

Central Precinct Renewal Program

Noise and Vibration Assessment Addendum Report

August 2023

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Acknowledgement of Country

We respectfully acknowledge the Traditional Custodians of the Central Precinct, the Gadigal and recognise the importance of the place to Aboriginal people and their continuing connection to Country and culture. We pay our respect to Elders past, present and emerging.

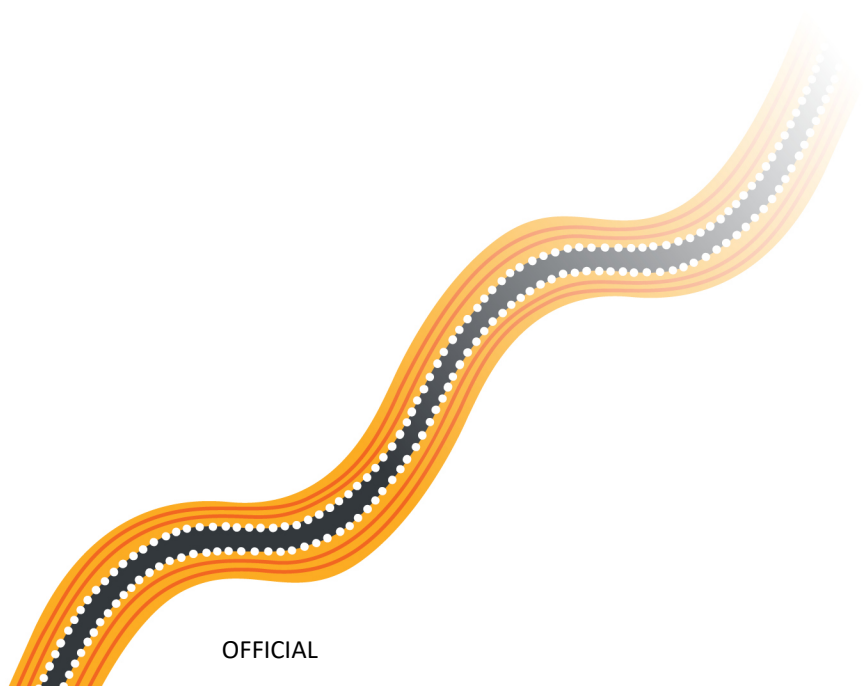


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Document control

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Versions

Version	Amendment notes
1.0	Issued to TfNSW for Review
2.0	Issued to TfNSW for Review – Standard text included
3.0	Issued to TfNSW for Review – Standard text updated
4.0	Final
5.0	Final – minor revisions

1. Introduction

Arcadis was engaged by Transport for NSW to prepare the Noise and Vibration Assessment as part of the Central State Significant Precinct (SSP) Study. The Central SSP Study and supporting documents were made available for public comment from 22 August to 4 October 2022. During the exhibition period, community members and stakeholders were invited to provide their comments and feedback on the rezoning proposal. Arcadis has prepared this addendum report to respond to the relevant feedback received concerning this report.

The purpose of this report is to:

- Summarise feedback received from the public exhibition of the SSP Study, specifically relating to the Noise and Vibration Assessment
- Respond to key technical matters raised during the public exhibition to inform the Response to Submissions Report for Central Precinct
- Assess the proposed changes to the revised scheme for Central Precinct
- Provide additional recommendations (where required) for the proposed planning framework for Central Precinct

This addendum is intended to be read in conjunction with the exhibited Noise and Vibration Assessment.

2. The exhibited SSP Study

The Central SSP Study and supporting documents were made available for public comment from 22 August to 4 October 2022. During the exhibition period, community members and stakeholders were invited to provide their comments and feedback on the rezoning proposal.

2.1 The exhibited proposal

The exhibited rezoning proposal included a Place Strategy, Urban Design Framework, Public Domain Strategy, draft Design Guide, Explanation of Intended Effect and supporting technical studies, which seek to enable the delivery of:

- approximately 269,500 square metres of commercial gross floor area GFA.
- approximately 22,850 square metres of retail GFA
- approximately 47,250 square metres of education/ tech GFA
- approximately 14,300 square metres of community/cultural GFA
- approximately 84,900 square metres of residential GFA
- approximately 53,600 square metres of hotel GFA.
- approximately 22,500 square metres of student accommodation GFA.
- 15% of new dwellings to be provided as affordable housing
- over two hectares of new and improved publicly accessible spaces, including:
 - Central Square, a new approximately 7,000 square metre publicly accessible square located at the George Street and Pitt Street junction
 - Central Green, a new approximately 6,000 square metre publicly accessible park located immediately south of the Sydney Terminal building
 - Mortuary Station Gardens, an approximately 4,470 square metre publicly accessible plaza (excluding the Mortuary Station building) located at Mortuary Station
 - Sydney Terminal building western rooftop, a 970 square metre publicly accessible space above the Terminal building roof
 - upgrades to Eddy Avenue Plaza and Ibero-American Plaza.
- an integrated network of streets, laneways and other movement corridors, including:
 - Central Avenue, as Central Precinct's new main street
 - Devonshire Link, as Central Precinct's main east-west linking street
 - a north-south link as an intimately scaled, active laneway
 - a supporting network of other open-to-the-sky laneways generally running east-west through the Precinct
 - a number of through-block links to provide further permeability for pedestrians
 - an eastern colonnade having a generous, double-storey height
 - three new active transport over-rail bridges
 - a revitalised Goods Line.

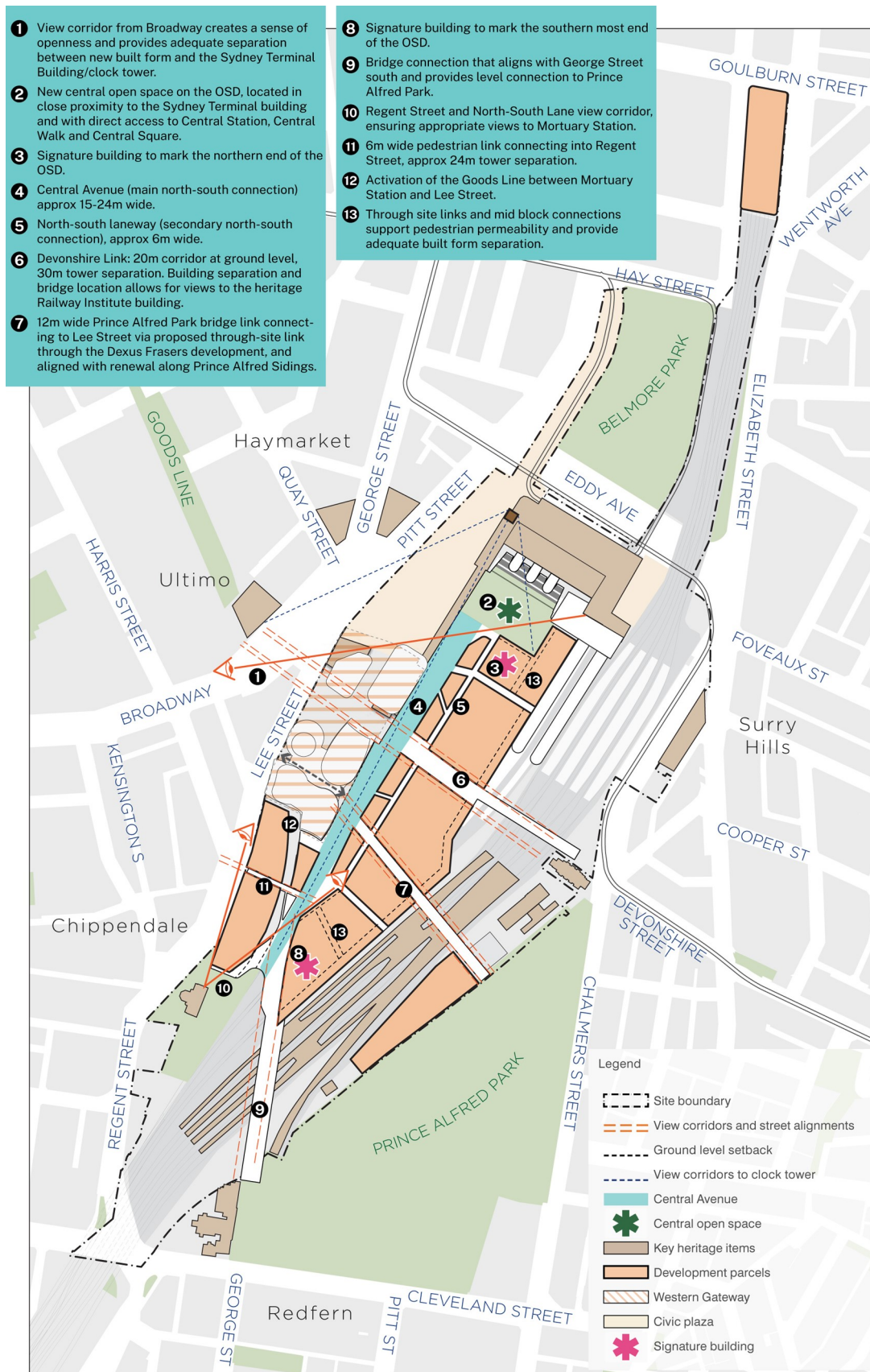


Figure 1: Exhibited Urban Design Framework

Source: Architectus, 2022

3. Feedback relating to Noise and Vibration Assessment received during exhibition

A total of 368 submissions were received from individuals, local council, government agencies, industry bodies, non-government organisations and interest groups. Table 1 below provides an overview of the feedback relating to Noise and Vibration Assessment based on our review of the submissions.

Table 1 Summary of feedback from public exhibition relating to Noise and Vibration Assessment

Theme	Summary of feedback
Noise impacts	Concern regarding increased noise levels during construction and operation.
	Concern regarding the amenity of the development considering the noise generated by trains.
	Support for noise and vibration assessment requirements.
Background Noise Measurements	Lack of project specific background noise measurements impacting project evaluation.
Performance Noise Criteria	Need for alignment with Sydney DCP noise and vibration, and acoustic privacy planning controls.

4. Responses to key issues raised

4.1 Concerns about noise impacts

Issue

General feedback from the public raised concern over increased noise levels during construction and ultimately as a result of the development. Sydney Local Health District specifically raised concern for impacts on the Sydney Emergency Dental Hospital located immediately east of Central Station along Chalmers Street.

The Government Architect feedback also mentioned the need to demonstrate that a high-quality acoustic amenity and natural ventilation for residents can be achieved given the noise impacts from the rail corridor and that the precinct permits build-to-rent.

Response

The Design Guide Section 9.6, Guidance Item 1 requires a Noise and Vibration Impact Assessment, and Item 6 requires a Construction Noise and Vibration Management Plan to be prepared when submitting a development application for a new building at Central Precinct.

Additional Design Guide controls provide performance noise criteria and guidance on noise attenuation measures to ensure an appropriate level of amenity is achieved. With respect to build-to-rent, the noise controls will remain consistent with those for residential and serviced apartments provided in the Design Guide.

The current Design Guide controls are considered appropriate to address noise and vibration impacts of proposed development. No further modifications to the Design Guide are proposed in response to this feedback.

4.2 Background Noise Measurements

Issue

The City of Sydney Council feedback has mentioned that long-term noise monitoring was not completed for the Central Precinct SSP Noise and Vibration Assessment given the impact of the COVID-19 pandemic. Council notes that the omission of this information makes it hard for any planning authority to evaluate such development in the context of a change to the noise environment.

During the time of preparing the SSP Noise and Vibration Assessment the Sydney region experienced a number of Covid-19 lockdowns significantly impacting road traffic movements and to a lesser extent rail traffic movements. Long-term noise monitoring was postponed given these impacts. To inform the assessment, monitoring results were obtained from previous projects in the vicinity of Central Station.

Short-term road and rail traffic noise measurements specifically for the Central Precinct SSP were undertaken prior to the Covid-19 lockdowns which were also used to inform the assessment.

Section 2.1 of the SSP Noise and Vibration Assessment documents the ambient noise levels and details the various sources of information used.

Response

In line with SSP Noise and Vibration Assessment Section 9.4, it is recommended that the ambient noise study, including undertaking long-term noise monitoring, be conducted once both:

- 1) traffic levels return to what is considered to be normal (post-covid) levels and
- 2) construction noise impacts from Sydney Metro works have subsided.

The Design Guide Section 9.6, Guidance Item 1 requires a Noise and Vibration Impact Assessment to be prepared when submitting a development application for a new building at Central Precinct. This would require determining ambient noise levels at the time.

The current Design Guide controls are considered appropriate to address noise and vibration impacts of proposed development. No further modifications to the Design Guide are proposed in response to this feedback.

4.3 Performance Noise Criteria

Issue

The City of Sydney Council feedback has highlighted the importance of performance criteria to ensure potential noise and vibration impacts are adequately assessed and mitigated. Council have recommended alignment of the Design Guide to the Sydney Development Control Plan (DCP) planning controls, in particular the addition of the Sydney DCP 2021, Section 4.2.3.11, Provision 10 requirement to limit the transmission of noise to and between dwellings, all floors should have a weighted standardised impact sound level ($L'_{nT,w}$) less than or equal to 55 where the floor separates a habitable room and another habitable room, bathroom, toilet, laundry, kitchen, plant room, stairway, public corridor, hallway and the like.

Response

Noise and vibration guidance is provided as Section 9.6 of the Design Guide. Addition of the suggested City of Sydney DCP provision into the Design Guide is recommended in response to Council's recommendation.

Recommended wording is provided in Section 7.1.

5. The revised proposal

Based on the feedback received during the public exhibition of the Central Precinct rezoning proposal, a revised proposal has been prepared for the consideration of Department of Planning (DPE) as part of its assessment. The revised proposal includes an updated Urban Design Framework and Public Domain Strategy, which establishes the updated Reference Masterplan and has informed updates to the proposed planning framework for Central Precinct. The updated Reference Masterplan comprises:

- approximately 263,000 square metres of commercial gross floor area (GFA).
- approximately 24,450 square metres of retail GFA
- approximately 46,000 square metres of education/ tech GFA
- approximately 14,800 square metres of community/ cultural GFA
- approximately 82,350 square metres of residential GFA
- approximately 53,000 square metres of hotel GFA.
- approximately 20,700 square metres of student accommodation GFA.
- 30% of new dwellings to be provided as affordable housing
- over two hectares of new and improved publicly accessible spaces, including:
 - Central Square, a new approximately 7,000 square metre publicly accessible open space located at the junction of George Street and Pitt Streets at street level
 - Central Green, a new approximately 6,200 square metre publicly accessible open space located immediately south of the Sydney Terminal building at deck level, including the Sydney Terminal building western rooftop
 - Devonshire Square, an approximately 3,700 square metre publicly accessible plaza at the junction of Central Avenue and the Devonshire link
 - Southern Plaza, an approximately 4,700 square metre publicly accessible plaza at the junction of Central Avenue and the George Street Bridge
 - Mortuary Station Gardens, an approximately 6,500 square metre (excluding the Mortuary Station building) publicly accessible plaza located at street level at the junction of the Mortuary Station and the Goods Line
 - upgrades to Eddy Avenue Plaza and Ibero-American Plaza.
- an integrated network of streets, laneways and other movement corridors, including:
 - Central Avenue, as Central Precinct's new main street
 - Devonshire Link, as Central Precinct's main east-west sequence
 - a north-south link as an intimately scaled, active laneway
 - a supporting network of other open-to-the-sky laneways generally running east-west through the Precinct
 - through-block links to provide further permeability for pedestrians
 - three active transport over-rail bridges
 - a revitalised Goods Line as an active transport corridor.

The key features of the updated Reference Masterplan, include:

- A network of new and enhanced public spaces linked together by green connections. This will include:
 - A new Central Square that will deliver on the vision for a new public square at Central Station, as one of three major public spaces within the Sydney CBD connected by a people-friendly spine along George Street
 - A Central Green (Dune Gardens) at the north of Central Precinct will create a new civic park extension of the Sydney Terminal building and a new vantage point for Central Sydney
 - A new civic space (Devonshire Square) at the proposed entry/exit point to Central Walk from the OSD, giving access to all platforms within Central Station.
 - Mortuary Station Gardens at Mortuary Station will be a key public domain interface between Chippendale and the over-station development and a public link to the Goods Line
 - A reconfigured Southern Plaza at the southern end of the OSD deck will provide a new arrival and meeting space when coming from Redfern and a key connection to Redfern when coming from the city
 - Henry Deane Plaza which will prioritise the pedestrian experience, improving connectivity and pedestrian legibility within the Western Gateway sub-precinct and provide clear, direct links to and from Central Station and its surrounds
 - Eddy Avenue Plaza will transform into a more civic environment with improved amenity and an enhanced interface with the Sydney Terminal building.
- A new network of circulation spaces that are legible and provide for public access and use of the place. This will include:
 - Central Avenue, with a consistent minimum width of 18 metres located to provide long views of the Sydney Terminal Building clocktower. Central Avenue will be a place for people to dwell and move through while linking together a sequence of publicly accessible spaces on the OSD deck, including the Central Green, Devonshire Square and the Southern Plaza
 - A minimum 6-metre wide north-south laneway providing an additional intimate and active link between the sequence of publicly accessible spaces on the OSD deck, and opportunities for smaller courtyard experiences
 - Three new over-rail connections to enhance pedestrian and bicycle access to and from Surry Hills, Prince Alfred Park, Redfern and Chippendale and circulation to and through the Central Precinct
 - The extension of public access along the Goods Line offering a new connection to Darling Harbour from Mortuary Station Gardens
 - New vertical transportation locations throughout the precinct provide accessible vertical connections to the OSD.

The revised proposed land allocation for Central Precinct is described in **Table 1** below.

Table 1: Breakdown of allocation of land within Central Precinct

Land allocation	Proposed
Open-air rail corridor (Infrastructure)	89,781 sqm
Western Gateway	16,638 sqm
Developable area (Total)	131,593 sqm
Public Space (Including open space, squares, plazas, movement zones, streets and links)	71,603 sqm / 54.4 % of Developable area
Building area	59,990 sqm / 45.6 % of Developable area
Central SSP total area	238,012 sqm (23.8 ha)

The revised Indicative Reference Master Plan for Central Precinct is illustrated in **Figure 2** below.

5.1 Key changes from the exhibited proposal

The feedback on the exhibited rezoning proposal has informed subsequent amendments to the Reference Masterplan. A summary of the key changes adopted as part of the revised Reference Masterplan are described below:

- **Improved interface between Terminal and OSD:** The interface relationship between the OSD deck and the Terminal Building has been further rationalised to improve the function of the station as a major interchange and better respect the heritage of Central Railway Station. The following changes have been made:
 - a reduced spatial extent of the stairs between the OSD deck and the Terminal to now be a consolidated vertical connection (stairs, lift and escalators) to the north-eastern edge of Central Green
 - an expanded concourse level with greater access to daylight and new opportunities for landscaping that will improve the passenger experience on the platforms and in the concourse, compared to the exhibited proposal
 - incorporating an interpretation of the platform canopies to deliver a heritage-responsive and weather-protected connection.
- **Consistent 18-metre-wide Central Avenue:** A consistent width of 18 metres has been provided for Central Avenue. The future role and function of this link has been revised from an avenue between the north and south of the OSD deck to now becoming a connector of a sequence of public spaces on the OSD deck.
- **Additional mid-block through-site links:** The introduction of additional mid-block connections to reinforce breaking up the podiums on the OSD deck level into interconnected smaller building forms.
- **Removal of the Eastern Colonnade:** The eastern colonnade has been removed from the revised Reference Masterplan.

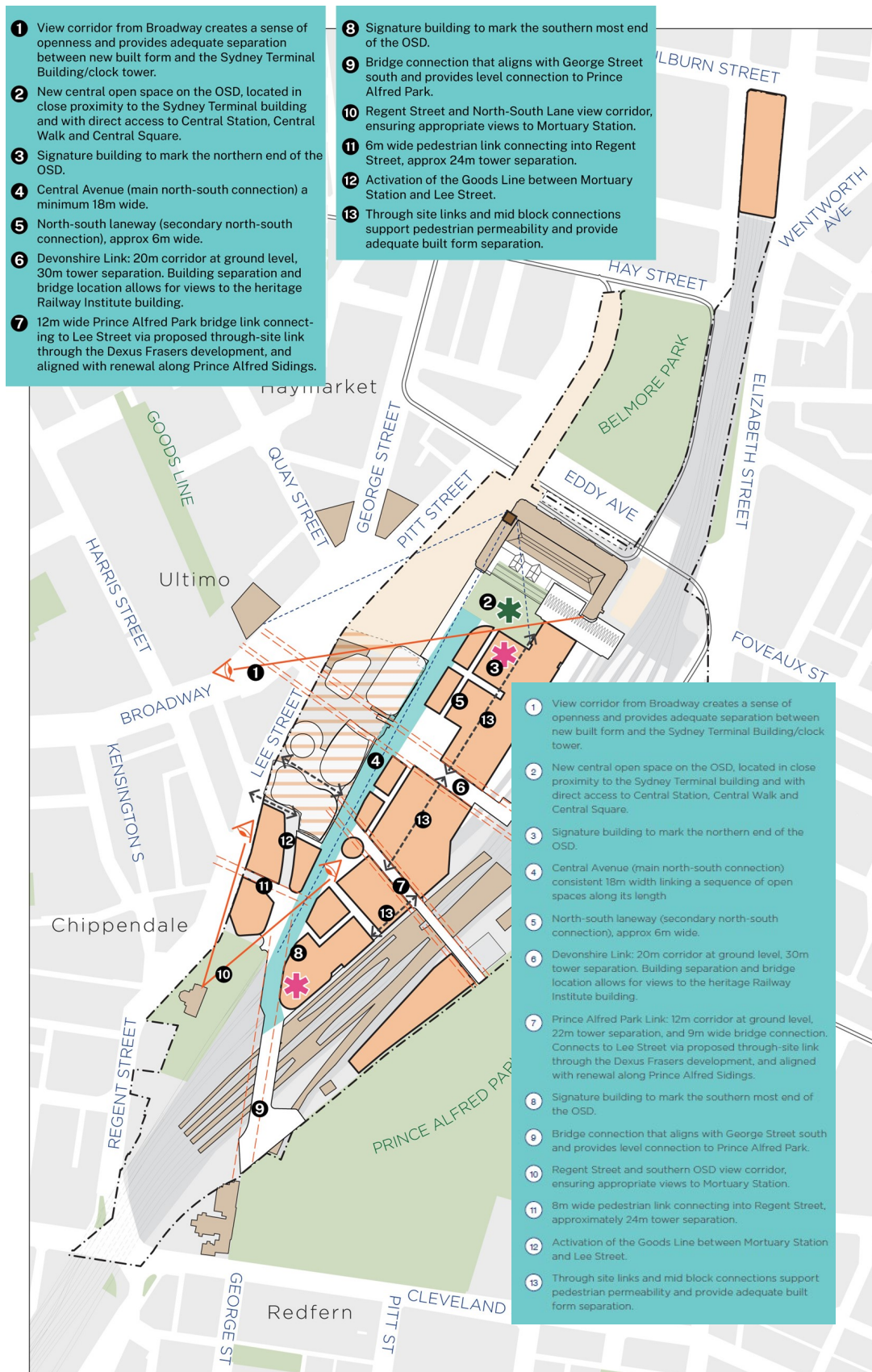


Figure 2: Revised Urban Design Framework

Source: Architectus, 2023

- **Reconfiguration of Central Green:** The layout of Central Green has been adjusted to be a squarer geometry compared to the exhibited proposal. The primary movement path through Central Green is now focused toward the southern and eastern edges of this open space. The indicative design of Central Green has also been adjusted to improve its relationship with the Terminal Building through the incorporation of seating and greater landscaping at the northern edge of the park.
- **An enlarged Mortuary Station Gardens:** The reduction of the podium building envelope of the Regent Street Sidings building brought about through changes to the bus layover and basement entry /exit pathways provide for an enlarged public space at Mortuary Station Gardens by 2,030 square metres to a total area of 6,500 square metres. The increase in the size of this public space also presents the opportunity to retain the existing fig tree at Mortuary Station and provide a new playground that is accessible to the broader community.
- **Devonshire Square:** A new square of approximately 3,700 square metres has been included into the revised Reference masterplan at the junction of Central Avenue and the Devonshire link, which will provide a new civic space at the entry point to the proposed extended Central Walk. (Central Walk will provide access to all of the rail platforms in Central).
- **Southern Plaza:** A new reconfigured civic space of approximately 4,700 square metres at the southern end of Central Avenue, providing a new arrival and meeting space when coming from the south. Within the Southern Plaza, there is the potential for a marker building that is designed with a Connecting with Country focus.
- **Regent Street Sidings:** The podium envelope at Regent Street Sidings has been further rationalised to improve the integration between the OSD deck level and Regent Street Sidings, the Goods Line and Mortuary Station Gardens. This has been through the following changes:
 - undergrounding the bus layover into the basement to enable the reduction of the podium footprint
 - consolidating basement entry/exit into a single location for loading, residential parking and bus layover
 - locating basement entry/exit at a signalised intersection
 - increase the opportunity to activate the Goods Line and Mortuary Station Gardens
 - extending the OSD deck level to integrate with the podium rooftop of Regent Street Sidings.
- **Increased green cover:** An increase to the overall green cover in the precinct has been adopted as part of the revised Reference Masterplan.
- **Enhanced east-west view lines:** The indicative building envelopes on the OSD deck have been refined in location and shape to increase the separation of tower forms and enhance east-west view lines.
- **Reduction in overall GFA:** Based on refinements to the Reference Masterplan, the overall proposed GFA of Central Precinct has reduced by approximately 10,600 square metres.

6. Assessment

As part of the Central Precinct SSP Noise and Vibration Assessment 3-dimensional noise modelling was undertaken to assess the potential noise impact from and onto the precinct.

To assess the revised Reference Master Plan the 3-dimensional noise model has been updated to reflect the built form as provided in the building massing provided 03/05/2023 as shown below in Figure 1.

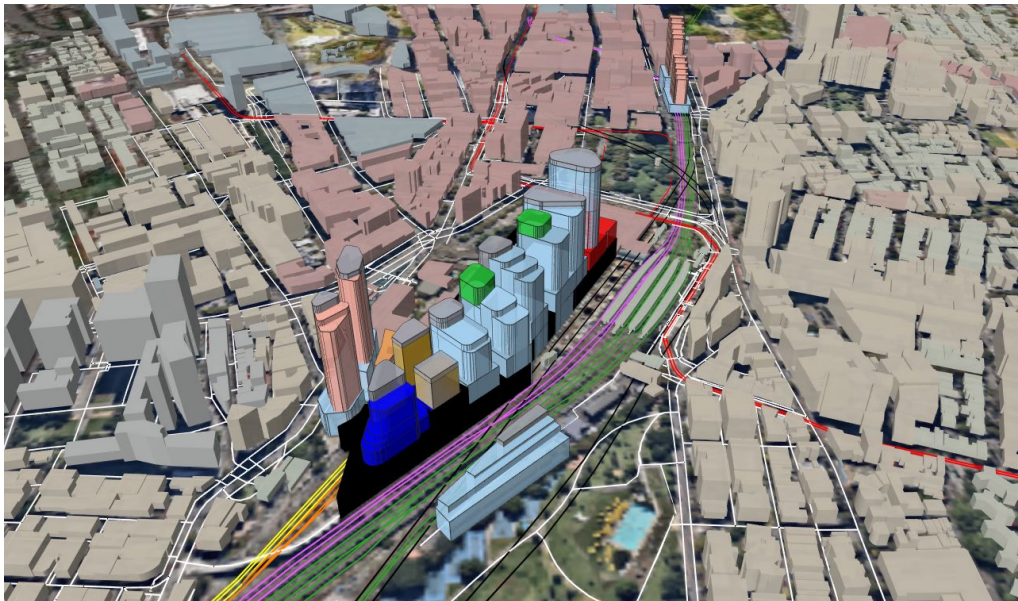


Figure 1: 3D View of Updated 3D Noise Model

Changes in noise impacts caused by the updated massing in the revised Reference Master Plan were assessed for noise generated by external noise sources (primarily road and rail) and mechanical plant noise.

Predicted façade noise levels were reviewed. Changes in noise levels were generally minor meaning that building controls and mitigation measures detailed in the SSP Noise and Vibration Assessment Section 9.1 remain unchanged.

Other recommendations detailed in the SSP Noise and Vibration Assessment Section 9.2 (Management of mechanical plant noise), Section 9.3 (evaluation of vibration impacts) and Section 9.4 (Future work) also remain unchanged.

7. Recommendations

7.1 Design Guide

Based on the responses to key issues raised (Section 4) and assessment of the revised scheme (Section 6) the following modifications to the Design Guide are recommended as indicated in **red**.

The residential noise controls have been updated from the Sydney DCP 2012 criteria to the State Environmental Planning Policy (Transport and Infrastructure) 2021 requirements. Central Precinct is either land within or adjacent to the rail corridor (SEPP Section 2.100) and bounded by roads with daily traffic volumes of more than 20,000 vehicles (SEPP Section 2.120). The SEPP criteria were adopted for the SSP Noise and Vibration Assessment (refer to Section 4.1.4) and are more stringent than the Sydney DCP requirements.

9.6 Noise and vibration

Objectives

- a) *To ensure an appropriate level of amenity in relation to noise and vibration is provided for workers, visitors and residents.*

Guidance

- 1) *A Noise and Vibration Impact Assessment is to be prepared by a suitably qualified acoustic consultant when submitting a development application for a new building at Central Precinct.*
- 2) *The Noise and Vibration Impact Assessment is to consider and respond to noise and vibration impacts from the Sydney rail yard and adjacent suburban network, the surrounding road network, mechanical equipment and other systems, construction and other potential noise and vibration sources.*

- 3) ***The repeatable maximum $L_{Aeq(1hour)}$ for residential buildings and serviced apartments must not exceed the following levels:***

a. 35dB for bedrooms (10pm-7am)

b. 40dB anywhere else in the residential accommodation (other than a garage, kitchen, bathroom or hallway) at anytime.

Note: Residential apartments are to in accordance with Section 4B – Natural ventilation and Section 4J – Noise and pollution of the ‘Apartment Design Guide’ (Department of Planning and Environment, July 2015), and as time to time, amended.

- 4) *Internal noise levels and vibration for non-residential uses are to comply with AS2107 2016: recommended design sound levels and reverberation times for non-residential uses.*

- 5) *The overall design and layout of dwellings, where appropriate, is to include the following noise attenuation measures:*
 - a. a limit on window size and number where oriented towards an intrusive noise source*
 - b. seals at entry doors to reduce noise transmission from common corridors or outside the building*
 - c. minimisation of the number of shared walls with other dwelling units*
 - d. storage, circulation areas, and non habitable rooms to buffer noise from external sources*
 - e. double or acoustic glazing*
 - f. operable acoustic screens to balconies.*
- 6) *A Construction Noise and Vibration Management Plan is to be prepared by a suitably qualified acoustic consultant when submitting a development application for a new building at Central Precinct. This management plan is to detail:*
 - a. the relevant noise and vibration criteria*
 - b. the planned hours of work*
 - c. any significant works that will take place at these times, and any that are likely to exceed noise and vibration criteria*
 - d. what steps will be taken to mitigate this, including reducing noise levels.*
- 7) *To limit the transmission of noise to and between dwellings, all floors are to have a weighted standardised impact sound level ($L'_{nT,w}$) less than or equal to 55 where the floor separates a habitable room and another habitable room, bathroom, toilet, laundry, kitchen, plant room, stairway, public corridor, hallway and the like.*

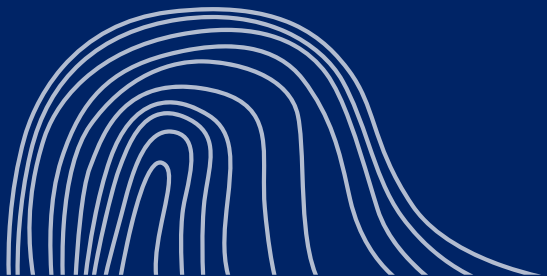
8. Conclusion

Arcadis has undertaken a review of the feedback received from the Central State Significant Precinct (SSP) Study public exhibition as relevant to the Noise and Vibration Assessment.

Based on this review additional revisions to the Design Guide are recommended to better align with the SSP study recommendations and address stakeholder concerns raised by the City of Sydney Council.

To assess the revised Reference Master Plan the 3-dimensional noise model has been updated. Changes in noise levels were generally minor meaning that building controls and mitigation measures detailed in the SSP Noise and Vibration Assessment Section 9.1 remain unchanged. Other recommendations detailed in the SSP Noise and Vibration Assessment Section 9.2 (Management of mechanical plant noise), Section 9.3 (evaluation of vibration impacts) and Section 9.4 (Future work) also remain unchanged.

No further modifications or additions to the Noise and Vibration Assessment recommendations or conclusions are noted based on this review.



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