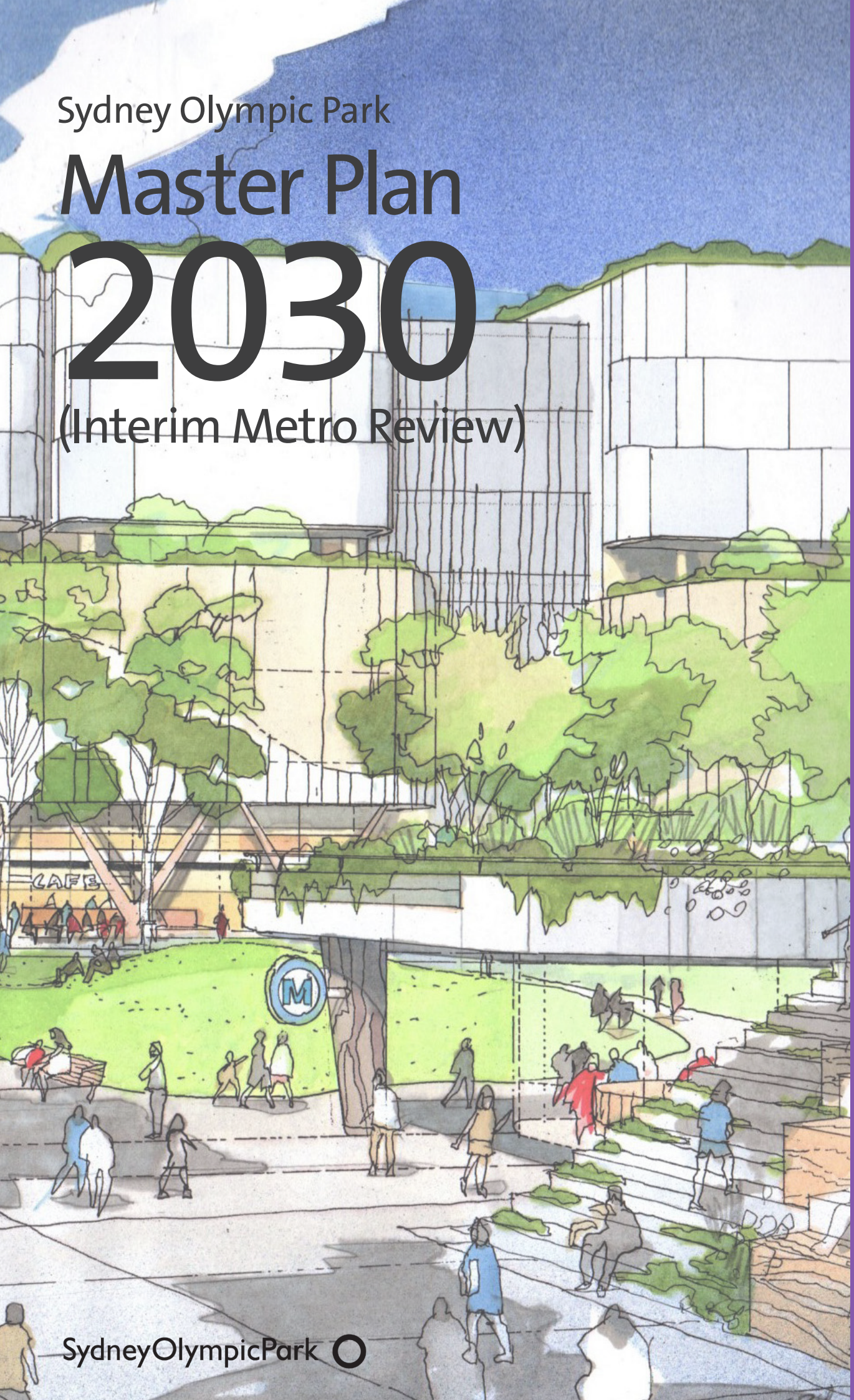
Sydney Olympic Park

Master Plan 2030

(Interim Metro Review)



SydneyOlympicPark

ANNEXURE 5: ACOUSTIC REPORT

REPORT

SYDNEY OLYMPIC PARK

MASTER PLAN 2030 – NOISE MANAGEMENT GUIDELINES

INTERIM AMMENDMENT 2021
RWDI # 2104602
August 6, 2021

SUBMITTED TO

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STUDY TYPE: INTERIM AMMENDMENT 2021
SYDNEY OLYMPIC PARK

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1 INTRODUCTION

The Sydney Olympic Park Master Plan 2030 (MP2030) provides guidance for proposed development within the Sydney Olympic Park "the Park". Under the *Sydney Olympic Park Authority Act 2001*, the Sydney Olympic Park Authority (SOPA) is required to maintain and update the Master Plan.

MP 2030 came into effect on the 10 March 2010 (and was most recently updated in the 2018 review) and represents a 20-year vision for sustainable development. It includes detailed provisions for the development of land in the Town Centre at Sydney Olympic Park, as well as a requirement that the document be reviewed every 5 years after the date of adoption.

RWDI Australia have been engaged to update the acoustic provisions within the Master Plan 2030 (2018 review). This update addresses the amendments to the central precinct layout, land use and building massing to facilitate the delivery of a Sydney Metro West station and its integration with this precinct.

The primary focus of these guidelines is to minimise potential acoustic impacts of sporting and entertainment venues on other land uses within and around the park. Our review includes the updated Central precinct built form and the following noise sources:

- Noise sources associated with Stadium Australia, including both sports and concert events;
- Noise produced by Spotless Stadium events;
- Noise produced by traffic associated with events and day-to-day operation of the park;
- The Royal Easter Show outdoor carnival;
- Plant noise produced by commercial developments within the park; and
- Noise produced by the rail link.

A high-level review of the noise implications associated with the Food and Beverage (F&B) and public domain events within the Central / Metro precinct as well as crowds moving toward the Metro Station following an event is assessed separately in more detail.

1.1 Project Description

Central Precinct is bounded by Murray Rose Avenue to the north, Australia Avenue to the east, Sarah Durack to the south and Olympic Boulevard to the west. Dawn Fraser Avenue and Herb Elliot Avenue in the north of the precinct have established urban characters comprising office buildings with continuous shopfronts along both streets, centred on the existing heavy rail Train Station. Whilst the remainder of the Central Precinct, currently comprises low rise, large floorplate commercial and industrial buildings, hotels and residential flat buildings.

The land covered by the Park is shown in Figure 1-1.

Since the Master Plan 2030 first came into effect, Sydney Olympic Park has grown considerably with the addition of residential and commercial developments.

The proposed updates to the central precinct include a new Metro Station and the redevelopment of much of the land into a mixed used residential, commercial and entertainment precinct. Figure 1-2 presents an illustration of the proposed Central precinct with the location of the Metro Station highlighted in yellow.

Figure 1-1 Lands covered by the Sydney Olympic Park Master Plan 2030

Figure 1-2 Central Precinct illustrative plan

In summary, the amendments to the Master Plan include:

- Integration of Sydney Metro West station box into the Central Precinct;
- Integration of a pedestrian plaza from Olympic Boulevard to the Metro Station;
- Location of the bus interchange on Fig Tree Drive;
- Refinement of the street hierarchy to integrate with the Metro Station;
- Integration and connection of Central Urban Park to the Abattoir Precinct;
- Integration of fine grain streets and through site links into the urban network;
- Amendments to the land use controls to integrate the Metro Station into the Central Precinct;
- Amendments to the building height controls and other planning controls as necessary.

2 MODELLED SCENARIOS

Modelled scenarios are consistent with previous versions of the Master Plan with the exception of the updated Central precinct built form. These scenarios include:

- Sporting event in Stadium Australia;
- Concert in Stadium Australia
- Carnival noise (Royal Easter Show);
- Late night party noise;
- Football (Spotless Stadium);
- Traffic Noise; and
- Rail Noise.

Whilst there are other noise generating activities held in the park, these are considered the most critical.

The indicative building locations and heights have been provided by the SOPA. Where necessary, a height of 3.5m has been assumed per storey.

Site-related noise emissions were modelled with the "CadnaA" noise prediction program, using the Concawe noise prediction algorithms. Factors that are addressed in the noise modelling are:

- Sound level emissions and location;
- Screening effects from buildings;
- Ground topography;
- Noise attenuation due to geometric spreading;
- Ground absorption; and
- Atmospheric absorption.

The impact of different scenario noise sources was considered individually and cumulatively on the acoustic suitability for residential development of different areas of the park. Each source has been modelled at heights of 20m and 40m and 80m above ground, to reflect the impact of the least screened portions of mid-rise buildings, high-rise buildings, and towers respectively.

The noise contour plots are derived from the individual modelled scenarios. However, they are not discussed in detail in this report as the long-term strategy for the development is best informed by the combined effects, as illustrated by the plots identifying the acoustic suitability for residential development of the different areas of the park. These have been derived from all of the most critical scenarios identified above on the basis that they would generally occur at different times of the day and would therefore not act cumulatively.

2.1 Source noise levels

The sound power levels for Park events used in this assessment are drawn from our previous assessments and more recent event monitoring data. These are summarised in Table 2-1.

The location of these venues are shown in Figure 2-1 below.

Table 2-1 Sound Power Levels used in noise modelling of Park Events

Event, Location & Plan Label	Sound Power Level (dBA L_{Aeq})
Stadium Australia Events (3)	
Stadium Australia Sport Events (80,000 people) Crowd & PA Noise	136
Stadium Australia Rock Concert + Crowd Noise	145
Spotless Stadium Events (1)	
Showground Rock Concert On-axis power level for single speaker stack	142
Showground Rock Concert Crowd Noise	128
Showground AFL / Cricket (25,000 people in Main Arena) Crowd & PA Noise	131
Royal Easter Show – Main Arena event, Crowd & PA	125
Royal Easter Show – Carnival rides external to Main Arena	118
Athletics Centre (4)	
Athletics Event Crowd & PA Noise	129
Qudos Bank Arena (2)	
(Indoor) Rock Concert	120 (external to arena)

Figure 2-1 Major venues located in the Town Centre

3 ACOUSTIC SUITABILITY FOR RESIDENTIAL DEVELOPMENT

Each scenario / noise type was modelled separately, and noise contours were derived based on the external criteria. Contours with respect to the corresponding criteria were then summed graphically to form contours of 'Acoustic Suitability for Residential Development'(ASRD), covering all noise types.

For the individual scenarios there are differing noise criteria that determine the suitability of a site, these criteria are set out in Table 4 1. The table also identifies the levels that correspond to the contours for 'Some Mitigation Required', 'Maximum Mitigation Required', and 'Not Suitable for Residential Development' conditions shown on the plots. These criteria have not changed since the previous assessment.

Table 3-1 Residential noise criteria for each noise type and contour levels

Noise Type	Source of Criterion	Noise Measure	External Criterion[5]	Some Mitigation Required	Substantial Mitigation Required	Maximum Mitigation Required	Not Suitable for Residential Development
Sports & Concerts	SOP Guidelines[1]	L_{AMax}	60dBA	>60dBA	>70dBA	>80dBA	>85dBA
Late Night Parties	SOP Guidelines[1]	$L_{eq,125Hz,15min}$	50dB	>50dB	>60dB	>70dB	>75dB
Industrial	Industrial Noise Policy[2]	$L_{Aeq,15min}$	45dBA	>45dBA	>55dBA	>65dBA	>70dBA
Carnival Area	Development Consent	$L_{A10,15min}$	45dBA	>45dBA	>55dBA	>65dBA	>70dBA
Road Traffic	Road Noise Policy[3]	$L_{Aeq,9hr}$ (10pm to 7am)	50dBA	>50dBA	>60dBA	>70dBA	>75dBA
Rail Traffic	Department of Planning[4]	$L_{Aeq,9hr}$ (10pm to 7am)	45dBA	>45dBA	>55dBA	>65dBA	>70dBA

Notes: 1) Sydney Olympic Park Noise Management Guidelines, Report No. 99053, July 2002.
2) Night time amenity criterion for 'Urban' areas, NSW Industrial Noise Policy, EPA.
3) NSW Road Noise Policy, EPA (formerly the ECRTN).
4) Development Near Rail Corridors and Busy Roads – Interim Guideline, NSW Department of Planning.
5) The equivalent internal noise criterion is 10dBA below the external criterion, 10dBA being the typical attenuation of an open window.

The following three figures present the Acoustic Suitability for Residential Development (ASRD). Figure 4 1 shows these areas at a 20m receiver height, representing mid-rise buildings, and valid when assessing buildings <25m height. Figure 4 2 shows this at a 40m receiver height representing mid-rise buildings between 25m and 50m height. Figure 4 3 shows this at an 80m receiver height representing high-rise buildings over 50m height. There is minimal difference in the contours above this height due to lack of shielding, therefore Figure 4 3 can be used for buildings 100m tall and above.

Figure 3-1 Acoustic suitability for residential development, under 25m building height

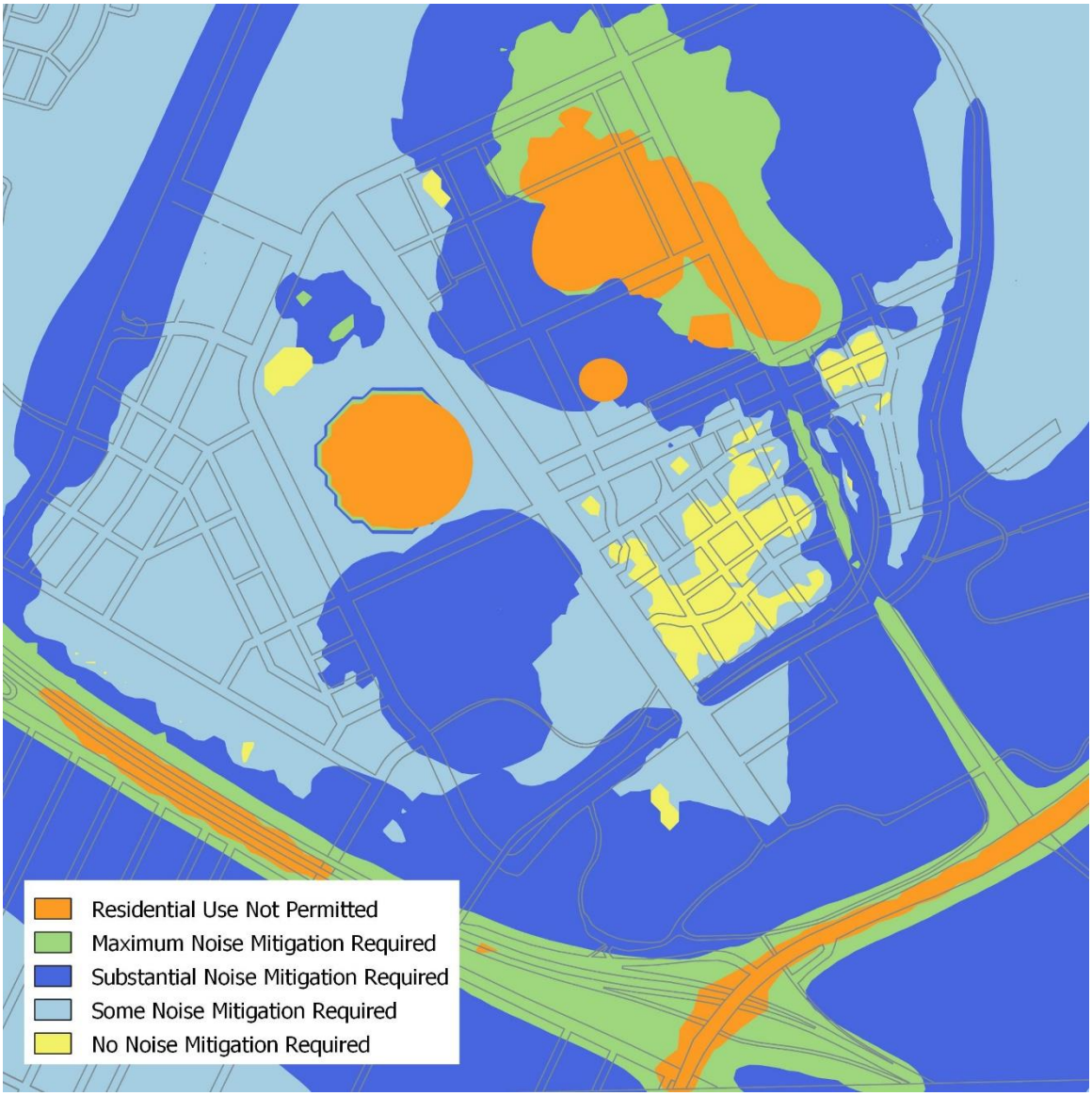


Figure 3-2 Acoustic suitability for residential development, 25m to 50m building height

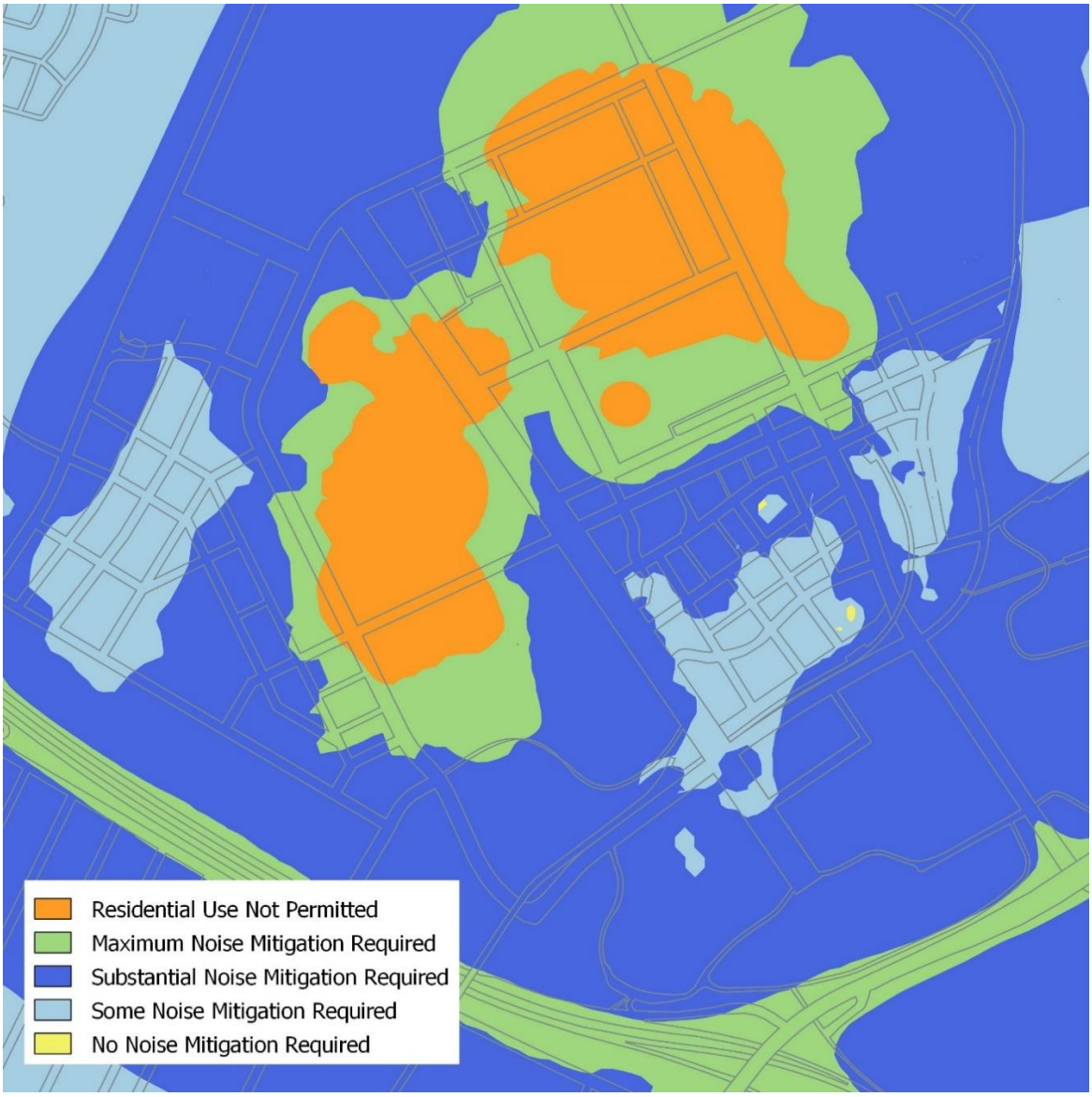
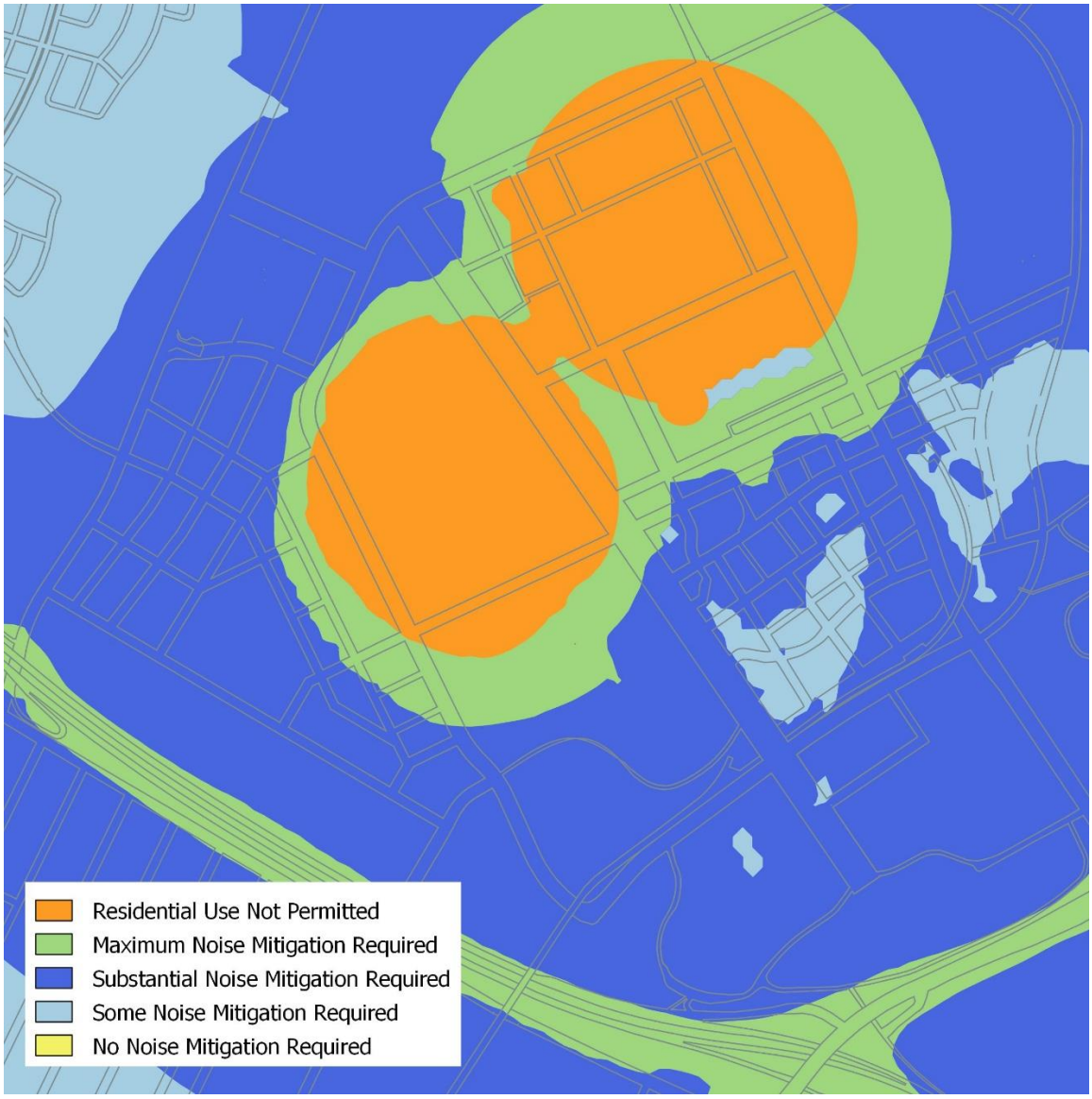


Figure 3-3 Acoustic suitability for residential development, over 50m building height



4 METRO STATION EVENT CROWD

The Sydney Olympic Park Pedestrian Assessment has developed scenarios for crowds leaving events at Sydney Olympic Park and accessing various forms of transport away from the Park. This assessment found that following a large event at the stadium approximately 26,000 people could be accessing the Metro Station late in the evening. These pedestrians would be marshalled along Olympic Boulevard before entering the Central precinct and passing by residential receivers before entering the Metro Station, as shown in Figure 4-1.

Figure 4-2 presents the proposed land uses for the Central precinct, where the residential buildings are shown in red and the Metro Station marshalling area shown shaded in yellow.

Figure 4-1 Sydney Olympic Park Pedestrian Assessment – Metro access

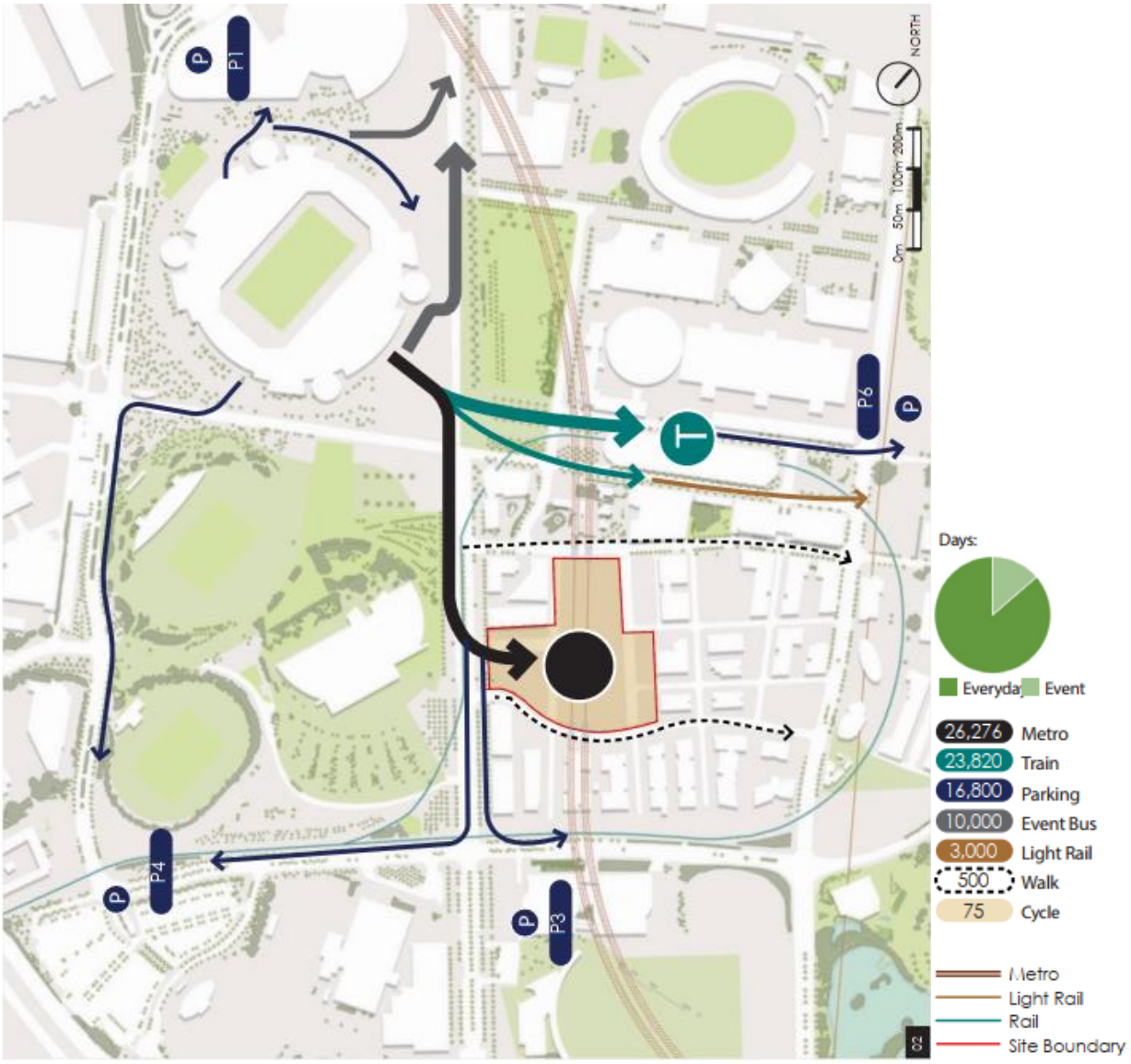
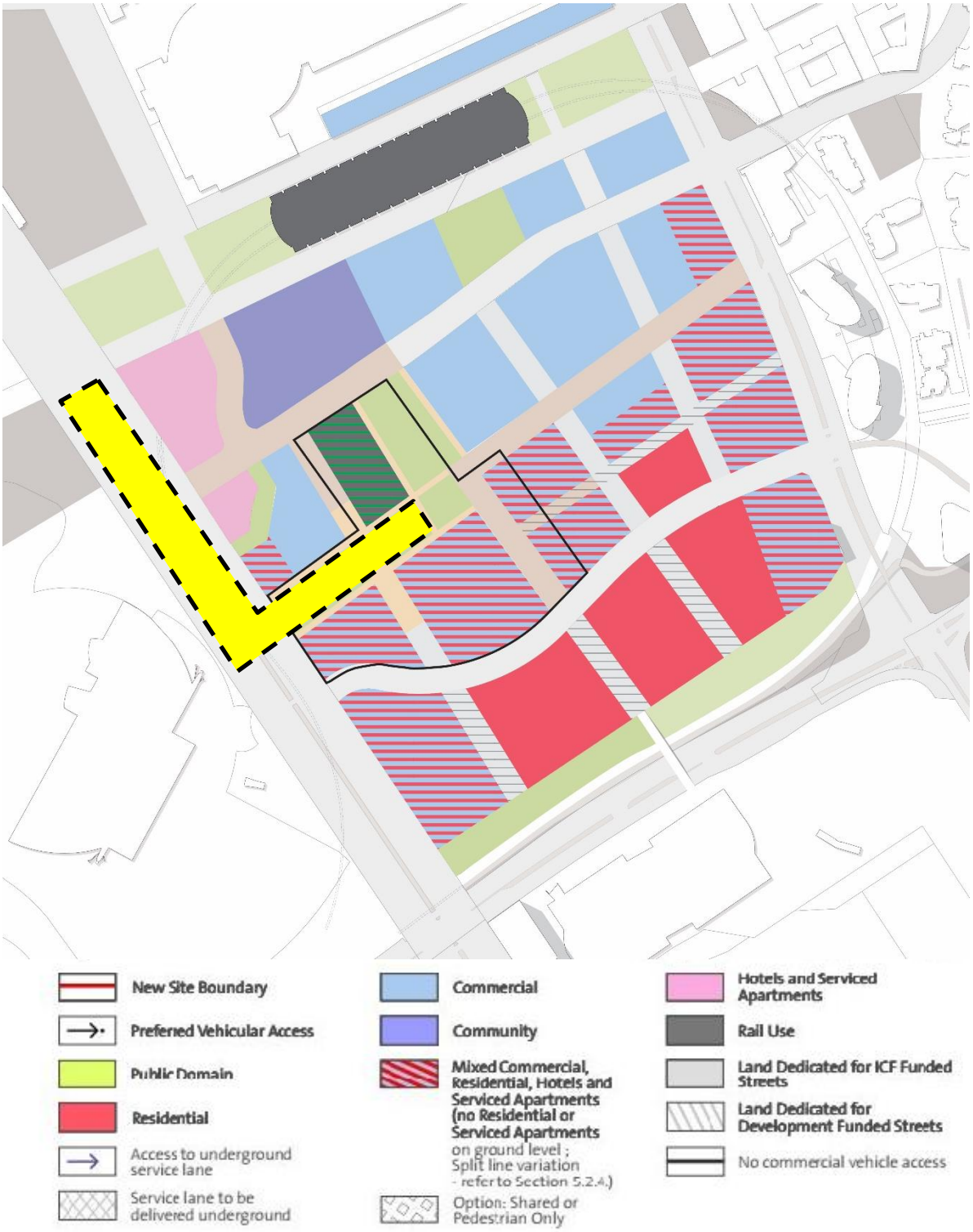


Figure 4-2 Master Plan 2030 (2018 Review) land uses



To determine the potential impacts at these proposed residential buildings along the marshalling corridor a Building Evaluation has been undertaken using the CadnaA noise model. This modelling assumed the full 26,000 crowd within the marshalling area and 50% of people speaking with a raised voice.

Figure 4-3 and Figure 4-4 present the Building Evaluation results for buildings along the marshalling area. The results indicate these buildings could experience external free field $L_{Aeq,15\ min}$ levels in the range of 70-75 dBA along much of their lower floors. The middle floors of the towers overlooking the marshalling area could experience external noise levels of 60-70 dBA and the higher floors levels >60 dBA.

The residential noise criteria for sports and concert noise uses the L_{Amax} noise descriptor. For a large crowd over a large area a typical L_{Amax} is assumed to be 3dB above the $L_{Aeq,\ 15\ min}$ level. It is expected those marshalling fans will be able to remind them they are in a residential area, although there will be occasional higher levels from fans celebrating by singing and individual shouts directly below residences. With residences set back as close as 10m this would result in L_{Amax} noise levels of 75-80dBA. It is noted that these buildings are to be mixed-use, and non-residential uses are proposed for the lower floors.

. These large-scale events would occur on an intermittent basis and residents would be aware of their proximity to the Stadia and the Metro station. Nevertheless, building façade design will need to consider short term high noise levels. As outlined in the Master Plan 2030 Noise Controls, residential development that falls into this category requires mechanical ventilation to allows windows and doors to be closed. Controls such as heavy glazing, balcony design and location of habitable rooms withing the building should be considered.

Figure 4-3 View of Central precinct from the southern end of Olympic Boulevard

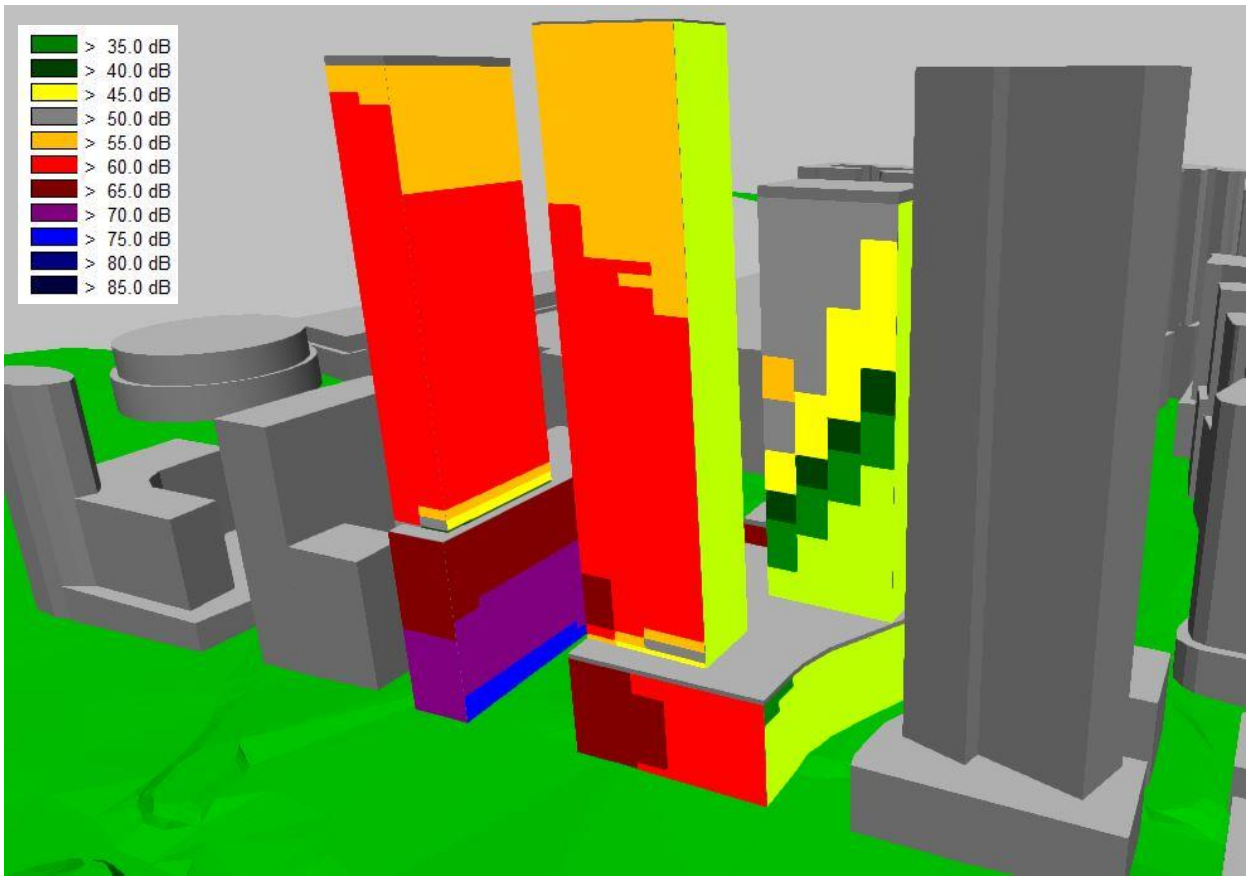
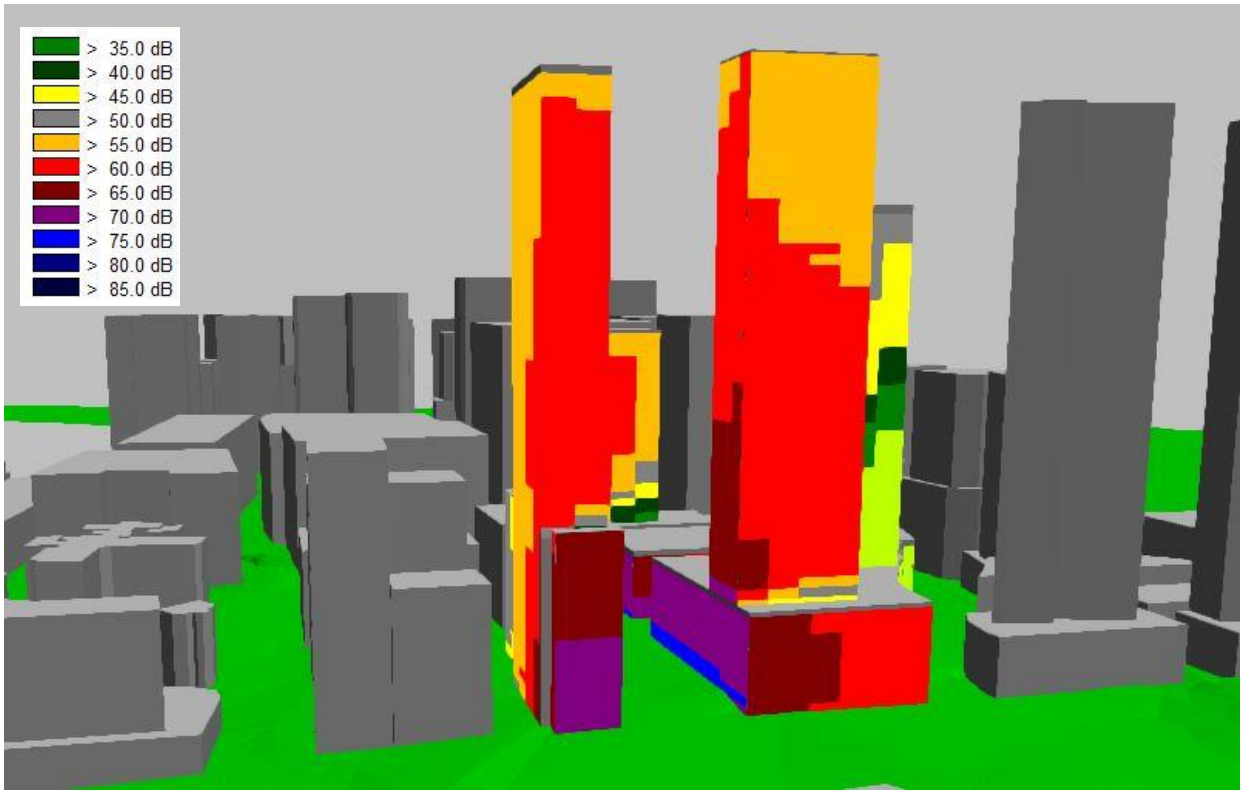


Figure 4-4 View of Central precinct from Olympic Boulevard looking towards the Metro station



5 CENTRAL PRECINCT ENTERTAINMENT AND HOSPITALITY

This section provides a high level review of the noise implications associated with the Food and Beverage (F&B) and public domain events within the Central precinct at Sydney Olympic Park. The Central precinct, including the Metro development will have a mix of retail, commercial and residential components including ancillary community facilities.

The proposed building uses and heights are shown in Figure 5-1 and Figure 5-2, with the Metro site outlined in yellow. These show residential towers varying from 20 to 45 storeys. Typically 5-8 storeys of podium block edge with the towers above, set back within the podium structure on some facades.

Three 3D images from different directions are shown. The pink are existing buildings, blue commercial and brown residential with the metro quarter in yellow.

Figure 5-1 Proposed building uses

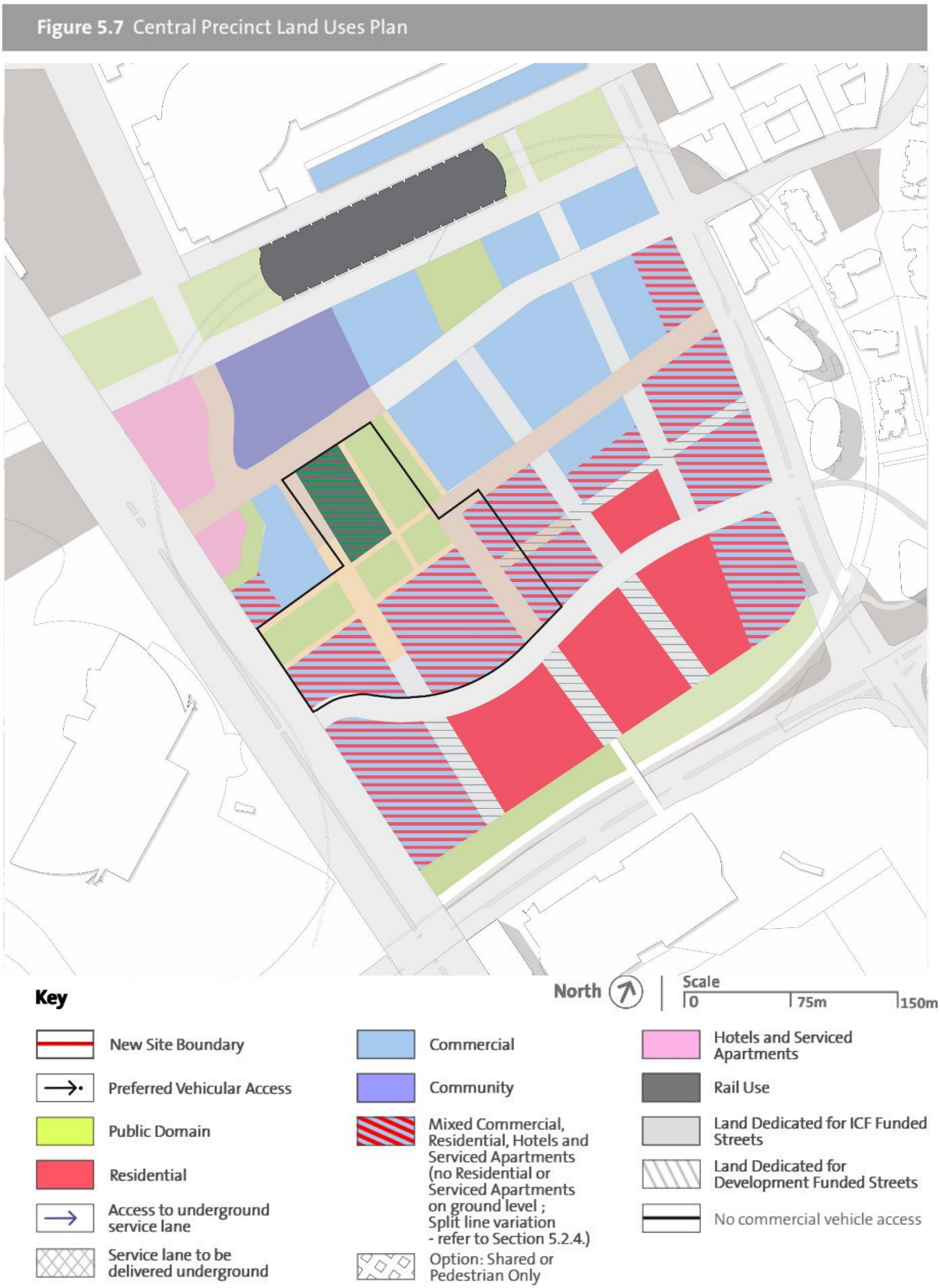
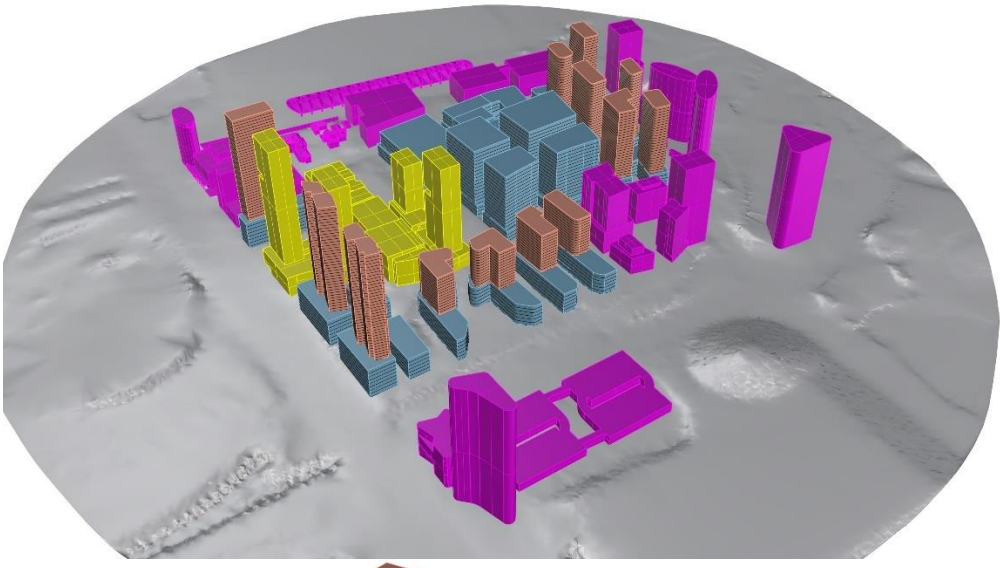
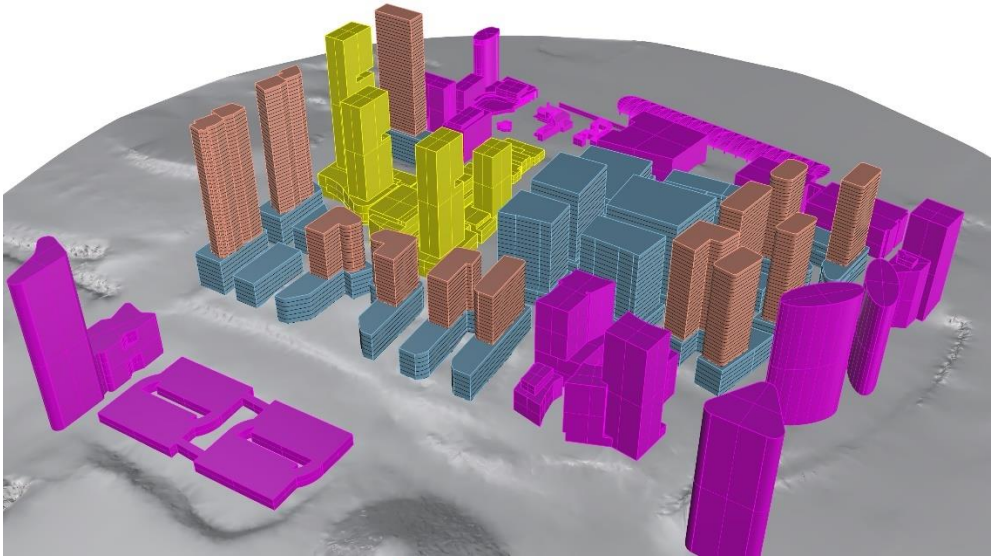


Figure 5-2 Proposed building heights

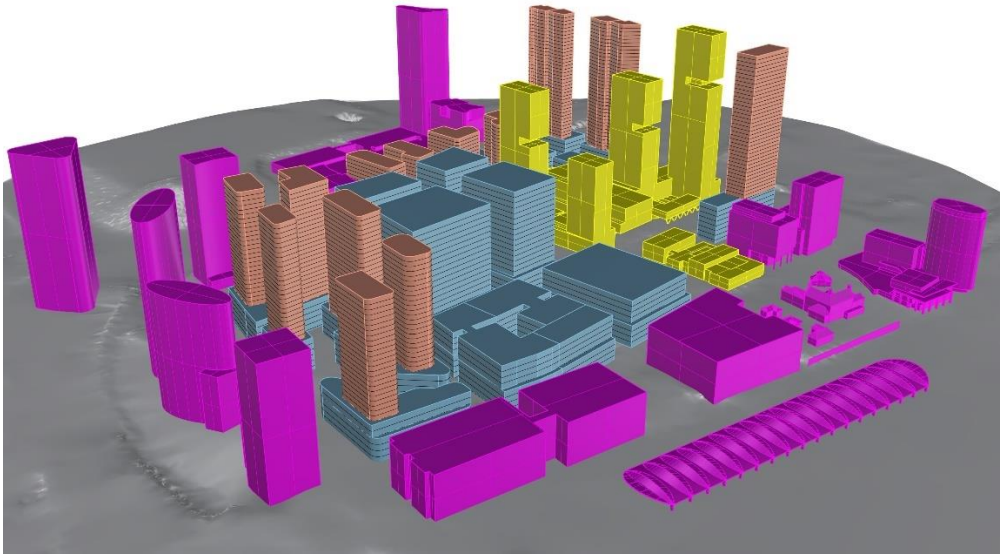
View from south west



View from south east



View from north east



5.1 Review of Noise Issues

This review focusses on the two main malls running north south and east west which are potentially overlooked by residential receivers and likely to include several F&B offerings likely with outdoor dining and drinking such that cumulative impacts from multiple venues needs to be considered.

Figure 5-3 Central precinct retail areas

In addition, there are several public spaces which are overlooked by a mix of either commercial or residential buildings. These spaces are capable of supporting community events which may include live music and large gatherings.

Figure 5-4 Central precinct public spaces

Figure 5-5 below shows in more details the primary active zones which we interpret as those most likely to have F&B with outdoor patrons.

Figure 5-5 Ground floor active zones

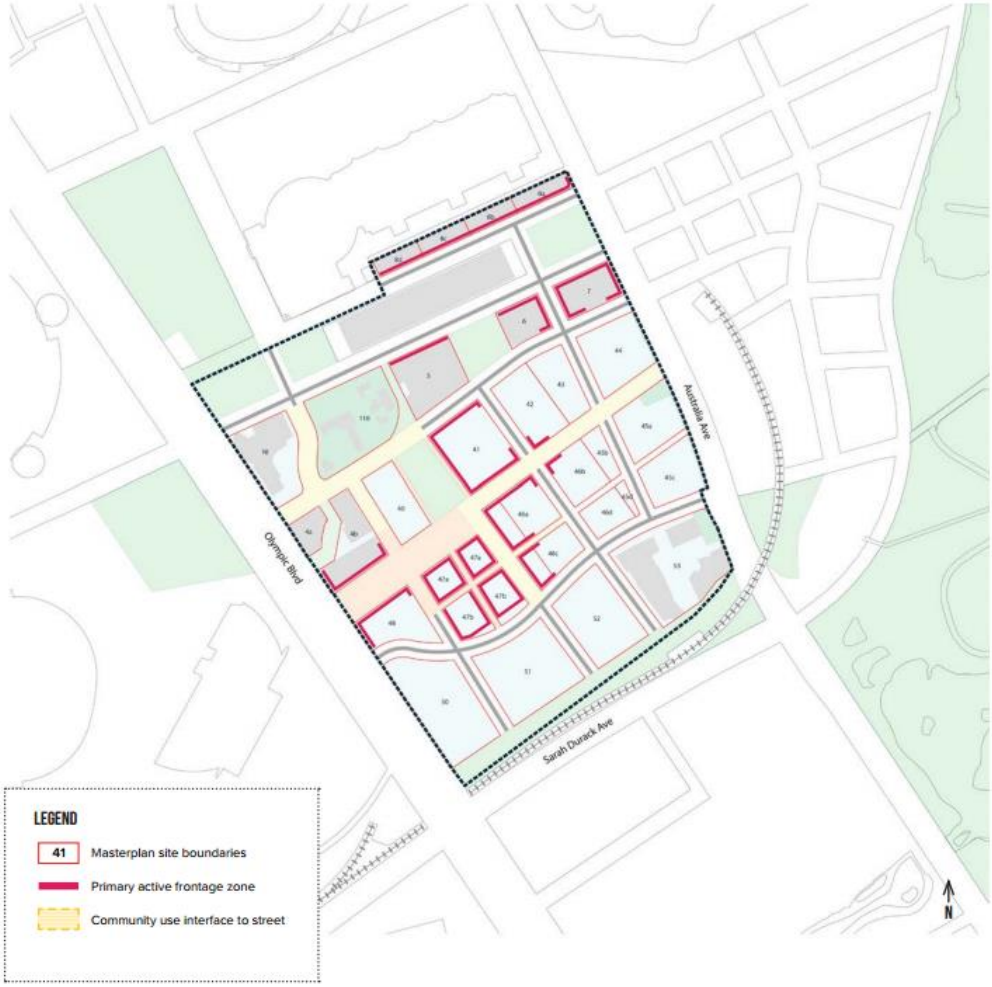


Figure 5-6 Examples of mall and outdoor active zones

5.2 Noise Mitigation and Management Measures

The purpose of this section is to provide some general guidance to the design of the mixed-use areas of the Central precinct to providing the best possible environment for residential integration into a lively entertainment area.

It is noted from the current plans that the intention is to have 4 storey podium structures along much of the main retail precincts with the residential components at higher elevation and set back from the podium to provide additional distance and some shielding. It should be noted that reflections of noise from side to side between the podiums can reduce the benefit of shielding therefore building articulation will assist in reducing these reflections.

Where residences are located on the floor directly above Food and Beverage (F&B) premises the use of solid awnings to shield noise from below or combination of solid and operable awning which can be closed based on a combination of time of day, patron numbers and behaviour. Temporary umbrellas and fabrics do not offer sufficient noise reduction.

Consideration of greater slab thicknesses (300mm) and resiliently mounted ceiling treatment for mixed use buildings where residential is located directly above a F&B premise.

There should be strict limits on outdoor noise, ideally no outdoor speakers for the F&B premises and only minor noise spill from internal systems which are limited.

For the public domain areas, ideally a site provided PA system can be used by performers, which has been designed and set up to minimise music propagating to residences. This is preferable to each performer bringing their own PA with no control over outcomes.

It is also critical to manage expectations for those moving to the area and those who are operating businesses within this precinct. This should make it clear they are living in an apartment that overlooks active areas that has approved outdoor trading until 11:00pm/12 midnight as well as public domains which have special events. Similarly, future business operators need to understand they are surrounded by residences and to expect strict time and noise limits.

Section 4.6.15 of Sydney Olympic Park Master Plan 2030 outlines the 'Public Positive Covenants' and requires a Section 88 to acknowledge potential noise impacts from major sports and entertainment events. It is recommended to update this for the central precinct to include noise from F&B, retail and outdoor active zones that will occur more frequently.

Whilst commercial receivers are expected to have sealed facades noise impacts from events still require consideration.

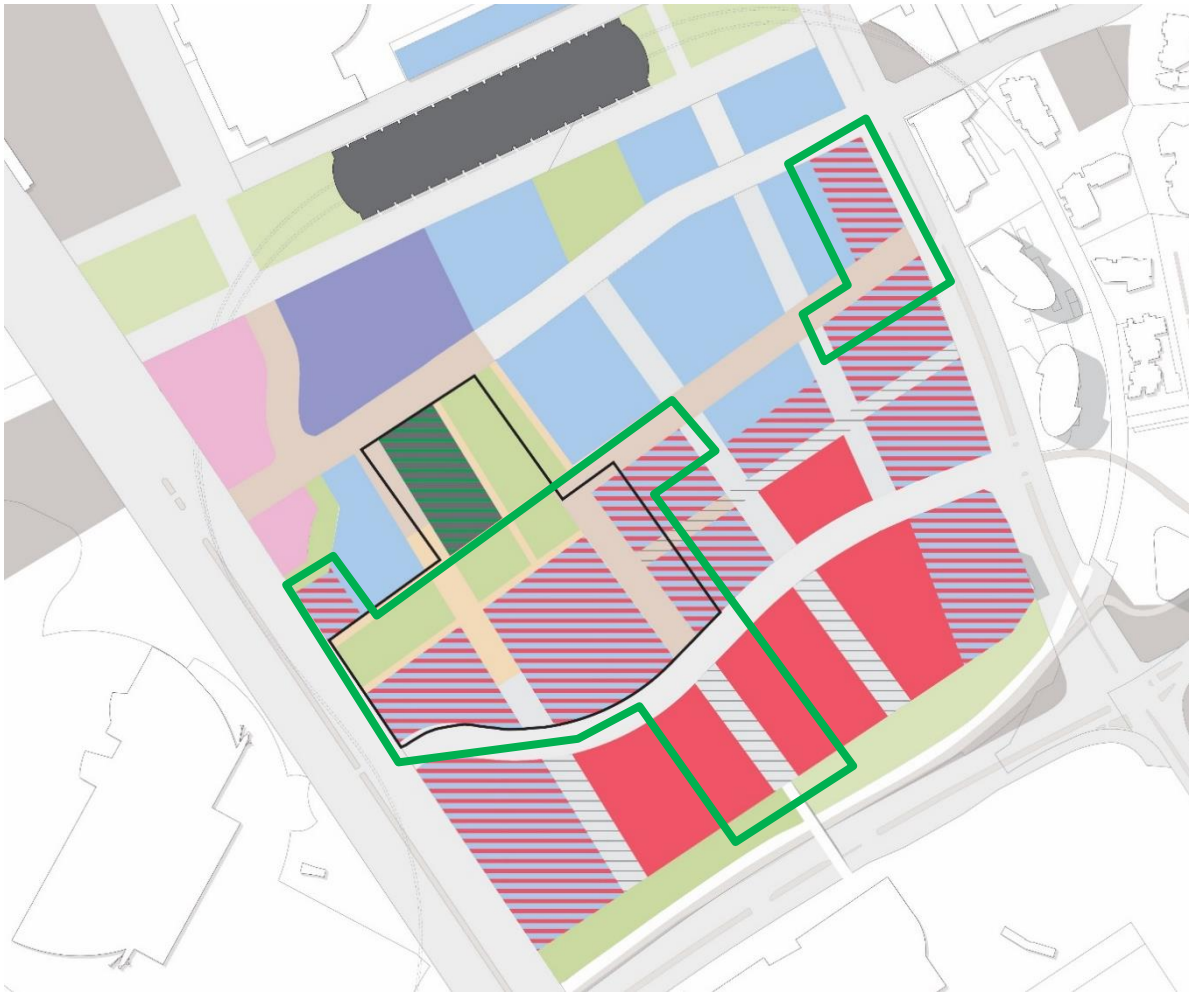
We recommend that a Central Precinct Acoustic Masterplan is prepared which will need to address the following aspects:

- Strict time limits for various Food & Beverage uses (weekdays, weeknight, weekend days/nights, special events). This allows more relaxed noise limits within approved hours with no noise outside so residents know when things will stop.
- Manage people noise from outdoor dining/drinking differently to music and establish strict limits for music.

- Strict time limits for events and restriction on the number of different categories of events each year. Likely events would be categorised by type (Minor/Mid & Major).
- Mixed use buildings – No residential in podiums, so private residential more distant from noise source and potentially set back so shielding also provided.
- Residential buildings - Use of podiums with non-residential uses(car park or communal space such as gyms, pools, home theatre) so private residential more distant from noise source and potentially set back so shielding also provided.
- Apartment layout – Keeping bedrooms away for areas which overlook active zones.
- Establish internal noise criteria to suit the precinct such that the façade design (windows and doors) use of winter gardens are also critical in reducing noise and residents can choose to keep these close at times when they need to reduce external noise. Stricter limits than currently outlined in the Master Plan 2030 may be necessary for noise from F&B, retail and outdoor active zones within the Central precinct as noise impacts could occur more frequently than current event noise.
- Address cumulative noise where limits on hours and patron numbers are attached to individual tenancies, but with some flexibility to allow small changes where impacts can be managed. This will ensure the internal noise limits can be achieved from cumulative noise emissions.

The residential receivers with the highest likely impacts are outlined in green in Figure 5-7.

Figure 5-7 Potentially worst impacted residential receivers outlined in green



6 CONCLUSIONS AND RECOMMENDATIONS

RWDI Australia have conducted a review of the acoustic provisions for the Sydney Olympic Park Master Plan 2030. The work conducted in our assessment is based on the original study for the Master Plan 2030 and subsequent reviews and addresses the impact of proposed changes within the Central precinct to include the updated built form and Sydney Metro Station. Criteria for this assessment have been taken from the Sydney Olympic Park Noise Management Guidelines (original Report: 99053, July 2002) with updated references from the latest government guidelines.

Noise modelling was based on previous modelling for the Master Plan 2030 and new contours of 'Acoustic Suitability for Residential Development' have been developed. Minor changes, mostly in the Central precinct due to the changed built form have been observed.

We recommend that the revised contours of 'Acoustic Suitability for Residential Development' (Figure 3-1, Figure 3-2, and Figure 3-3) are included in the draft amended Master Plan. There is no need to change the nominated criteria as these reflect current standards.

Additional modelling of crowds waiting to access the Metro Station following a large event at the stadium has been undertaken. External noise levels along the façade of the buildings overlooking the marshalling area have been presented and will require consideration in residential façade design.

A high level review of potential noise issues within the Central precinct due to Food & Beverage, retail and public events has been undertaken. The review has provided guidance for the design of these areas, to allow for better integration of residential premises into this precinct.

It is expected that control measures such as upgraded glazing, wintergardens and floorplan design to limit noise to habitable rooms will be required to meet the internal noise criteria for residences within the central precent.