

Housing the Hunter: a plan for renewal at Broadmeadow

Preferred scenario technical report - noise, air quality and odour

Prepared for Department of Environment, Housing and Infrastructure

May 2024

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1 Introduction

EMM Consulting Pty Limited (EMM) has been commissioned by New South Wales (NSW) Government Department of Planning, Housing and Infrastructure (DPHI) to support the development of a Structure Plan for the Broadmeadow Regionally Significant Growth Area (Broadmeadow). The Structure Plan will be informed by a Place Strategy and several technical studies.

The project, referred to as ‘Housing the Hunter: a plan for renewal at Broadmeadow’ focuses on the preparation of a Place Strategy and subsequent first-move state-led rezoning for a minimum of 2,000 homes on government-owned land. Housing the Hunter focuses on the efficient use of land to deliver residential and employment benefits with established services and infrastructure. There is potential for Broadmeadow to be an employment and residential centre that capitalises on transport options, Hunter Park, advanced manufacturing, sports medicine, and creative industries. The Broadmeadow precinct area is shown in a local context in Figure 1.1 (as ‘Precinct boundary’).

This report has been prepared to support the Structure Plan. EMM’s role was to provide technical input with respect to Package B – Environmental. This report addresses the technical areas of noise, vibration, air quality and odour. Biodiversity and bushfire advice also provided by EMM, is addressed in a separate report.

An initial Enquiry by Design (EbD) workshop was held in Newcastle on 3–4 May 2023. An outcome of the workshop was the Draft Scenarios Report which presented three scenarios for development within Broadmeadow (COX 2023). This report did not identify any specific objectives relating to noise amenity or air quality impacts.

The scenarios provided in the Draft Scenarios Report were updated and refined during and after a final EbD workshop held in Newcastle on 11–12 October 2023. From this workshop, an ‘emerging preferred scenario’ was developed and provided for assessment to the technical specialists.

It is noted that school infrastructure and transport initiatives are indicative only and subject to detailed design, analysis, feasibility review, funding commitments, etc. No investment decisions have been made in this regard.

This report presents an analysis of the emerging preferred scenario and first-move state-led rezoning in relation to potential noise, vibration, air quality and odour impacts at sensitive land uses (e.g. sensitive receptors such as residences and schools) as a result of the proposed changes to land use. This analysis also includes recommendations relating to how potential impacts could be avoided and managed in the future.

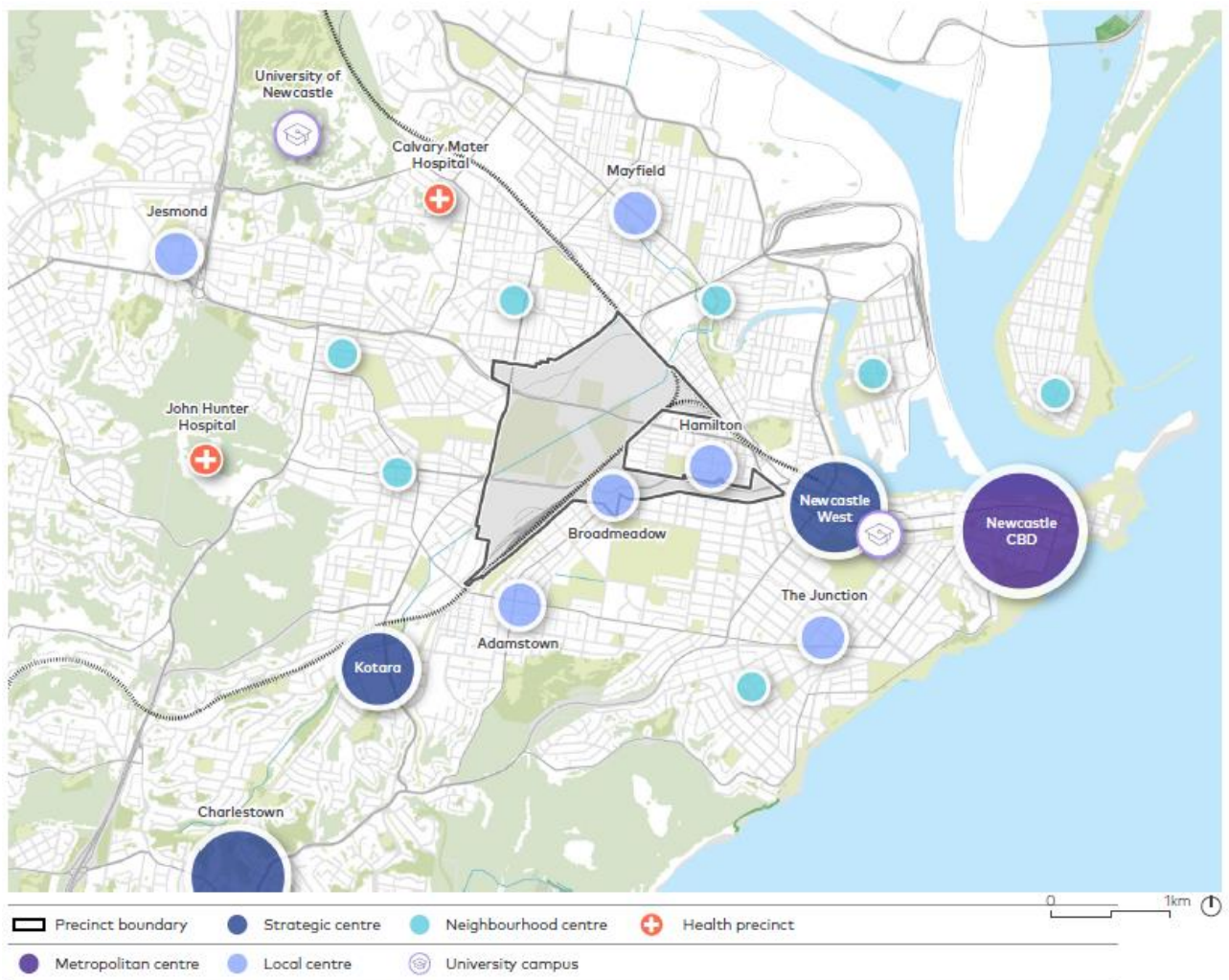


Figure 1.1 Housing the Hunter - local context (COX 2023)

2 Policy, legislation, and guidelines

2.1 Noise

Existing noise policy and guidance relevant to potential development within the Precinct are provided in Table 2.1 including a summary of the likely implications. These guidelines are typically applied within the current NSW planning approval pathways at the development application stage.

Table 2.1 Noise guidance

Policy, guideline, document	Typical application	Summary of potential constraint to future development
Road and rail		
Road Noise Policy (NSW DECCW 2011)	<p>Assessment of noise to existing noise sensitive development from:</p> <ul style="list-style-type: none"> • new or redeveloped roads; or • additional traffic on existing roads generated by land use developments. <p>For new noise sensitive development near existing roads the RNP states that “developers must meet internal noise goals in the” SEPP Transport and Infrastructure 2021.</p>	<p>The project does not currently involve the development of new roads.</p> <p>Where new, traffic-generating developments are proposed in the future, they would generally be required, in accordance with current NSW planning approval pathways, to prepare an assessment of road traffic noise in accordance with the RNP.</p> <p>This is not anticipated to provide a major constraint to development across the Precinct and would be addressed via future development applications.</p>
State Environment Planning Policy (Transport and Infrastructure) (NSW Government 2021)	<p>Noise sensitive development on land in or adjacent to a road (with an annual average daily traffic >20,000 vehicles) or rail corridor where the consent authority considers it likely to be adversely impacted by noise or vibration.</p>	<p>Consent must not be granted unless it is demonstrated that proposed residential development can achieve relevant internal noise levels:</p> <ol style="list-style-type: none"> 1. 35 dB in bedrooms between 10pm and 7am 2. 40 dB anywhere else in the residence (other than garage, kitchen, bathroom or hallway) at any time. <p>This is generally addressed at the development application stage when there is greater certainty around the proposed buildings, their use and the level of traffic noise exposure.</p> <p>This is not anticipated to provide a major constraint to development across the Precinct with internal noise levels likely to be able to be achieved through implementation of building design principles.</p>
Development near rail corridors and busy roads – interim guideline (NSW Department of Planning 2008)	<p>Guidance to consent authorities in relation to when a detailed assessment of noise and/or vibration would be required for proposed noise sensitive development near a road or rail corridor.</p> <p>Also provides useful examples of planning measures and acoustic treatments that can be used to control/minimise noise impacts at noise sensitive developments including residences, education and health facilities, places of worship, etc.</p>	<p>For passenger and freight rail services at less than 80 km/h some level of noise and vibration assessment would generally be required for sensitive development within approximately 60 m of the nearest operational track.</p> <p>The requirement for the assessment of noise for sensitive development near roads is dependent on traffic volumes and the type of proposed development however some consideration of noise would generally be required for developments within approximately 300 m of busy roads (e.g. roads with AADT of at least 20,000 or Council defined ‘classified’ roads).</p>

Table 2.1 **Noise guidance**

Policy, guideline, document	Typical application	Summary of potential constraint to future development
Sporting and major entertainment events		
Noise Guide for Local Government (NSW EPA 2023)	Guidance to local councils in relation to managing typical noise issues.	Effective management of noise from major sporting and entertainment events will require the ongoing implementation of appropriate noise management measures including enforcement of conditions of consent (which should include allowable operating hours, appropriate noise limits, noise monitoring and effective crowd management).
Industrial and commercial premises		
Existing Consents and Environment Protection Licences	Typically contain site specific requirements for operators to meet noise limits at specific locations that represent the nearest existing noise sensitive locations.	Potential land-use conflict if noise-sensitive developments are proposed nearer to industrial/commercial premises than existing noise-sensitive developments.
Noise Policy for Industry (NSW EPA 2017)	Proposed industrial and commercial development would generally be required, in accordance with current NSW planning approval pathways, to prepare an assessment of industrial-type noise in accordance with the NPfI.	Potential land-use conflict if new industrial development is proposed in proximity to existing noise-sensitive developments. Onus would be on the developer to incorporate noise reduction design into their new development.
Music venues		
Noise Guide for Local Government (NSW EPA 2023)	Guidance to local councils in relation to managing typical noise issues. Some existing venues have noise limits within their licence conditions. A new live entertainment venue would be required to demonstrate that their proposed operation would be able to achieve relevant noise targets.	Potential land-use conflict if new pubs/clubs are proposed in proximity to existing noise-sensitive developments. Onus would be on the developer of a music venue to incorporate noise reduction design into their development. Potential land-use conflict if new residences are proposed in proximity to existing venues.
Newcastle After Dark Strategy 2018-2022 (The City of Newcastle 2018)	Guiding principles to assist in the development of Newcastle's night-time economy.	The strategy suggests the implementation of Section 10.7 planning certificates to manage community expectations around noise levels in mixed use business and residential zones and night-time precincts. The strategy also suggests that noise monitoring could be a useful tool by providing access to downloadable sound files of city noise levels at certain thresholds.
Aviation activity		
Noise Guide for Local Government (NSW EPA 2023)	General guidance	It is acknowledged that safety and air traffic considerations may necessarily take precedence over noise control especially given that the aircraft are used for emergency response. Additional information will be required in relation to likely future operations of this facility.

2.2 Air quality and odour

Existing air quality policy and guidance relevant to potential development within the Precinct are provided in Table 2.2 including a summary of the likely implications. These guidelines are typically applied within the current NSW planning approval pathways at the development application stage.

Table 2.2 Air quality guidance

Policy, guideline, document	Typical application	Summary of potential constraint to development
General		
National Environment Protection (Ambient Air Quality) Measure (NEPC 2021)	Specifies air quality criteria to be applied when assessing impacts from emission sources on sensitive receptors (e.g. residences).	If an air quality impact assessment is required by council or regulators for a development within the project boundary, predicted impacts would need to be shown to be below the criteria at sensitive receptors. If results are above the criteria, there may be restrictions on development or mitigation measures may be required.
Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (NSW EPA 2022)	Specifies air quality criteria to be applied when assessing impacts from emission sources on sensitive receptors (e.g. residences). Guidance for conducting an air quality impact assessment is also provided.	As above.
Road and rail		
SEPP Transport and Infrastructure (NSW Government 2021)	Road and rail construction sites.	Dust control measures should be implemented prior to construction works to mitigate dust emissions.
Development near rail corridors and busy roads – interim guideline (NSW Department of Planning 2008)	Guidance to consent authorities in relation to minimising air quality impacts at sensitive receptors close to busy roads. The document focuses on building design considerations to minimise air quality impacts. It does not provide guidance on when an air quality impact assessment is required.	Air pollutant concentrations are highest adjacent to major roads but decrease sharply with distance from the kerb. Air quality should be a design consideration under the following circumstances: <ul style="list-style-type: none"> • within 10 m of a congested collector road (traffic speeds of less than 40 km/hr at peak hour) or a road grade >4% or heavy vehicle percentage flows >5% • within 20 m of a freeway or main road (with more than 2,500 vehicles per hour, moderate congestions levels of less than 5% idle time and average speeds of greater than 40 km/h) • within 60 m of an area significantly impacted by existing sources of air pollution (road tunnel portals, major intersection / roundabouts, overpasses or adjacent major industrial sources) • as considered necessary by the approval authority based on consideration of site constraints, and associated air quality issues.

Table 2.2 **Air quality guidance**

Policy, guideline, document	Typical application	Summary of potential constraint to development
Good Practice Guide for the Assessment and Management of Air Pollution from Road Transport Projects (CASANZ 2023)	The Guide provides a comprehensive procedure for determining the changes in air quality due to the construction or operation of a road project and how these may be minimised. It also provides guidance for developments near busy roads.	An initial screening air quality assessment may identify the need for a detailed assessment. Results of the detailed assessment may be unfavourable (i.e. above criteria) or may require additional mitigation.
Food outlets		
Local Government Air Quality Toolkit: Food Outlets (NSW EPA 2021)	The toolkit provides guidance for local council officers assessing potential dust and odour impacts from food outlets. It details air quality and odour management procedures and technologies for minimising air quality and odour impacts.	There may be a potential land-use conflict if residences are proposed in proximity to odour-generating food outlets.
Industrial and commercial premises		
Existing Consents and Environment Protection Licences	Typically contain site specific requirements for operators to meet air quality criteria at specific locations that represent the nearest air quality receptors.	Potential land-use conflict if air quality-sensitive developments are proposed closer to industrial/commercial premises than existing air quality-sensitive developments.

3 Existing noise, air quality and odour sources

3.1.1 Noise

A detailed search was conducted of various websites including City of Newcastle development application tracker, NSW Major Projects and NSW EPA environment protection licence (EPL) search. Very little quantitative noise data is publicly available regarding the existing noise environment across the study area. This is not expected to limit the capacity or quality of our acoustical advice for the purpose of strategic planning for the study area.

The existing (and proposed) noise environment features the following:

- Road traffic from major roadways through and around the site including Griffiths Road and Tudor Street/Belford Street/Lambton Road. Due to the extension of the Newcastle Inner City Bypass (currently under construction), future road traffic volumes on both Griffiths Road and Lambton Road are expected to decrease compared to existing volumes (a positive outcome for the subject area).
- Rail traffic, both passenger and freight (including coal), along the Main Northern Railway. No significant changes are proposed to the rail alignment within the study area or to the types or volumes of trains in the short to medium term. Consideration has been given to the future proposed transport network which may include a mass transit corridor along Tudor Street/Belford Street/Lambton Road, a rapid bus network and a transport interchange in the vicinity of the existing Broadmeadow train station.
- Sporting venues and major entertainment events.
- Industrial and commercial premises.
- Hotels (pubs) including live entertainment.
- Westpac Rescue helicopter facilities. There is a possibility that this facility may be moving in the future. If not, and it does become a future consideration for the Strategy, additional operational details (including noise studies) will be required.

3.1.2 Air quality and odour

To understand the existing air quality environment, an extensive search was conducted of publicly available resources, including the NSW Major Projects website, the City of Newcastle development application tracker, and Google Earth.

The main sources of anthropogenic air pollutant emissions within and in proximity to the project boundary are:

- Carrington Coal Terminal – Carrington Coal Terminal receives coal by rail at two facilities. Coal is then loaded to ships via two ship loaders. Potential air quality impacts include dust from operations and wind erosion from the coal stockpiles. However, as the facilities are 1.7 km from the project boundary, they would be unlikely to have an adverse effect on sensitive receptors (e.g. residences).
- Kooragang Coal Terminal – Potential sources of dust are similar to the Carrington Coal Terminal. Given the distance to the project (3.5 km), sensitive receptors within the project boundary are unlikely to experience significant periods of elevated air quality concentrations from this source.
- Ampol Newcastle Fuel Terminal – The terminal includes a vapour recovery unit that serves the road tanker filling gantry. Volatile organic compounds (VOCs) are likely to make up a large proportion of air quality emissions from this site.

- Rail traffic – Both passenger transport and freight transport (including coal) along the Main Northern Railway. There may be potential air quality impacts from passenger or freight trains and uncovered coal wagons. The Broadmeadow Maintenance Centre is also responsible for air quality emissions from their operations including train repairs and servicing. VOCs are likely to make up a large proportion of air quality emissions from this site.
- Road traffic – Major roadways through and around the site include Griffiths Road and Tudor Street/Belford Street/Lambton Road. The main sources of air pollution from roads are combustion emissions (e.g. NO_x and particulate matter) and non-exhaust particulate matter (e.g. brake and tyre wear).
- Fast food outlets – These include potential odour sources such as McDonalds, KFC, Hungry Jacks and Red Rooster. Some outlets that exist within the boundary are generally located within 30 m of residences.

4 Emerging preferred scenario

An initial Enquiry by Design (EbD) workshop was held in Newcastle on 3–4 May 2023. An outcome of the workshop was the Draft Scenarios Report which presented three scenarios for development within Broadmeadow (COX 2023). A range of technical specialists attended the workshop to provide advice on potential impacts as a result of the proposed land use changes. This information was then reviewed and used to inform updated scenarios analysed at a final EbD workshop held in Newcastle on 11–12 October 2023. From this workshop, the emerging preferred scenario was developed and is the subject of the analysis provided in this report.

The emerging preferred scenario is the outcome of the EbD workshops and aims to achieve the vision and non-negotiable planning features established through the workshops.

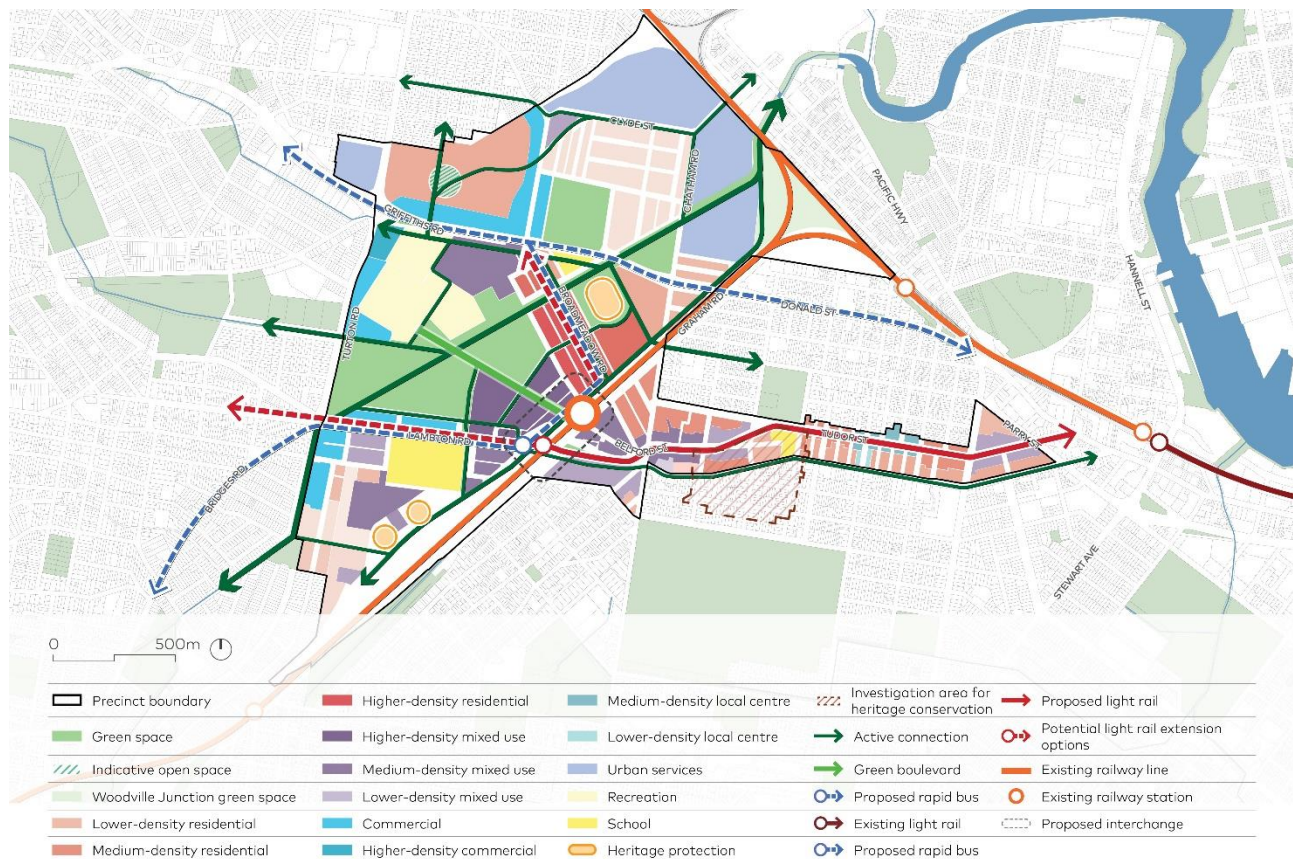


Figure 4.1 Emerging preferred scenario

5 SWOT - preferred scenario

5.1 Overview

The following sections provide a summary of the strengths, weaknesses, opportunities, and threats of the preferred scenario as they relate to amenity associated with noise and air emissions and the ongoing control and management of such emissions.

5.2 Strengths

- Retaining the majority of Hamilton North industrial land reduces the need for rezoning and management of expectations regarding changes in noise amenity or air emissions.
- Additional public open space in Hamilton North (northern side of Griffiths Road along Thorn Road and Bates Street) provides an increased buffer between Griffiths Road and residential properties.
- Proposed commercial development on northern side of Griffiths Road can provide a buffer between the road and the proposed new residences here (although commercial development will need to be carefully managed here).
- Co-locating arena/leisure centre away from new residential areas provides opportunity to implement an Entertainment Precinct (although residential as part of mixed-use will need to be considered and carefully managed).
- No (or very limited) proposed land-use changes along Belford and Tudor Streets. Although the density of residential development along this area is proposed to increase, there is no additional industrial or commercial development proposed.
- Green space buffer between rail and residential/education in area south of Lambton Road (although there is a proposed 'higher density residential' and 'mixed-use' adjacent to the rail line that will need careful design).
- Most new residential areas are located away from major roads. Where mixed-use is proposed adjacent roads (Lambton Road/Belford Street and Griffiths Road) this provides greater opportunities, compared to low density residential, for incorporating design measures to minimise noise and air quality impacts from road traffic.
- Residential, mixed use and open spaces are proposed next to schools in the south-west of the site. These land use types are not likely to include significant air quality emission sources.
- The proposed green buffer in Hamilton North between existing residents and industrial land (although it will provide limited benefits).

5.3 Weaknesses

- Proximity of new residential areas in Hamilton North to the proposed transport interchange.
- New mixed-use adjoining the entertainment/indoor recreation area (noise impacts likely able to be managed via detailed noise assessment of arena or introduction of an Entertainment Precinct).

- New residential and mixed-use along the rail line. New residential within approx. 60 m of passenger and freight rail line or 300 m of a busy road may require a detailed acoustic and air quality assessment as part of the development application phase (subject to regulator or council requirements). A conservative buffer distance to protect residences from air quality emissions from rail sources is 200 m. If uncovered coal wagons continue to use this railway line, a higher separation distance is preferred (e.g. 300 m).
- A medium density residential area is proposed adjacent to Griffiths Road. New residential within approx. 300 m of a busy road may require a detailed acoustic assessment as part of the development application phase (subject to regulator or council requirements). To protect residences from air quality emissions, a conservative buffer distance from major road sources of 200 m is recommended. Section 7.3 also provides design principles that could be incorporated to mitigate air quality impacts through building design.
- Commercial land uses are proposed to the east and south of a new medium density residential area north of Griffiths Road. Noise and air quality assessments may be required here for proposed uses to ensure impacts on the neighbouring residences are appropriately assessed and managed.

5.4 Opportunities

- Introduce concept of Entertainment Precinct which could provide planning pathways/authority to manage expectations around noise amenity.
- Biodiversity/wetland could be utilised to introduce vegetation – this will not reduce noise levels but can reduce the impact of noise by providing an ‘out of sight, out of mind’ effect.
- Locating fast food outlets (with potential odour emissions) together in commercial areas and situating them away from residences and educational facilities, would help to reduce the possibility of odour impacts as impacts are less likely to occur when similar uses are adjacent.
- Use open space as a buffer between residences or other sensitive uses and the railway line.
- Include the design principle of minimising amenity impacts within the Structure Plan to ensure that amenity is considered at the early planning stages, e.g. “Site planning, building size, shape and orientation, and interior layout is to minimise noise and air quality impacts at proposed and existing residential locations as far as possible.”

5.5 Threats

- Poor community consultation and lack of engagement with potentially affected communities.
- Future mass transit corridor may introduce new noise impacts along Belford/Tudor – detailed noise, vibration and air quality impact assessment may be required.
- Proposed mixed use development (including residential) may be constrained in proximity to the Westpac Helicopter prior to its relocation.
- If uncovered coal wagons continue to use the railway line through to the south-west of the site, proposed residential areas directly adjoining this area may have an elevated exposure to emissions. A conservative buffer distance to protect residences from air quality emissions from rail sources is 200 m. If uncovered coal wagons continue to use this railway line, a higher separation distance is preferred (e.g. 300 m).

6 State-led first-move considerations

The plan for the first-move state-led rezoning (see **Figure 6.1**) has been reviewed. There are no significant constraints from a noise or air quality perspective to prevent the rezoning of the Go Karts and Stadium Forecourt, Newcastle Showground, Basketball Stadium & PCYC or Locomotive Depot.

Given the proximity of new or increased density of residential land to the rail line and major roads, it is likely that a noise investigation will be required to support any development application. This investigation would typically take approximately 4-6 weeks and involve a noise monitoring program for approximately one or two weeks. An analysis of the measured data would then be undertaken to determine the feasibility of future residential (or other noise-sensitive) developments being able to achieve relevant noise goals. Defining the noise exposure and demonstrating this can be managed through feasible and reasonable means, will improve the success probability of the rezoning.

An air quality impact assessment may also be required as part of the development application process given the proximity of proposed residences to roads and the rail line. This would typically involve a desktop-based emissions and dispersion modelling study.

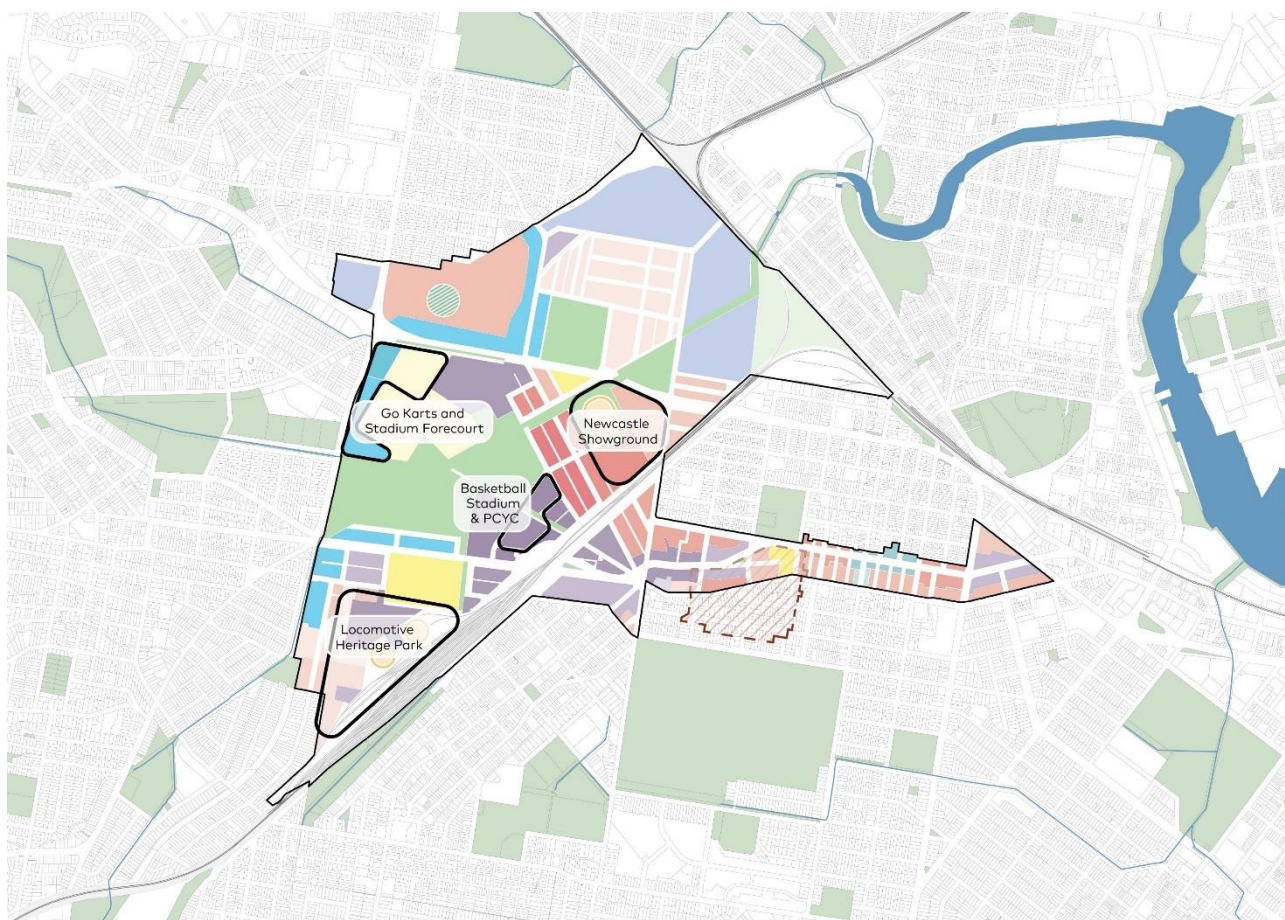


Figure 6.1 First-move state-led rezoning

7 Other considerations

7.1 Alternative planning framework

With the ongoing use and evolution of parts of the Precinct as venues for large entertainment and sporting events or active night-time economy sites, there is an opportunity to investigate the feasibility and practicality of implementing relevant planning framework that incorporates the concept of an 'Entertainment Precinct' (or similar) to manage expectations around noise emissions and allow for enforcement of appropriate noise limits by relevant regulatory authorities (likely Council). Success of such a concept will rely on effective community consultation and the relevant regulatory authority having the resources to enforce the noise limits.

A special entertainment precinct can be a venue, street or area where councils set and manage amplified music levels through a noise/sound management plan. Councils can create a precinct by amending their Local Environmental Plan. This lets councils set localised noise criteria and compliance procedures for licensed venues. A similar concept could be adopted to manage noise from the large entertainment and sporting events within the Precinct area.

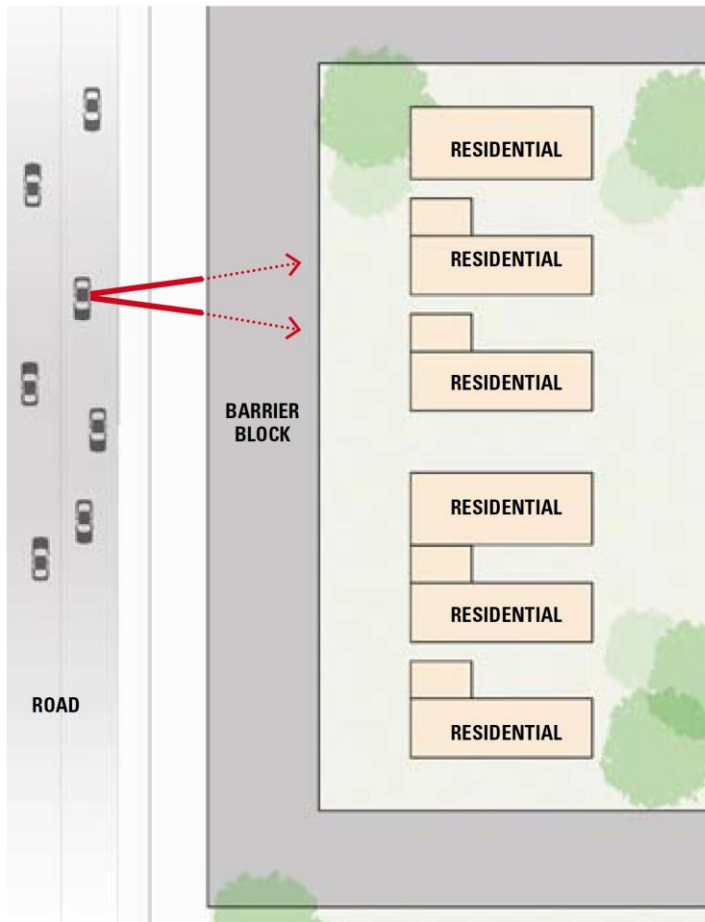
7.2 Building design

The *Development near rail corridors and busy roads – Interim Guideline* (NSW Department of Planning 2008) provides examples of good design principles to avoid noise and vibration impacts. These design principles also typically provide benefits in relation to potential air quality and odour impacts. The following examples could be incorporated in the design of new or redeveloped residential areas to achieve appropriate amenity for future residences. Although the Guideline focuses on noise from rail corridors and busy roads, the principles provided in relation to building design to reduce noise levels can be used for a range of noise sources, including entertainment noise.

A key element of minimising impacts involves increasing the separation distance between the road/rail sources and the sensitive areas. This could be achieved by incorporating the following:

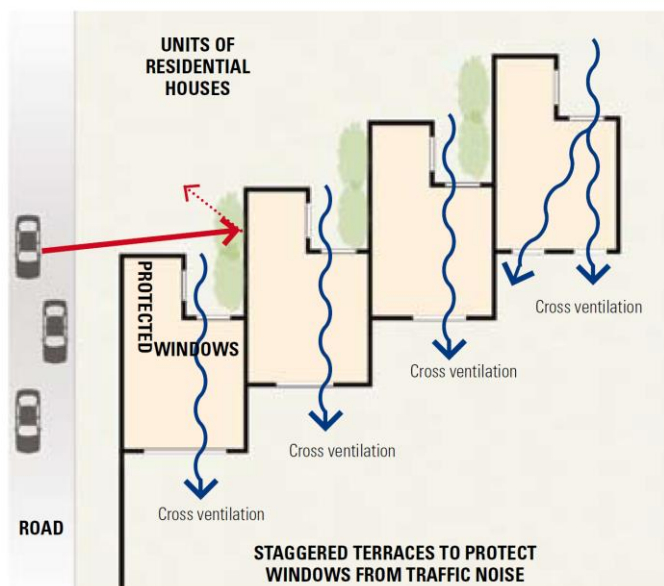
- Locating sensitive rooms (e.g. bedrooms, living areas) away from the road or rail corridor. Conversely, rooms which are less sensitive or used less often (e.g. laundries, storage rooms) should be located on the same side as the road/rail corridor.
- Use less-sensitive buildings (e.g. commercial premises) as a shield for residential dwellings or other sensitive uses such as aged care facilities and childcare centres (see example of the 'barrier block' in Figure 7.1).
- Use of staggered terraces to protect openings (windows and doors) from traffic noise (refer Figure 7.2). This can provide the opportunity to shield windows and doors from traffic noise whilst allowing for natural ventilation.
- Avoid buildings that are angled (i.e. not perpendicular) to the road/rail corridor as this can provide opportunity for noise and air emissions to be reflected between the buildings and into openings.
- Build residential apartments on top of a podium (this could consist of, for example, parking or commercial space) (refer Figure 7.3).
- Use of balcony treatments (for example, solid balustrades, absorptive materials, louvres) to reduce traffic noise entering the building.

- Use of noise barriers. Where space allows, this could be a solid barrier in the form of an earth mound or fence/wall (or a combination of the two) located between source and receiver or it could be more localised to target specific openings (doors or windows) (refer Figure 7.4 and Figure 7.5).



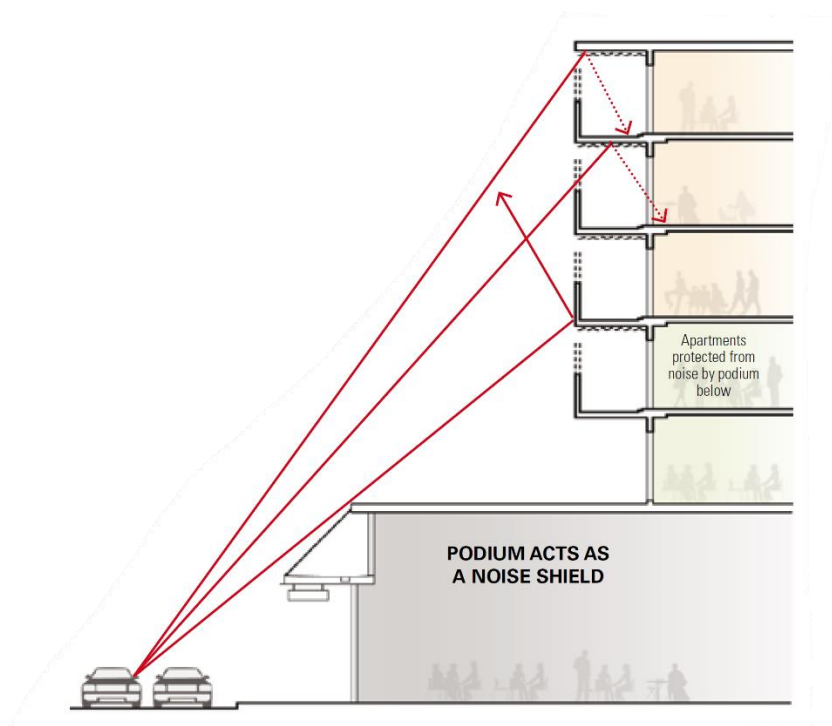
Source: Development near rail corridors and busy roads – interim guideline (Department of Planning 2008)

Figure 7.1 Example of using less-sensitive buildings as a shield from road or rail corridor



Source: Development near rail corridors and busy roads – interim guideline (Department of Planning 2008)

Figure 7.2 Staggered terraces



Source: Development near rail corridors and busy roads – interim guideline (Department of Planning 2008)

Figure 7.3 Podium to act as a barrier between residences and road/rail

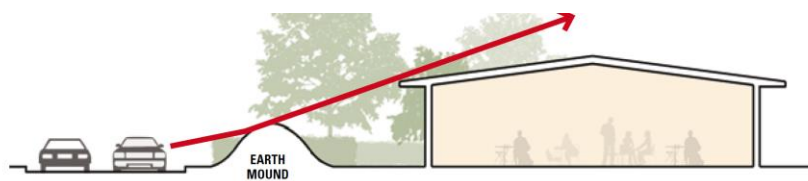


Figure 3.18b: Noise barrier using an earth fence/wall

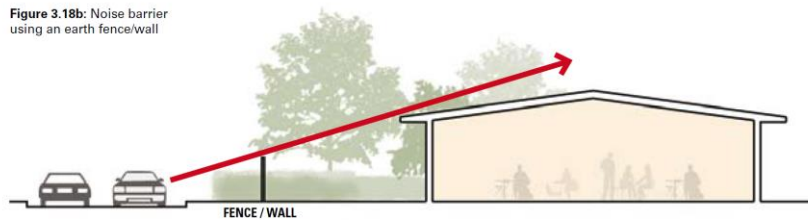
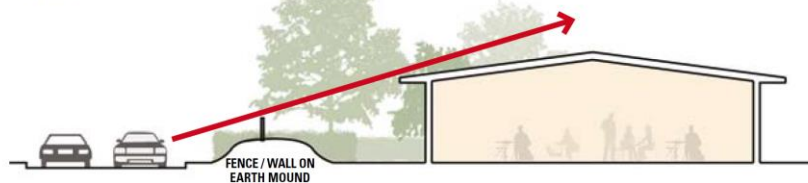


Figure 3.19: Noise barrier using a fence/wall



Source: Development near rail corridors and busy roads – interim guideline (Department of Planning 2008)

Figure 7.4 Noise barrier examples

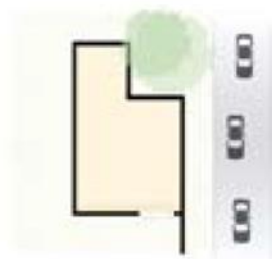
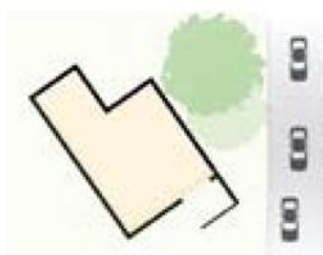


Figure 7.5 Examples of localised screens/barriers for window and door openings

7.3 Air quality planning principles

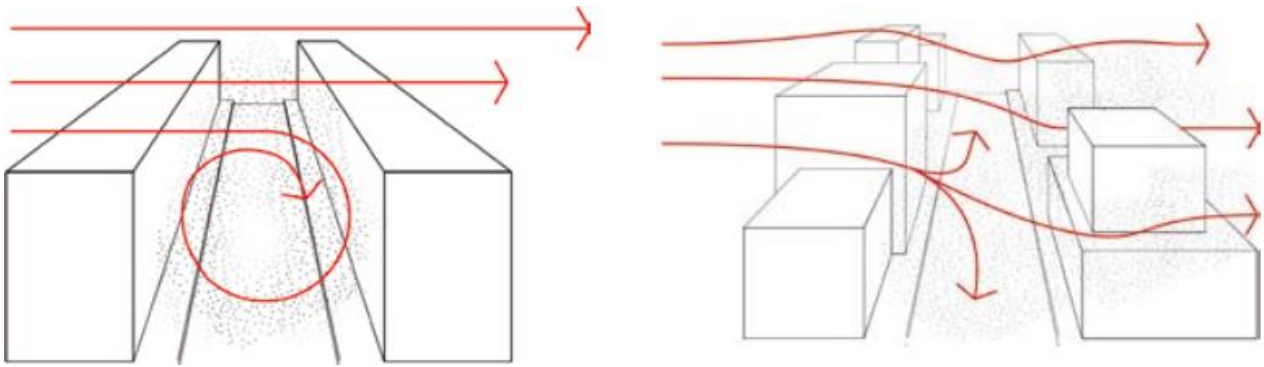
The following points outline some general air quality planning principles that may be applied in situations where receptors (residences, commercial operations, etc.) exist emission sources:

- where possible, higher sensitivity development could be located near uses where likely exposure to air pollution or nuisance odour would be limited (e.g. locating a small commercial operation or recreational area, which may have limited staff present onsite, next to a significant emission source)
- construction dust impacts to be managed through a construction dust management plan and risk assessments if needed noting that construction impacts are typically short-term in nature
- general buffer distance (i.e. distance of development to the source) guidance exists in states outside of NSW, e.g.:
 - 100 m from major roads (SA EPA 2016)
 - 150 m from freeways and high-traffic roads (CARB 2005)
 - 300 m from distribution centres (CARB 2005)
 - 200 m from road freight transport or transport vehicle depots (bulk chemical) or refuelling facilities (Emission Impossible 2012, WA EPA 2005)
 - 300 m from rail yards (CARB 2005).

Related to the buffer distance guidance, the recently published *Good Practice Guide for the Assessment and Management of Air Pollution from Road Transport Projects* (CASANZ 2021) states that for surface roads, evidence suggests that the influence on air quality is negligible at distances of more than 200 m.

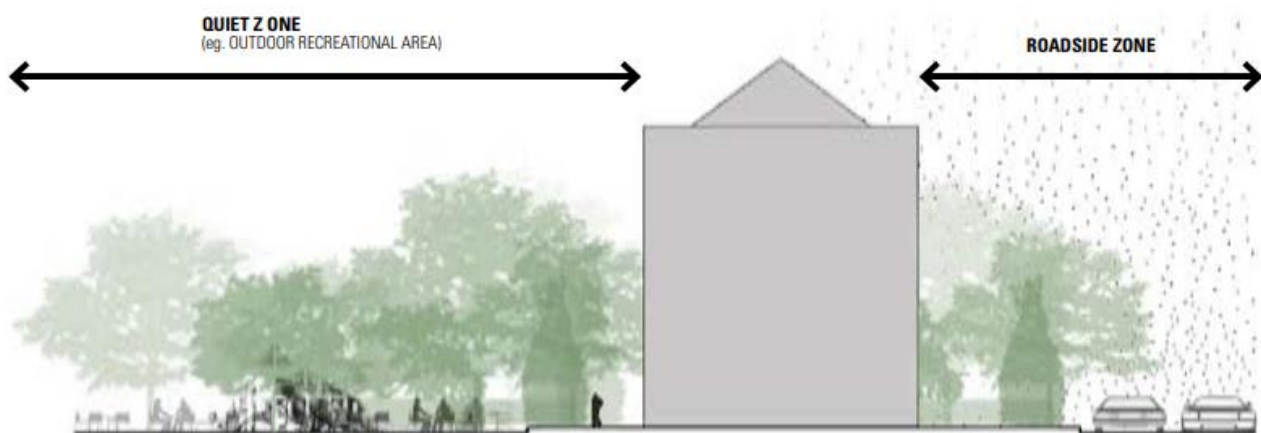
The *Development near rail corridors and busy roads – Interim Guideline* (NSW Department of Planning 2008) provides examples of good design principles to minimise air quality impacts. The following examples could be incorporated in the design of new or redeveloped residential areas to minimise the potential for air quality impacts adjacent to busy roads or railway:

- Minimise the formation of urban canyons that result in poor dispersion. Use buildings of different heights interspersed with open areas and set back the upper stores of multi-level buildings. Figure 7.6 provides an example of poor air dispersion in an urban canyon compared with building planning leading to better dispersion.
- Incorporate separation distance between sensitive uses and the road using broad scale site planning principles such as building siting and orientation (as shown in Figure 7.7). The location of living areas, outdoor space and bedrooms and other sensitive uses (such as childcare centres) should be as far as practicable from the major source of air pollution.
- Ventilation design and windows (that can be opened) should be considered in the design of development located adjacent to busy roads. When the use of mechanical ventilation is proposed, the air intakes should be sited as far as practicable from the road.
- Use vegetative screens, barriers, or earth mounds to assist in maintaining local ambient air amenity.



Source: NSW Department of Planning (2008)

Figure 7.6 The effect of road canyons on dispersion of air pollutants



Source: NSW Department of Planning (2008)

Figure 7.7 Using separation distances between sensitive land uses and busy roads

7.4 Staged changes to land use

The plan for the staged changes to land use (see Figure 7.8) has been reviewed. It is not anticipated that there would be any additional considerations relating to noise, air quality or odour as a result of the proposed staging plan.

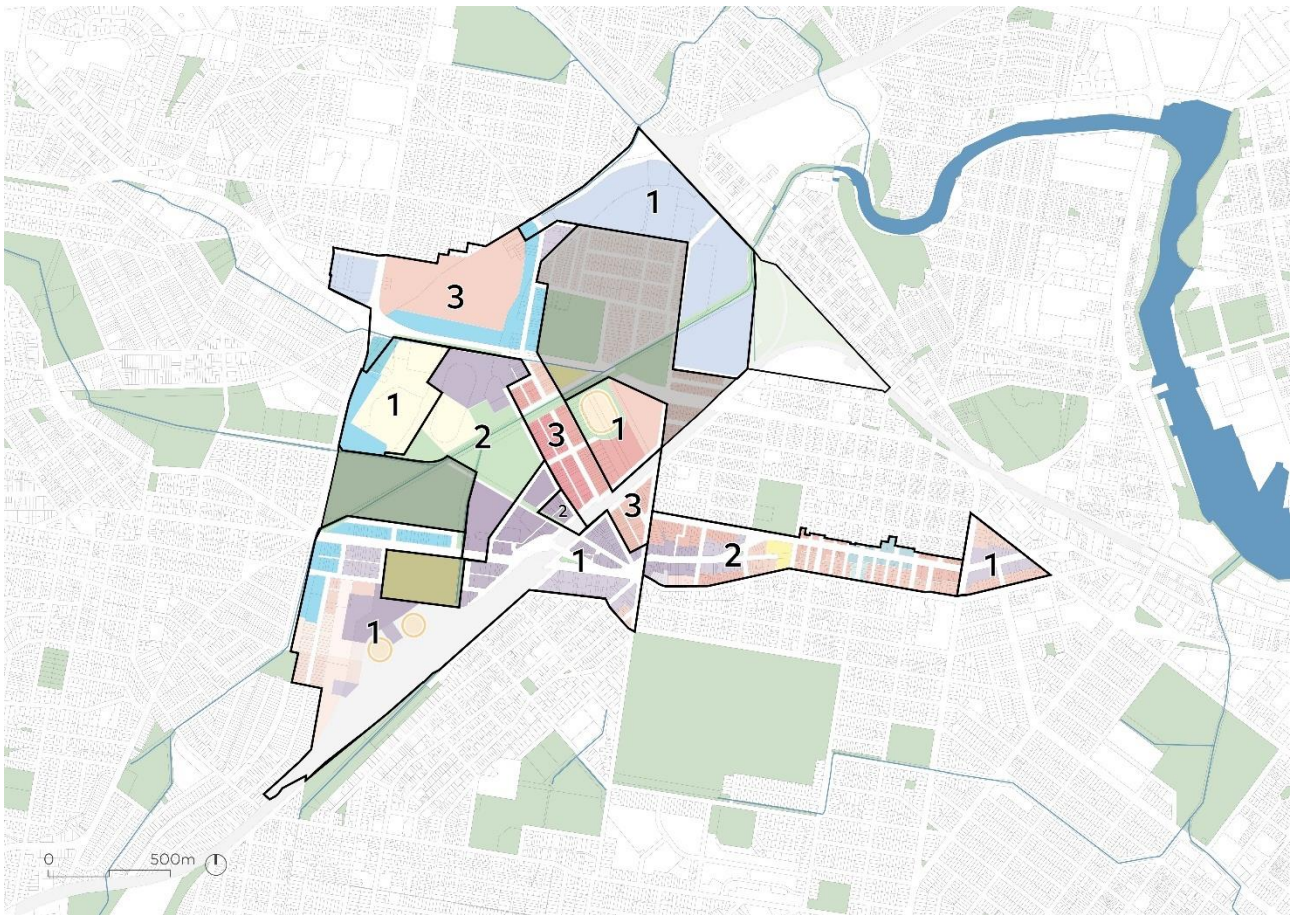


Figure 7.8 Staged land use planning of the project

7.5 Proposed flood mitigation

Preliminary flood mitigation measures in the form of retention basins in and around the site are shown in Figure 7.9. These are not expected to have any implications with regard to the control and management of noise and air quality emissions.



Figure 7.9 Preliminary draft flood mitigation measures

8 Summary of findings and recommendations

EMM has provided an evaluation of the emerging preferred scenario as it relates to potential noise and air quality impacts.

To minimise the potential for noise and air quality impacts an overall design principle of maximising the separation between sources of noise and air emissions (road, rail, industry) and sensitive receptors (residences, health, education, etc.) should be implemented.

After the land-use planning process has maximised potential separation, noise reduction / management is typically applied in the following hierarchy for developments that generate noise:

- Controlling noise at the source: e.g. engineering design, low-noise road surface, track alignment, low-noise engines, quietest plant that can do the job, etc.
- Controlling transmission of noise: use of barriers or enclosures.
- Controlling noise at the receiver: double-glazing, mechanical ventilation systems, façade design, roof or sub-floor insulation, etc.

Further to maximising separation distances, the following planning and building design considerations could be considered to minimise the potential for air quality impacts:

- Where possible, development with potential air quality sources should be located away from sensitive receptors.
- Locating similar types of sources (e.g. odour from fast-food outlets) together in commercial areas would help to reduce the possibility of odour impacts, as these are less likely to occur when similar uses are adjacent.
- The following building design principles will help to minimise the potential for air quality impacts adjacent to busy roads:
 - Use of different building heights interspersed with open areas to minimise the formation of urban canyons that result in poor dispersion.
 - Locating living areas or play areas (in the case of schools) away from the road.
 - Locating air intakes as far as possible from the road.
 - Use of vegetative screens between sensitive receptors and the road.

There are no major constraints to the project in relation to potential noise and air quality impacts. Impacts would primarily be adequately managed through the implementation of current policies and guidelines via existing planning approval pathways. The exception to this would be where new residences are introduced in closer proximity to existing industry which may be the case in the north of the subject site. This will require careful land-use planning by the relevant regulatory authority over time and ensuring new residential development in this area are aware of the existing environmental amenity.

We recommend consideration of a relevant planning framework that incorporates the concept of an 'Entertainment Precinct' (or similar) to manage expectations around noise emissions and allow for enforcement of appropriate noise limits by relevant regulatory authorities (likely Council) for sporting or entertainment events or night-time economy areas.

For new residential dwellings, especially multistorey apartments, in proximity to noise sources (e.g. transport interchange, major roads or the rail line) onus would be on the developer to demonstrate compliance with the National Construction Code including that appropriate internal noise levels can be achieved. Recommendations regarding design elements that could be considered in this regard are provided in Section 6.2 and would also be effective at minimising noise impacts from other sources such as entertainment venues.

Important considerations to effectively manage changing land use and amenity impacts include:

- effective community consultation
- establishment of clear expectations around noise and air quality
- appropriate enforcement of relevant limits.

With regard to the first-move state-led rezoning, there are no key significant constraints from a noise or air quality perspective to prevent or delay the rezoning of the Go Karts and Stadium Forecourt, Newcastle Showground, Basketball Stadium & PCYC or Locomotive Depot.

Given the proximity of new or increased density of residential land to the rail line and major roads, it is likely that a noise investigation will be required to support the development application. This investigation would typically take approximately 4–6 weeks and involve a noise monitoring program for approximately one to two weeks. An analysis of the measured data would then be undertaken to determine the feasibility of future residential (or other noise-sensitive) developments being able to achieve relevant noise goals. By defining the noise exposure and demonstrating this can be managed through feasible and reasonable means, will improve the success probability of the rezoning.

An air quality impact assessment may also be required as part of the development application process given the proximity of proposed residences to roads and the rail line. This would typically involve a desktop-based emissions and dispersion modelling study.

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