Plan Area (refer to Figure 6.7).

### 6.3.8 BOX HILL STRUCTURE PLAN AREA

The cumulative impact of multiple noise or vibration sources in a single area intended to be developed for sensitive uses within the Box Hill Structure Plan Area need to be considered when assessing the impacts and designing mitigation, taking into account all relevant requirements (as per Section 6.3.2) for the noise and vibration sources with defined influence areas (as per Table 6.2). This applies to:

- Areas that fall within two or more influence areas. This applies to the section of the Box Hill Structure Plan Area where both railway noise and vibration influence areas need to be considered (refer to Figure 6.8).

Planning requirements for new sensitive development in proximity to other noise sources not considered by the influence areas discussed in Table 6.2, specific to Box Hill Structure Plan Area, are:

- While an influence area is not required under the Planning Scheme around existing roads in the Box Hill Structure Plan Area, Canterbury Road, along the southern portion of the Box Hill Structure Plan Area, has considerable current traffic flows (two-way AADT of 31,000 vehicles, with 6 per cent being heavy vehicles) that exceed the investigation threshold adopted for this report. A noise influence area of 150m is therefore recommended for this road, and new residential development within this influence area should meet the noise standards for residential development in the existing Planning Schemes that apply to 40,000 AADT roads. This means demonstrating through an acoustic assessment that the requirements for road traffic noise in Table 6.3 are met.

- Although siren noise from emergency services is not within the scope of any Victorian noise regulations, consideration should be given during planning to require acoustic mitigation for new sensitive developments in proximity to existing fire station at 1052 Maroondah Highway/Whitehorse Road and Box Hill Hospital identified within Box Hill Structure Plan Area. This should be addressed through the application of specific acoustic mitigation (refer to Section 6.4.3). The character of siren noise, such as tonality, impulsiveness and intermittency should be also considered in the acoustic mitigation design.

## 6.4 Risk mitigation strategies for new development

This section sets out typical risk mitigation strategies that a new sensitive development could implement to reduce human health, well-being and amenity risks associated with noise and vibration emissions from existing sources.

The preferred approach for new sensitive developments in proximity to a noise source (or within an influence area identified in this assessment) is to follow a hierarchy of controls as follows:

- design measures to benefit both outdoor and indoor amenity within the development, including appropriate orientation of sensitive areas and the provision of shielded outdoor spaces

- dwelling layout to locate sensitive internal areas on quieter facades such that internal amenity can be achieved with natural ventilation

- building envelope treatments where it is not possible to provide appropriate internal amenity through application of the above measures so far as reasonably practicable.

*Apartment Design Guidelines for Victoria 2021* (Department of Environment, Land, Water and Planning, 2021) and the *Planning Practice Note 83: Assessing external noise impacts for apartments 2017* (Department of Environment, Land, Water and Planning, 2017) provide guidance on standard building siting, layout and design strategies to protect residents from noise intrusion due to external noise sources. These documents also present guidance on standard or typical acoustic design treatments, which should be considered by developers. This section draws from these documents to provide guidance on standard planning design strategies and acoustic mitigation design measures.

### 6.4.1 DESIGN STRATEGIES

Strategies to address potential noise and vibration impacts at future sensitive receivers within the influence areas (identified in Section 6.2) that do not involve modifying existing business and developments, with their associated activities and noise sources, are limited to the following typical strategies that planners should consider when allocating sensitive land uses:

- Strategic layout planning – use of buffer zones and set back distances to propose new sensitive development at adequate distance separations from existing businesses and infrastructure with noise and vibration emissions and, consider existing land use designations to propose noise emitting developments near those that already exist.

- Use of existing screening features – new sensitive development could benefit from existing features that can provide acoustic screening as well as from new proposed features which could be designed for other purposes such as landscape, visual or safety aspects. The screening features may also belong to other adjacent developments from which new development can benefit. Examples of screening features include earth mounds, embankments, existing topographic features, solid fences, noise barriers or existing built features located between the source and the sensitive development. These can offer varying degrees of acoustic screening that would depend on the position of the receptor, screening feature and noise source. Their acoustic benefit should be evaluated to ascertain the level of acoustic screening provided.

### 6.4.2 ACOUSTIC MITIGATION

Developers should consider the following standard good practice acoustic mitigation design measures, for new sensitive developments within the defined influence areas (and in general for any sensitive development in the SRL East Structure Plan Areas), particularly for those within the influence areas:

- Strategic building layout:
    - » Locating noise-sensitive rooms and windows (particularly bedrooms) away from external (and internal) noise sources to minimise noise intrusion. For example, using non-sensitive spaces like walkways, laundries, and storage as a buffer area between the emission sources and sensitive rooms.
    - » Where practicable, consideration of quiet facades to address noise at external areas of the development and allow for openable windows, in particular when developments are proposed adjacent to sources of road traffic or railway noise. This approach will also benefit internal noise levels for rooms situated on the quiet façade(s).
    - » Where practicable, physically separating sensitive areas from external noise sources by additional setbacks.

- Mitigation at the propagation path – acoustic screening features such as acoustic fencing or noise barriers and incorporating solid balustrades into balconies that act as a shield from external noise sources.

- Mitigation at sensitive building facades:
    - » Providing acoustically rated glazing, enclosed balconies (winter gardens), wall and roof construction materials with mass or sound absorption properties. Appendix 1 of the *Planning Practice Note 83:*

*Assessing external noise impacts for apartments 2017* provides standard design treatments for noise for different façade elements, including walls, windows and floors with acoustic performance considerations.

» Sealing gaps and joints, servicing penetrations using acoustic insulation, or limiting the extent of openings facing the external noise source(s).

Sensitive land uses would preferably be designed to allow windows to be open for natural ventilation while achieving acceptable internal noise levels. The application of the good design practices listed in the *Apartment Design Guidelines for Victoria 2021* and *Planning Practice Note 83: Assessing external noise impacts for apartments 2017* can assist in achieving this in many cases. However, it is noted this may not be practicable in all instances, particularly when developments are proposed near existing transportation sources. In these cases, mitigation would need to involve upgrading the building façade and ventilation that allows windows and doors to remain closed for noise control, although it is noted that this should be the last measure applied once further optimisation of the layout is not possible.

In relation to each SRL East Structure Plan Area, these good design practice strategies are of particular relevance for any new sensitive developments planned within the influence areas, shown in the figures in Section 6.2, as follows:

- Cheltenham Structure Plan Area: around Nepean Highway, the Frankston Line and the industrial land uses south of Keys Road (IN1Z), as shown in Figure 6.1.
- Clayton Structure Plan Area: around Princes Highway, Wellington Road, the Pakenham / Cranbourne Line and the industrial land uses at Audsley Street (IN1Z), as shown in Figure 6.2.
- Monash Structure Plan Area: around Princes Highway, Wellington Road and the industrial land uses south of Princes Highway (IN1Z), as shown in Figure 6.4. They also apply to any sensitive uses planned alongside Blackburn Road, which has traffic flows that exceed the investigation threshold adopted for this report (refer to Section 4.2.1).
- Glen Waverley Structure Plan Area: around Springvale Road, the Glen Waverley rail Line and the industrial land uses at Aristoc Road and Springvale Road (IN1Z), as shown in Figure 6.6.
- Burwood Structure Plan Area: around the industrial land uses at Highbury Road and Huntingdale Road (IN1Z & IN3Z), as shown in Figure 6.7. They also apply to any sensitive uses planned alongside Burwood Highway, which has traffic flows that exceed the investigation threshold adopted for this report.
- Box Hill Structure Plan Area: around the Belgrave / Lilydale Line and the industrial land use area at Station Street / Albion Road (IN3Z), as shown in Figure 6.8. They also apply to any sensitive uses planned alongside Canterbury Road, which has traffic flows that exceed the investigation threshold adopted for this report.

Where standard treatments, such as those described in this section, are to be incorporated into a proposed development, they need to be put in the context and be specific to be development. Their suitability and effectiveness need to be demonstrated through an acoustic assessment.

### 6.4.3 SPECIFIC ACOUSTIC MITIGATION

The standard mitigation measures discussed in the previous section are broadly applicable and generally effective in most scenarios. However, in certain instances, specific acoustic mitigation measures may be required. In the case of the SRL East Structure Plan Areas, this is considered to be limited to areas of cumulative influence from noise and/or vibration and at areas of helicopter noise influence.

In cases where a higher degree of noise mitigation is required, a specific acoustic design would need to be developed for each sensitive development as part of the acoustic assessment. The assessment would identify what specific interventions, if any, would be required to adequately mitigate the risk associated with noise.

Specific controls (in addition to the standard controls) need to be considered for any land to be developed for sensitive uses within the influence areas considered around the heliports and DDO boundaries representing the approach/departure flightpaths. These are anticipated to be required to address the influence of helicopter noise identified in:

- Clayton Structure Plan Area as shown in Figure 6.3.
- Monash Structure Plan Area as shown in Figure 6.5.

Noise-sensitive developments within these areas are likely to require high-performing acoustic glazing and other potential treatments, such as specific façade and roof design constructions, to ensure appropriate internal noise levels. The required performance of the building elements will vary depending on the degree of helicopter noise at the specific location of the proposed sensitive development, which should be defined through an acoustic assessment. The acoustic design would need to consider the nature of helicopter noise by assessing the maximum, rather than long-term average noise levels, as set out in the EPA Victoria *Noise control guidelines* and AS 2021:2015 (refer to Appendix A).

It is considered that these measures should also be applied to new sensitive developments in proximity to fire stations and hospitals that use emergency vehicles with siren noise. Fire stations are located in the Cheltenham and Box Hill Structure Plan Areas and hospitals in the Clayton, Monash and Box Hill Structure Plan Areas.

It is generally not practical to control helicopter noise and siren noise in external areas as shielding measures are typically ineffective. However, emergency helicopter noise and siren noise are relatively infrequent compared to other noise sources, such that external amenity would still be achieved at times when helicopter movements are not occurring. Developers should evaluate the possibility of openable windows and consider providing specific controls to manage noise levels in external areas of the sensitive developments (such as winter gardens).

## 6.5 Noise and vibration from SRL East

Noise and vibration from the construction and operation of the SRL East were also considered for this assessment, using information from the Environment Effects Statement (EES) prepared for the project in November 2021, which considered impacts at existing receivers in defined study areas.

### 6.5.1 CONSTRUCTION

Construction noise will be managed through conducting works during Normal Working Hours where reasonably practicable, and the application of standard noise management measures in line with EPA Publication 1834. As objective targets are not specified by the guide, noise benchmarks were established in the EES with reference to the SRLA Residential Support Guidelines. Where the benchmarks were predicted to be exceeded, reasonably practicable adjustments to construction methods or additional mitigations were considered to minimise impacts. Noise levels from construction were predicted in the EES to exceed the Normal Working Hours benchmark during certain activities of limited duration at all of the SRL East sites except at Monash, where with the adoption of reasonably practicable measures, the benchmark was not predicted to be exceeded due to its existing ambient conditions and considerable distance from sensitive areas.

To address impacts, SRL delivery contractors are required to apply established and proven construction noise management measures and adhere to the Environmental Performance Requirements (EPRs) and Project-specific SRLA Residential Guidelines for noise management. Although no significant cumulative impacts were identified, any potential issues arising during the long construction period will be managed via the Construction Noise and Vibration Management Plans (CNVMPs).

Construction vibration modelling was carried out as part of the EES considering a scenario with 'standard mitigation' based on information from SRLA, including timeframes for construction, construction methods and equipment. Additional mitigation measures to minimise the potential impacts to receivers, in relation to human comfort, to the extent reasonably practicable were identified to meet the GED. With the implementation of these measures, most of the impacts are expected to be avoided. Due to the proximity of existing residential properties to the SRL station at Cheltenham, a limited number of receivers close to the station works may still experience short-term impacts during a limited period when construction works are occurring near these properties, as vibration intensive equipment would only be used intermittently.

Overall, measures to minimise the risk of harm to human health and the environment from construction noise and vibration will be set out in CNVMPs to be developed by the appointed Project contractor(s). In the context of this assessment, Structure Plans should consider the SRL East construction programme when planning the construction works for the Structure Plans to avoid or address potential cumulative impacts from multiple construction sites. Construction noise and vibration form the SRL East is only relevant to this assessment where Structure Plan developments are being constructed near the SRL East construction sites before their completion. Note that this information is not known at present.

### 6.5.2 OPERATION

Operational noise from SRL East will be effectively contained in tunnels within each SRL East Structure Plan Area. For this reason, risks related to noise impacting new residential development are considered to be negligible as SRL East will not introduce additional airborne noise to the areas. Some noise emissions may arise from development of mechanical plant at the stations, however, this would be controlled to achieve compliance with the Regulations by the SRL East project.

In terms of vibration, the potential source of vibration (and ground-borne noise) during the operation of SRL East will be trains moving through the tunnels. The SRL East design incorporates mitigation to control ground-borne noise and vibration across its entire length and it will comply with the guideline reference criteria, supporting the objectives of the General Environmental Duty.

The SRL East vibration mitigation was designed considering the existing sensitive land uses identified in the EES, with the EES concluding that there would be no impacts on human comfort from vibration and ground-borne noise when considering the specified vibration-isolation track-form, as follows, within each SRL East Structure Plan Area:

- Cheltenham Structure Plan Area: proposed 'High' attenuation track-forms at the Cheltenham SRL station and the adjoining tunnel sections.
- Clayton Structure Plan Area: proposed 'Very high' and 'High' attenuation track-forms at the Clayton SRL station and adjoining tunnel sections.
- Monash Structure Plan Area: proposed 'Very high', 'High' and 'Standard' attenuation track-forms at the Monash SRL station and the adjoining tunnel sections.
- Glen Waverley Structure Plan Area: proposed 'Very high', 'High' and 'Standard' attenuation track-forms at the Glen Waverley SRL station, adjoining tunnel sections, and the emergency support facility.

- Burwood Structure Plan Area: proposed ‘Very High’ and ‘High’ attenuation track-forms at the Burwood SRL station, adjoining tunnel sections and the electrical substation.
- Box Hill Structure Plan Area: proposed ‘Very High’ and ‘High’ attenuation track-forms at the Box Hill SRL station and adjoining tunnel sections.

The proposed vibration mitigation, listed above, will ensure that areas of *existing* residential land uses above the rail alignment and station are not adversely impacted by vibration and ground-borne noise.

Future residential development opportunities considered directly above the footprint of the new SRL underground stations will need to meet the vibration criteria for residential buildings (as per Table A.8 in Appendix A), taking into account the vibration mitigation proposed in the EES, as listed above for each SRL East Structure Plan Area. Based on the EES, it can be assumed that new residential developments at areas directly above or adjacent to the proposed ‘Very High’ and ‘High’ attenuation track-form types are unlikely to experience significant risk from vibration and ground-borne noise from SRL East. Additionally, it is anticipated that any development above the SRL underground stations would be required to develop a vibration mitigation strategy in consultation with SRLA such that this risk would be appropriately addressed through that process.

Other sensitive developments, such as laboratories within educational or health facilities, which have equipment sensitive to vibration, would need to incorporate measures into their design to address the vibration influence from SRL East and cater to their specific vibration mitigation requirements. The requirements for any such development would depend on the specific needs of those uses and would be the responsibility of the developer.

## 6.6 Assessment of residual risk

Table 6.4 presents the assessment of residual risks after consideration of the risk controls (in Section 6.2.7) and risk mitigation strategies (in Section 6.4). Risk rankings in this assessment are qualitative and range from Negligible to High. These have been defined in Section 2.1.

**TABLE 6.4 ASSESSMENT OF RESIDUAL RISK**

| RISK | (UNMITIGATED) RISK | RISK CONTROLS AND MITIGATION | RESIDUAL RISK |
|---|---|---|---|
| Future sensitive development located outside of an influence area (as shown in the Figures in Section 6.2). | Negligible | Acoustic mitigation is not necessary. | Negligible |
| Future sensitive development located within an influence area, different than a helicopter noise influence area. | Low | Acoustic mitigation is likely to be required in most cases and its functionality and effectiveness needs to be demonstrated through an acoustic assessment at planning stage. | Low |
| Future sensitive development located within an influence area for helicopter noise. | Medium | A higher degree of acoustic mitigation is likely to be required to achieve planning compliance, which should be demonstrated through an acoustic assessment.<br>Strategic layout planning is required before allocating sensitive uses in these areas. | Low |
| Future sensitive development located within a cumulative influence area, where more than one area of influence overlaps | Medium | | Low |

Potential risks identified in the SRL East Structure Plan Areas range from Negligible to Medium as per Table 6.4, when risk controls or mitigation are not considered. In line with Table 6.4, the residual risks for new sensitive development in the SRL East Structure Plan Areas, after consideration of risk controls and mitigation, are anticipated to be Negligible or Low in all Areas. Any potential risks are expected to be addressed through

the implementation of planning controls, as discussed in Section 6.2.7, and mitigation strategies via strategic layout and/or acoustic mitigation design to be demonstrated through an acoustic assessment, as discussed in Section 6.4.

Section 7 provides recommendations that also address any potential noise and vibration risks at future sensitive developments.

## 6.7 Summary

This risk assessment has identified existing noise and vibration sources in the SRL East Structure Plan Areas with associated areas of noise and vibration influence where potential impacts need to be addressed to manage human health, well-being and amenity risks associated with new sensitive development.

The identified influence areas for noise and vibration do not restrict the development of sensitive land uses in the SRL East Structure Plan Areas. While parts of each SRL East Structure Plan Area are subject to noise and vibration influence from existing sources, the application of the existing acoustic controls included in the planning schemes are expected to appropriately manage this risk with new developments generally able to control noise and vibration through the application of standard controls.

This assessment has identified the relevant planning requirements and possible mitigation measures, with recommendations, that can be applied to future sensitive development proposed within the identified influence areas, to inform the SRL East Structure Plans and provide guidance for planners and developers. Consideration to other noise sources not considered by the influence areas has also been included. Through implementation of the controls already set out in the planning schemes and additional recommendations within this report, noise and vibration impacts are anticipated to be avoided or minimised as far as reasonably practicable.

Based on a high-level qualitative approach, it is concluded that when adopting the identified planning controls and mitigation design, the potential risk on future sensitive development is anticipated to be Negligible or Low in all six SRL East Structure Plan Areas.

# 7 Recommendations

This section provides noise and vibration recommendations to consider when developing the Structure Plans.

The recommendations aim to minimise potential negative impacts of change in the SRL East Structure Plan Areas, and maximise potential for positive change.

## 7.1 Structure planning

Based on the assessment, recommendations were developed to inform the development of Structure Plans. The recommendations aim to provide guidance for planners and developers of future sensitive land uses, within the identified influence areas, to avoid or minimise noise and vibration impacts as far as reasonably practical.

1. It is considered that noise and vibration risks in the SRL East Structure Plan Areas can generally be adequately addressed by applying controls that already exist in municipal planning schemes, as per the VPPs. The planning schemes require that an acoustic assessment is completed for any residential sensitive development proposed within a noise and/or vibration influence area. The risk controls are detailed in Section 6.3. The acoustic assessment should consider layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) to ensure compliance with relevant environmental requirements.

Specific consideration beyond the planning scheme requirements are recommended for:

2. Sensitive developments near existing industrial land uses: No agent of change process exists for new sensitive development near existing industrial land uses under the existing planning schemes or legislation. Consideration should be given to identifying when new residential land uses are intended to be proposed closer than existing sensitive uses to existing industrial zones, and these are planned to be located within an influence area for industrial noise. In these cases, future sensitive development should be designed to accommodate existing industrial noise emissions to ensure that noise levels at the sensitive use comply with the noise limits set as per the Environment Protection Regulations, to avoid introducing a new compliance burden on existing industrial uses. Consideration of layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) would be in most cases sufficient to ensure compliance.

3. External impacts from road and rail traffic: as the existing VPPs do not set out a specific external noise requirement for sensitive land uses from road and rail traffic noise and prescribe criteria for internal noise levels only (in clause 55.07 and clause 58.04), future developments should demonstrate consideration and implementation of good design practices to protect human health, well-being and amenity in external areas so far as reasonably practicable.

4. Road noise: Consideration should be given to requiring residential development within 150m of Blackburn Road, Burwood Highway and Canterbury Road in the Monash, Burwood and Box Hill Structure Plan Areas, respectively, to comply with the noise levels specified in the current Planning Schemes for apartments in clauses 55.07-7 and 58.04-3. Consideration of layout design strategies (Section 6.4.1) and acoustic mitigation measures (Section 6.4.2) would be sufficient to ensure compliance.

5. Helicopter noise: Consideration should be given to incorporating a requirement for sensitive development within the helicopter influence areas in the Clayton and Monash Structure Plan Areas to address emergency helicopter noise, as this is not currently addressed in the municipal planning schemes. This assessment

recommends guidance to consider the potential impacts from this source and indoor noise criteria to guide the acoustic mitigation design (summarised in Table 6.3). This is considered appropriate to guide the planning requirements for sensitive developments in the SRL East Structure Plan Areas in the helicopter noise influence areas identified in this assessment. The nature and character of helicopter noise, such as tonality, impulsiveness and intermittency require consideration when assessing the impacts from this source and developing the mitigation design Consideration of specific acoustic mitigation (Section 6.4.3) alongside layout design strategies (Section 6.4.1) would be in most cases sufficient to manage the noise impacts from this source.

6. Siren noise: Consideration should be given to requiring sensitive development within the defined influence area of 250m to address the potential effects of emergency vehicle siren noise on the amenity of occupants in proximity to emergency services. Fire stations are in the Cheltenham and Box Hill Structure Plan Areas and hospitals with ambulance vehicles in the Clayton, Monash and Box Hill Structure Plan Areas. Consideration of specific acoustic mitigation (Section 6.4.3) alongside layout design strategies (Section 6.4.1) would be in most cases sufficient to manage the noise impacts from these sources.

7. Construction noise: The Structure Plans should consider active construction sites when sequencing construction of new sensitive developments to avoid or manage potential cumulative impacts from noise and vibration from multiple construction sites at existing sensitive locations in the SRL East Structure Plan Areas. This assessment provides recommendations to identify potential risk areas. Suitable planning and sequencing, alongside management and mitigation measures via Construction Management Plans are generally expected to address the impact from this temporary source.

## 7.2 Other opportunities

This section sets out other opportunities that are considered as complementary to any requirements of the Structure Plans for new sensitive development within the noise and vibration influence areas. They are general best practice, reinforcing the current applicable legislative requirements for planning and would not necessarily be included in the Structure Plan but may be provided as accompanying recommendations to help achieve the Structure Plan vision and objectives.

### 7.2.1 RESIDENTIAL SENSITIVE DEVELOPMENT

Other opportunities for allocating land for residential land uses, including aged care, hotel accommodation and the like, within the noise and vibration influence areas (identified in Section 6.2), are as follows:

- Developers should consider the proximity of any new sensitive development to existing sources of noise and vibration at the planning stage, to evaluate the degree of acoustic mitigation needed and the associated costs. The closer to the source, the higher the extent of acoustic mitigation likely to be required.

- The areas where there is the potential for a cumulative impact requires careful consideration and developers should engage an acoustic consultant to provide advice when planning developments in these areas. This applies where one or more influence areas overlap with each other.

- Developers should demonstrate careful consideration has been given to the location and orientation of external areas in new residential developments and/or the inclusion of physical noise mitigation measures such as noise barriers to limit external noise levels as reasonably practicable as possible, consistent with the objectives of the General Environmental Duty. This is particularly advised for development in the four first rows of houses within the noise influence areas identified for roads and rail corridors.

### 7.2.2 OTHER SENSITIVE DEVELOPMENTS

Opportunities for non-residential sensitive developments (as defined in Section 2.1) within noise and vibration influence areas that developers should have regard to are:

- Developers should demonstrate that careful consideration has been given to the location and orientation of external areas that may be noise sensitive. These are any outdoor areas in educational facilities, medical treatment areas of hospitals and community facilities, such as outdoor play areas in schools or passive recreation areas in community sport centres.

- Developers should demonstrate the design of the development achieves appropriate internal acoustic amenity, through an acoustic report that demonstrates the design complies with recommended internal noise levels set out inset out in AS/NZS 2107:2016 *Recommended design sound levels and reverberation times for building interiors*.

- In relation to vibration, developments with equipment sensitive to vibration, should incorporate the necessary measures in their design to address the vibration arising from the operation of SRL East. These measures will depend on the specific nature of the use, and would be a matter for the developer of these uses. Usually, sensitive equipment would be present in research or health facilities.

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Joint Venture

# Appendix A

# Planning legislation, policy and guidance

# Appendix A: Planning legislation, policy and guidance

This appendix presents the legislation, polices and other documents relevant to the technical assessment, and to land use planning and development in the SRL East Structure Plan Areas.

## Planning and Environment Act 1987

The *Planning and Environment Act 1987* (Vic) establishes the statutory framework for Victoria's planning system. The planning system and planning schemes are tools that enable land use strategies to be implemented and effect positive change to the built environment.

## Environment Protection Act 2017

The primary legislation underpinning this assessment is the *Environment Protection Act 2017* (Vic) (the Act) and the subordinate legislation established under this Act. The *Environment Protection Act 2017* (Vic) sets out environmental obligations and protections for Victorians. Under the Act, the following primary considerations apply to an assessment of noise:

- The General Environmental Duty (GED)
- Unreasonable noise
- Aggravated noise

The GED requires anyone conducting an activity that poses risks to human health and the environment from pollution or waste to avoid or minimise those risks, so far as reasonably practicable, Noise constitutes 'pollution', and it includes vibration.

'Reasonably practicable' measures mean putting in controls to eliminate the risk of harm to human health and the environment so far as reasonably practicable. If eliminating the risk of harm is not reasonably practicable, then the risk of harm must be reduced so far as reasonably practicable.

Demonstrating that a person or business undertaking the activity has done what is reasonably practicable can be achieved if (EPA Victoria, 2020):

- Well-established effective practices or controls have been adopted to eliminate or manage risk; and/or
- Where well-established practices or controls do not exist, it can be shown that effective controls have been assessed and adopted.

The Environment Protection Act also prohibits unreasonable noise and aggravated noise. The Act provides a definition for unreasonable noise in two parts. Part (a) of the definition states that noise that is unreasonable with regard to:

- Its volume, intensity or duration
- Its character
- The time, place and other circumstances in which it is emitted
- How often it is emitted
- Any prescribed factor.

Part (b) of the definition states that noise is unreasonable noise if it is prescribed to be so. Under the Environment Protection Regulations, noise that exceeds the noise limits established in accordance with EPA Victoria Publication *1826.4 Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues* (Noise Protocol) is prescribed to be unreasonable noise.

Unreasonable noise occurs if noise meets the requirements of Part (a) and/or Part (b) of the definition under the Environment Protection Act.

The offence of aggravated noise is discussed under the Environment Protection Regulations heading below.

## Environment Protection Regulations 2021

The *Environment Protection Regulations 2021* (Vic) (the Regulations) are a subordinate instrument of the *Environment Protection Act 2017* (Vic). They cover a broad suite of topics including contaminated land, the framework for permissions, waste management and environmental management (including air and noise) as well as administrative matters relating to offences, fees and transitional arrangements.

The Regulations set out a noise framework for residential, commercial, industrial and trade premises, as well as entertainment venues and events. Under the Regulations, the assessment of noise from commercial, industrial and trade premises, and entertainment venues and events at noise sensitive areas must be carried out in accordance with the Noise Protocol, both in terms of establishing noise limits at noise sensitive areas and in terms of the measurement of noise from the subject premises.

‘Noise sensitive areas’ are defined in the Regulations as:

- The area within 10 metres of the external walls of dwellings (including residential care facilities but excluding caretaker’s houses), residential buildings, and noise sensitive residential uses
- The area within 10 metres outside the external walls of any dormitories, wards, bedrooms and living rooms of caretaker’s houses, hospitals, hotels, motels, residential hotels specialist disability accommodation, corrective institutions, tourist establishments, retirement villages and residential villages
- The area within 10 metres outside the external walls of classrooms or other rooms where learning occurs at childcare centres, kindergartens, primary schools and secondary schools
- Within the boundary of tourist establishments, campgrounds and caravan parks located in rural areas.

The Regulations prescribe noise limits that apply to noise sources. That is, they impose an obligation on emitters of noise rather than on new sensitive land uses. However, it is common planning practice for significant new sensitive land uses (such as where a land use is proposed to be rezoned to accommodate noise sensitive areas) to consider existing noise emissions to prevent a new compliance burden being placed on existing noise sources (refer to Section 4.3.1). In the case of live music entertainment venues, an obligation exists under the planning framework that any residential land uses proposed within 50 metres is designed to accommodate the existing noise emissions of the venue (refer to the ‘Entertainment Venues’ heading further below)

## Commercial, industrial and trade premises

For commercial, industrial and trade premises, the Regulations define Day, Evening and Night periods for the assessment of noise. These are provided in Table A.1.

**TABLE A.1 APPLICABLE TIME PERIODS – COMMERCIAL, INDUSTRIAL AND TRADE PREMISES**

| TIME PERIOD | DETAILS |
|---|---|
| Day | Monday to Saturday, 7am to 6pm |
| Evening | Monday to Saturday, 6pm to 10pm<br>Sundays and public holidays, 7am to 10pm |
| Night | 10pm to 7am any day |

The Regulations define:

- In Division 3 - Regulation 118: Unreasonable noise from commercial, industrial and trade premises, as the noise during the time periods in Table A.1 upon 'noise sensitive areas' that exceeds the applicable noise limits, as defined in line with the Noise Protocol (EPA Publication 1254.2).
- In Division 3 - Regulation 121: Aggravated noise from commercial, industrial and trade premises as noise that exceeds:
  - » 75 dB $L_{Aeq,30\text{-}min}$ or the Noise Protocol noise limit by more than 15 dB during the Day
  - » 70 dB $L_{Aeq,30\text{-}min}$ or the Noise Protocol noise limit by more than 15 dB during the Evening
  - » 65 dB $L_{Aeq,30\text{-}min}$ or the Noise Protocol noise limit by more than 15 dB during the Night.

## Entertainment venues

For indoor entertainment venues and events, the Regulations define Day, Evening and Night periods for the assessment of noise. These are provided in Table A.2.

**TABLE A.2 APPLICABLE TIME PERIODS – INDOOR ENTERTAINMENT VENUES**

| TIME PERIOD | DETAILS |
|---|---|
| Day / Evening | 7am to 11pm Monday to Saturday (except public holidays) |
| | 9am to 10pm Sunday or a public holiday (except if either is preceding a public holiday) |
| | 9am to 11pm Sunday or a public holiday (if either is preceding a public holiday) |
| Night | 11pm to 7am the following day, Monday to Friday (except a public holiday or a day preceding a public holiday) |
| | 11pm to 9am following day, Saturday or any day preceding a public holiday |
| | 7am to 10pm the following day, Sunday or a public holiday (if either is preceding a public holiday) |

The Environment Protection Regulations define:

- In Division 4 - Regulation 125: Unreasonable noise as noise from indoor entertainment venues during the time periods in Table A.2 upon 'noise sensitive areas' that exceeds the applicable noise limits, as defined in line with the Noise Protocol.

- In Division 4 - Regulation 127: Aggravated noise as noise from indoor entertainment venues that exceeds:
  - » the Noise Protocol noise limit by more than 15 dB during the Day and Evening
  - » the Noise Protocol noise limit by more than 20 dB during the Night.

It is important to note the agent of change principle applies to indoor entertainment venues and events. This is set out in clause 53.06 of the Regulations to manage the relationship between live music venues and residential uses and assigns the responsibility for noise attenuation measures to the 'agent of change' (that is, a new use or development that is introduced into an existing environment). In practical terms, new or existing live music venues aiming to establish or expand must address and mitigate any noise impact on nearby residential properties. Likewise, new residential developments near existing live music venues are responsible for incorporating noise attenuation measures to safeguard residents from the live music noise.

## Environment Reference Standard

The *Environment Reference Standard* (Vic) (ERS) is a subordinate instrument made under the Environment Protection Act. The ERS was gazetted on 26 May 2021 and amended on 29 March 2022 (Victoria Government, 2022). The ERS identifies environmental values for Victoria in the areas of air quality, noise, water and contaminated land, and defines indicators and objectives to measure those values.

The ERS supports the protection of the environment from pollution and waste by providing a benchmark to assess and report on environmental conditions in the whole or any part of Victoria. The ERS does not set out enforceable compliance limits. Rather, risks of harm to human health and the environment from pollution and waste must be minimised as far as reasonably practicable, in accordance with the GED.

Part 3 of the ERS documents environmental values of the ambient sound environment, and indicators and objectives for the environment that are intended to support these values in assessing if the environmental value is being achieved, maintained or threatened. Table A.3 defines the environmental values of the ambient sound environment. Table A.4 lists the supporting indicators and objectives, which are defined as Day and Night period outdoor noise levels for different land use categories.

**TABLE A.3 ENVIRONMENTAL VALUES OF THE AMBIENT SOUND ENVIRONMENT**

| ENVIRONMENTAL VALUE | DESCRIPTION OF ENVIRONMENTAL VALUE |
|---|---|
| Sleep during the night | An ambient sound environment that supports minimal sleep disruption at night |
| Domestic or recreational activities | An ambient sound environment that supports recreational and domestic activities in a residential setting |
| Normal conversation | An ambient sound environment that allows for a normal conversation indoors without the need to raise voices |
| Child learning and development | An ambient sound environment that supports cognitive development and learning in children |
| Human tranquillity and enjoyment outdoors in natural areas | An ambient sound environment that allows for the appreciation and enjoyment of the environment for its natural condition and the restorative benefits of tranquil soundscapes in natural areas |
| Musical entertainment | An ambient sound environment that recognises the community's demand for a wide range of musical entertainment |

**TABLE A.4 INDICATORS AND OBJECTIVES OF THE AMBIENT SOUND ENVIRONMENT**

| LAND USE CATEGORY AND DESCRIPTION | INDICATOR [1] | OBJECTIVE |
|---|---|---|
| Category I: An urban form with distinctive features or characteristics of taller buildings, high commercial and residential intensity and high site coverage.<br>Includes, Industrial Zone 1 (IN1Z), Industrial Zone 2 (IN2Z), Port Zone (PZ), Road 1 Zone (RDZ1), Capital City Zone (CCZ), Docklands Zone (DZ) | Outdoor $L_{Aeq,8h}$ | 55 decibels (dB) |
| | Outdoor $L_{Aeq,16h}$ | 60 dB |
| Category II: Medium rise building form with a strong urban or commercial character. Includes, Industrial Zone 3 (IN3Z), Commercial 1 Zone (C1Z), Commercial 2 Zone (C2Z), Commercial 3 Zone (C3Z), Activity Centre Zone (ACZ), Mixed Use Zone (MUZ), Road 2 Zone (RDZ2) | Outdoor $L_{Aeq,8h}$ | 50 dB |
| | Outdoor $L_{Aeq,16h}$ | 55 dB |
| Category III: Lower rise building form including lower density residential development and detached housing, typical or suburban residential settings or in towns of district or regional significance.<br>Includes Residential Growth Zone (RGZ), General Residential Zone (GRZ), Neighbourhood Residential Zone (NRZ), Urban Floodway Zone (UFZ), Public Park and Recreation Zone (PPRZ), Urban Growth Zone (UGZ). | Outdoor $L_{Aeq,8h}$ | 40 dB |
| | Outdoor $L_{Aeq,16h}$ | 50 dB |
| Category IV: Lower density or sparse populations with settlements that include smaller hamlets, villages and small towns that are generally unsuited for further expansion. Land uses include primary industry and farming.<br>Includes Low Density Residential Zone (LDRZ), Township Zone (TZ), Rural Living Zone (RLZ), Green Wedge A Zone (GWAZ), Rural Conservation Zone (RCZ), Public Conservation and Resource Zone (PCRZ), Green Wedge Zone (GWZ), Farming Zone (FZ), Rural Activity Zone (RAZ) | Outdoor $L_{Aeq,8h}$ | 35 dB |
| | Outdoor $L_{Aeq,16h}$ | 40 dB |
| Category V: Unique combinations of landscape, biodiversity and geodiversity. These natural areas typically provide undisturbed species habitat. Natural areas are classified as land within Category V irrespective of the planning zones that apply to that land. | Qualitative | A sound quality that is conducive to human tranquillity and enjoyment having regard to the ambient natural soundscape. |

[1] The $L_{Aeq,8h}$ and $L_{Aeq,16h}$ are defined as the A-weighted equivalent noise level over the daytime period between 6 am to 10 pm and the night-time period between 10pm to 6am, respectively.

Comprehensive Development Zone (CDZ), Priority Development Zone (PDZ), Special Use Zone (SUZ) and Public Use Zone (PUZ) could also fall in Category I, II, III or IV depending on surrounding land uses and the intent of the specific planning zone (which may have a diversity of uses) as specified in a schedule to the planning zone.

Note that the noise metrics for the indicators and objectives in Table A.4 defined in the ERS are long-term average noise metrics (i.e. $L_{Aeq,16h}$ and $L_{Aeq,8h}$) and the impact of noise from sources with transient, intermittent and/or low frequency acoustic characteristics may not be accounted for by the average metrics in the ERS. Noise sources that exhibit special acoustic characteristics require consideration or additional metrics. These are discussed, where relevant, in the assessment in Section 6 and in the recommendations in Section 7.

## Noise policy and guidance for different noise sources

# Noise Protocol

EPA Victoria Publication 1826.4: *Noise limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (May 2021) (Noise Protocol) sets methodologies for establishing noise limits for operational noise sources related to commercial, industrial, trade premises and entertainment venues activities, and for assessing noise levels against the noise limits.

The Environment Protection Regulations require compliance with the noise limits defined by the Noise Protocol, with exceedances resulting in prescribed unreasonable noise as defined by the Environment Protection Act.

Annex A of the Noise Protocol designates a type for each of the land use zones codes, common to all planning schemes in Victoria and, also, for types of zones and reservations specific to planning schemes of local government areas within metropolitan Melbourne and its urban growth boundary, which include the areas covered by the SRL East Structure Plan Areas. In relation to this, the Noise Protocol states in clause 10 that:

*In designating a zone or reservation as a type, the Authority must have regard to the nature of uses permitted in that zone or reservation and must generally designate –*

*a. residential, rural and open spaces as type 1; and*

*b. commercial, business and light industry as type 2; and*

*c. general industry and major roads as type 3.*

In addition to being a critical part of establishing noise limits for a noise source, the designated types in the Noise Protocol can also be considered to provide guidance as to the level of acoustic design that may be required for a new sensitive development. Quieter land zone uses are assigned to type 1 and would typically be considered suitable for sensitive development without significant design interventions. However, development in type 2 and type 3 land uses may require more significant interventions to accommodate noise generating sources.

The designated types associated with the existing land use zones identified in SRL East Structure Plan Areas have been used for this technical assessment to aid defining when noise influence areas are required, and the evaluation of their potential noise impacts.

**Noise Protocol Part I - Commercial, industrial and trade premises**

Part I of the Noise Protocol defines different procedures for establishing noise limits for commercial, industrial and trade premises depending on whether the noise sensitive receptor is located within a major urban area or rural areas. Major urban areas are defined as those locations within Melbourne's urban growth boundary or within defined areas around major regional centres. SRL East Structure Plan Areas are located in urban areas.

For urban areas such as where SRL East Structure Plan Areas are located, the Noise Protocol defines noise limits dependent on the following:

- Time of day – different noise limits apply for the different Day, Evening and Night periods
- Land zoning used to determine the Zoning Level
- The measured background noise levels in the area in the absence of noise due to commercial, industrial or trade premises used to determine the Background Level.

Part I of the Noise Protocol also sets out adjustments for the character of the noise that must be considered when assessing noise from a commercial, industrial or trade premisses, where the character is determined to be present or audible at the sensitive receiver location. The following temporal and spectral characteristics of the noise need to be considered:

- Tonality – the presence of a distinct, identifiable prominent frequency or tonal component within the sound
- Impulsiveness – a sudden, brief burst of sound energy with rapid onset and decay
- Intermittency – irregular sound with silent intervals between noise bursts, forming an intermittent pattern.

**Noise Protocol Part II ‑ Entertainment venues**

Part II of the Noise Protocol refers to music noise. In terms of noise limits for indoor entertainment venues, the Noise Protocol sets music noise limits that are based on:

- Time of day – different noise limits apply for venues operating during the Day and Evening to those operating at Night
- The measured background noise levels in the area in the absence of noise from the subject or other premises.

For the purpose of setting noise limits for music noise from indoor entertainment venues, the background level is:

- The $L_{A90}$ level, for the day and evening period
- The $L_{OCT90}$ level, for the night period.

The noise limit for music noise from indoor entertainment venues that apply within noise sensitive areas, are:

- For the day and evening period as defined in Regulation 123, $L_{A90}$ + 5dB; and
- For the night period as defined in Regulation 123, $L_{OCT90}$ + 8dB

## VicRoads Traffic noise reduction policy – Arterial Roads, Freeways and Highways

The *VicRoads traffic noise reduction policy (2005)* (Vic) requires VicRoads (now the Department of Transport and Planning (DTP)) to limit traffic noise as follows:

- A limit of 63dB applies to new arterial roads and freeways if the noise level had been less than 63dB before the road was built. However, if the preceding noise level was 63dB or more (such as from local roads), a noise increase of up to 2dB is allowed.
- A limit of 63dB applies to arterial roads and freeways, where two or more lanes are added AND buildings which previously provided shielding from traffic noise are removed.

DTP will also consider limiting the increase in traffic noise due to a new road to no more than 12dB where the pre-existing noise level is less than 50dB.

The noise levels referred to in the policy are $L_{A10\ (18\ hour)}$ at residential dwellings, aged care homes, hospitals, motels, caravan parks and other buildings of a residential use, and $L_{A10\ (12\ hour)}$ at schools, kindergartens, libraries and other noise-sensitive community buildings.

This policy does not provide for noise attenuation along existing arterial roads.

It is important to note that the application of the policy in this assessment is limited since there are no State-controlled freeways that may influence the SRL East Structure Plan Areas.

While the *VicRoads traffic noise reduction policy* applies to road infrastructure upgrades, developers of new sensitive land uses adjacent to future or existing freeways are required by the VicRoads *Requirements of Developers – Noise Sensitive Uses* to ensure that traffic noise at future dwellings will not exceed the noise limits outlined in the policy. This will usually mean that developers must construct noise barriers, unless an alternative approach is agreed in consultation with the Responsible Authority and DTP. Local councils are encouraged to refer planning permit applications to DTP in these instances. This is expected to ensure appropriate conditions are placed on developers to mitigate traffic noise.

## Passenger Rail Infrastructure Noise Policy (PRINP)

The *Passenger Rail Infrastructure Noise Policy 2013* (Vic) (PRINP) provides recommended criteria for new residential developments exposed to rail noise. The criteria act as a threshold which, when exceeded, triggers investigation of potential mitigation measures. The PRINP is triggered when there is statutory approval required for:

- Construction of new passenger rail infrastructure
- Redevelopment of existing passenger rail infrastructure
- A change in land use adjacent to the rail corridor – which is the relevant to this assessment.

The implementation of the PRINP is not mandatory in all instances, but planning authorities must have regard to it as early as possible in the development of a relevant planning scheme amendment relating to land near an existing or planned rail corridor.

Table A.5 lists the PRINP investigation thresholds for residential developments near an existing passenger rail corridor.

**TABLE A.5 PRINP INVESTIGATION THRESHOLDS FOR RESIDENTIAL DEVELOPMENT NEAR AN EXISTING RAIL CORRIDOR**

| TIME | INVESTIGATION THRESHOLDS |
|---|---|
| Day (6am – 10pm) | $L_{Aeq}$ 65 dB or $L_{Amax}$ 85 dB[1] |
| Night (10pm – 6am) | $L_{Aeq}$ 60 dB or $L_{Amax}$ 85 dB[1] |

[1] As defined by the PRINP, the $L_{Amax}$ is the 95$^{th}$ percentile of the maximum sound pressure level attributed to train pass-bys.

PRINP takes a balance of objectives approach to noise mitigation. If the investigation thresholds in Table A.5 are exceeded, balanced mitigation options for avoiding, minimising and mitigating rail noise need to be considered by transport bodies and planning authorities, by applying the policy principles set in the PRINP, which can include planning and/or engineering treatments. Alternative measures may be considered through planning scheme amendments such as architectural treatments to reduce internal, rather than external, rail noise levels.

## Aircraft noise AS 2021:2015, ANEF System and Airport Environs Overlay (AEO)

The Airport Environs Overlay (AEO) is an overlay that is part of the Victorian Planning Provisions (VPPs), and which implements the airport's Aircraft Noise Exposure Forecast (ANEF) contours and the land use recommendations of Australian Standard AS 2021:2015 *'Acoustics – Aircraft Noise Intrusion Building Siting and Construction'* (AS 2021:2015).

AS 2021:2015 provides guidance on the interpretation of ANEF contours that can be referred to by planning authorities when considering applications for new sensitive land use development in the vicinity of an airfield. AS 2021:2015 recommends that land use planning is restricted within the 20 ANEF contour for residential developments and this is considered as an 'acceptable site'. Buildings on acceptable sites would not usually need to be designed and constructed to provide protection specifically against aircraft noise. However, it should not be inferred that aircraft noise will be unnoticeable in areas with 20 ANEF contour or lower. A 'conditionally acceptable site' criteria falls within the 20 to 25 ANEF contour. Areas falling within the 25 ANEF contour or greater are considered unacceptable for residential development under AS 2021:2015.

Aircraft noise has the potential to be relevant to SRL East Structure Plan Areas near an airport. However, while the Clayton and Cheltenham Structure Plan Areas are near Moorabbin Airport, none of the SRL East Structure Plan Areas are directly affected by the Moorabbin Airport AEO such that there is no direct application of the aircraft noise provisions under the VPPs to the SRL East Structure Plan Areas.

## Helicopter noise

Helicopter noise is relevant to this assessment where helipads operate within the SRL East Structure Plan Areas. This includes the Victorian Heart Hospital within the Monash Structure Plan Area and the Monash Children's Hospital within the Clayton Structure Plan Area, which both have helipads (refer to Section 5.4 and Section 5.3) that operate during standard hours, as well as outside standard hours for emergency flights.

**Noise control guidelines**

EPA Publication 1254.2 *Noise control guidelines* (May 2021) provides guidance to municipal officers to assist with addressing possible noise nuisance and for resolving complaints or preventing a possible noise nuisance. With regards to helicopters, Section 16 of the guidelines provides the following external noise level criteria, which covers three separate components, each of which should be satisfied at the nearest affected buildings:

- The measured $L_{AeqT}$ (measured over the entire daily operating time of the helipad, between 7am to 10pm) should not exceed 55dB at the residence
- The measured maximum noise level $L_{Amax}$ should not exceed 82 dB at the nearest residential premises (See Note below)
- Operation outside the hours between 7am and 10pm should not be permitted except for emergency flights.

Note: These levels will generally be met by a separation between the landing site and the residential premises of 150 metres for helicopters of less than 2 tonnes all-up-weight, and 250 metres for helicopters of less than 15 tonnes all-up-weight.

It is noted the *Noise control guidelines* apply predominantly to the assessment of proposed helipads, but do not apply to the helipads within the Clayton and Monash Structure Plan Areas due to their need for emergency flights. For this technical assessment, the Noise control guidelines were considered to provide guidance on the risk associated with noise impacts for new sensitive uses near the helipads.

**Australian Standard 2021:2015 Aircraft Noise Intrusion**

For aircraft noise intrusion, such as from the emergency helicopter operations associated with the Victorian Heart Hospital and Monash Children's Hospital, the guideline criteria set out in the AS 2021:2015 '*Aircraft noise intrusion – Building siting and construction'* (AS 2021:2015) are considered relevant. The criteria are not mandatory unless specified in a planning regulation or approval.

Table A.6 lists the AS 2021:2015 recommended maximum internal noise levels ($L_{AS\ Max}$) for aircraft flyovers, including helicopter flyovers, for residential land uses.

**TABLE A.6 AS2021:2015 MAXIMUM INTERNAL NOISE GUIDELINE LEVELS FOR HELICOPTER FLYOVER**

| BUILDING TYPE AND ACTIVITY | RECOMMENDED INTERNAL NOISE LEVELS $L_{ASMAX}$ [1,2] |
|---|---|
| ***Houses, home units, flats, caravan parks*** | |
| Sleeping areas, dedicated lounges | 50 dB |

| BUILDING TYPE AND ACTIVITY | RECOMMENDED INTERNAL NOISE LEVELS $L_{ASMAX}$ [1,2] |
|---|---|
| Other habitable spaces | 55 dB |

Notes:

[1] The indoor design sound levels in this table are hypothesised values based on Australian experience. A design sound level is the maximum level (dB $L_{ASmax}$) from an aircraft flyover which, when heard inside a building by the average listener, will be judged as not intrusive or annoying by that listener while carrying out the specified activity. Owing to the variability of subjective responses to aircraft noise, these figures will not provide sufficiently low interior noise levels for occupants who have a particular sensitivity to aircraft noise.

[2] The indoor design sound levels are intended for the sole purpose of designing adequate construction against aircraft noise intrusion and are not intended to be used for assessing the effects of noise. Land use planning authorities may have their own internal noise level requirements which may be used in place of the levels above.

Note that criteria in Table A.6 are solely intended as guidance for indoor design sound levels. For new residential developments proposed near existing helipads, the indoor noise criteria requirement is to be established by or in agreement with the relevant planning authority, where the values in Table A.6 may be considered appropriate.

## Construction noise

Construction noise and vibration are temporary sources and therefore are not directly relevant to this assessment. However, consideration is given to the potential impact during construction of the developments, part of the structure plans. It is recognised that there is the potential for cumulative impacts on existing sensitive receivers in the SRL Structure Plan Areas, due to the possibility of other construction sites, including the SRL East sites, to be in operation when the structure plan developments are being constructed.

EPA Victoria has prepared the *Civil construction, building and demolition guide 2023* (EPA Victoria Publication 1834) that provides guidance on construction noise management to the construction industry (including vibration). EPA Victoria Publication 1834 is not a compliance document but is intended to assist in contributing to the state of knowledge that duty holders should consider in meeting the GED. As such, it provides a framework for assessing construction noise and vibration.

Under EPA Victoria Publication 1834, land uses sensitive to airborne construction noise (noise sensitive receivers, also sensitive to vibration) are defined to include sensitive areas or species from a human or environmental context, including, but not limited to:

- Social surroundings (houses, hospitals, schools, playgrounds, public amenities)
- Waterways, streams, sources of drinking water for people or livestock
- Parks and recreational areas
- Areas of public interest and cultural significant
- Land or water with identified flora, fauna, vegetation, ecosystem or environmental value.

EPA Victoria Publication 1834 defines working hours periods and recommends different construction noise management techniques for different working hours as summarised in Table A.7.

**TABLE A.7 CONSTRUCTION WORKING HOURS - EPA VICTORIA PUBLICATION 1834**

| TIME PERIODS AND WORKING HOURS | CONSTRUCTION NOISE PROVISIONS |
|---|---|
| Normal Working Hours:<br>7 am – 6 pm Monday to Friday<br>7 am – 1 pm Saturdays | Minimise noise as far as possible in any situation. |
| Weekend/Evening Working Hours:<br>6 pm – 10 pm Monday to Friday<br>1 pm – 10 pm Saturdays<br>7 am – 10 pm Sundays and public holidays | Unless works are classed as Unavoidable Works, then noise levels at residential premises should not exceed the background noise level by:<br>▪ 10 dB or more for up to 18 months after project commencement<br>▪ 5 dB or more after 18 months |
| Night Period:<br>10 pm – 7 am any day | Unless works are classed as Unavoidable Works, then construction noise levels should be inaudible within a habitable room of any residential premises. |

No specific noise limits are established for works during Normal Working Hours, but construction noise should be minimised as far as possible.

Works should be carried out during the Normal Working Hours, where possible. However, at times it might not be possible for works to occur during these hours. This may be due to a number of factors including, but not limited to:

- Worker safety when working around road or rail corridors.
- Work must be carried out on weekends or at night to minimise impacts on the broader transport network.

If works are required outside of Normal Working Hours, then these would need to be classified as:

- **Unavoidable Works:** Works that must be conducted outside of Normal Working Hours.
- **Managed-Impact Works:** Works where noise emissions are managed through actions specified in a noise and vibration management plan, to minimise impacts on noise sensitive receivers. These works do not include intrusive characteristics such as impulsive noise or tonal movement alarms.
- **Low-Noise Impact Works:** Inherently quiet or unobtrusive works, such as manual painting, internal fitouts and cabling. These works do not include intrusive characteristics such as impulsive noise or tonal movement alarms.

## Vibration – Human Comfort

Vibration (also referred to as ground-borne vibration) is transmitted through the ground and can reach the foundation of a building, which then responds to the vibration, and transmits it through the building structure. Ground-borne vibration is associated with a frequency range of roughly between 1 and 100 Hz.

Train pass-bys are a common source of ground-borne vibration, relevant to this assessment. The ground-borne vibration is generated by the interaction between the train and the track (and subsoil). The magnitude of the vibration at a sensitive receptor depends on various factors including the distance separation, the train and railway types and ground soil properties. Due to geometrical spread and damping, vibration amplitudes are likely to decrease with increasing distance from the source. The attenuation is frequency dependant.

While vibration is subject to the General Environmental Duty under the Environment Protection Act, no specific vibration criteria apply in Victoria and so reference has been made to relevant vibration criteria from other jurisdictions. The vibration criteria used for this technical assessment was based on:

- British Standard - BS 6472: *'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting', 2008* (BS 6472-1:2008)

- Department of Environment and Conservation (NSW) – '*Assessing Vibration: a technical guideline*' *2006* which sets out assessment methodologies in general accordance with British Standard BS 6472-1:2008.

Due to the variable and intermittent nature of vibration events from rail pass-bys, the criteria defined by these documents assess intermittent vibration using Vibration Dose Value (VDV) on human comfort. VDV is a cumulative level measurement of vibration level over a specific period (Day and Night periods). This parameter is typically used when assessing intermittent vibration as it is sensitive to peaks in vibration and combines the amplitude of vibration with the time for which the vibration occurs. It is typically used for human exposure to vibrations. Based on the reference documents listed above, and aligned with the Environment Effects Statement (EES) for SRL East, acceptable VDVs applicable to the SRL East Structure Plan Areas are provided in Table A.8.

**TABLE A.8 GROUND-BORNE VIBRATION CRITERIA FOR SENSITIVE RECEIVERS INSIDE BUILDINGS**

| TYPE OF OCCUPANTS | VIBRATION DOSE VALUE (VDV) CRITERIA ($M/S^{1.75}$) | | | |
|---|---|---|---|---|
| | DAYTIME[1] | | NIGHT-TIME[1] | |
| | PREFERRED | MAXIMUM | PREFERRED | MAXIMUM |
| Residential buildings (occupants) | 0.20 | 0.40 | 0.10 | 0.20 |
| Other sensitive buildings (occupants in educational, health, sport facilities) | 0.40 | 0.80 | 0.40 | 0.80 |

[1] Daytime is specified as the period between 07:00 and 22:00. Night-time is specified as the period between 22:00 and 07:00.

AJM
Joint Venture

# Appendix B

# Planning schemes: noise policies

# Appendix B: Planning schemes: noise policies

## Victoria planning provisions

This appendix presents the planning schemes policies identified for noise and set out in the VPPs (as listed in Table 4.2 in Section 4.2.1), which apply to all the SRL East Structure Plan Areas as these are contained within their Planning Schemes. The information in this Appendix has been reproduced from www.planning.vic.gov.au and only the text relevant to noise within the policies is presented.

## Clause 13.05-1S Noise Management (Noise)

Objective: To assist the management of noise effects on sensitive land uses.

Strategy: Ensure that development is not prejudiced and community amenity and human health is not adversely impacted by noise emissions.

Minimise the impact on human health from noise exposure to occupants of sensitive land uses (residential use, childcare centre, school, education centre, residential aged care centre or hospital) near the transport system and other noise emission sources through suitable building siting and design (including orientation and internal layout), urban design and land use separation techniques as appropriate to the land use functions and character of the area.

Policy guidelines: Consider as relevant: The noise requirements in accordance with the Environment Protection Regulations under the *Environment Protection Act 2017.*

Policy documents: Consider as relevant:

- *Environment Protection Regulations under the* Environment *Protection Act 2017*
- *Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues* (Publication 1826, Environment Protection Authority, May 2021)
- *Environment Reference Standard* (Gazette No. S 245, 26 May 2021)
- *Passenger Rail Infrastructure Noise Policy* (Victorian Government, 2013)
- *VicTrack Rail Development Interface Guidelines* (VicTrack, 2019)

## Clause 13.07-3S Live music (Amenity, Human Health and Safety)

**Objective:** To encourage, create and protect opportunities for the enjoyment of live music.

Strategies: Identify areas where live music venues are encouraged or where there are high concentrations of licensed premises or clusters of live music venues.

Implement measures to ensure live music venues can co-exist with nearby residential and other noise sensitive land uses.

# Clause: 18.02-7S Airports and airfields

Objective: To strengthen the role of Victoria's airports and airfields within the state's economic and transport infrastructure, guide their siting and expansion, and safeguard their ongoing, safe and efficient operation.

Strategies: Protect airports and airfields from incompatible land use and development. Prevent land use or development that poses risks to the safety or efficiency of an airport or airfield, including any of the following risks:

- Building-generated windshear and turbulence.
- Increased risk of wildlife strike.
- Pilot distraction from lighting.
- Intrusion into protected airspace.
- Interference with communication, navigation and surveillance facilities.
- Increased risk to public safety at the end of runways.

Minimise the detrimental effects of aircraft noise when planning for areas around airports and airfields.

Limit the intensification of noise-sensitive land uses, and avoid zoning or overlay changes that allow noise-sensitive land use and development, where ultimate capacity or long-range noise modelling indicates an area is within a 20 Australian Noise Exposure Forecast (ANEF) contour or higher.
Avoid zoning or overlay changes that allow noise-sensitive land uses outside the Urban Growth Boundary, and encourage measures to reduce the impact of aircraft noise in planning for areas within the Urban Growth Boundary, where ultimate capacity or long-range noise modelling indicates an area is within 'number above' contours (N Contours) representing:

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

Ensure land use and development at airports and airfields contributes to the aviation needs of the state and the efficient and functional operation of the airport or airfield.

Ensure land use and development at airports complements the role of the airport relevant to the precincts:

- Moorabbin Airport – a general aviation airport that is an important regional and state aviation asset supporting the state's aviation industry and access to regional Victoria.

Plan for areas around airports and airfields so that land use or development does not prejudice future airport or airfield operations or expansions in accordance with an approved strategy or master plan for that airport or airfield.

Preserve long-term options for a new general aviation airport south-east of metropolitan Melbourne by ensuring urban land use and development does not infringe on possible sites, buffer zones or flight paths.

Avoid the location of new airports and airfields in areas that have greater long-term value to the community for other purposes.

Ensure that in the planning of airports and airfields, land use decisions are integrated, appropriate land use buffers are in place and provision is made for associated businesses that service airports.

Plan the location of airports and airfields, nearby existing and potential development, and the land-based transport system required to serve them, as an integrated operation.

Plan the visual amenity and impact of any land use or development on the approaches to an airport or airfield to be consistent with the status of the airport or airfield.

Policy documents: Consider as relevant:

- *National Airports Safeguarding Framework* (as agreed by Commonwealth, State and Territory Ministers at the meeting of the Standing Council on Transport and Infrastructure on 18 May 2012)
- *Avalon Airport Master Plan* (Avalon Airport Australia Pty Ltd, 2015)
- *Avalon Airport Strategy* (Department of Business and Employment/Aerospace Technologies of Australia, 1993) and its associated Aircraft Noise Exposure Concepts
- *Melbourne Airport Strategy* (Government of Victoria/Federal Airports Corporation, approved 1990) and its associated *Final Environmental Impact Statement*

## Clause 45.02 Airport Environs Overlay

(Shown on the planning scheme map as **AEO** with a number).

Purpose

To implement the Municipal Planning Strategy and the Planning Policy Framework.

To identify areas which are or will be subject to high levels of aircraft noise, including areas where the use of land for uses sensitive to aircraft noise will need to be restricted.

To ensure that land use and development are compatible with the operation of airports in accordance with the appropriate airport strategy or master plan and with safe air navigation for aircraft approaching and departing the airfield.

To assist in shielding people from the impact of aircraft noise by requiring appropriate noise attenuation measures in new dwellings and other noise sensitive buildings.

To limit the number of people residing in the area or likely to be subject to significant levels of aircraft noise.

45.02-2 Construction of buildings:

Any new building must be constructed so as to comply with any noise attenuation measures required by Section 3 of Australian Standard AS 2021-2015, Acoustics - Aircraft Noise Intrusion - Building Siting and Construction, issued by Standards Australia Limited.

**Note:** In Section 3 of Australian Standard AS 2021-2015, Table 3.3 refers to both building types and activities within those buildings. Each building type listed has its ordinary meaning and should not be interpreted as defined in this scheme.

45.02-5 Decision guidelines:

Before deciding on an application, in addition to the decision guidelines in clause 65, the responsible authority must consider, as appropriate:

- The Municipal Planning Strategy and the Planning Policy Framework.
- Whether the proposal will result in an increase in the number of dwellings and people affected by aircraft noise.
- Whether the proposal is compatible with the present and future operation of the airport in accordance with the appropriate airport strategy or master plan.
- Whether the design of the building incorporates appropriate noise attenuation measures.
- The views of the airport owner.

## Clause 53.04 Convenience Restaurant and Take-away Food Premises

53.04-1 Application: These requirements only apply to land in a residential zone.

53.04-2 Decision guidelines: Before deciding on an application to use land for a convenience restaurant or take-away food premises or to construct a building or construct or carry out works associated with a convenience restaurant or take-away food premises, in addition to the decision guidelines in clause 65, the responsible authority must consider, as appropriate:

- Whether the site layout and the design of buildings, noise attenuation measures, landscaping, car parking, vehicle access lanes, loading bays, rubbish bins, plant and equipment, lights, signs, drive through facilities and playgrounds are designed to prevent significant loss of amenity to adjoining land due to noise, emission of noise, emission of light or glare, loss of privacy, litter or odour.
- Whether any special measure may be necessary to protect the amenity of adjoining land in residential use, including buffer planting, noise attenuation measures and litter collection arrangements.

## Clause 53.06 Live Music Entertainment

Purpose:

To protect live music entertainment venues from the encroachment of noise sensitive residential uses.

To ensure that noise sensitive residential uses are satisfactorily protected from unreasonable levels of live music and entertainment noise.

To ensure that the primary responsibility for noise attenuation rests with the agent of change.

53.06-1 Application:

This clause applies to an application required under any zone of this scheme to use land for, or to construct a building or construct or carry out works associated with:

- A live music entertainment venue.
- A noise sensitive residential use that is within 50 metres of a live music entertainment venue.
- A noise sensitive residential use that is in an area specified in clause 1.0 of the schedule to this clause

This clause does not apply to:

- The extension of an existing dwelling.
- A noise sensitive residential use that is in an area specified in clause 2.0 of the schedule to this clause.

53.06-2 Meaning of terms:

In this clause:

- live music entertainment venue means:
  - » a food and drink premises, nightclub, function centre or residential hotel that includes live music entertainment
  - » a rehearsal studio
  - » any other venue used for the performance of music and specified in clause 3.0 of the schedule to this clause, subject to any specified condition or limitation.
- ***noise sensitive residential use*** means a community care accommodation, dependent person's unit, dwelling, residential aged care facility, residential village, retirement village or rooming house.

53.06-3 Requirements to be met:

A live music entertainment venue must be designed, constructed and managed to minimise noise emissions from the premises and provide acoustic attenuation measures that would protect a noise sensitive residential use within 50 metres of the venue.

A noise sensitive residential use must be designed and constructed to include acoustic attenuation measures that will reduce noise levels from any:

- Indoor live music entertainment venue to below the noise limits specified in the Environment Protection Regulations under the Environment Protection Act 2017 and the incorporated Noise Protocol (Publication 1826, Environment Protection Authority, November 2020)
- Outdoor live music entertainment venue to below 45dB(A), assessed as an $L_{eq}$ over 15 minutes.

For the purpose of assessing whether the above noise standards are met, the noise measurement point may be located inside a habitable room of a noise sensitive residential use with windows and doors closed (consistent with EPA Publication 1826).

A permit may be granted to reduce or waive these requirements if the responsible authority is satisfied that an alternative measure meets the purpose of this clause.

53.06-4 Application requirements: An application must be accompanied by the following information, as appropriate:

- If the application is associated with a noise sensitive residential use:
  - » the location of any live music entertainment venues within 50 metres of the site
  - » the days and hours of operation of identified venues.
- If the application is associated with a live music entertainment venue:
  - » the location of any noise sensitive residential uses within 50 metres of the site
  - » the days and hours of operation of that venue

» the times during which live music will be performed.

53.06-5 Decision guidelines: Before deciding on an application, in addition to the decision guidelines in clause 65, the responsible authority must consider, as appropriate:

- The extent to which the siting, layout, design and construction minimise the potential for noise impacts.
- Whether existing or proposed noise sensitive residential uses will be satisfactorily protected from unreasonable live music and entertainment noise.
- Whether the proposal adversely affects any existing uses.

Planning Practice Note 81 (PPN81): Live music and entertainment noise (November 2022)

PPN81 provides guidance about the operation of clause 53.06 (Live Music and Entertainment Noise). It refers to Entertainment venue noise which is regulated by Part 5.3, Division 4 of the Environment Protection Regulations 2021 (the Regulations) and the Noise Protocol.

The note explains the agent of change principle, introduced into clause 53.06, to manage the relationship between live music venues and residential uses. The principle assigns responsibility for noise attenuation measures to the 'agent of change', explaining that a new residential development close to an existing live music venue will be responsible for noise attenuation of its building to protect future residents from the live music venue and, also applies the other way around for a new use or an existing live music venue seeking to establish or expand (that is, they will be responsible for attenuating any noise effects that are caused by that change on nearby residential properties). Everyone has a role in noise management, including existing permit holders and live music entertainment venues who must ensure they comply with the Regulations and any relevant permits or other obligations.

The Note also provides guidance for techniques and approaches on how to meet the requirements of clause 53.06 listing measures for both attenuating a live music venue and attenuating a noise sensitive residential use. It also specifies that despite the Regulations do not prescribe noise limits for noise associated with the arrival and departure of people attending a premises, it requires a venue applicant to still identify how they propose to manage the behaviour of patrons coming and going from the venue so that nuisance impacts on neighbours are minimised.

**Clause 55.03-10 Parking location (Site Layout and Building Massing)**

Objectives: To provide convenient parking for resident and visitor vehicles.

To protect residents from vehicular noise within developments.

**Standard B15**

Car parking facilities should:

- Be reasonably close and convenient to dwellings.
- Be secure.
- Be well ventilated if enclosed.

Shared accessways or car parks of other dwellings should be located at least 1.5 metres from the windows of habitable rooms. This setback may be reduced to 1 metre where there is a fence at least 1.5 metres high or where windowsills are at least 1.4 metres above the accessway.

## Clause 55.04-8 Noise impact (Amenity impacts – two or more dwellings on a lot and residential buildings)

Objectives: To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources.

**Standard B24**

Noise sources, such as mechanical plant, should not be located near bedrooms of immediately adjacent existing dwellings.

Noise sensitive rooms and secluded private open spaces of new dwellings and residential buildings should take account of noise sources on immediately adjacent properties.

Dwellings and residential buildings close to busy roads, rail lines or industry should be designed to limit noise levels in habitable rooms.

Decision guideline: Before deciding on an application, the responsible authority must consider the design response.

## Clause 55.07-7 Noise impacts (Apartment Developments)

Purpose: Clause 55.07 sets out requirements for an apartment development.

Objective: To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources.

**Standard B41**

Noise sources, such as mechanical plants should not be located near bedrooms of immediately adjacent existing dwellings.

The layout of new dwellings and buildings should minimise noise transmission within the site.

Noise sensitive rooms (such as living areas and bedrooms) should be located to avoid noise impacts from mechanical plants, lifts, building services, non-residential uses, car parking, communal areas and other dwellings.

New dwellings should be designed and constructed to include acoustic attenuation measures to reduce noise levels from off-site noise sources.

Buildings within a noise influence area specified in Table B8 (Table A.1 in this report) should be designed and constructed to achieve the following noise levels:

- Not greater than 35dB(A) for bedrooms, assessed as an LAeq,8h from 10pm to 6am.
- Not greater than 40dB(A) for living areas, assessed $L_{Aeq,16h}$ from 6am to 10pm.

Buildings, or part of a building screened from a noise source by an existing solid structure, or the natural topography of the land, do not need to meet the specified noise level requirements.

Noise levels should be assessed in unfurnished rooms with a finished floor and the windows closed.

**TABLE B.1 NOISE INFLUENCE AREA**

| NOISE SOURCE | NOISE INFLUENCE AREA* |
|---|---|
| **Zone interface** | |
| 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 |
| Railway servicing freight in Metropolitan Melbourne | 135 metres from the centre of the nearest track |

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

Decision guidelines: Before deciding on an application, the responsible authority must consider:

- The design response.
- Whether it can be demonstrated that the design treatment incorporated into the development meets the specified noise levels or an acoustic report by a suitably qualified consultant submitted with the application.
- Whether the impact of potential noise sources within a development have been mitigated through design, location and siting.
- Whether the layout of rooms within a dwelling mitigates noise transfer within and between dwellings.
- Whether an alternative design meets the relevant objectives having regard to the amenity of the dwelling and the site context.

## Clause 58.04-3 Noise impact (Amenity Impacts)

Objectives: To contain noise sources in developments that may affect existing dwellings. To protect residents from external and internal noise sources.

**Standard D16**

The Standard D16 contains the same text as per clause 55.04-8 Noise impact (Amenity impacts) set out above in this section and is considered one of the main policies relevant to this assessment.

# Kingston Planning scheme

This appendix presents the Planning Schemes policies identified for noise and set out in the Kingston Planning Scheme (as listed in Table 4.4 in Section 4.2.2), which are beyond those in the VPPs and apply to eastern

portion of the Cheltenham Structure Plan Area and a portion of Clayton Structure Plan Area. The information in this Appendix has been reproduced from www.planning.vic.gov.au and only the text relevant to noise within the policies is presented.

## Clause 02.03-3 Environmental risks and amenity (Strategic directions)

Noise and land use compatibility:

The significant role played by the Moorabbin Airport in the local and regional economy and in the state's transport infrastructure must be protected. There is a need to ensure that the use and development of land around the Moorabbin Airport is sensitive to the long term operation of the airport.

Materials recycling facilities have played an important role in reducing waste at landfill sites. As landfill sites cease operation in Kingston, alternative locations for future facilities in the region are to be found outside Kingston's green wedge. It is important that these facilities are located appropriately in order to minimise off site impacts.

Strategic directions for noise and land use compatibility impacts are to:

- Ensure that buffers are established and maintained around aircraft related activities at Moorabbin Airport and land filling operations, to minimise impacts on nearby sensitive land uses and the health and welfare of the community.

- Avoid intensifying use and development, particularly sensitive uses, in areas subject to high levels of aircraft noise.

## Clause 02.03-8 Transport (Strategic directions)

An integrated transport network based on public transport, road, pedestrian and cycle systems is important in providing access for Kingston residents to commercial and activity centres, community facilities, education and recreation areas. Kingston's landscape assets offer extensive opportunities for both cycling and walking. A great number of cyclists from other municipalities enjoy Beach Road, the coastal bike path and inland cycling routes. Improved the public transport services, interchange facilities and links between activity centres will help address the issue of inadequate access for some parts of the municipality to public transport services.

The sustainability of Kingston's transport network is dependent upon improvements to the road network to manage capacity and address deficiencies identified in the north-south and east-west arterial road connections. The missing links in the road network has direct implications for inter/intra-regional movement patterns, the efficiency of local and industrial traffic movements throughout the municipality, air and noise pollution and road safety. Poor linkages between industrial precincts and the major arterial road network also cause significant conflict between industrial traffic and abutting land uses.

Strategic directions for transport planning are to:

- Integrate land use and transport planning to create a more sustainable community.

- Support increased transport choices available to Kingston's residents and to ensure accessibility to services and open space areas.

- Promote the development of bicycle and pedestrian linkages between residential, commercial, industrial and open space areas.

- Improve traffic circulation, car parking, site layout and truck access to sites within Kingston's older industrial areas.

# Clause 13.05-1L Noise abatement – Kingston

Strategies: Encourage the inclusion of acoustic attenuation measures for new housing within the Activity Centre Zone, Commercial 1 Zone and Mixed Use Zone areas, to mitigate adverse amenity impacts of non-residential uses.

Incorporate design measures, including acoustic attenuation, into new housing developed in locations adjacent to noise generating activities such as industrial areas, main roads, rail lines and the Moorabbin Airport.

# Clause: 18.02-7L-02 Noise abatement – Moorabbin Airport environs

Policy application: This policy applies to all land within the area identified on the Moorabbin Airport Environs map to this clause (excluding land affected by an Airport Environs Overlay control).

This policy does not apply to buildings and works to make modifications to a dwelling that was constructed prior to 22 December 1999.

Strategies: Facilitate use and development of land that is compatible with the operation of the Moorabbin Airport in respect to the impact of aircraft noise on sensitive uses.

Promote the installation of noise attenuation measures in new dwellings and other buildings developed for sensitive uses in locations that are affected by aircraft noise.

Policy guidelines: Consider as relevant:

- The Australian Noise Exposure Forecast (ANEF) as contained in the master plan for the airport.
- The potential impacts of aircraft noise on the following uses: accommodation, art & craft centre, child care centre, display home, education centre, hospital, hotel, office, place of assembly, research & development centre, research centre, restricted recreation facility, tavern.
- The present and future airport operations in accordance with the approved master plan for Moorabbin Airport.
- The views of the Commonwealth Department of Infrastructure and Transport regarding the impact of the development on the Moorabbin Airport environs.
- Constructing buildings in accordance with noise attenuation measures at Section 3 of *Australian Standard AS2021-2015, Acoustics - Aircraft Noise Intrusion - Building Siting and Construction* (Standards Australia Limited, 2015).

Policy documents: Consider as relevant:

- Australian Standard AS2021-2015, Acoustics – Aircraft Noise Intrusion – Building Siting and Construction (Standards Australia Limited, 2015)

# Schedule 24 to Clause 43.02 Design and Development Overlay

(Shown on the planning scheme map as **DDO24)**.

**Clayton South Industrial Precinct**

The Overlay applies to the land known as:

- 1376-1378 Centre Road, Clayton South
- 1380-1388 Centre Road, Clayton South
- 1400 Centre Road, Clayton South
- 1408-1418 Centre Road, Clayton South
- 456B Haughton Road, Clayton South
- 2-6 Audsley Street, Clayton South
- 8 Audsley Street, Clayton South
- 14-26 Audsley Street, Clayton South
- 20-22 Main Road, Clayton South

2.0 Access, Movement and Amenity

- Future development should incorporate the recommendations set out in the report(s) prepared pursuant to the requirement at clause 5.0 (Noise and Vibration Impact) of this Schedule to the satisfaction of the Responsible Authority.

5.0 Application Requirements

An application must be accompanied by the following documents, reports, guidelines and plans, where appropriate, prepared to the satisfaction of the responsible authority:

- Development Concept Plan: A Development Concept Plan must be provided including urban design principles and the following information (included here those related to noise only):
  - » Treatments for key interface areas (such as interface with the Dandenong Line and between non-residential land uses and proposed development) which may include noise and vibration attenuation.
- Waste Management Plan: A Waste Management Plan must be provided which includes:
  - » Designation of methods of collection including the need to provide for private services or utilisation of Council services. If private collection is used, this method must incorporate recycling services and must comply with the relevant EPA noise guidelines relating to time of collection.
- Noise and Vibration Impact Report: A Noise and Vibration Impact Report prepared by a suitably qualified person(s) must be provided to the satisfaction of the Responsible Authority after seeking and considering the views of the Department of Transport, Planning and Local Infrastructure. The Report must include:
  - » Whether the proposed development is likely to be affected by Centre Road and, in particular, the Dandenong Line
  - » Noise and vibration impacts on the development site from Centre Road and the Dandenong Line
  - » What ameliorative or remedial measures will be taken to mitigate the adverse impacts (if any) identified in the report.

6.0 Decision Guidelines

The following decision guidelines apply to an application for a permit under clause 43.02, in addition to those specified in clause 43.02 and elsewhere in the scheme which must be considered, as appropriate, by the responsible authority (included here those related to noise only):

Whether new development incorporates ameliorative or remedial measures to mitigate any adverse impacts identified in the Noise and Vibration Impact Report.

AJM
Joint Venture

# Appendix C

# Existing conditions

# Appendix C: Existing Conditions

This appendix presents the existing conditions identified for the assessment in detail, relevant to noise and vibration for each Study Area.

Existing sources are identified to provide context for this technical assessment in understanding the existing sound environment in the Study Areas, based on the current land uses.

## Cheltenham Study Area

The Cheltenham Study Area is located in the cities of Kingston and Bayside. The eastern portion of the Study Area to the east of the rail line is in the City of Kingston, and the western portion of the Study Area to the west of the rail line is in the City of Bayside.

There are industrial land uses concentrated to the north-east of the Cheltenham Structure Plan Area and significant green areas of golf courses adjacent to the south. Commercial areas are concentrated alongside Highett Road and Nepean Highway, east of the existing Southland Station, with the Hampton East Activity Centre Area to the south-east of the Cheltenham Structure Plan Area, allocated within the Bayside Planning Scheme for mixed use. Areas to the north-west, west and east of the Cheltenham Structure Plan Area are generally used for residential land uses, with small scattered local commercial areas. Moorabbin Airport is located approximately 2 kilometres south-east of the Cheltenham Structure Plan Area.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.1 .

## Potential sources from existing businesses

Noise emissions from existing business are likely from general industrial and commercial activities of small to large scale involving motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, HVAC, AHU and ASHP units). Music from events/entertainment venues is also a consideration.

No vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.1 below identified businesses with potential noise sources within Cheltenham Structure Plan Area, and those within the Study Area (but outside the Cheltenham Structure Plan Area).

## TABLE C.1 EXISTING BUSINESSES WITH IDENTIFIED NOISE SOURCES IN THE CHELTENHAM STRUCTURE PLAN AREA AND STUDY AREA

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within Cheltenham Structure Plan Area** | | | | |
| Westfield Southland Shopping Centre (C1Z) | 1239 Nepean Highway, Cheltenham | Commercial: restaurants, leisure and retail | Weekdays:<br>9am – 5:30pm<br>Weekends:<br>9am – 5pm | External mechanical plant for building services and deliveries generate noise emissions. Limited vehicle noise (within multistorey car park). |
| Nepean Highway Commercial Areas (C1Z and C2Z) | Alongside Nepean Highway within the following areas:<br>- Cheltenham<br>- Highett | Commercial: restaurants, retail, offices, and services | Weekdays:<br>8:30am – 6pm<br>Weekends:<br>9am – 6pm<br>Mc Donald's 24/7 | External mechanical plant for building services and deliveries generate noise emissions. Potential for patron noise. |
| Highett Road Commercial Areas (C1Z) | Alongside Highett Road surrounding Highett Station within Highett | Commercial: restaurants, shopping centre, retail | Weekdays:<br>8am – 10pm<br>Weekends:<br>9am – 10pm | External mechanical plant for building services and deliveries generate noise emissions. Potential for patron noise. |
| Bay Road commercial area (C1Z) | 340 to 362 Bay Road, Cheltenham | Commercial: restaurants, offices, and services | Weekdays:<br>8am – 11pm<br>Weekends:<br>9am – 12am | External mechanical plant for building services and deliveries generate noise emissions. Potential for vehicle noise (within car parks) and patron noise. |
| Commercial areas to the west (C1Z and C2Z) | Areas located to the west of the Cheltenham Structure Plan Area, within Cheltenham | Commercial: restaurants, bars, shops, and offices | Weekdays:<br>5:30am – 7:30pm<br>Weekends:<br>9am –10pm<br>Event's venues potentially longer hours on event's dates. | External mechanical plant for building services and deliveries generate noise emissions. Limited emissions from sound reinforcement systems used at indoor music venues. Potential for patron noise. |
| Highett Fire Station (PUZ1) | 150 Wickham Road, Highett | Fire Station | Emergency services 24 hours / 7 days a week | Fire truck vehicle movements and syren noise. |
| **Within Study Area (outside Cheltenham Structure Plan Area)** | | | | |
| Chesterville Road / Wickham Road / Keys Road industrial areas (IN1Z) | Located alongside Chesterville Road, Wickham Road and Keys Road within:<br>- Highett<br>- Cheltenham<br>- Moorabbin | Commercial: restaurants, bars, retail, services, and offices | Weekdays:<br>7:30am – 10pm<br>Weekends:<br>9am – 9pm<br>Live music venue is open till 12am weekdays and 3am weekends | Noise emissions from specific indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. Limited emissions from sound reinforcement systems used at indoor music venues. Potential for patron noise. |
| Cheltenham Activity Centre Zone (ACZ1) | Areas located alongside rail line and Nepean Highway in Cheltenham VIC 3192, covering:<br>- 1 to 13 Barret Street<br>-1218 to 1250 Nepean Highway<br>- 1273 to 1299 Nepean Highway | Commercial: restaurants, bars, retail and offices | Weekdays:<br>8am – 10pm<br>Weekends:<br>9am – 9pm<br>Pub is open every day till 4am | External mechanical plant for building services and deliveries generate noise emissions.<br>External missions from sound reinforcement systems used at pub garden. Potential for patron noise. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Local commercial areas (C1Z) | Small areas scattered around the Cheltenham Structure Plan Area, located at:<br>- Cheltenham<br>- Black Rock<br>- Sandringham<br>- Hampton<br>- Highett<br>- Hampton East<br>- Moorabbin | Commercial: restaurants, services retail and offices | Weekdays:<br>8am – 10pm<br>Weekends:<br>9am – 8pm | External mechanical plant for building services and deliveries generate noise emissions. Potential for patron noise. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.1 and their potential noise emissions are described below.

**Within Cheltenham Structure Plan Area**

Westfield Southland Shopping Centre (C1Z)

Westfield Southland is one of the biggest shopping centres in Australia with approximately 400 retailers. It is one of the main areas for shopping in Cheltenham and is recognised as a Principal Activity Centre in the Melbourne metropolitan area. The existing Southland Station was built in 2017 to provide transport connections to the shopping centre. Westfield Southland is within a C1Z land use zone and is located on both sides of Nepean Highway, to the south of Bay Road and Karren Street at 1156 Nepean Highway in Cheltenham VIC 3192.

Potential noise sources are external mechanical plant used for building services, and deliveries (from stationary HGVs, refrigeration units, loading/unloading activities), Commercial activities are located indoors with no insignificant emissions outside and vehicle noise from the multi-storey carpark is also contained.

Nepean Highway commercial areas (C1Z and C2Z)

Four commercial areas alongside Nepean Highway within a C2Z land use zone were identified:

- 1158 to 1216 Nepean Highway in Cheltenham, adjacent to the south of Westfield Southland Shopping Centre – to the south-east of the Cheltenham Structure Plan Area
- 1247 to 1269 Nepean Highway and 1 to 16 Chesterville Road in Cheltenham within a C1Z land zone, adjacent to the south of Westfield Southland Shopping Centre – to the south-east area of the Cheltenham Structure Plan Area
- 1150 to 1152 Nepean Highway and 411 Bay Road in Highett, opposite to the north of Westfield Southland Shopping Centre – to the south-east area of the Cheltenham Structure Plan Area
- 1117 to 1123 Nepean Highway in Cheltenham– to the northern area of the Cheltenham Structure Plan Area.

These commercial areas include restaurants, cafes, retail shops and offices such as a gym, medical centre, dentist, car dealer, car repair centre, petrol station employment centre and a Victorian Government office. Potential sources of noise external mechanical plant used for building services, and deliveries.

Highett Road commercial areas (C1Z)

Four commercial areas to the northern area of the Cheltenham Structure Plan Area alongside Highett Road surrounding Highett Station were identified at:

- 471 to 499 Highett Road in Highett
- 505 to 565 Highett Road and 2 to 24 Railway Parade in Highett
- 256 to 286 Highett Road, 47 to 49 Middleton Street and 75 Graham Road in Highett
- 288 to 364 Highett Road in Highett.

These commercial areas include restaurants, cafes, supermarkets, retail shops and services such as the Highett Shopping Centre, a car rental agency, physiotherapist, beauty salon, barber shop, library and medical centres. Potential sources of noise include external mechanical plant used for building services, and deliveries. Patron noise can sometimes be present.

Bay Road commercial area (C1Z)

This small commercial area is within a C1Z land use zone and located to the western area of the Cheltenham Structure Plan Area at 340 to 362 Bay Road in Cheltenham VIC 3192. The commercial area includes restaurants, hairdressers, a laundry and offices. Potential noise sources are external mechanical plant used for building services, and supply deliveries.

Commercial areas to the west (C1Z and C2Z)

Nine commercial areas to the west of the Cheltenham Structure Plan Area were identified, with most designated C2Z, or otherwise indicated at:

- 22 to 111 Tulip Street in Cheltenham, extending to Talinga Road on the north, limiting with George Street to the west and Reserve Road to the east
- 312 to 390 Reserve Road in Cheltenham, extending to the rear of properties on Jack Road and Ambrose Avenue to the east, limiting with Park Road on the south and Bay Road to the north
- 2 to 65 Ambrose Avenue, 34 to 28 Monterey Drive and 2 to 8 Bellevue Road in Cheltenham, within a C1Z land use zone
- 260 to 300 Bay Road in Cheltenham, extending to Wangara Road on the south, limiting with George Street to the west and Reserve Road to the east
- 1 to 5 Graham Road, 325 to 357 Bay Road and 4 to 8 Middleton Street in Cheltenham
- 313 to 323 Bay Road and 16 to 26 Mary Avenue in Cheltenham
- 283 to 289 Bay Road in Cheltenham and 1 to 5 Beaumaris Parade and 2 to 6 Tibrockney Steet in Highett
- 257 to 271 Bay Road in Cheltenham, within a C1Z land use zone
- 223 to 249 Bay Road in Cheltenham, extending to Merchant Street to the north from 2 to 48 Advantage Road, limiting with Park Road to the south and Bay Road to the north.

These commercial areas include restaurants, cafes, supermarkets, fitness centres, retail shops and services including corporate offices, car dealers, car repair and maintenance centres, tyre and auto parts shops, flooring store and supplier, a garden centre supplier, medical centres, a pilates studio, a gymnastics club, gyms, hotels, a recycling centre (Upparel), a bus and coach supplier (Ventura Moorabbin Depot) cat kennel, and weddings and event venues.

Potential noise sources are specific activities of the businesses and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise is also expected from external mechanical plant used for building services, and from deliveries. Patron noise can also be present, depending on the business, such as bars and event venues. Indoor music events generate noise from sound reinforcement systems, but these are expected to be contained within the venue.

**Within Study Area (outside Cheltenham Structure Plan Area)**

Chesterville Road / Wickham Road / Keys Road industrial areas (IN1Z)

- Four IN1Z industrial land use areas outside the Cheltenham Structure Plan Area were identified, on the north-eastern boundary of the Study Area alongside Chesterville Road, Wickham Road and Keys Road at:
- 218 to 294 Wickham Road in Highett, limiting with the Highett Reserve on the south, the rear of properties on Rowans Road on the west and Chesterville Road on the east
- 18 to 90 Keys Road in Cheltenham, limiting with the rear of properties on Tintern Mews, Susan Court, Darvall Court, Linden Avenue, Irving Court and Asleigh Court on the south, Chesterville Road on the west and the Harold Caterson Reserve on the east
- 239 to 295 Wickham Road in Moorabbin, limiting with the Bricker Reserve and Genoa Street on the north, the rear of properties on Rowans Road on the west and Chesterville Road on the east
- 1 to 157 Keys Road in Moorabbin, limiting with South Road on the north, Chesterville Road on the west and Warringal Road on the east.

Industrial and commercial businesses within these areas include restaurants, cafes, supermarkets, gyms and fitness centres, as well as retail shops, corporate offices, car dealers, repair and maintenance centres, tyre and auto parts shops, a trailer dealer, petrol stations, a live music venue (Pockets Moorabbin) a medical equipment supplier, an electrical supply store, a gas supply company and scrap metal dealers.

Potential noise sources are industrial and commercial activities and associated light machinery and equipment, with most expected to be indoors with limited emissions outside. Noise is also expected from external mechanical plant used for building services, and from deliveries.

Patron noise can sometimes be expected, depending on the nature of the business such as bars.

Indoor music events generate noise emissions from sound reinforcement systems, but these are expected to be limited outside.

Cheltenham Activity Centre Zone (ACZ1)

The Cheltenham Activity Centre Zone (ACZ1) is designated within the Kingston Planning Scheme and is area is adjacent to the south-eastern portion of the Cheltenham Structure Plan Area. Three areas were identified:

- A triangle-shaped area limited on the south with 1 to 13 Barret Street in Cheltenham, Charman Road on the west and the rail line (Frankston to Mentone Line) on the east
- An area spanning between the rail line (Frankston to Mentone Line) and 1218 to 1250 Nepean Highway in Cheltenham, limiting on the south with Hofman Street, Cameron Street and Courtney Street and with Moota Court and Baker Street on the north
- 1273 to 1299 Nepean Highway, 1 to 6 Goulburn Street and 2 Chesterville Road in Cheltenham.

This area includes commercial businesses with services such as cafes, restaurants, takeaways, pubs and bars, general retail shops, supermarkets and grocery shops, pharmacies, corporate offices, hair salons, gyms, a hotel and a car wash.

Potential noise sources include external mechanical plant used for building services, and deliveries.

Patron noise can sometimes be present depending on the nature of the business such as the bars, pubs or restaurants. A pub with a garden area with potential to host live music was identified (Tudor Inn).

Local commercial areas (C1Z)

Fifteen smaller local commercial areas are scattered within the Cheltenham Structure Plan Area, and the Study Area within C1Z zoning areas were identified at:

- 158 to 176 Weatherall Road in Cheltenham – south of the Cheltenham Structure Plan Area
- 38 to 44 Weatherall Road and 85 to 87 Morey Road in Cheltenham – south of the Cheltenham Structure Plan Area
- 111 to 146 Bluff Road in Black Rock – south-west of the Cheltenham Structure Plan Area
- 177 to 189 Bluff Road in Black Rock – south-west of the Cheltenham Structure Plan Area
- 212 to 236 Bluff Road in Sandringham – west of the Cheltenham Structure Plan Area
- 257 to 267 Bluff Road in Sandringham – west of the Cheltenham Structure Plan Area
- 302 to 320 Bluff Road in Sandringham– west of the Cheltenham Structure Plan Area
- 404 to 424 Bluff Road in Hampton – north-west of the Cheltenham Structure Plan Area
- 351 to 371 Bluff Road and 95 to 97 Highett Road in Hampton – north-west of the Cheltenham Structure Plan Area
- 1 to 23 Highett Road in Highett – north-west of the Cheltenham Structure Plan Area
- 1 to 17 Keith Street in Hampton East – north-west of the Cheltenham Structure Plan Area
- 1 to 15 Chapel Road and 8 to 10 Netter Court in Moorabbin VIC 3189 – north-east of the Cheltenham Structure Plan Area
- 25 to 39 Bernard Street in Cheltenham – east of the Cheltenham Structure Plan Area
- 69 to 99 Cavanagh Street in Cheltenham – east of the Cheltenham Structure Plan Area
- 69 to 99 Coolac Street in Cheltenham – south-east of the Cheltenham Structure Plan Area

These commercial areas include local restaurants, cafes, supermarkets, grocery and pharmacy shops, fitness centres and gym, corporate offices and other retail businesses.

Potential noise sources are external mechanical plant used for building services, and deliveries. Patron noise can sometimes be present depending on the nature of the business.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise and vibration from transport activities and civil infrastructure in the Cheltenham Structure Plan Area and Study Area are listed in Table C.2.

## TABLE C.2 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE AND VIBRATION SOURCES IN THE CHELTENHAM STRUCTURE PLAN AREA AND STUDY AREA

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE CHELTENHAM STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| Transport | | | | | |
| Nepean Highway | North-west – south-east running through the central portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Karen Street | East-west connecting Nepean Highway and Tennyson Street at the central area of the Cheltenham Structure Plan Area. | Within Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Bay Road | East-west connecting with Nepean Highway at the central area of the Cheltenham Structure Plan Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Highett Road | East-west connecting with Nepean Highway running through the northern portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Wickham Road | East-west running through the northern portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Centre Dandenong Road | East-west connecting to Nepean Highway at the centre of the Cheltenham Structure Plan Area running through the southern portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Chesterville Road | North-south running through the eastern portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Bluff Road | North-south running through the western portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Park Road | East-west connecting with Tulip Street on the east and Nepean Highway on the west, running through the southern portion of the Study Area. | Within and outside Cheltenham Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Frankston Rail Corridor | North-west – south-east running through the central portion of the Study Area, parallel to Nepean Highway. | Within and outside Cheltenham Structure Plan Area | Passenger and freight railway | Train pass-byes. First service 05:30am<br>Last service 12:30am | Railway (airborne) noise and limited ground-borne noise and vibration |
| Infrastructure | | | | | |
| Cheltenham, train Station | Cheltenham VIC 3192. To the south-east of the Cheltenham Structure Plan Area. | Outside Cheltenham Structure Plan Area | Train station and bus stop | As per service times detailed above for the Frankston Rail Corridor | Mechanical plant for building services and PA systems. |

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE CHELTENHAM STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| Southland train Station | Cheltenham VIC 3192. In the central area of the Cheltenham Structure Plan Area. | Within Cheltenham Structure Plan Area | Train station and bus stop | As per service times detailed above for the Frankston Rail Corridor | Mechanical plant for building services and PA systems. |
| Highett train Station | Train Street and Railway Parade, Highett VIC 3190. In the north-western area of the Cheltenham Structure Plan Area. | Within Cheltenham Structure Plan Area | Train station and bus stop | As per service times detailed above for the Frankston Rail Corridor | Mechanical plant for building services and PA systems. |

Noise and vibration sources identified in Table C.2 are described below.

Nepean Highway

Nepean Highway is an arterial highway running through the centre of the Cheltenham Structure Plan Area and connects Cheltenham to Albert Park to the north and to the Mornington Peninsula further south. Nepean Highway mostly has three to four lanes in each direction and supports a large volume of traffic. Based on VicRoads traffic volume data, Nepean Highway in the Cheltenham area carries a total two-way AADT of approximately 66,000 vehicles, with 5 per cent being heavy vehicles.

Karen Street

Karen Street is a municipal road that connects to Nepean Highway and Tennyson Street. It also serves as an access to Southland Shopping Centre. VicRoads traffic volume data indicates that Karen Street carries an AADT of approximately 8000 vehicles on westbound and 6900 (a total of 14,900 AADT), with 3 per cent being heavy vehicles.

Bay Road

Bay Road is an arterial road which provides throughfare in the Cheltenham Structure Plan Area, between Nepean Highway and Beach Road to the west. Based on VicRoads traffic volume data, Bay Road in the Southland Shopping Centre and Cheltenham area carries an AADT of approximately 12,000 vehicles on westbound and 8700 vehicles on eastbound (a total of 20,700 AADT), with 6 per cent being heavy vehicles.

Highett Road

Highett Road is an arterial roadway in the northern portion of the Cheltenham Structure Plan Area and provides thoroughfare between Chesterville Road and Buff Road in the northern study area. VicRoads traffic volume data indicates that Highett Road carries an AADT of approximately 4200 vehicles in each direction (a total of 8,400 AADT). There is no record of heavy vehicle traffic for this road in the consulted database.

Wickham Road

Wickham Road is an arterial roadway in the northern portion of the Cheltenham Structure Plan Area and provides thoroughfare between Chesterville Road and Buff Road in the northern study area. VicRoads traffic volume data indicates that Highett Road carries a total two-way AADT of approximately 5800 vehicles, with 6 per cent being heavy vehicles.

Centre Dandenong Road

Centre Dandenong Road is an arterial road in the southern portion of the Cheltenham Structure Plan Area and Study Area. It connects the Nepean Highway to the west and to the Mornington Peninsula Freeway to the east. Based on VicRoads traffic volume data, North Road carries an AADT of approximately 12,000 vehicles in eastbound and 13,000 westbound (a total of 25,000 AADT), with 6 per cent being heavy vehicles.

Park Road
Park Road is an arterial road in the southern portion of the Cheltenham Structure Plan Area and Study Area and is a continuation of Centre Dandenong Road. It connects to the Nepean Highway to the east and to the Cheltenham commercial area to the west. Based on VicRoads traffic volume data, Park Road carries an AADT of approximately 5400 vehicles in each direction (a total of 10,800 AADT). There is no record of heavy vehicle traffic for this road in the consulted database.

Chesterville Road
Chesterville Road is a arterial road and running along the eastern portion of the Cheltenham Structure Plan Area and Study Area. It also provides access to Southland Shopping Centre. Based on VicRoads traffic volume data, Chesterville Road carries a total two-way AADT of approximately 18,000 vehicles, with 6 per cent being heavy vehicles.

Bluff Road
Bluff Road is an arterial road and running along the western Study Area. It connects the Cheltenham area to South Road to the north and to the suburb of Black Rock to the south. Based on VicRoads traffic volume data, Bluff Road carries an AADT of approximately 8500 vehicles in each direction (a total of 17,000 AADT), with 3 per cent being heavy vehicles.

Frankston Line
The Frankston Line forms part of the suburban rail network. The line is double tracked on the entire length of the track and is primarily for passenger services. The Line services approximately eight and four passenger trains per hour during peak and non-peak periods, respectively. At Highett Station, Southland Station and Cheltenham Station, daily train services start at 5am and end at 1am, extending to 4am on Fridays. Individual train pass-bys generate noise alongside the line and there is potential for ground-borne noise and vibration close to the line.

Highett Station, Southland Station, Cheltenham Station
Highett Station, Southland Station and Cheltenham Station are all located within Cheltenham and include rail and bus services. The stations service the Frankston Line. V/line regional trains also pass through the stations and they are part of the Principal Freight Network. Potential noise sources include external mechanical plant used for building services and PA systems. Note that train horn noise is not within the scope of any noise regulations in Victoria.

## Clayton Study Area

The Clayton Study Area is in the cities of Monash and Kingston. At the core of the Clayton Structure Plan Area is the main commercial strip running along Clayton Road, with the existing Clayton Station at the northern end of the commercial strip. The Monash Hospital complex including the Monash Children's Hospital and the Monash Medical Centre are located in the centre of the Clayton Structure Plan Area in a Public Land Zone (PUZ2).

There are significant areas of industrial land uses surrounding the Clayton Structure Plan Area to the south and south-east, with other smaller industrial areas within the Clayton Structure Plan Area.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.2.

It is worth noting the Study Area for the Clayton Structure Plan Area overlaps with the Monash Study Area on the north-east, covering almost half the Study Area. This means there are existing conditions common to both, and which are reported for both (in Section 5.4 above and this Section 5.3).

## Potential sources from existing businesses

Noise emissions from existing business are likely from general industrial and commercial activities of small to large scale involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, HVAC, AHU and ASHP units). Music from identified music and events/entertainment venues is also a consideration, although pubs with outdoor live music are not present in the Study Area.

No vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.3 summarises businesses with potential noise within the Clayton Structure Plan Area, and those within the Study Area (but outside the Clayton Structure Plan Area).

**TABLE C.3 EXISTING BUSINESSES WITH IDENTIFIED NOISE SOURCES IN THE CLAYTON STRUCTURE PLAN AREA AND STUDY AREA**

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within Clayton Structure Plan Area** | | | | |
| Monash Hospital complex (PUZ3) | 246 Clayton Road, Clayton | Accident and emergency and medical services | 24/7 | External mechanical plant for building services, deliveries and vehicle noise (within car park) generate noise emissions.<br>Ambulance vehicle movements and syren noise. |
| Clayton Road Commercial Areas (C1Z) | Alongside Clayton Road between 299 to 421 Clayton Road, Clayton | Commercial: restaurants, retail and shops | Weekdays:<br>7am - 12am<br>Weekends:<br>9am - 12am | External mechanical plant for building services and deliveries generate noise emissions.<br>Potential for patron noise. |
| Local (small) Commercial Areas (C1Z & C2Z) | Located in Clayton | Commercial: restaurants, and shops | Weekdays:<br>9am - 12am<br>Weekends:<br>9am - 9:30pm | External mechanical plant for building services and deliveries generate noise emissions.<br>Potential for patron noise. |
| Audsley Street industrial area (IN1Z) | Audsley Street, Clayton South | Industrial and Commercial | Weekdays:<br>7am – 9pm<br>Weekends:<br>9am – 5pm | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Browns Road industrial area (IN1Z) | 27 Browns Road, Clayton | Car park | Not specified | Vehicle noise (within car park) generate noise emissions. Note that there are not any industries identified within this area. |
| **Within Study Area (outside Clayton Structure Plan Area)** | | | | |
| Princes Highway / Westall Road industrial areas (IN1Z) | Five areas located south of Princes Highway alongside and alongside Westall Road within:<br>-1808 to 1984 Princes Highway in Clayton<br>-841 to 917 Princes Highway in Springvale<br>- Clayton Business Park in Clayton South<br>- 2 to 4 Westall Road in Springvale<br>- 26 to 34 Westall Road in Springvale | Industrial and commercial: Manufacturing, corporate, automotive | Weekdays:<br>6am – 8pm<br>Weekends:<br>6am – 9pm<br>Gym: 24/7 | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| North Road / Huntingdale Road industrial areas (IN1Z) | Three areas located adjacent to the east of Huntingdale Road and alongside North Road in:<br>- Oakleigh South<br>- Huntingdale | Industrial and commercial: retail and services | Weekdays:<br>6am – 9:30pm<br>Weekends:<br>6am – 7pm | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Clayton Road industrial area (IN1Z) | Located in Clayton South. Adjacent to the east of Clayton Road and south of Keeley Park. | Industrial and commercial: retail and services | Weekdays:<br>7am – 9pm<br>Weekends:<br>6am – 6pm | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment) and unloading and loading of heavy vehicles. Emissions from any external mechanical plant used for building services. |
| Local commercial areas (C1Z) | Small commercial areas located in:<br>- Clayton South<br>- Clarinda | Commercial: services, restaurants, retail shops | Weekdays:<br>6:30am – 8pm<br>Weekends:<br>8am – 8pm | External mechanical plant for building services and deliveries generate noise emissions. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.9 and their potential noise emissions are described below.

**Within Clayton Structure Plan Area**

Monash Hospital complex (PUZ3)

Monash Hospital complex is located in the centre of the Clayton Structure Plan Area. It provides specialist tertiary-level healthcare to Melbourne's south-east. The complex contains a range of medical services with an emergency department and a hospital school. Facilities include the Monash Medical Centre, Monash Children's Hospital, Monash Heart Hospital, Jessie McPherson Private Hospital and the Monash Children's Hospital School. Potential noise sources are external mechanical plant used for building services, supply deliveries, vehicle noise from car parks, helicopters (including emergency flights) and ambulance sirens. These sources are assumed to be present supporting the typical operations of the hospital. Noise from sirens is not within the scope of the Environment Protection Regulations due to their emergency nature.

The helipad sits on the rooftop of the Monash Children's Hospital at an Australian Height Datum (AHD) of 92.6 metres. The operating pattern or number of events for emergency helicopters are not prescribed as the helipad is used for emergency services. Helicopters are not permitted to fly lower than 1000 feet (304.8 metres) over built-up areas, or 500 feet (152.4 metres) over any other areas, unless they are landing or taking off, in line with the CASA regulations. However, emergency helicopters can fly below these heights in certain situations. The main noise source is the helicopter's rotors, especially when a helicopter hovers for a long time over a single location, and noise is dictated by the flight path and flight height.

Clayton Road commercial areas (C1Z)

A commercial strip is located in the centre of the Clayton Structure Plan Area. Six discrete C1Z land zoning areas located alongside Clayton Road were identified:

- 411 to 421 Clayton Road and 1332 to 1334 Centre Road in Clayton South
- 370 to 382 Clayton Road, 1336 to 1360 Centre Road and 1 to 87 Olive Street in Clayton South
- 317 to 409 Clayton Road, 1389 to 1391 Centre Road, 2 Cooke Street and 16 Dunstan Street in Clayton South

- 276 to 368 Clayton Road and 1397 Centre Road in Clayton
- 125 to 151 Carinish Road and 270 Clayton Road in Clayton
- 99 to 121 Carinish Road and 299 to 315 Clayton Road in Clayton

The listed areas above contain general retail shops including restaurants, cafes, takeaways, supermarkets, pharmacies, hair salons, homeware shops, blinds shop and a mattress store. There is also the Clayton Shopping Plaza, a hotel and a real estate agency office. Potential sources of noise are external mechanical plant used for building services and supply deliveries(from stationary HGVs, loading/unloading activities). In some instances, patron noise can be present depending on the nature of the business, such as the hotel.

Local commercial areas (C1Z and C2Z)

Four smaller local commercial areas were identified within the Clayton Structure Plan Area, mainly within C1Z land zoning areas as otherwise stated:

- 1286 to 1312 Clayton Road in Clayton – to the south- west area of the Clayton Structure Plan Area
- 1418 Centre Road in Clayton – a rock-climbing gym with a C2Z land zone, to the south-east area of the Clayton Structure Plan Area
- 1459 to 1485 Clayton Road in Clayton – to the south-east area of the Clayton Structure Plan Area
- 176 to 162 Clayton Road in Clayton – to the north area of the Clayton Structure Plan Area.
- These areas include local restaurants, cafes, takeaways, supermarkets, grocery and pharmacy shops, bars (without a garden) and dry cleaners. Potential sources of noise are external mechanical plant used for building services and supply deliveries. Patron noise can be present sometimes depending on the nature of the business, such as bars.

Audsley Street industrial area (IN1Z)

This industrial area is within a IN1Z zoning area in the southern area of the Clayton Structure Plan Area. It is adjacent to Centre Road and limiting with Murdock Steet on the south, alongside Meriton Place, James Street and Audsley Street. Industrial and commercial businesses in this industrial area include car repair garages and maintenance services, car dealers, an auto parts shop, furniture wholesaler, flooring store, homeware store, carpet wholesaler cleaning products supplier and building materials supplier. There are also a few restaurants, grocery shops and a fitness centre.

Potential noise sources are industrial and commercial activities and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise is also expected from external mechanical plant used for building services and supply deliveries.

Browns Road industrial area (IN1Z)

This industrial area is located on a small land parcel at 27 Browns Road within a IN1Z zoning area in the central eastern area of the Clayton Structure Plan Area. There is a car park identified at this land parcel (such as Browns Road South Car Park), with no current industries. There is potential for noise from vehicles in the car park.

**Within Study Area (outside Clayton Structure Plan Area)**

Princes Highway / Westall Road Industrial Areas (IN1Z)

Six IN1Z industrial land use areas were identified outside and adjacent to the east of the Clayton Structure Plan Area. These are located to the south of Princes Highway (Dandenong Road) and alongside Westall Road at:

- 1808 to 1984 Princes Highway in Clayton, extending to Centre Road on the south, limiting with (approx.) Buckland Street on the west and Westall Road on the east

- 841 to 917 Princes Highway in Springvale, extending to Centre Road on the south, limiting with Westall Road on the west and Springvale Junction on the east

- Clayton Business Park in Clayton South, limiting on the north with Centre Road and Rayhur Street (and the Westall Line) on the south, between Kombi Road on the west and Westall Road on the east

- 2 to 24 Westall Road, 2 to 21 Yannis Court, 1598 to 1624 Centre Road and 1 to 46 Aspen Circuit in Springvale

- 26 to 34 Westall Road in Springvale, adjacent to the Westall Rail Maintenance Depot on the south, limiting with the rear of properties on Burden Street on the west and Westall Road on the east

- 1662 to 1712 Princes Highway in Oakleigh East, extending to Bonham Crescent, White Street and Black Street on the south, limiting with the Princess Highway Reserve on the west and Clayton Road on the east – this area is located to the north-west of the Clayton Structure Plan Area.

Industrial and commercial businesses in these areas include a business park with corporate offices, product manufacturers, warehouses and services businesses such as automotive car repair and dealers, auto parts stores, gyms, spas, homeware stores, building materials stores, a flooring store, concrete product supplier, furniture store, self-storage facilities and a computer store. There are also a few cafes and restaurants.

Potential noise sources are industrial and commercial activities and associated light machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from external mechanical plant used for building services and supply deliveries is expected.

North Road / Huntingdale Road industrial areas (IN1Z)

Three IN1Z industrial land use areas to the north-east of the Clayton Structure Plan Area were identified at:

- Limiting on the south with Valley Street, on the north-east with the rail line (from Huntingdale Station to the existing Clayton Station) and extending on the west from 352 to 388 Huntingdale Road and from 2 to 4 Coora Road in Oakleigh South

- Limiting on the north from 1318 to 1380 North Road in Oakleigh South, on the south-west with the rail line (from Huntingdale Station to the existing Clayton Station) and on the east with the rear of properties on Colin Road

- Limiting on the south from 1287 to 1363 North Road in Huntingdale, on the east with Franklyn Street and the rear of the properties on Huntingdale Road on the west, extending to Hargreaves Street on the north.

These areas include corporate offices, sports facilities, retail and services businesses including car repair and maintenance mechanics, car dealers, gyms, a rock climbing studio, self-storage facilities, a scrap metal dealer, brewery, furniture store, homeware stores, flooring store, bathroom supply store and computer store.

Potential noise sources are industrial and commercial activities and associated light machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from external mechanical plant used for building services and from deliveries is also expected.

Clayton Road industrial area (IN1Z)

This is a significant IN1Z industrial land use area on the southern boundary of the Study Area. The industrial area also extends outside the Study Area. The industrial area within the Clayton Structure Plan Area, limits on the west with Clayton Road and the rear of the properties on Brady Avenue, and Monash Crescent on the east. On the north the industrial area limits with Rosebank Avenue, Keeley Park and the rear of properties on Cleary Court. To the south it limits with Osborne Avenue.

The industrial area contains corporate offices, manufacturing and services businesses including car manufacturers, a car wash, car repair and maintenance centres, an engineering manufacturing company, a

plastic resin manufacturing, a packaging supply store, waste management company, food processing company, a gym, badminton courts, travel agent and kitchen supply store.

Potential noise sources are industrial and commercial activities and associated light machinery and equipment, with most expected to be indoors with limited emissions outside. Some activities involve loading and unloading of heavy goods vehicles with incoming or final products with potential outdoor emissions such as waste management. Noise from mechanical plant used for building services is also expected.

Local commercial areas (C1Z)

Six small commercial areas outside the Clayton Structure Plan Area in C1Z zoning areas were identified at:

- 132 to 166 Rosebank Avenue in Clayton South – to the south-west of the Clayton Structure Plan Area
- 39 to 45 Brentwood Close in Clayton South – to the south of the Clayton Structure Plan Area
- 53 to 63 Springs Road in Clayton South – to the south-west of the Clayton Structure Plan Area
- 1194 to 1216 Centre Road in Clarinda – to the west of the Clayton Structure Plan Area
- 1152 to 1154 Centre Road and 2 Clarinda Road in Clarinda – to the west of the Clayton Structure Plan Area
- 1148 to 1150 Centre Road in Clarinda – to the west of the Clayton Structure Plan Area.

These areas contain local businesses including restaurants, cafes, takeaways, post offices, hair salons, accountant offices, supermarkets and grocery shops, a dental and laboratory clinic and petrol station.

Potential noise sources are external mechanical plant used for building services and from deliveries. Patron noise can sometimes be present depending on the nature of the business.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise and vibration from transport activities and civil infrastructure identified in the Clayton Structure Plan Area and Study Area are listed in Table C.4.

## TABLE C.4 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE AND VIBRATION SOURCES IN THE CLAYTON STRUCTURE PLAN AREA AND STUDY AREA

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE CLAYTON STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| **Transport** | | | | | |
| Westall Road | North-south running through the eastern portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Centre Road | East-west running through the central portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Clayton Road | North-south running through the central portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Blackburn Road | North-south running through the western portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Wellington Road | East-west running through the northern portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| North Road | East-west running through the northern portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Princess Highway | North-south running through the northern portion of the Study Area. | Within and outside Clayton Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Huntingdale Road | North-south running through the western portion of the Study Area. | Outside Clayton Structure Plan Area | Freeway | Constant | Road traffic noise |
| Pakenham/Cranbourne Rail Corridor | North-west – South-east running through the central portion of the Study Area. | Within and outside Clayton Structure Plan Area | Passenger and freight railway | Train pass-byes. First service 05:30am<br>Last service 12:30am | Railway (airborne) noise and limited ground-borne noise and vibration. |
| **Infrastructure** | | | | | |
| Clayton train Station | Clayton Road / Haughton Road, Clayton. Central area of the Clayton Structure Plan Area. | Within Clayton Structure Plan Area | Railway and bus station | As per service times detailed above for the Pakenham/Cranbourne Rail Corridor. | Mechanical plant for building services, PA systems, Although, very limited as the station is located underground. |
| Huntingdale train Station | Huntingdale Road / Haughton Road, Oakleigh. To the north-west of the Clayton Structure Plan Area. | Outside Clayton Structure Plan Area | Railway and bus station | As per service times detailed above for the Pakenham/Cranbourne Rail Corridor. | Mechanical plant for building services, PA systems, Although, very limited as the station is located underground. |

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE CLAYTON STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| Westall Rail Maintenance Depot | 36B Westall Road, Springvale. To the north-east of the Clayton Structure Plan Area. | Outside Clayton Structure Plan Area | Rolling stock maintenance depot and stabling yard | 24/7 | Noise emissions from rolling stock maintenance activities (such as carriage wash machines, wheel lathes, fuelling). Emissions from stationary trains and train movements and external mechanical plant servicing the depot buildings. |
| Monash Children's Hospital Heliport | 246 Clayton Road, Clayton. In the central of the Clayton Structure Plan Area. | Within Clayton Structure Plan Area | Helipad | Emergency services, as required | Helicopter noise |
| Victorian Heart Hospital Heliport | 631 Blackburn Road, Clayton. To the north-east of the Clayton Structure Plan Area. | Outside Clayton Structure Plan Area | Helipad | Emergency services, as required | Helicopter noise |

Noise and vibration sources identified in Table C.4 are described below.

Westall Road

Westall Road is an arterial highway running through the south-eastern area of the Study Area and connects Princes Highway to the Dingley Bypass and Dandenong Bypass further south. The arterial mostly has three to four lanes in each direction. Based on VicRoads traffic volume data, Westall Road in the Clayton area carries a total two-way AADT of approximately 49,000 vehicles, with 10 per cent being heavy vehicles.

Centre Road

Centre Road is an arterial roadway connecting to the Princes Highway/Springvale Road intersection on the east and to Nepean Highway on the west. The road has two inbound and outbound lanes. VicRoads traffic volume data indicates that Centre Road in the Clayton area services an AADT of approximately 11,000 vehicles on westbound and 9900 on eastbound (a total of 20,900 AADT), with 9 per cent being heavy vehicles.

Clayton Road

Clayton Road is an arterial roadway, between Ferntree Gully Road to the Dingley Bypass in the south. Based on VicRoads traffic volume data, Clayton Road in the Clayton area carries an AADT of approximately 12,000 vehicles on northbound and 8700 vehicles on southbound (a total of 20,700 AADT), with 6 per cent being heavy vehicles.

Blackburn Road

Blackburn Road is an arterial roadway connecting Burwood Highway on the north and Princes Highway to the south in Clayton. The road mostly has two to three inbound and outbound lanes. The road runs into the eastern boundary of the Study Area and based on VicRoads traffic volume data, carries a total two-way AADT of approximately 29,000 vehicles, with 9 per cent being heavy vehicles.

Wellington Road

Wellington Road is an arterial highway and connects the area to the Eastlink tollway to the east and Princes Highway to the west. Wellington Road mostly has three to four lanes in each direction and supports a large volume of traffic. Based on VicRoads traffic volume data, Wellington Road carries a total two-way AADT of approximately 40,000 vehicles, with 5 per cent being heavy vehicles.

North Road

North Road is an arterial highway and is a continuation of Wellington Road to the west. It connects the north-western areas to Nepean Highway further west. Based on VicRoads traffic volume data, North Road carries a total two-way AADT of approximately 44,000 vehicles, with 6 per cent being heavy vehicles.

Princes Highway

Princes Highway is a major arterial highway and runs across metropolitan Melbourne. It connects the Monash area to the city of Melbourne in the north and as far as Pakenham to the south before merging to become the M1. Based on VicRoads traffic volume data, Princes Highway in the Clayton area, Princess Highway carries a total two-way AADT of approximately 45,000 vehicles, with 7 per being heavy vehicles.

Huntingdale Station

Huntingdale Station is a transport hub in Huntingdale that includes rail and bus services. It services the Cranbourne and Pakenham rail corridor of Melbourne's metropolitan train network, managed by Metro Trains Melbourne. V/line regional trains pass through Huntingdale and it is part of the Principal Freight Network. Huntingdale Station is also integrated with a bus terminus, providing passengers with numerous local bus services to the surrounding suburbs. Potential sources of noise at the station include external mechanical plant used for building services and PA systems. Note that train horn noise is not within the scope of any noise regulations in Victoria.

Westall Rail maintenance depot

The Westall Rail maintenance depot is located on the south-western boundary of the Study Area within a State Transport Infrastructure land use zone (TRZ1), adjacent to the rail corridor and an industrial land use zone to the east of Westall Road.

Potential noise sources are rolling stock maintenance activities including carriage wash machines, wheel lathes and fuelling, with some activities expected to be undertaken within a maintenance shed but others outdoors at the stabling yard. Train noise from stationary trains and train movements in and outside the stabling yard is also expected from external mechanical plant used for servicing the building at the depot. The depot operates 24/7 since trains are serviced, maintained and stabled after finishing their service.

Monash Children’s Hospital heliport

The heliport is located within the Clayton Structure Plan Area and sits on the rooftop of the Monash Children’s Hospital at an AHD of 92.6 metres. The operating pattern or number of events for emergency helicopters are not prescribed as the heliport supports emergency services. Helicopters are not permitted to fly lower than 1000 feet (304.8 metres) over built-up areas, or 500 feet (152.4 metres) over any other areas, unless they are landing or taking off, in line with the CASA regulations. However, emergency helicopters can fly below these heights in certain situations. The main noise source is the helicopter's rotors, especially when a helicopter hovers for a long time over a single location, and noise is dictated by the flight path and flight height.

Victorian Heart Hospital heliport

The hospital is located within the Monash University Clayton campus, outside the Clayton Structure Plan Area to the north-east of the Study Area. The helipad sits on the hospital's rooftop, 55 metres above the Blackburn Road level. An operating pattern or number of events are not prescribed since the helipad supports emergency services. Helicopters are not permitted to fly lower than 1000 feet (304.8 metres) over built-up areas, or 500 feet (152.4 metres) over any other areas, unless they are landing or taking off, in line with the CASA regulations. However, emergency helicopters can fly below these heights in certain situations. The main noise source is the helicopter's rotors, especially when a helicopter hovers for a long time over a single location, and noise is dictated by the flight path and flight height.

## Monash Study Area

The Monash Study Area is located in the City of Monash. It contains significant areas allocated to Special Purpose Zones associated with the Monash Technology Precinct (SUZ6), where commercial and industrial businesses are identified. There is also a large Public Land Zone allocated to Education (PUZ2) for the Monash University Clayton campus. Both areas are located at the centre of the Monash Structure Plan Area, with the surrounding areas containing residential and scattered small commercial zones. There are considerable areas of industrial and moderate amount of commercial land uses alongside Princes Highway to the south of the Monash Structure Plan Area.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.3.

# Potential sources from existing businesses

Noise emissions from existing business are likely from general industrial and commercial activities of small to large scale involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, HVAC, AHU and ASHP units). Music from identified music and events/entertainment venues is also a consideration, although pubs with outdoor live music are not present in the Study Area.

No vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.5 summarises the identified businesses with potential noise within the Monash Structure Plan Area, and those within the Study Area (but outside the Monash Structure Plan Area).

**TABLE C.5 EXISTING BUSINESSES WITH IDENTIFIED SOURCES IN THE MONASH STRUCTURE PLAN AREA AND STUDY AREA**

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within Monash Structure Plan Area** | | | | |
| Monash Technology Precinct (SUZ6) | Spanning within and outside the Monash Structure Plan Area, in the following areas:<br>- Mount Waverley<br>- Notting Hill<br>- Clayton<br>- Mulgrave | Industrial and commercial | Weekdays:<br>8am – 11pm<br>Weekends:<br>8am – 11pm<br>Some businesses operate 24/7 | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Monash University Clayton campus (PUZ2) | Wellington Road, Clayton | Educational, sports facilities, hospital, event venue, commercial | Weekdays:<br>9am – 5:30pm<br>Weekends: closed<br>Some facilities operate 24/7 | Noise emissions from external mechanical plant for building services and deliveries.<br>Limited emissions from indoor activities at the Monash Pavilion.<br>Ambulance vehicle movements and syren noise from Victorian Heart Hospital, located within the campus. |
| Monash Recycling & Waste Centre (PUZ6) | 390 Ferntree Gully Road, Notting Hill | Community facility for (trade and residential) waste. | Weekdays and Weekends:<br>7:30am – 3pm<br>Closed on some public holidays. | Noise emissions from HGVs and plant employed for waste lifting and removal. Also, from external mechanical plant servicing the admin and staff buildings. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Notting Hill Community Hall (PUZ6) | 386 Ferntree Gully Road, Notting Hill | Community facility | Not specified. | Indoor events generate noise emissions from PA and sound reinforcement systems.<br>Patron noise.<br>Increased road traffic during events. |
| Australian Synchrotron (SUZ5) | 800 Blackburn Road, Clayton | Research and Educational | 24/7 | External mechanical plant for building services and deliveries of materials/supplies generate noise emissions.<br>Potential for vehicle noise (within car parks). |
| CSIRO (Commonwealth land) | Research Way, Clayton | Research | Weekdays:<br>9am – 5pm<br>Weekends: Closed | External mechanical plant for building services and deliveries of materials/supplies generate noise emissions.<br>Potential for vehicle noise (within car parks). |
| Dandenong Road / Blackburn Road commercial area (C2Z) | 2049 to 2105 Dandenong Road and 669 Blackburn Road, Clayton | Commercial: retail, offices, and services | Weekdays:<br>6:30am – 6pm<br>Weekends:<br>7am – 4pm<br>Gym & hotel: 24/7 | External mechanical plant for building services and deliveries generate noise emissions.<br>Potential for vehicle noise (within car parks) and patron noise. |
| Local (small) commercial areas (C1Z) | Small areas located at:<br>- Clayton<br>- Notting Hill<br>- Glen Waverley | Commercial: restaurants, shops, and offices | Weekdays:<br>5:30am – 07:30pm<br>Weekends:<br>9:00am – 10pm | External mechanical plant for building services and deliveries generate noise emissions. |
| **Within Study Area (outside Monash Structure Plan Area)** | | | | |
| Notting Hill Hydroelectric Power Plant (PUZ1) | 1 Gardiner Road, Clayton | Power generation | 24/7 | Noise emissions from transformers, associated ventilation systems and maintenance HGVs.<br>Limited emissions from generators and hydroelectric turbines since these are housed. |
| Monash Hospital complex (PUZ2) | 246 Clayton Road, Clayton | Accident and emergency and medical services | 24/7 | External mechanical plant for building services, deliveries and vehicle noise (within car park) generate noise emissions. |
| Springvale Road commercial area (C2Z) | 539 to 597 Springvale Road, Mulgrave | Commercial: automotive, restaurants, retail, hotel | Weekdays:<br>7:30am – 9pm<br>Weekends:<br>9am – 9pm | External mechanical plant for building services and deliveries generate noise emissions. Potential for vehicle noise (within car parks) and patron noise. |
| Princes Highway commercial areas (C2Z) | Two areas located at:<br>- 2127 to 2149 Dandenong Road Clayton<br>- 2167 to 2221 Dandenong Road and 93 to 103 Garden Road Clayton | Commercial: retail, offices, and services | Weekdays:<br>5am – 6pm<br>Weekends:<br>8am – 5pm<br>Gym: 24/7 | External mechanical plant for building services and deliveries generate noise emissions. |
| Local commercial areas (C1Z) | Two areas located within:<br>- Wheelers Hill<br>- Mount Waverley<br>- Oakleigh East<br>- Huntingdale<br>- Clayton | Commercial: restaurants, retail, and services | Weekdays:<br>6am – 10:30pm<br>Weekends:<br>6am – 10:30pm<br>Gym: 24/7 | External mechanical plant for building services and deliveries generate noise emissions. Potential for patron noise. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Princes Highway / Westall Road industrial areas (IN1Z) | Two areas located south of Princes Highway alongside Westall Road at:<br>-1808 to 1984 Princes Highway in Clayton<br>-841 to 917 Princes Highway in Springvale | Industrial and commercial | Weekdays:<br>6am – 8pm<br>Weekends:<br>6am – 9pm<br>Gym: 24/7 | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Princes Highway / North Road / Huntingdale Road industrial areas (IN1Z) | Three areas located to the south-west of the Monash Structure Plan Area at:<br>-1662 to 1712 Princes Highway in Oakleigh East<br>- 1287 to 1363 North Road in Huntingdale<br>- 1318 to 1380 North Road in Oakleigh South | Industrial and commercial: retail and services | Weekdays:<br>6am – 9:30pm<br>Weekends:<br>6am – 7pm | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Rosemary Court industrial area (IN1Z) | Rosemary Ct, Mulgrave | Industrial and commercial | Weekdays:<br>6am – 5:30pm<br>Saturdays:<br>7am – 5pm<br>Sundays: closed | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.5 and their potential noise emissions are described below.

**Within Monash Structure Plan Area**

Monash Technology Precinct (SUZ6)

The areas allocated to the Monash Technology Precinct (SUZ6) are located within and outside the Monash Structure Plan Area. There are six areas identified:

- South of Monash Freeway limiting to the south with Ferntree Gully Road, between Stephensons Road to the west to Blackburn Road to the east in Mount Waverley – mostly outside the Monash Structure Plan Area.
- South of Ferntree Gully Road limiting to the south to Normanby Road, between Stephensons Road to Blackburn Road in Notting Hill – half the area is within the Monash Structure Plan Area, the other is on the northern portion of the Study Area but outside the Monash Structure Plan Area.
- South of Normanby Road and Notting Hill extending to Normanby to the south, between Blackburn Road to Nantilla Road, Clayton – half the area is within the Monash Structure Plan Area, the other is within the eastern portion of the Study Area, but outside the Monash Structure Plan Area.
- South of Monash Freeway limiting with Wellington Road to the south, between Nantilla Road to the west and Springvale Road to the east in Mulgrave – outside the Monash Structure Plan Area
- South of Wellington Road limiting with Faigh Street to the south and set back from Dandenong Road (or Princess Highway), between Barton Road and Cambro road to the west and Springvale Road and Kakin Mulgrave – outside the Monash Structure Plan Area.
- South of Wellington Road limiting with the rear of the properties on Medoro Grove to the south, between Springvale Road to the west and Glenvale Crescent in Mulgrave – outside the Monash Structure Plan Area.

These SUZ6 areas comprise general industrial and commercial businesses such as manufacturing, retail and businesses parks with offices and warehouses including real state agencies, car dealers, car repair centres, a DHL Express service point, a coffee roasters company, furniture stores, a self-storage facility, a commercial refrigeration distributor, commercial cleaning services and a medical supply store. There are also sports schools and training centres, gyms, hotels and educational facilities.

Potential sources of noise are industrial and commercial activities and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from deliveries and external mechanical plant used for building services is also expected.

Although the ERS is not a compliance standard, it may be considered by a relevant planning authority when evaluating if noise risks are likely at the land use of a planning proposal.

Monash University Clayton campus (PUZ2)

Monash University Clayton campus is located in the PUZ2 zoning area to the north of Wellington Road, limiting with Research Way and Normanby Road, between Boundary Road on the west and Blackburn Road on the east. The campus provides student residences, a medical facility (the Victorian Heart Hospital), a sports complex, car parking areas, a supermarket, restaurant and cafes, a library, classrooms, lecturer rooms, laboratories and a performing arts theatre. Potential sources of noise are associated with external mechanical plant servicing the buildings, helicopters associated with the Victorian Heart Hospital helipad, limited deliveries and cark park noise. Other emissions from specific activities are expected to be limited since they are mostly indoors.

Monash Recycling & Waste Centre (PUZ6)

Monash Recycling and Waste Centre (formerly Waste Transfer Station) is within the PUZ6 zoning area at 390 Ferntree Gully Road on the north area of the Monash Structure Plan Area. It is a community facility, managed by the City of Monash for accepting trade and residential waste for disposal or recycling. Large volumes of waste are stored in skips before being transferred to other facilities for recycling. Potential sources of noise relate to the dropping and removal of waste, and using HGVs and mobile plant for waste lifting and removal. External mechanical plant servicing the administration and staff office buildings may also cause noise.

Notting Hill Community Hall (PUZ6)

Notting Hill Community Hall is a community facility on the north area of the Monash Structure Plan Area and serves as a cultural and civic hub for the city and surrounding areas. The hall is available for hire and accommodates up to 130 people in the main hall room. There is also a meeting room, kitchen, toilets and car park. Potential sources of noise are expected from the PA and sound reinforcement systems (in some cases for live music), which are expected to be limited since they are indoors. Noise from external mechanical plant servicing the building is expected. There is potential for patron noise and from increased road traffic on local roads when events are hosted at the community hall.

Australian Synchrotron (SUZ5)

The Australian Synchrotron is a major research facility in Clayton within the Monash Structure Plan Area, adjacent to the east of Blackburn Road and the Monash University Clayton campus. The synchrotron is one of Australia's most significant pieces of scientific infrastructure. It is anticipated that most activities at the facility are undertaken indoors with limited emissions outside. Potential sources of noise are external mechanical plant used for building services, deliveries of materials and supplies (from stationary HGVs, loading/unloading activities and noise from carparks).

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is an Australian Government agency responsible for scientific research. This research facility is located within the Monash Structure Plan Area, adjacent to the north of the Monash University Clayton campus on Commonwealth Area. Most activities at

this facility are undertaken indoors with limited emissions outside. Potential sources of noise are external mechanical plant used for building services, deliveries of materials and supplies, and noise from car parks.

Dandenong Road / Blackburn Road commercial area (C2Z)

This commercial area is within a C2Z zoning area from 2049 to 2105 Dandenong Road and 669 Blackburn Road in Clayton, to the south of the Monash Structure Plan Area. The commercial area contains retail and services buildings including a gym, luggage store, car repair and maintenance service, a kitchen re-modeler store, building materials store, liquor store, car rental agency, carpet store, home improvement store, tile store, tool store and a hotel.

Potential sources of noise are external mechanical plant used for building services, and deliveries (from stationary HGVs, loading/unloading activities). Patron noise and vehicle noise from car parks can sometimes be present depending on the nature of the business, such as the hotel and gym.

Local commercial areas (C1Z)

Six smaller local commercial areas were identified within the Monash Structure Plan Area in C1Z zoning areas:

- 3 to 19 Hampshire Road and 49 to 51 Norfolk Street in Glen Waverley – to the northern area of the Monash Structure Plan Area
- 402 to 414 Ferntree Gully Road in Notting Hill – to the north area of the Monash Structure Plan Area
- 39 to 49 Westerfield Drive in Notting Hill – to the north-east area of the Monash Structure Plan Area
- 1897 to 1919 Dandenong Road in Clayton – to the south-west area of the Monash Structure Plan Area
- 41 to 53 Morton Street in Clayton – to the north-east area of the Monash Structure Plan Area
- 864 to 2107 Blackburn Road and 210 to 2125 Dandenong Road in Clayton – to the south-east area of the Monash Structure Plan Area.

These areas feature local restaurants, cafes, supermarkets, grocery and pharmacy shops, shopping, fitness centre, cinemas, accounting and financial offices and other retail businesses. Potential sources of noise are external mechanical plant used for building services and supply deliveries. Patron noise can sometimes be present depending on the nature of the business.

**Within Study Area (outside Monash Structure Plan Area)**

Notting Hill mini hydroelectric power plant (PUZ1)

This mini hydroelectric power plant of 0.40 MW capacity is managed by Melbourne Water and located at 1 Gardiner Road in Clayton, north-east of the Monash Structure Plan Area. Potential sources of noise include generators that power the hydroelectric turbines and from the turbines themselves. However, these are within a housing structure and the turbines are located underground with limited emissions outdoors. Noise emissions from transformers, associated ventilation systems and maintenance HGVs are also expected.

Monash Hospital complex (PUZ3)

Monash Hospital complex is located to the south-west of the Monash Structure Plan Area and provides specialist tertiary-level health care to Melbourne's south-east. The complex features a range of medical services with an emergency department and a hospital school. It consists of facilities including the Monash Medical Centre, Monash Children's Hospital, Monash Heart Hospital, Jessie McPherson Private Hospital and Monash Children's Hospital School. Potential sources of noise are external mechanical plant used for building services, supply deliveries, noise from car parks and ambulance sirens. These are assumed to be present supporting the typical operations of the hospital. Noise from sirens is not within the scope of the Environment Protection Regulations due to their emergency nature.

Springvale Road commercial area (C2Z)

The Springvale Road C2Z commercial area is located from 539 to 597 Springvale Road to the north-east of the Monash Structure Plan Area and is adjacent to an industrial area to the west, and surrounded by the road network to the north, east and west. The area mostly contains automotive businesses including car dealers and repair and maintenance services. It also contains a hotel, with associated restaurants and shops.

Potential sources of noise are external mechanical plant used for building services, supply deliveries (from stationary HGVs, loading/unloading activities) and noise from car parks. Patron noise can sometimes be present depending on the nature of the business, such as the hotel.

Princes Highway commercial areas (C2Z)

Two C2Z commercial areas on Princes Highway (Dandenong Road) are located to the south and outside the Monash Structure Plan Area:

- 2127 to 2149 Dandenong Road in Clayton
- 2167 to 2221 Dandenong Road and 93 to 103 Garden Road in Clayton.

The area contains retail and services businesses including a car rental agency, landscaping supply store, plumbing supply store, trailer rental service, petrol station, supermarket, appliance store and repair services, music instrument store, storage facility, building equipment hire service, financial consultant offices and a spa.

Potential sources of noise are mechanical plant used for building services, and supply deliveries (from stationary HGVs, loading/unloading activities).

Local commercial areas (C1Z)

Ten local commercial areas were identified outside the Monash Structure Plan Area in C1Z zoning areas:

- 602 to 628 Ferntree Gully Road and 580 Springvale Road in Wheelers Hill VIC 3150 – on the north-eastern boundary of the Study Area
- 623 to 631 Ferntree Gully Road and 530 to 540 Springvale Road in Wheelers Hill VIC 3150 – on the north-eastern boundary of the Study Area
- 407 to 435 Blackburn Road and 1 to 69 Centreway in Mount Waverley VIC 3149 – on the northern boundary of the Study Area
- 14 to 22 Bellerive Avenue in Mount Waverley – to the north-west of the Monash Structure Plan Area
- 9 to 23 Berrima Street in Oakleigh East – to the north-west of the Monash Structure Plan Area
- 2 to 4 Macrina Street in Oakleigh East – to the north-west of the Monash Structure Plan Area
- 2 to 18 Lawson Street in Oakleigh East – to the west of the Monash Structure Plan Area
- 62 to 72 Berkeley Street in Huntingdale – to the west of the Monash Structure Plan Area
- 162 to 176 Clayton Road in Clayton – to the south-west of the Monash Structure Plan Area.

These areas contain corporate offices, car parking areas, local retail and services businesses including restaurants, take aways, cafes, supermarkets, grocery and liquor shops, pharmacies, dry cleaners, petrol stations, fitness and sports facilities and a blood donation centre. Potential sources of noise are external mechanical plant used for building services, and supply deliveries. Patron noise can sometimes be present depending on the nature of the business.

**Princes Highway / Westall Road industrial areas** (IN1Z)

Two IN1Z industrial land use areas were identified outside the Monash Structure Plan Area, on the southern boundary of the Study Area, to the south of Princes Highway (Dandenong Road) at:

- 1808 to 1984 Princes Highway in Clayton, extending to Centre Road on the south, limiting with (approx.) Buckland Street on the west and Westall Road on the east
- 841 to 917 Princes Highway in Springvale, extending to Centre Road on the south, limiting with Westall Road on the west and Springvale Junction on the east.

Industrial and commercial businesses are located within these areas including the Springvale Homemaker Centre shopping mall, corporate offices and sports facilities along with retail and services business such as automotive car repair and dealers, gyms, spas, homeware stores, building materials stores, flooring store, furniture store, self-storage facilities, a computer store, cafes and restaurants.

Potential sources of noise are industrial and commercial activities and associated light machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from deliveries and external mechanical plant used for building services is also expected.

Princes Highway / North Road / Huntingdale Road industrial areas **(IN1Z)**

Three IN1Z industrial land use areas were identified outside the Monash Structure Plan Area, to the south of Princes Highway and alongside North Road:

- 1662 to 1712 Princes Highway in Oakleigh East VIC 3166, extending to Bonham Crescent, White Street and Black Street on the south, limiting with the Princess Highway Reserve on the west and Clayton Road on the east – to the west of the Monash Structure Plan Area
- Limiting on the south with 1287 to 1363 North Road in Huntingdale VIC 3166, on the east with Franklyn Street and the rear of the properties on Huntingdale Road on the west, extending to Hargreaves Street on the north – on the southern boundary of the Study Area
- Limiting on the north with 1318 to 1380 North Road in Oakleigh South VIC 3167, on the south-west with the rail line (between Huntingdale Station to Clayton Station), and on the east with the rear of properties on Colin Road – on the southern boundary of the Study Area.

These areas contain corporate offices, sports facilities and retail and services businesses including car repair and maintenance mechanics, car dealers, gyms, rock climbing studio, self-storage facilities, scrap metal dealer, brewery, furniture store, homeware stores, flooring store, bathroom supply store and a computer store.

Potential sources of noise are industrial and commercial activities and associated light machinery and equipment, with most of expected to be indoors with limited emissions outside. Noise from deliveries and external mechanical plant used for building services is also expected.

Rosemary Court industrial area (IN1Z)

A small industrial precinct in a IN1Z zoning area is located in Mulgrave outside the Monash Structure Plan Area, to the north-east. The industrial area is adjacent to a commercial land use zone to the east and surrounded by the road network. Ferntree Gully Road is to the north, the Monash Freeway Onramp is to the east and the Monash Freeway is to the south. Businesses in the industrial area include a car dealer, car repair shop, auto air conditioning service, motorcycle parts store, tire shop, industrial equipment supplier (of products such as blowers, gas generators, compressors and air dryers), granite supplier, roofing contractor, metal manufacturer and coffee roasters.

Potential sources of noise are industrial and commercial activities and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from mechanical plant used for building services and from supply deliveries is also expected.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise and vibration from transport activities and civil infrastructure identified in the Monash Structure Plan Area and Study Area are listed in Table C.6.

**TABLE C.6 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE AND VIBRATION SOURCES IN THE MONASH STRUCTURE PLAN AREA AND STUDY AREA**

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE MONASH STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| **Transport** | | | | | |
| Springvale Road | North-south running through the southern portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Ferntree Gully Road | East-west running through the northern portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Clayton Road | North-south running through the western portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Blackburn Road | North-south running through the eastern area of the Study Area. | Within and outside Monash Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Wellington Road | East-west running through the southern portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| North Road | East-west running through the southern portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Princess Highway / Dandenong Road | North-west – south-east running through the southern portion of the Study Area. | Within and outside Monash Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Monash Freeway | East-west running through the northern portion of the Study Area. | Outside Monash Structure Plan Area | Freeway | Constant | Road traffic noise |
| **Infrastructure** | | | | | |
| Monash University Clayton-Caulfield Bus Loop | South-western area of the Monash Structure Plan Area. | Within Monash Structure Plan Area | Bus terminal | Weekdays and Saturdays 5:30am-12:00am<br>Sundays: 8:00am-10:00pm | Road traffic noise and stationary vehicle noise. Potential for noise emissions from PA systems. |
| Victorian Heart Hospital Heliport | 631 Blackburn Road, Clayton. In the south-central area of the Monash Structure Plan Area. | Within Monash Structure Plan Area | Helipad | Emergency services, as required | Helicopter noise |
| Monash Children's Hospital Heliport | 246 Clayton Road, Clayton. In the south-western portion of the Study Area. | Outside Monash Structure Plan Area | Helipad | Emergency services, as required | Helicopter noise |

Noise and vibration sources identified in Table C.6 are described below.

Springvale Road

Springvale Road is an arterial highway running through the eastern boundary of the Study Area and connects the area to the Eastern Freeway to the north and to Port Phillip Bay to the south. Springvale Road mostly has

three to four lanes in each direction. Based on VicRoads traffic volume data, Springvale Road in the Monash area carries a total two-way AADT of approximately 41,000 vehicles, with 4 per cent being heavy vehicles.

Ferntree Gully Road

Ferntree Gully Road is an arterial roadway connecting the Monash Structure Plan Area to the Burwood Highway to the east and to Princes Highway to the west. The road mostly has two to three inbound and outbound lanes. On the north-eastern part of the Study Area, Ferntree Gully Road connects with Monash Freeway, with on and off ramps. VicRoads traffic volume data indicates that Ferntree Gully Road in the Monash area carries an AADT of approximately 14,000 vehicles on westbound and 11,000 on eastbound (a total of 25,000 AADT), with 6 per cent being heavy vehicles.

Clayton Road

Clayton Road is an arterial roadway which provides throughfare in the western portion of the Study Area, between Ferntree Gully Road to the Dingley Bypass in the south. Based on VicRoads traffic volume data, Clayton Road in the Monash area carries an AADT of approximately 12,000 vehicles in the north-bound and 8,700 vehicles in the southbound (a total of 20,700 AADT), with 6 per cent being heavy vehicles.

Blackburn Road

Blackburn Road is an arterial roadway connecting Burwood Highway to the north and Princes Highway in Clayton to the south. The road mostly has two to three inbound and outbound lanes. The road runs from south to north within the Monash Structure Plan Area. Based on VicRoads traffic volume data, Blackburn Road carries a total two-way AADT of approximately 30,000 vehicles, with 9 per cent being heavy vehicles.

Wellington Road

Wellington Road is an arterial highway running through the southern portion of the Study Area and connects the area to the Eastlink Toll way to the east and Princes Highway to the west. At the junction with Princess Highway to the west, Wellington Road becomes North Road. Wellington Road mostly has three to four lanes in each direction. Based on VicRoads traffic volume data, Wellington Road carries an AADT of approximately 20,000 vehicles in each direction (a total of 40,000 AADT), with 5 per cent being heavy vehicles.

North Road

North Road is an arterial highway and a continuation of Wellington Road to the west. It connects the south-western area to Nepean Highway further west. Based on VicRoads traffic volume data, North Road carries a total two-way AADT of approximately 44,000 vehicles, with 6 per cent being heavy vehicles.

Princes Highway (Dandenong Road)

Princes Highway is a major arterial highway and runs across metropolitan Melbourne. It connects the Monash area to the city of Melbourne in the north and as far as Pakenham to the south, before merging to become the M1. Based on VicRoads traffic volume data, Princes Highway in the Monash area carries a total two-way AADT of approximately 45,000 vehicles, with 7 per cent being heavy vehicles.

Monash Freeway

Monash Freeway (M1) is a major freeway servicing most of the metropolitan south-east region. Access to the freeway in the Monash area is available via Wellington Road, Ferntree Gully Road and Blackburn Road with entry/exit ramps. Monash Freeway connects to Princes Highway to the south-east and to Citylink tollways to the north. Based on VicRoads traffic volume data, the Monash Freeway in the Monash area carries a total two-way AADT of approximately 175,000 vehicles, with 11 per cent being heavy vehicles.

Monash University Clayton bus loop

The Monash University Clayton bus loop is an open terminal located off Wellington Road on the eastbound, within the Monash University Clayton campus. The bus loop is within the Monash Structure Plan Area. The bus loop services 19 bus routes and connects Monash University to surrounding train stations and neighbourhoods. Potential sources of noise at the bus stop include stationary vehicle noise, road traffic noise and PA systems.

Victorian Heart Hospital heliport

The Victorian Heart Hospital is located on the Monash University Clayton campus and within the Monash Structure Plan Area. The helipad sits on the hospital's rooftop, 55 metres above the Blackburn Road level. An operating pattern or number of events are not prescribed because the helipad is used for emergency services. Helicopters are not permitted to fly lower than 1000 feet (304.8 metres) over built-up areas, or 500 feet (152.4 metres) over any other areas, unless they are landing or taking off, in line with the Civil Aviation Safety Authority (CASA) regulations. However, emergency helicopters can fly below these heights in certain situations. The main source of noise is from the helicopter's rotors, especially when a helicopter hovers for a long time over a single location, and noise is dictated by the flight path and flight height.

Monash Children's Hospital heliport

The Monash Children's Hospital is located outside the Monash Structure Plan Area, to the south-west of the Study Area. The hospital is part of a complex of various Monash Hospital facilities including the Monash Medical Centre. The helipad sits on the rooftop of the Monash Children's Hospital at an Australian Height Datum (AHD) of 92.6 metres. The operating pattern or number of events for emergency helicopters are not prescribed because the helipad is used for emergency services. Helicopters are not permitted fly lower than 1000 feet (304.8 metres) over built-up areas, or 500 feet (152.4 metres) over any other areas, unless they are landing or taking off, in line with the CASA regulations. However, emergency helicopters can fly below these heights in certain situations. The main source of noise is the helicopter's rotors, especially when a helicopter hovers for a long time over a single location, and noise is dictated by the flight path and flight height.

## Glen Waverley Study Area

The Glen Waverley Study Area is located in the City of Monash. It is predominantly residential with a main commercial area surrounding the existing Glen Waverley Station and small light industrial areas to the south of the Glen Waverley Structure Plan Area.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.4.

# Potential sources from existing businesses

Noise emissions from existing business are likely from light industrial and commercial activities involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, HVAC, AHU and ASHP units). Music from events/entertainment venues is also a consideration, although pubs with outdoor live music are not present in the Study Area.

No vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.7 summarises the identified businesses with potential noise within the Glen Waverley Structure Plan Area, and those within the Study Area (but outside the Glen Waverley Structure Plan Area).

**TABLE C.7 EXISTING BUSINESSES WITH IDENTIFIED NOISE SOURCES IN THE GLEN WAVERLEY STRUCTURE PLAN AREA AND STUDY AREA**

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within Glen Waverley Structure Plan Area** | | | | |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Springvale Road, The Glen shopping centre and Century City Walk Areas (C1Z) | 227 to 297 Springvale Road, Glen Waverley | Commercial: retail, entertainment and restaurants. | Weekdays:<br>8:30am - 11:00pm<br>Weekends:<br>10:00am-10:00pm | External mechanical plant for building services and deliveries generates noise emissions.<br>Potential for patron noise. |
| High Street Commercial Area (C1Z) | 676 to 710 High Street Road Glen Waverley | Commercial: supermarkets, restaurants and shops | Weekdays:<br>9:00am - 11:00pm<br>Weekends:<br>09:00am-10:00pm | External mechanical plant for building services and deliveries generates noise emissions. |
| Aristoc Road Industrial Area (IN1Z) | Aristoc Road, Glen Waverley | Industrial and commercial | Weekdays:<br>8am – 5pm<br>Weekends:<br>10am – 5pm | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Springvale/Wilson Road Industrial Area (IN1Z): Wilson Transformer Company | 310 to 336 Springvale Road, Glen Waverley | Electrical equipment manufacturing | Not specified | Noise emissions from manufacturing machinery and equipment, transformers, industrial ventilation systems, deliveries and external mechanical plant used for commercial and industrial building services. |
| **Within Study Area (outside Glen Waverley Structure Plan Area)** | | | | |
| Mt Waverley Mini Hydroelectric Power Plant (PUZ1) | 802 to 828 Waverley Road, Glen Waverley | Power generation | 24/7 hours | Noise emissions from transformers, associated ventilation systems and maintenance HGVs. Limited emissions from generators and hydroelectric turbines, since these are housed. |
| Blackburn Road Commercial Areas (C1Z) | Located in the following areas:<br>- Mount Waverley<br>- Glen Waverley | Commercial: restaurants, shopping and retail | Weekdays:<br>8am – 10pm<br>Weekends:<br>9am –10pm | External mechanical plant for building services and deliveries generate noise emissions. |
| Local (small) Commercial Areas (C1Z) | Located in Glen Waverley | Commercial: restaurants, shopping and retail | Weekdays:<br>8am – 10pm<br>Weekends:<br>09am –10pm | External mechanical plant for building services and deliveries generate noise emissions. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.7 and their potential noise emissions are described below.

**Within Glen Waverley Structure Plan Area**

Springvale Road, The Glen shopping centre and Century City Walk (C1Z)

This is a main commercial area in Glen Waverley from 227 to 297 Springvale Road to the south of High Street Road. It offers a range of restaurants, cafes and entertainment venues as well as supermarkets and clothing, electronics and homeware stores. The area surrounds the existing Glen Waverley Station and contains two main commercial hubs; The Glen shopping centre, a major regional shopping centre; and the Century City Walk, an undercover entertainment and dining complex which includes cinemas and a bowling alley.

Potential sources of noise are external mechanical plant used for building services, supply deliveries (from stationary HGVs, refrigeration units, loading and unloading activities) and vehicle noise in carparks. Patron noise can sometimes be present depending on the business.

High Street commercial area (C1Z)
A small commercial area is located from 676 to 710 High Street Road that includes a petrol station, supermarkets, restaurants, shops and a dry cleaner. Potential sources of noise include external mechanical plant used for building services and supply deliveries.

Aristoc Road industrial area (IN1Z)
The Aristoc Road industrial area is within a IN1Z zoning area between Waverley Road to the south of Lincoln Avenue, limiting with Myrtle Street Road on the east and the rear of residential properties on Bogong Avenue. Industrial and commercial businesses operate in the industrial area, including car repair garages and maintenance services, car dealers, car tyres supplies, printing services, warehouses, corporate offices and gym and sport businesses.

Potential sources of noise relate to industrial and commercial activities and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from supply deliveries and any external mechanical plant used for building services is expected.

Springvale/Wilson Road industrial area (IN1Z)
The Springvale/Wilson Road industrial area is within a IN1Z zoning area from 310 to 354 Springvale Road, limiting with Wilson Road to the north and extending to the rear of the residential properties on Jordan Grove. Industrial and commercial businesses include uniform and office supply stores, although most of the area is occupied by the Wilson Transformer Company, a manufacturer of power and distribution transformer solutions operating a manufacturing facility and including a corporate office, power transformer business and service business units.

Potential sources of noise are expected be associated with the use of machinery and equipment for manufacturing activities at the Wilson Transformer Company, with most expected to be located indoors with limited emissions outside. However, it is noted that within the land parcel there are items of plant located outdoors (potentially for transformer testing) as well as areas for loading and unloading deliveries with materials, supplies and final products which generate noise. Noise emissions from the power transformers (≤400kV), HGVs, lifting equipment and external mechanical plant used for building services and industrial purposes are also expected.

**Within Study Area (outside Glen Waverley Structure Plan Area)**

Mt Waverley mini hydroelectric power plant (PUZ1)
This mini hydro-electric power plant of 0.33 MW capacity is managed by Melbourne Water and is located from 802 to 828 Waverley Road limiting with the north-west of the Glen Waverley Structure Plan Area. Potential sources of noise are from generators that power the hydroelectric turbines and from the turbines themselves. However, these are within a housing structure and the turbines are likely underground with limited emissions outdoors. Noise from transformers, associated ventilation systems and maintenance HGVs is also expected.

Blackburn Road commercial areas (C1Z)
These commercial areas are mainly located alongside Blackburn Road and surrounding the existing Syndal Station. Nine discrete commercial areas are identified, most located to the west of the Glen Waverley Structure Plan Area:

- North-west of Blackburn Road and High Street Road intersection, from 621 to 641 High Street Road and 187 to 197 Blackburn Road in Mount Waverley
- 202 to 272 Blackburn Road in Glen Waverley, south-west of the Blackburn Road and High Street Road intersection
- 203 to 207 Blackburn Road in Mount Waverley

- 215 to 217 Blackburn Road in Mount Waverley
- 233 to 235 Blackburn Road in Mount Waverley
- 241 to 277 Blackburn Road in Mount Waverley
- 7 to 29 Coleman Parade in Glen Waverley.
- 1 to 17 Leicester Avenue in Glen Waverley, adjacent to the east of Blackburn Road, to the south-west of the Glen Waverley Structure Plan Area
- North-west of the Blackburn Road and Lemont Avenue intersection, from 407 to 435 Blackburn Road in Mount Waverley and alongside Centreway, limiting with Pinewood Drive to the north – to the south-west of the Glen Waverley Structure Plan Area.

These areas are all within a C1Z zoning area and with businesses including restaurants, takeaways, cafes, supermarkets, dry cleaners, post offices, beauty salons, gyms and fitness studios and roof repair contractors. Potential sources of noise are external mechanical plant used for building services, and deliveries.

Local commercial areas (C1Z)

Smaller local commercial areas identified outside the Glen Waverley Structure Plan Area include:

- 28 to 48 Willow Avenue in Glen Waverley – north-west of the Glen Waverley Structure Plan Area
- 29 to 43 Martin Place in Glen Waverley – north of the Glen Waverley Structure Plan Area
- 22 to 30 Thompson Street in Glen Waverley – north-east of the Glen Waverley Structure Plan Area
- 2 to 24 Kerrie Road in Glen Waverley – east of the Glen Waverley Structure Plan Area
- 39 to 47 Viewpoint Avenue in Glen Waverley – south-east of the Glen Waverley Structure Plan Area
- 1 to 11 Glenwood Avenue in Glen Waverley – adjacent to the southern Glen Waverley Structure Plan Area.

These areas are all within a C1Z zoning area and contain local restaurants, take aways, cafes, shops and corporate offices. Noise from mechanical plant used for building services and deliveries is expected.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise and vibration associated with transport activities and civil infrastructure identified in the Glen Waverley Structure Plan Area and Study Area for the are listed in Table C.8.

**TABLE C.8 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE AND VIBRATION SOURCES IN THE GLEN WAVERLEY STRUCTURE PLAN AREA AND STUDY AREA**

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE GLEN WAVERLEY STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| **Transport** | | | | | |
| Springvale Road | North-south running through the central portion of the Study Area. | Within and outside Glen Waverley Structure Plan Area | Arterial highway | Constant | Road traffic noise |

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE GLEN WAVERLEY STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| High Street Road | East-west running through the northern portion of the Study Area. | Within and outside Glen Waverley Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Blackburn Road | North-south running through the western portion of the Study Area. | Within and outside Glen Waverley Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Waverley Road | East-west running through the southern portion of the Study Area. | Within and outside Glen Waverley Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Glen Waverley Rail Corridor | Starting at the central area of the Glen Waverley Structure Plan Area, to the western boundary of the Study Area. | Within and outside Glen Waverley Structure Plan Area | Passenger railway | Train pass-byes. First service 5:30am<br>Last service 12:30am | Railway (airborne) noise and limited ground-borne noise and vibration |
| **Infrastructure** | | | | | |
| Glen Waverley Station | Glendale Street and Coleman Parade, on the central area of the Glen Waverley Structure Plan Area. | Within Glen Waverley Structure Plan Area | Railway and bus station | As per service times detailed above for the Glen Waverley Rail Corridor | Mechanical plant for building services, PA systems, although very limited as the station is underground. |
| Syndal Station | Fiander Avenue and Coleman Parade, to the west of the Glen Waverley Structure Plan Area. | Outside Glen Waverley Structure Plan Area | Railway station | As per service times detailed above for the Glen Waverley Rail Corridor | Mechanical plant for building services, PA systems, although very limited as the station is underground. |

Noise and vibration sources identified in Table C.8 are described below.

Springvale Road

Springvale Road is an arterial highway running through the centre of the major commercial district and connects Glen Waverley to the Eastern Freeway to the north and to Port Phillip Bay to the south. Springvale Road is mostly three to four lanes in each direction. Based on VicRoads traffic volume data, Springvale Road carries a total two-way AADT of approximately 50,000 vehicles in the Glen Waverley area, with 5 per cent being heavy vehicles.

High Street Road

High Street Road is an arterial roadway connecting the north of the Glen Waverley Structure Plan Area as far as Albert Park to the east and to Burwood Highway to the west. The road mostly has three to four lanes in each direction. VicRoads traffic volume data indicates that Burwood Highway carries a total two-way AADT of approximately 22,000 vehicles, with 6 per cent being heavy vehicles.

Blackburn Road

Blackburn Road is an arterial roadway connecting Burwood Highway to the north and to the Princes Highway in Clayton to the south. The road mostly has two to three inbound and outbound lanes. The road runs into the western boundary of the Study Area. Based on VicRoads traffic volume data, Blackburn Road carries a total two-way AADT of approximately 29,000 vehicles, with 6 per cent being heavy vehicles.

Waverley Road

Waverley Road is an arterial roadway connecting Glen Waverley to Chadstone to the west and Wheelers Hill to the east. The road has two inbound and outbound lanes and services the southern industrial area of the Glen

Waverley Structure Plan Area. VicRoads traffic data indicates that Waverley Road carries a total two-way AADT of approximately 20,000 vehicles, with 3 per cent being heavy vehicles.

Glen Waverley Line

The Glen Waverley Line which form part of the metropolitan rail network operated by Metro Trains Melbourne. The Glen Waverley Line starts and ends at the existing Glen Waverley station and is double tracked along its entire length. The Line services eight and four trains per hour during peak and non-peak periods, respectively. At Glen Waverley Station, services operate from 5am to 1am and on Fridays extend to 4am.

Glen Waverley Station

Glen Waverley Station is a major transport hub in Glen Waverley that includes rail and bus services. It services the Glen Waverley Line with a major bus terminus integrated that provides numerous local bus services to the eastern suburbs and greater Melbourne. Potential sources of noise at the station include external mechanical plant used for building services and PA systems. Note that train horn noise is not within the scope of any noise regulations in Victoria.

Syndal Station

Syndal Station is located on the western boundary of the Study Area and on the Glen Waverley Line. The station incorporates a multi-storey carpark and has direct access to the Blackburn Road commercial area in Syndal. Potential sources of noise at the station include external mechanical plant used for building services and PA systems. Note that train horn noise is not within the scope of any noise regulations in Victoria.

## Burwood Study Area

The Burwood Study Area is located in the cities of Monash and Whitehorse. It is predominantly residential with a considerable industrial area located in the south-west area of the Burwood Structure Plan Area. Commercial businesses of small to medium size are also present in the Burwood Structure Plan Area, and Deakin University Burwood campus is located at the north of the Burwood Structure Plan Area.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.5.

# Potential sources from existing businesses

Noise emissions from existing business are likely from general industrial and commercial activities of small to medium scale involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, HVAC, AHU and ASHP units). Music from identified music and events / entertainment venues is also a consideration, although pubs with outdoor live music are not present in the Study Area.

No vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.9 summarises the identified businesses with potential noise sources within the Burwood Structure Plan Area, and those within the Study Area (but outside the Burwood Structure Plan Area).

## TABLE C.9 EXISTING BUSINESSES WITH IDENTIFIED NOISE SOURCES IN THE BURWOOD STRUCTURE PLAN AREA AND STUDY AREA

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within Burwood Structure Plan Area** | | | | |
| Highbury Road Industrial Areas (IN1Z & IN3Z) | Four discrete land use zones located adjacent to Highbury Road within Burwood | Industrial and commercial | Weekdays:<br>7:30am – 5:30pm<br>Saturdays:<br>9am – 5pm<br>Note that most are closed during weekends. | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and external mechanical plant used for building services. |
| Huntingdale Road Industrial Area (IN1Z) | Between Highbury Road and Florence Street, Burwood | Industrial and commercial | Weekdays:<br>8am – 5pm<br>Saturdays:<br>10am – 4pm<br>Note that most are closed during weekends. | Noise emissions from specific industrial and commercial indoor activities (use of machinery and equipment), deliveries and external mechanical plant used for building services. |
| Local (small) Commercial Areas<br>(C1Z and C2Z) | - Burwood Highway (east)<br>- Burwood Highway and Station Street (west)<br>- 1 to 13 Barlyn Road, Mount Waverley | Commercial: restaurants, shops and offices | Weekdays:<br>7am –12am<br>Weekends:<br>10am – 11pm<br>Some open 24/7 | External mechanical plant for building services and deliveries generate noise emissions. |
| Deakin University Burwood campus (PUZ2 and SUZ1) | North of Burwood Highway, between Elgar Road and Station Street. Burwood | Educational and sports facilities | 24/7 | External mechanical plant for building services generates noise emissions. |
| The Besen Centre (SUZ1) | 87 to 89 Station Street, Burwood | Event venue and performing arts centre | Not specified | External mechanical plant for building services. Road traffic flows on local roads are anticipated to increase during large events. Indoor sound reinforcement systems used for live music and performances, with limited emissions outside. |
| **Within Study Area (outside Burwood Structure Plan Area)** | | | | |
| RSPCA Burwood East (MUZ) | 3 Burwood Highway, Burwood East | Animal VET & Shelter | Sunday to Friday:<br>9am – 4:30pm<br>Saturday:<br>8:30am – 5pm | Noise emissions from dogs barking, deliveries and external mechanical plant for building services. |
| Burwood Brickworks Shopping Centre (C1Z) | 70 Middleborough Road, Burwood East | Commercial: restaurants, shopping and retail | Everyday:<br>9am – 5:30pm<br>Thursdays:<br>9am – 7pm | External mechanical plant for building services and deliveries generates noise emissions. Potential for patron noise. |
| Burwood Heights Shopping Centre (C1Z) | 2 to 8 Burwood Highway, Burwood East | Commercial: restaurants, shopping and retail | Everyday:<br>9am – 5:30pm<br>Thursdays & Fridays:<br>9am – 7pm | External mechanical plant for building services and deliveries generates noise emissions. Potential for patron noise. |
| Middleborough Road Industrial Area (IN1Z) | 19 Ailsa Street, Box Hill South | Industrial: Paper mill / paper product supplier | Weekdays:<br>9am – 5pm<br>Weekends: Closed | Noise emissions from specific industrial indoor activities (use of machinery and equipment), deliveries and external mechanical plant used for building services. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Local (small) Commercial Areas (C1Z) | Located within the following areas:<br>- Ashwood<br>- Mount Waverley<br>- Burwood East<br>- Surrey Hills | Commercial: restaurants, shopping and retail | Depending on business. Typically, 8am – 11pm | External mechanical plant for building services and deliveries generate noise emissions. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.9 and their potential noise emissions are described below.

**Within Burwood Structure Plan Area**

Highbury Road industrial areas (IN1Z and IN3Z)

The Highbury Road industrial area comprises mostly general industrial and commercial businesses. The industrial area consists of four discrete sub-areas:

- South of Burwood Highway extending to Highbury Road, to the east of Burwood Cemetery (IN1Z)
- Thin strip between McIntyre Street and Harker Street, to the west of Cromwell Street (IN3Z)
- South of Highbury Road limiting with Gardiners Creek Trail, to the east of Sixth Avenue (IN1Z)
- North of Highbury Road limiting with Gardiners Creek Trail, between Ireland Street and Sinnott Street (IN3Z).

These areas contain businesses related to the automotive sector such as car repair and maintenance garages, car dealers and auto parts stores, as well as other retail shops such as a commercial refrigeration and maintenance store, a plumbing supplies store and a diving shop, along with art and dance studios and pet groomers.

Potential sources of noise are likely from industrial and commercial activities and associated machinery and equipment, with most expected to be indoors with limited emissions outside. Noise from deliveries and external mechanical plant used for building services is also expected.

Huntingdale Road industrial area (IN1Z)

The Huntingdale Road industrial area is within an IN1Z zoning area to the south of Highbury Road extending past Florence Street and limiting with Huntingdale Road on the east. General industrial and commercial businesses in the industrial area include a car repair and maintenance service, audio-visual equipment supplier, beauty products supplier, oil field equipment supplier, flooring store, blinds shop, air conditioning and roofing contractors. Potential sources of noise are expected to be similar to those described for the Highbury Road industrial areas above.

Local commercial areas (C1Z and C2Z)

Smaller local commercial areas identified in the Burwood Structure Plan Area are:

- Burwood Highway (C1Z and C2Z): Alongside Burwood Highway and Toorak Road, limiting on the west with Charles Street and Cromwell Street on the east. This area spans the western boundary of the Burwood Structure Plan Area.
- Burwood Highway and Station Street (C1Z): to the north of Burwood Highway and adjacent to Station Street, within the eastern area of the Burwood Structure Plan Area.

- 1 to 13 Barlyn Road (C1Z): within the south-eastern area of the Burwood Structure Plan Area.

These areas feature restaurants, cafes, take aways, corporate offices and car dealer shops. Potential sources of noise include external mechanical plant used for building services and supply deliveries.

Deakin University Burwood campus (PUZ2 and SUZ1)

Deakin University Burwood campus is located in the PUZ2 and SUZ1 zones, to the north of Burwood Highway, between Elgar Road and Station Street. The campus includes student residences, a medical facility, multi-level car parking areas, a library, classrooms, lecturer rooms and laboratories. Potential sources of noise include external mechanical plant used for building services, and cark park noise.

The Besen Centre (SUZ1)

Located on the Deakin University Burwood campus, the Besen Centre is a premium theatre for hire that services the eastern suburbs. The venue seats up to 999 people in traditional fixed theatre seating on two levels. The stage uses a full fly tower and orchestra pit with generous wing space and loading dock facilities. Potential sources of noise include external mechanical plant used for building services. Indoor sound reinforcement systems used for live music and performances are anticipated to have limited emissions outside. Road traffic on local roads is expected to increase during large events.

**Within Study Area (outside Burwood Structure Plan Area)**

RSPCA Burwood East (MUZ)

The Royal Society for the Prevention of Cruelty to Animals (RSPCA) Burwood East facility includes an animal shelter and adoption centre, and provides training programs and mobile veterinary services. Potential sources of noise are associated with dog barking or other animal vocalisations, as well as external mechanical plant used for buildings services, and supply deliveries.

Burwood Brickworks Shopping Centre (C1Z)

Burwood Brickworks Shopping Centre is within in a C1Z zone. The centre hosts retail outlets including supermarkets, fresh food markets, clothing stores, electronics stores and various dining options.

Potential sources of noise are external mechanical plant used for building services, supply deliveries (from stationary HGVs, refrigeration units, loading/unloading activities) and noise from within carparks. Vehicle and patron noise can sometimes be present.

Burwood Heights Shopping Centre (C1Z)

Burwood Heights Shopping Centre is a major shopping centre. The centre hosts retail outlets including supermarkets, fresh food markets, clothing stores, electronics stores and various dining options.

Potential sources of noise are external mechanical plant used for building services, supply deliveries (from stationary HGVs, refrigeration units, loading/unloading activities) and from within carparks. Vehicle and patron noise can sometimes be present.

Middleborough Road Industrial Area (IN1Z)

The Middleborough Road industrial area is located to the south of Canterbury Road, along the west of Middleborough Road and limiting with the Gardiners Creek trail to the west. Only a small portion of the industrial area is within the Study Area, to the north-east. Industry in the Study Area is a major paper product supplier business (the Sorbent Paper Company). Beyond the Study Area there are other general industrial and commercial businesses.

Potential sources of noise are expected from specific industrial indoor activities associated with machinery and equipment such as paper mills and motor-driven systems (including pumps, fans, compressed air and convertors). Deliveries and external mechanical plant used for building services would also generate noise.

Local commercial areas (C1Z)

Smaller local commercial areas within a C1Z land zoning area identified outside the Burwood Structure Plan Area but within the Study Area are:

- Warrigal Road and High Steet Road – adjacent to Warrigal Road, extending south of High Street Road, to the south-west of the Burwood Structure Plan Area
- Mavron Street to the south of High Street Road between Yooralla Steet and Cleveland Road – to the south of the Burwood Structure Plan Area
- 207 to 219 High Street – south of the Burwood Structure Plan Area
- 1 to 22 Yertchuk Avenue – south of the Burwood Structure Plan Area
- 35 to 45 Vannam Drive – south of the Burwood Structure Plan Area
- 3 to 13 Essex Road and 54 to 66 Essex Road – south of the Burwood Structure Plan Area
- 2 to 20 Andrew Street – south-east of the Burwood Structure Plan Area
- 334-336 Highbury Road – east of the Burwood Structure Plan Area
- 425 to 435 Highbury Road – east of the Burwood Structure Plan Area
- 2 to 50 Burwood Highway in Burwood East – east of the Burwood Structure Plan Area
- 156 to 168 Elgar Road, 186 to 196 Elgar Road, 201 to 207A Elgar Road and 1105 to 1125 Riversdale Road in Surrey Hills – north of the Burwood Structure Plan Area
- 1051 to 1069 Riversdale Road in Surrey Hills – north of the Burwood Structure Plan Area.

These areas are all within the C1Z zone areas and contain local restaurants, take aways, cafes, supermarkets, grocery shops, barber and beauty salons and general retail shops. Potential sources of noise are external mechanical plant used for building services and from supply deliveries. Patron noise can sometimes be present.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise from transport activities and civil infrastructure identified in the Burwood Structure Plan Area and Study Area are listed in Table C.10.

**TABLE C.10 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE SOURCES IN THE BURWOOD STRUCTURE PLAN AREA AND STUDY AREA**

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE BURWOOD STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| **Transport** | | | | | |
| Station Street | North-south running through the eastern portion of the Study Area. | Within and outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Burwood Highway | East-west running through the central portion of the Study Area. | Within and outside Burwood Structure Plan Area | Arterial highway | Constant | Road traffic noise |

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE BURWOOD STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| Elgar Road | Starting at the junction with Burwood Highway in the central area of the Burwood Structure Plan Area, continuing to the north of the Study Area. | Within and outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Highbury Road | East-west running through the central portion of the Study Area. | Within and outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Huntingdale Road | Starting at the junction with Highbury Road in the south-eastern area of the Structure Plan Area, continuing to the south of the Study Area. | Within and outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Warrigal Road | North-south running through the western portion of the Study Area. | Outside Burwood Structure Plan Area | Arterial highway | Constant | Road traffic noise |
| Riversdale Road | East-west running through the northern portion of the Study Area. | Outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Middleborough Road | North-south running through the eastern portion of the Study Area. | Outside Burwood Structure Plan Area | Arterial road | Constant | Road traffic noise |

Noise sources identified in Table C.10 are described below.

Station Street

Station Street is an arterial roadway connecting Highbury Road to the Eastern Freeway via Box Hill to the north, located along the eastern portion of the Burwood Structure Plan Area. The road runs through the eastern Burwood Structure Plan Area and mostly consists of two inbound and outbound lanes. Based on VicRoads traffic volume data, Station Street carries an AADT of approximately 11,000 vehicles northbound and 8300 vehicles southbound (a total of 29,300 AADT), with 6 per cent being heavy vehicles.

Burwood Highway

Burwood Highway is an arterial highway connecting Burwood to the Mount Dandenong Ranges to the east and to Toorak Road to the west. The road mostly has three to four lanes. VicRoads traffic volume data indicates that Burwood Highway carries an AADT of approximately 18,000 vehicles for east and westbound traffic (a total of 36,000 AADT), with 5 per cent being heavy vehicles.

Elgar Road

Elgar Street is an arterial roadway connecting Burwood Highway to the south with Eastern Freeway to the north. The road mostly has two inbound and outbound lanes. The road runs into the centre of the Burwood Structure Plan Area and based on VicRoads traffic volume data, carries a total two-way AADT of approximately 11,000 vehicles in the Burwood area, with 6 per cent being heavy vehicles.

Highbury Road

Highbury Road is an arterial roadway connecting Warrigal Road to Springvale Road to the east. The road mostly has two inbound and outbound lanes and services the industrial areas of the Burwood Structure Plan Area. VicRoads traffic data indicates that Highbury Road carries an AADT of approximately 12,000 vehicles, in each east and westbound directions in the Burwood area (a total of 24,000 AADT), with 6 per cent being heavy vehicles.

Huntingdale Road
Huntingdale Road is an arterial roadway connecting Highbury Road to Huntingdale Station to the south. The road has two inbound and outbound lanes and services the industrial areas of the Burwood Structure Plan Area. VicRoads traffic data indicates that Huntingdale Road carries an AADT of approximately 13,000 vehicles in each north and southbound directions within the Burwood area (a total of 26,000 AADT), with 6 per cent being heavy vehicles.

Warrigal Road
Warrigal Road is an arterial roadway connecting Canterbury Road at the north to Monash Freeway on the south. The road runs through the western portion of the Burwood Structure Plan Area and mostly has two inbound and outbound lanes. Based on VicRoads traffic volume data, Warrigal Road carries a total two-way AADT of approximately 30,000 vehicles, with 5 per cent being heavy vehicles.

Middleborough Road
Middleborough Road is an arterial roadway connecting to the Eastern Freeway via Box Hill to the north and to Highbury Road to the south, located along the eastern portion of the Study Area. The road mostly has two inbound and outbound lanes. Based on VicRoads traffic volume data, the road carries an AADT of approximately 13,000 vehicles northbound and 9600 vehicles southbound (a total of 22,600 AADT), with 5 per cent being heavy vehicles.

Riversdale Road
Riversdale Road is an arterial roadway connecting the northern portion of the Study Area from Elgar Road to the suburb of Hawthorn to the west. The road mostly has two inbound and outbound lanes (with a tram line). VicRoads traffic volume data indicates that Riversdale Road carries a total two-way AADT of 20,000 vehicles, with 7 per cent being heavy vehicles.

## Box Hill Study Area

The Box Hill Study Area is located in the City of Whitehorse. It is predominantly residential, with areas of small and medium-sized commercial and light industrial zones.

Land use zones relevant to noise and vibration in the Study Area are shown in Figure 3.6.

# Potential sources from existing businesses

Noise emissions from existing businesses are likely from commercial and light industrial activities (such as car repair services, printing services and small-scale manufacturing) involving the operation of motor-driven equipment (such as pumps, air compressors and conveyors) and mechanical plant used for building services (such as chillers, pumps, heating, ventilation and air conditioning (HVAC), air handling unit (AHU), air source heat pump (ASHP) units). Music from identified music and events/entertainment venues is also a consideration, although pubs with outdoor live music were not identified within the Box Hill Study Area.

No significant vibration sources from existing businesses that would likely extend beyond their boundaries were identified in the Study Area.

Table C.11 summarises identified businesses with potential noise sources within the Box Hill Structure Plan Area, and those within the Study Area (but outside the Box Hill Structure Plan Area).

## TABLE C.11 EXISTING BUSINESSES WITH IDENTIFIED NOISE SOURCES IN THE BOX HILL STRUCTURE PLAN AREA AND STUDY AREA

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| **Within** Box Hill **Structure Plan Area** | | | | |
| Box Hill Hospital (PUZ3) | 8 Arnold Street, Box Hill | Accident and emergency and medical services | 24 hours / 7 days a week | External mechanical plant for building services and deliveries generate noise emissions. Ambulance vehicle movements and syren noise. |
| Box Hill Central / Whitehorse Road & Station Street Commercial Areas (C1Z) | Box Hill Central: 1 Main Street, Box Hill<br>Other smaller areas at<br>Mont Albert and Box Hill | Commercial: restaurants, shopping and retail | Weekdays:<br>7am – 12am<br>Weekends:<br>10am – 12am | External mechanical plant for building services and deliveries generate noise emissions.<br>Potential for patron noise. |
| Station Street / Albion Road Industrial Area (IN3Z) | 480-500 Station Street, Box Hill South | Industrial and commercial | Weekdays and weekends 8:30am – 9pm | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Box Hill City Oval and Box Hill Pavilion (PPRZ) | Middleborough Road, Box Hill | Events at sport centre | Varies depending on event. Typically, 9am – 3pm | City Oval: Outdoor sporting events generate noise emissions from Public Address (PA) systems and patron noise.<br>Pavilion: noise emissions from indoor live music and patron noise.<br>Increased road traffic during events. |
| Box Hill Town Hall (PUZ6) | 1022 Whitehorse Road, Box Hill | Community centre & cultural hub for events | Weekdays:<br>9am – 5pm<br>Weekends: varies depending on event. | Outdoor and indoor live music events generate noise emissions from PA and sound reinforcement systems.<br>Patron noise. Increased road traffic. |
| East Box Hill Cricket Club (PPRZ) | 1160 Whitehorse Road, Box Hill | Sports venue | Tuesday, Thursday & Friday: 4:30pm – 8:30pm<br>Saturday:<br>9:30am – 9:30pm | Outdoor sport events generate noise emissions from PA and sound reinforcement systems.<br>Patron noise and increased road traffic noise during events. |
| Box Hill RSL Sub-Branch (RGZ3) | 26-30 Nelson Road, Box Hill | Community centre & hub for events | Weekdays & Saturdays:<br>9am – 1am<br>Sundays:<br>11am – 12am | Outdoor and indoor events, with live music generate noise emissions from PA and sound reinforcement systems. Patron noise and increased road traffic noise during events.<br>External mechanical plant for building services generate noise emissions. |
| FRV Fire Station 20 (RGZ2) | 1052 Maroondah Highway/Whitehorse Road, Box Hill | Fire Station | Emergency services 24 hours / 7 days a week | Fire truck vehicle movements and syren noise. |
| **Within Study Area (outside** Box Hill **Structure Plan Area)** | | | | |
| Lexton Road Industrial Area (IN3Z) | 22 to 83 Lexton Road, Box Hill North | Industrial and commercial | Weekdays:<br>8am – 5:30pm<br>Weekends:<br>9am – 5pm | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |
| Middleborough Industrial Area (IN1Z) | 169 to 321 Middleborough Road, Box Hill South | Industrial and commercial | Weekdays:<br>8:30am – 6pm<br>Weekends:<br>9am – 5pm | Noise emissions from specific light industrial and commercial indoor activities (use of machinery and equipment), deliveries and any external mechanical plant used for building services. |

| AREA / BUSINESS NAME | ADDRESS | ACTIVITY | OPERATING HOURS [1] | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|
| Local (small) Commercial Areas (C1Z) | Located within the following areas:<br>- Maroondah Highway Blackburn Road<br>- Whitehorse Road & Union Road<br>- Beresford Street & Mont Albert Road | Commercial: restaurants, shopping and retail | Weekdays:<br>08am – 9pm<br>Weekends:<br>9am – 10pm | External mechanical plant used for building services and noise from deliveries. In some instances, patron noise can be present depending on the nature of the business. |

[1] For the areas containing a group of commercial or industrial businesses, the hours of operation would vary depending on the individual businesses, the operating hours indicated are based on typical periods for most of the businesses within the area listed.

Businesses identified in Table C.11 and their potential noise emissions are described below.

**Within Box Hill Structure Plan Area**

Box Hill Hospital (PUZ3)

Box Hill Hospital is a key healthcare facility part of the Eastern Health network. It offers a broad spectrum of medical services, including emergency care, general medicine, and specialist services. Potential sources of noise include external mechanical plant used for building services, deliveries of supplies and ambulance sirens. These are assumed to be present supporting the typical operations of the hospital. Noise from sirens is not within the scope of the Environment Protection Regulations due to their emergency nature.

Box Hill Central / Whitehouse Road and Station Street Commercial Area (C1Z)

Box Hill Central is located in a C1Z zoning area and is a major shopping centre that serves as a key retail and transportation hub for the eastern suburbs. The shopping centre hosts a range of retail outlets including supermarkets, fresh food markets, clothing stores, electronics stores, and various restaurants and bars with indoor live music. The commercial zone spans between Edgar Road to Station Street, along the south of Whitehorse Road. Box Hill Central is integrated with the existing Box Hill Station, which is a significant transportation hub in Melbourne's public transport network. Noise emissions from Box Hill Station are included in under infrastructure features later in this section. Box Hill Central also provides multiple parking spaces.

Other commercial zones (C1Z) are located alongside Whitehorse Road and Station Street within the Box Hill Structure Plan Area:

- 811 to 823 Whitehorse Road in Mont Albert
- 837 to 849 Whitehorse Road in Box Hill
- 875 to 957 Whitehorse Road and 701 to 703 Station Steet in Box Hill
- 963 to 1033 Whitehorse Road and 702 to 706 Station Steet in Box Hill.

Potential sources of noise in these commercial zones include external mechanical plant used for building services, from deliveries (from stationary heavy goods vehicles (HGVs), refrigeration units, loading/unloading activities) and from within carparks. Patron noise and indoor live music can sometimes be present.

Station Street / Albion Road industrial area (IN3Z)

This small industrial area includes a car repair garage, car wash, supermarket and cafe. Potential noise sources are likely to originate from their specific activities and associated machinery and equipment, with most expected

to be located indoors. Noise from deliveries and external mechanical plant used for building services is also expected.

Box Hill City Oval (PPRZ)

Box Hill City Oval is a multi-purpose sporting ground located at the eastern portion of the Box Hill Structure Plan Area. It is a primary venue for local sports, including for Australian rules football and cricket. The oval has a capacity of approximately 10,000 spectators and features a grandstand, social club facilities, change rooms, and a broadcast-quality lighting system allowing for evening games. Box Hill Pavilion is co-located with the City Oval, on the south-west corner of the parcel, and hosts indoor corporate events, parties and weddings.

Potential sources of noise include outdoor and indoor sound reinforcement systems (in some cases for live music), PA systems, and patron noise, with limited emissions from external mechanical plant. Road traffic on local roads is expected to increase on event days.

Box Hill Town Hall (PUZ6)

Box Hill Town Hall is a community facility at the centre of the Box Hill Structure Plan Area and serves as a cultural and civic hub for the city and surrounding areas. The town hall provides a range of multi-purpose rooms and halls for community use and private hire. This includes a main hall with a stage and large seating capacity, meeting rooms and exhibition spaces. In addition to serving as a venue for cultural events, art exhibitions and concerts, the town hall is home to the Whitehorse Centre for Community Arts, a hub of cultural and artistic activities.

Potential sources of noise include outdoor and indoor sound reinforcement systems (in some cases for live music) and patron noise, with limited emissions from external mechanical plant. Road traffic on local roads is expected to increase when the town hall is hosting events.

East Box Hill Cricket Club (PPRZ)

The cricket club includes a bar and restaurant facilities. Potential sources of noise include outdoor PA systems, patron noise. indoor sound reinforcement systems used for live music, and external mechanical plant used for building services. Road traffic on local roads is expected to increase during large events.

Box Hill RSL Sub-Branch (RGZ3)

The Box Hill RSL Sub-Branch is located within a residential land use zone and is an organisation that supports veterans and their families. The branch includes facilities for meetings, functions, conferences and special events in the eastern region, and can accommodate up to 150 people.

Potential sources of noise include outdoor and indoor sound reinforcement systems, with live music and patron noise. Noise from external mechanical plant used for building services and from supply deliveries is also expected. Road traffic on local roads is expected to increase during the branch’s operating hours.

Surrey Hills Park and Cricket Club

The cricket club is located within a Public Use Zone on the south-western portion of the Box Hill Structure Plan Area. Surrey Park features two ovals, one baseball pitch, a baseball court and Aqualink Box Hill. It is also home to the Melbourne Baseball Club and the Surrey Park Model Boat Club. Potential sources of noise include outdoor PA systems, patron noise, indoor sound reinforcement systems used for live music, and external mechanical plant used for building services. Road traffic on local roads is expected to increase during large events.

**Within Study Area (outside Box Hill Structure Plan Area)**

Lexton Road Industrial Area (IN3Z)

The Lexton Road Industrial Area is situated in a IN3Z zoning area and comprises mostly light industrial and commercial businesses. The area contains businesses such as a student gallery and workshop studio, carpet

shed factory, automotive parts shops, storage facility, car accident repair centre, car garage, print shop, supermarket, and other similar retail shops.

Potential sources of noise are from light industrial and commercial activities and associated machinery and equipment, with most expected to be located indoors. Noise from deliveries and external mechanical plant used for building services is also expected.

Middleborough Road industrial area (IN1Z)

This industrial area is within a IN1Z zone at the south-eastern portion of the Study Area. It contains a range of industries such as car repair garages, storage facilities, retail shops (such as a pet shop, furniture and cabinet shops, paper and office supplies and auto parts store). Potential sources of noise are expected to be similar to those described for the Lexton Road industrial area above.

Local commercial areas (C1Z)

Smaller local commercial areas identified outside the Box Hill Structure Plan Area (and within the Study Area) are:

- Whitehorse Road/Maroondah Highway, Blackburn Road and Railway Road – The commercial areas span inside and outside the eastern area of the Box Hill Structure Plan Area. The commercial units are located alongside 85 to 173 Whitehorse Road, 21 to 98 Railway Road, 64 to 130 South Parade, and 20 to 30 Blackburn Road.
- Whitehorse Road and Union Road – The commercial areas span inside and outside the western area of the Box Hill Structure Plan Area. The commercial units are located from 490 to 560 and from 585 to 615 Whitehorse Road.
- Mont Albert Road and Hamilton Street, in the western area of the Box Hill Structure Plan Area – The commercial units are located from 343 to 377 Month Albert Road, 1 to 42 Hamilton Street, and 2 to 14A Churchill Street.

These areas are within a C1Z zone and feature local restaurants, cafes, supermarkets, grocery shops, shopping and retail businesses. Potential sources of noise include external mechanical plant used for building services and from deliveries. Patron noise can sometimes be present depending on the nature of the business.

## Potential sources from existing transport and civil infrastructure

Existing sources of noise and vibration from transport and civil infrastructure identified in the Box Hill Structure Plan Area and Study Area are summarised in Table C.12.

**TABLE C.12 EXISTING TRANSPORT AND CIVIL INFRASTRUCTURE WITH NOISE AND VIBRATION SOURCES IN THE BOX HILL STRUCTURE PLAN AREA AND STUDY AREA**

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE BOX HILL STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| **Transport** | | | | | |
| Station Street | North-south running through the central portion of the Study Area. | Within and outside Box Hill Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Whitehorse Road | East-west running through the central portion of the Study Area. | Within and outside Box Hill Structure Plan Area | Arterial highway | Constant | Road traffic noise |

| FEATURE NAME | LOCATION | WITHIN / OUTSIDE BOX HILL STRUCTURE PLAN AREA | TYPE | OPERATING PATTERN | POTENTIAL SOURCES OF NOISE AND VIBRATION |
|---|---|---|---|---|---|
| Elgar Road | North-south running through the western portion of the Study Area | Within and outside Box Hill Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Canterbury Road | East-west running through the southern portion of the Study Area. | Within and outside Box Hill Structure Plan Area | Arterial road | Constant | Road traffic noise |
| Belgrave / Lilydale Line | East-west running through the central portion of the Study Area, passing through Box Hill. | Within and outside Box Hill Structure Plan Area | Passenger railway | Train pass-byes. First service 05:30am<br>Last service 12:30am | Railway (airborne) noise. Potential for ground-borne noise and vibration limited in proximity to the rail corridor. |
| **Infrastructure** | | | | | |
| Box Hill Station | Central area of the Box Hill Structure Plan Area. | Within Box Hill Structure Plan Area | Railway station | As per service times detailed above for the Belgrave / Lilydale Line. | Mechanical plant for building services, PA systems, Although, very limited as the station is located underground. |
| Box Hill interchange – tram stop 58 & 109 | On Whitehorse Road, in the central portion of the Box Hill Structure Plan Area. | Within Box Hill Structure Plan Area | Tram stop | Weekdays and Saturdays: 4:30am –1am Sundays: 4:38am –1am | Mechanical plant for building services, PA systems. |

Noise and vibration sources identified in Table C.12 are described below.

Station Street

Station Street is an arterial roadway connecting Box Hill to the Eastern Freeway to the north and Highbury Road to the south. The road mostly has two inbound and outbound lanes. The road runs across Box Hill Central and the Station Street and Canterbury Road commercial area. According to VicRoads traffic volume data, Station Street carries a total two-way Annual Average Daily Traffic (AADT) of approximately 18,000 vehicles, with 3 per cent being heavy vehicles.

Whitehorse Road / Maroondah Highway

Whitehorse Road is an arterial highway connecting Box Hill to the Eastlink toll roadway to the east and to Burke Road to the west. The road mostly has three to four inbound and outbound lanes. VicRoads traffic volume data indicates that Whitehouse Road services an AADT of approximately 16,000 vehicles eastbound and 11,000 vehicles westbound (a total of 27,000 AADT), with 5 per cent being heavy vehicles.

Elgar Road

Elgar Road is an arterial roadway connecting Box Hill to the Eastern Freeway to the north and Burwood Highway to the south. The road mostly has two inbound and outbound lanes. The road forms the western edge of Box Hill. Based on VicRoads traffic volume data, Elgar Road carries an AADT of approximately 14,000 vehicles northbound and 13,000 vehicles southbound (a total of 27,000 AADT), with 4 per cent being heavy vehicles.

Canterbury Road

Canterbury Road is an arterial roadway connecting Box Hill to the suburb of Montrose to the east and to Burke Road to the west. The road mostly has three to four inbound and outbound lanes. VicRoads traffic volume data

indicates that Whitehouse Road services an AADT of approximately 14,000 vehicles eastbound and 17,000 vehicles westbound (a total of 31,000 AADT), with 6 per cent being heavy vehicles.

Belgrave / Lilydale Line

The Belgrave / Lilydale Line forms part of the suburban rail service. The line is double tracked the entire length and is primarily for passenger services. The Line services eight and four trains per hour in peak and non-peak periods, respectively. At the existing Box Hill Station the daily services start at 5am and end at 1am, and on Fridays extend to 4am. Individual train pass-bys generate noise emissions alongside the route alignment, and ground-borne noise and vibration may be noticeable, but only in close proximity to the rail line.

Box Hill Station

Box Hill Station is a major transport hub in Box Hill. It services the Belgrave / Lilydale Line of Melbourne's metropolitan network managed by Metro Trains Melbourne. Box Hill Station is also integrated with a major bus terminus that provides numerous local and regional bus services. The station is adjacent to the Box Hill tram terminus, which services Route 109, connecting to Port Melbourne via the city centre. Potential sources of noise at the station include external mechanical plant used for building services and PA systems. Note that train horn noise is not within the scope of any noise regulations in Victoria.

Box Hill interchange – tram stop service 58 & 109

The Box Hill interchange and 109 tram service is operated by Yarra Trams and links Box Hill (Stop 58) to Port Melbourne (Stop 129). Trams depart from Stop 58 every 6 to 10 minutes during peak periods. On weekdays and Saturdays services operate from 4:30am to 1am and on Sundays from 4:30am to 1am. Note that tram noise and vibration are not within the scope of any noise regulations in Victoria, nor potential noise relating to mechanical plant when the facilities at the tram stop are operating. PA systems are assumed to operate, with potential for announcements at any time during tram services.

AJM
Joint Venture

222 Exhibition Street
Melbourne VIC 3000

PO Box 23061 Docklands
VIC 8012 Australia

contact@srla.vic.gov.au | 1800 105 105 (call anytime)
**suburbanrailloop.vic.gov.au**

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