



TODOROSKI
AIR SCIENCES

AIR QUALITY & NOISE STUDY
BOTANY ROAD CORRIDOR:
URBAN DESIGN STUDY – STAGE 3

TZG Architects
for City of Sydney

11 March 2021

Job Number 20041102

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Air Quality & Noise Study

Botany Road Corridor

Urban Design Study – Stage 3

DOCUMENT CONTROL

Report Version	Date	Prepared by	Reviewed by
DRAFT - 001	01/12/2020	P Henschke	R Larmandieu
DRAFT - 002	16/12/2020	P Henschke	
FINAL - 001	17/12/2020	P Henschke	
FINAL - 002	27/01/2021	P Henschke	
FINAL - 003	11/03/2021	P Henschke	

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1 INTRODUCTION

Todoroski Air Sciences has prepared this report for Tonkin Zulaikha Greer (TZG) Architects on behalf of the City of Sydney (the City).

This Stage 3 report presents recommendations for land use, built form and design features intended to support the planning for the planned growth of the Botany Road Corridor (hereafter referred to as the Project). The recommendations are based on the assessed air and noise impacts presented in *Air Quality & Noise Study Botany Road Corridor Urban Design Study – Stage 1 + 2* (**Todoroski Air Sciences, 2020**).

This report incorporates the following aspects:

- ✦ A background of the Project and works associated with Stage 1 + 2;
- ✦ A review of the public domain features of the Project and how these influence potential traffic emissions; and,
- ✦ A description of the preferred options scenarios and how the incorporated land use, built form and design features improve air and noise impacts.



2 PROJECT BACKGROUND

The *Air Quality & Noise Study Botany Road Corridor Urban Design Study – Stage 1 + 2* (**Todoroski Air Sciences, 2020**) examined the potential for air quality and noise impacts within the Botany Road Corridor (the Study Area).

The key source of air and noise emissions within the Study Area was identified as road traffic and is the key driver for limiting the overall air quality and noise amenity within the area. Air quality and noise computer modelling were conducted to predict the potential impacts associated with the roads within the Study Area for the existing situation and two concept scenarios (Option 3A and Option 3B) which were designed to facilitate change with the planned growth and development in the Study Area.

The predicted air quality levels at the ground floor and first floor levels were found to exceed or be close to the applicable criteria along Gibbons Street, Regent Street and Botany Road for the existing situation and the two concept scenarios and would not be suitable for residential development. While there are no external requirements for road traffic noise, façade noise levels on buildings surrounding Gibbons Street, Regent Street and Botany Road are predicted to be high and would not be considered suitable for residential development without appropriate façade treatment. This is not unexpected considering the overall traffic volumes along these busy roads within the study area.

Figure 2-1 presents a comparison of the predicted incremental maximum 24-hour average PM_{2.5} concentrations for the existing and concept scenarios. **Figure 2-2** presents a comparison of the predicted noise contours for daytime (L_{Aeq,15hr}) for the existing and concept scenarios.

The air quality modelling predictions indicate the change in air quality levels associated with the Option 3A or Option 3B are not considered significant relative to the existing situation. The predicted traffic noise levels on the busy roads within the Study Area are high and will remain high whether Option 3A or Option 3B are implemented. The Option 3B provides a generally better improvement in noise impacts and beneficial reduction to air quality (health) impacts on Regent Street relative to Option 3A.

Analysis of the modelling results indicates that in comparison to Gibbons Street, Regent Street and Botany Road, the predicted air and noise impacts due to road impacts along Cope Street in the Study Area are significantly lower (approximately half the level predicted on the busy roads for air quality and notably lower noise levels) and are considered more typical of a residential area. The modelling also indicates that with increasing height, a reduction in the air pollution and traffic noise impacts occurs.

Thus, the ground and lower floors along Gibbons Street, Regent Street and Botany Road should be preferentially suited for commercial use rather than residential use which would be ideally set at height. The *Air Quality & Noise Study Botany Road Corridor Urban Design Study – Stage 1 + 2* (**Todoroski Air Sciences, 2020**) includes some general recommendations regarding the building layout and design features of new buildings in the Study Area and is discussed further in this report.

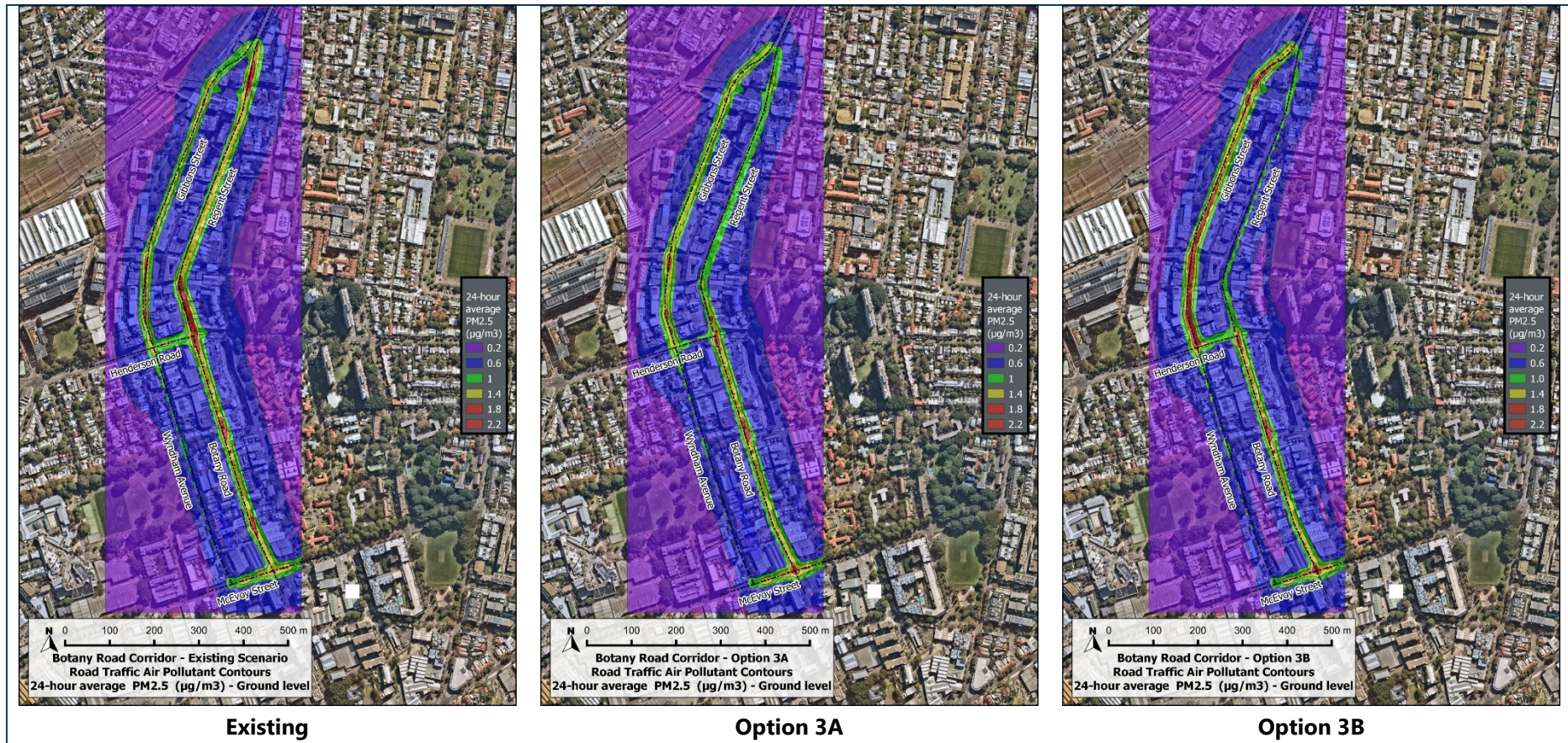


Figure 2-1: Predicted maximum 24-hour average PM_{2.5} concentrations (µg/m³)

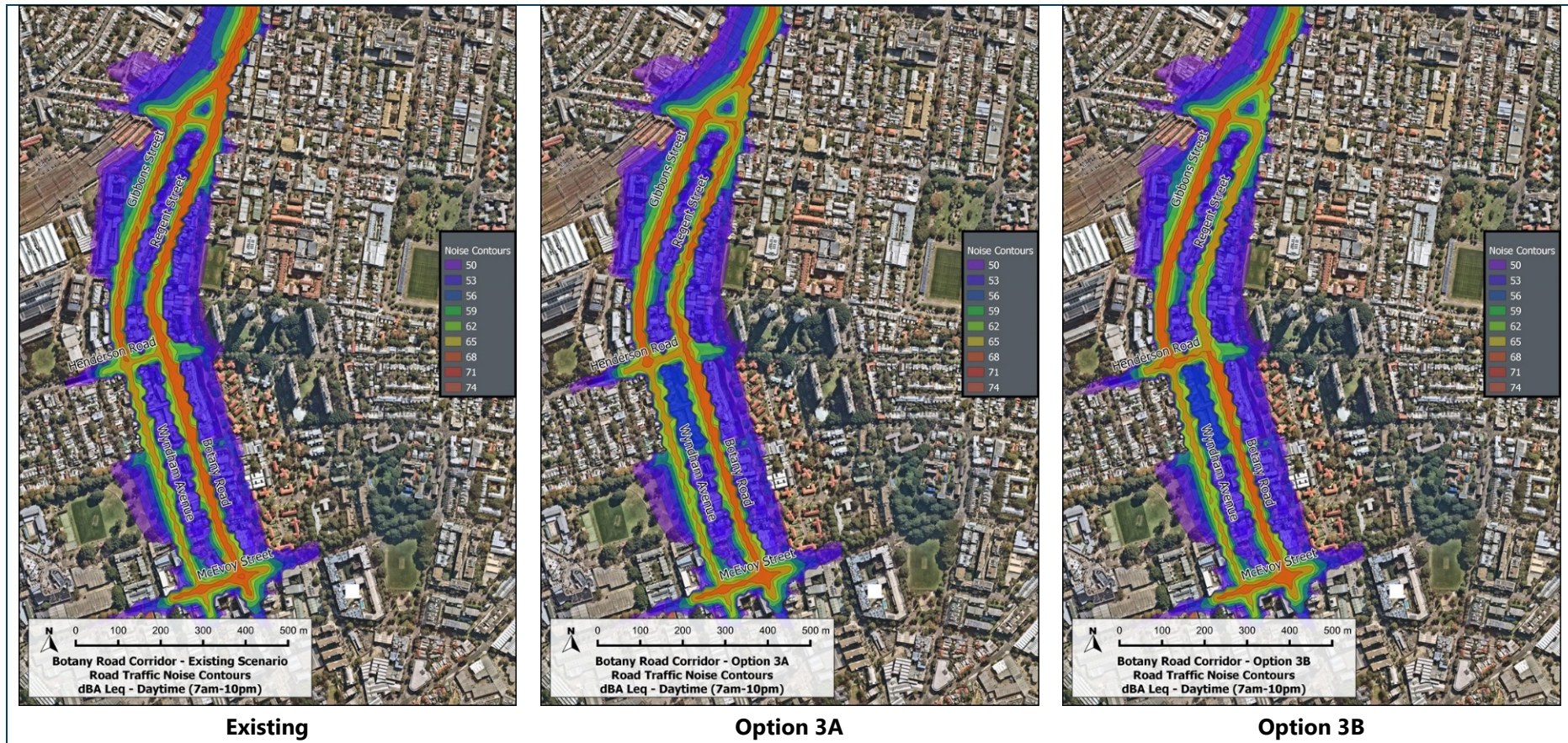


Figure 2-2: Predicted road traffic noise contours for Daytime (7am-10pm)

3 PUBLIC DOMAIN FEATURES

The key public domain features for the Project that would facilitate change with the traffic concept scenarios and the effect on air and noise emissions and impacts within the Study Area are discussed below.

3.1 Improved two-way traffic

Improved two-way traffic sees the removal of the existing one-way streets on Regent Street and Gibbons Street to allow for two-way operation on these streets.

The reconfiguration will see an overall reduction in traffic volume on Regent Street and conversely an increase on Gibbons Street, maintaining a north/south traffic flow along Botany Road and Gibbons Street. This allows for simplified movements at the Botany Road/ Henderson Road/ Raglan Street intersection and an improvement in flow, reducing queuing and idling time. Local traffic management on Wyndham Street will be required to maintain local access and discourage through traffic from Gibbons Street to enhance the existing safety and amenity.

Other features associated with the two-way traffic reconfiguration include a reduction in the current vehicle speeds along Regent Street and Gibbons Street and additional pedestrian crossings to promote safe pedestrian routes.

Improved parking options for Regent Street also arise with a two-way operation and reduced traffic volumes. Regent Street as a north/south thoroughfare is deterred and tends to become a more localised street with improved amenity. There is an overall improvement in the traffic related air and noise emissions along Regent Street promoting better street level conditions which would be compounded by the additional pedestrian demands generated by the Waterloo metro station.

3.2 Improved east/west movement

The improved two-way traffic within the Study Area will also facilitate an improvement with the east/west movement within the Study Area.

The improved east/west movement encourages options for traffic and active transport movement into and out of the Study Area. The encouragement of active transport between the different public transport modes associated with the bus and metro station within the Study Area would assist with reducing the overall traffic volume and improve air and noise impacts.

3.3 Bus metro interchange

The bus metro interchange is located at the Waterloo metro station and would integrate with the station entry to provide a convenient interchange of the two public transport modes.

The integrated bus metro interchange will ensure traffic flow along Botany Road is not adversely disrupted and its presence within the Study Area will assist with the encouragement of active transport and the use of public transport to reduce the overall traffic volume and improve air and noise impacts.

A signalised crossing would be developed outside Waterloo metro station to allow pedestrian movement across Botany Road to future development facing the Waterloo Metro Quarter.

3.4 Active laneways

The activation of the existing laneways, in particular those laneways linking with Regent Street within the Study Area naturally arise from the reduced traffic volume and promoting better street level conditions and pedestrian amenity.

The laneways spaces are shared spaces with minimal traffic volume would likely see improved traffic related air and noise impacts in these areas and ensures these spaces are open to allow cross wind flows through the Study Area.

To ensure future development facing the Waterloo Metro Quarter has adequate servicing and vehicle entry points, rear laneways will be activated which would reduce vehicle crossovers and traffic congestion along the frontage on Botany Road.



4 PREFERRED OPTIONS SCENARIO

Recommendations for land use, built form and design features within the Study Area are identified for four different areas. These areas include:

- ✦ Regent Street High Street Precinct – which focuses on the area along Regent Street from Redfern Street in the north to Henderson Road/ Raglan Street in the south.
- ✦ Rosehill Precinct – which focuses on the western side of Rosehill Street and Gibbons Street.
- ✦ Waterloo Metro Quarter Employment Quarter – which focuses on the Waterloo Metro Quarter and area along Botany Road between Henderson Road/ Raglan Street to the north and Buckland Street/ Wellington Street to the south.
- ✦ McEvoy Street Precinct – which focuses on the southern portion of Botany Road in the Study Area with McEvoy Street to the south.

4.1 Regent Street Precinct

The Regent Street Precinct will see a reduction in traffic volumes and improved parking options along Regent Street which will result in an improvement in traffic related air quality and noise impacts.

This precinct already benefits from roadway setbacks in some sections and pockets of low buildings with variable heights. The roadway setbacks are recommended to be maintained or extended where possible to further improve traffic related air quality and noise impacts in the precinct and should be encouraged for commercial/ retail shopfronts. The existing low buildings with variable heights within the precinct should be retained where possible as this promotes wind and air flow within the precinct.

Potential commercial developments are suitable for siting parallel to the roadway with future residential developments to be limited to existing built form or limited heights. There are no significant changes to the built form in this precinct.

4.2 Rosehill Precinct

The Rosehill Precinct is likely to experience an increase in traffic volumes along Gibbons Street which will result in increases in traffic related air quality and noise impacts.

This precinct is preferentially suited for commercial development over residential development and existing commercial buildings should be retained. Encouraging mixed use and commercial growth along Gibbons Street will minimise residential areas which are influenced by traffic related air quality and noise impacts

The local terrain features should be considered when setting building heights to minimise canyoning. **Figure 4-1** presents an aerial view of the proposed Rosehill Precinct built form showing up to 12 storeys. Encouraging a sloped aspect for buildings on the west of the precinct which follows the terrain will allow for unimpeded wind flows into the precinct and wider Study Area. This built form reduces canyoning effects and is offset with other existing tall buildings in the precinct to minimise the reverberation of noise from traffic and provide some benefit in dispersing air pollutants.



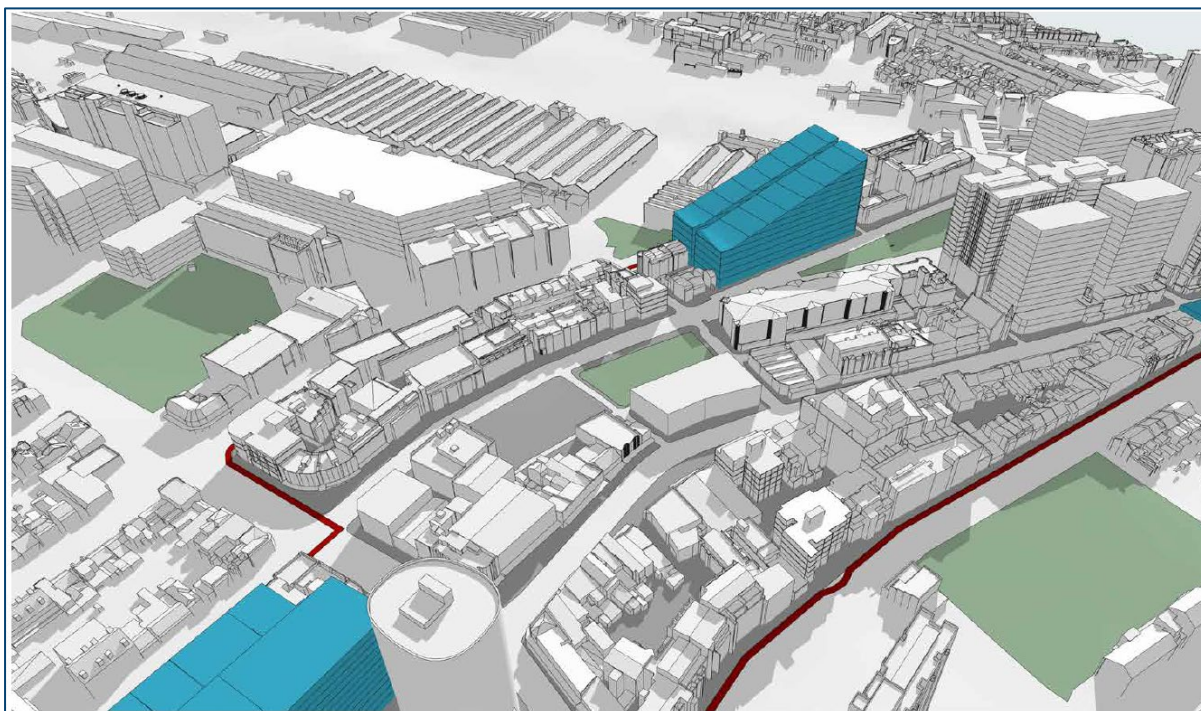


Figure 4-1: Aerial view of Rosehill Precinct built form

4.3 Waterloo Metro Quarter Precinct

The urban design options for the Waterloo Metro Quarter Precinct are recommended to retain commercial floor space opposite the Waterloo Metro due to the traffic related air and noise impacts. The comparison of the assessed traffic scenarios in **Figure 2-1** and **Figure 2-2** indicate air and noise impacts remain high in this location.

Further detail on the level of noise impact experienced in this location is presented in **Figure 4-2** showing a cross-sectional view of the predicted noise levels on Botany Road and Cope Street for day-time. On Botany Road, noise levels experienced at the ground and lower levels are generally higher than $\geq 65\text{dBA } L_{\text{Aeq}}(15\text{hr})$. The influence of urban canyon design on noise can be observed as traffic noise propagates vertically beyond the height of the building (note: building in figure is approximately 3 storeys). It is noted that traffic noise levels from Botany Road is approximately 15dBA lower in streets located parallel to Botany Road when shielded by a building, which is a significant reduction.

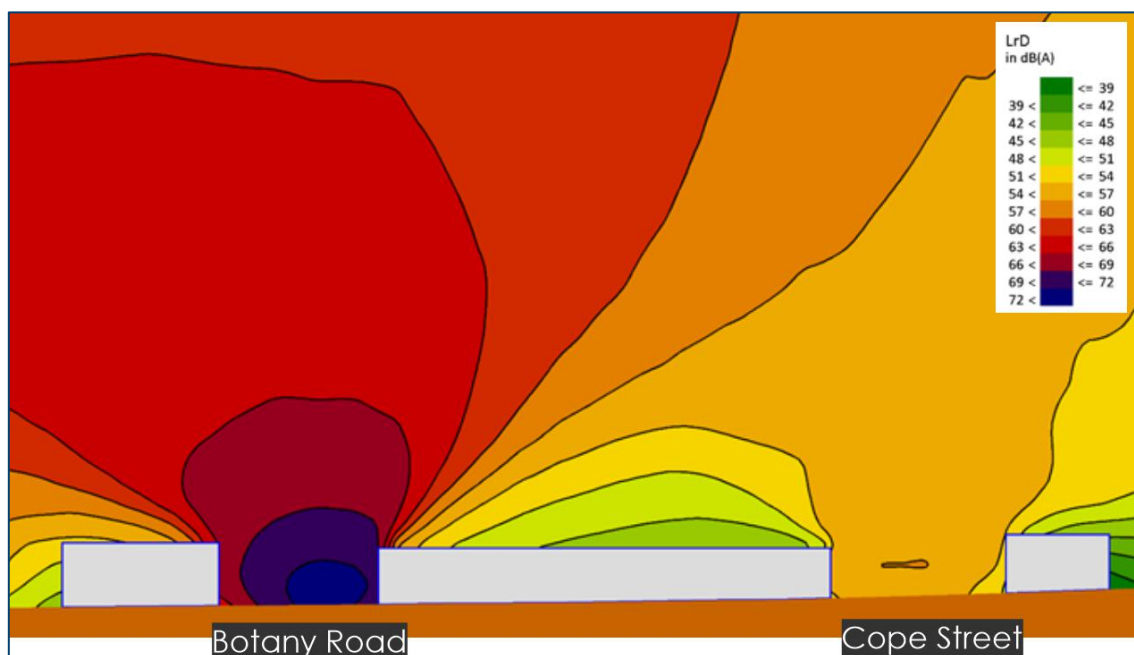


Figure 4-2: Cross-sectional view of predicted noise levels for Waterloo Metro Quarter Precinct for day-time

The modelled noise levels for the ground and lower levels along the Botany Road are predicted to be high and would not be considered suitable for residential development and would be recommended for commercial use instead. The modelled noise predictions also indicate noise levels decrease with height and that by increasing the building height along busy roads can be an efficient way to reduce noise impacts on parallel streets.

Figure 4-3 presents an aerial view of the proposed Waterloo Metro Quarter Precinct built form. This includes taller buildings with 12 storeys for 66-74 Botany Road, 9 storeys for 100-110 Botany Road and 5 storeys for Wyndham Street frontage. The built form will provide a continuous streetscape and street wall height facing the Waterloo Metro Station.

The effect of the proposed built form on predicted noise levels is estimated in **Figure 4-4** showing that increasing the building height along Botany Road will reduce noise impacts on Wyndham Street through shielding effect.

Residential use can occur at height if found to be suitable. A detailed air quality and noise impact assessment report is recommended to be conducted with the development application for residential development to confirm the suitability of residential use in the precinct. The air quality and noise impact assessment reports will also include provisions for mitigation and abatement requirements, as necessary.

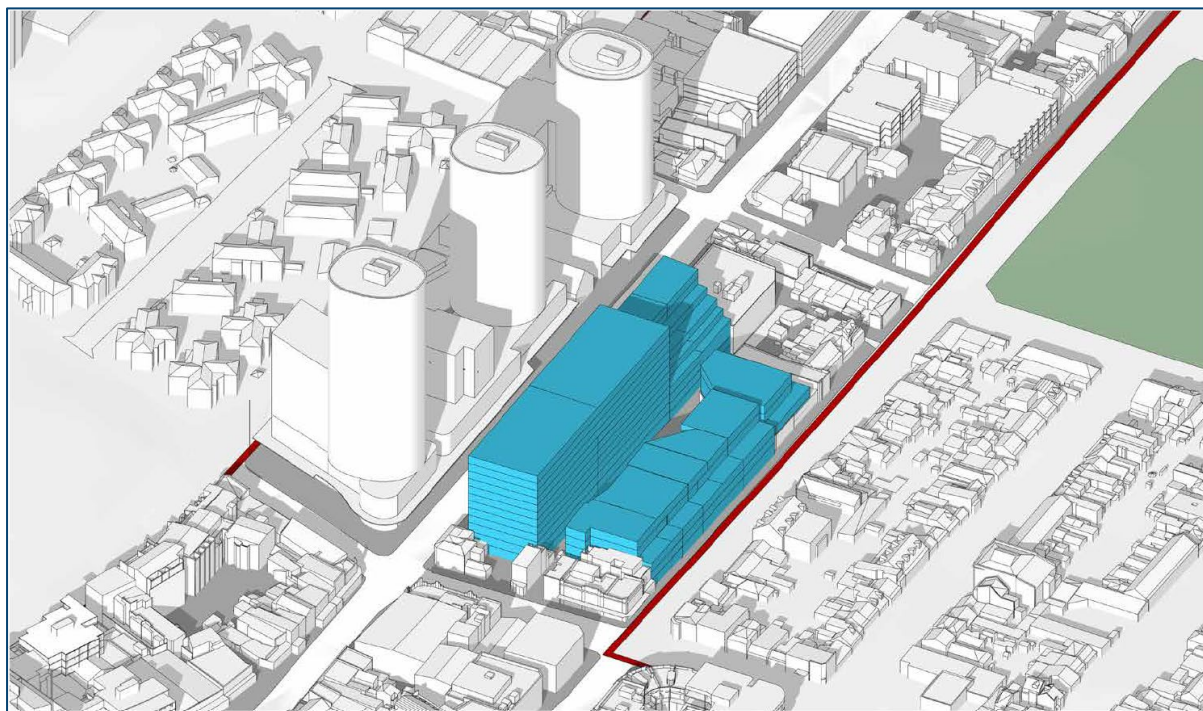


Figure 4-3: Aerial view of Waterloo Metro Quarter Precinct built form

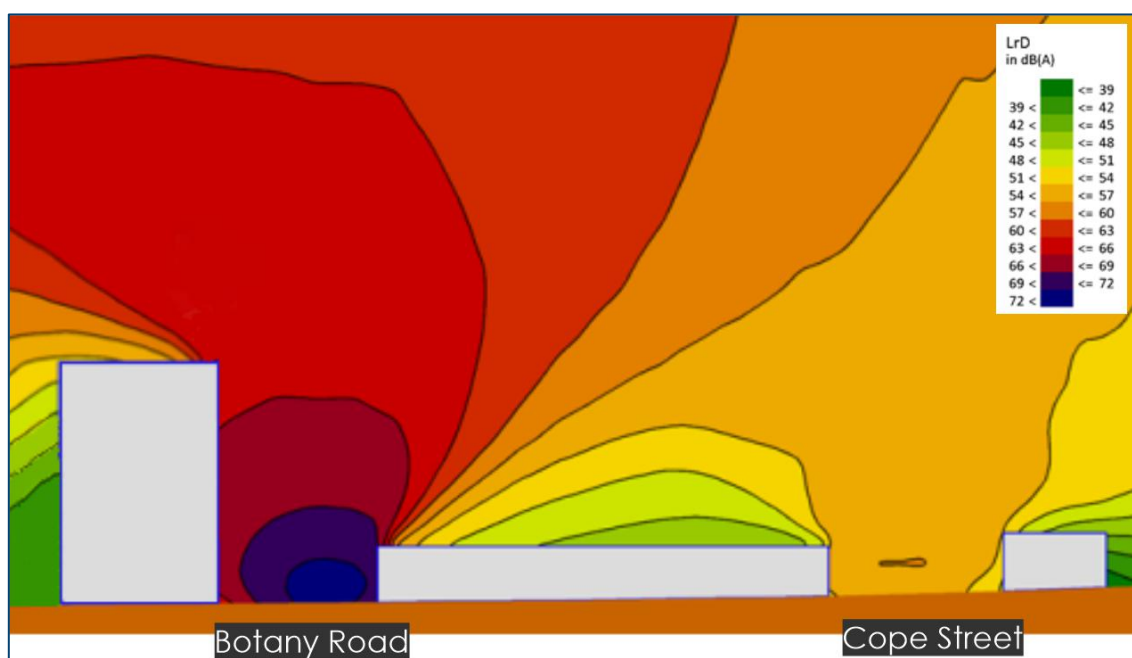


Figure 4-4: Cross-sectional view of estimated noise levels for Waterloo Metro Quarter Precinct with proposed built-form for day-time

4.4 South McEvoy Street Precinct

The South McEvoy Street Precinct comprises the southern part of the Study Area where Botany Road intersects with McEvoy Street. Both Botany Road and McEvoy Street are busy roads and traffic related air and noise impacts are high in this location.

Commercial floor space is preferred for the ground and lower floors over residential use in this precinct. Further detail on noise levels experienced in this location is presented in **Figure 4-5** showing a cross-sectional view of the predicted noise levels on Botany Road and Wyndham Avenue for day-time. The figure indicates that noise levels decrease with height and that the height of the building (note: building in figure is approximately 4 storeys) with consideration of setback from the roadway would decrease even further.

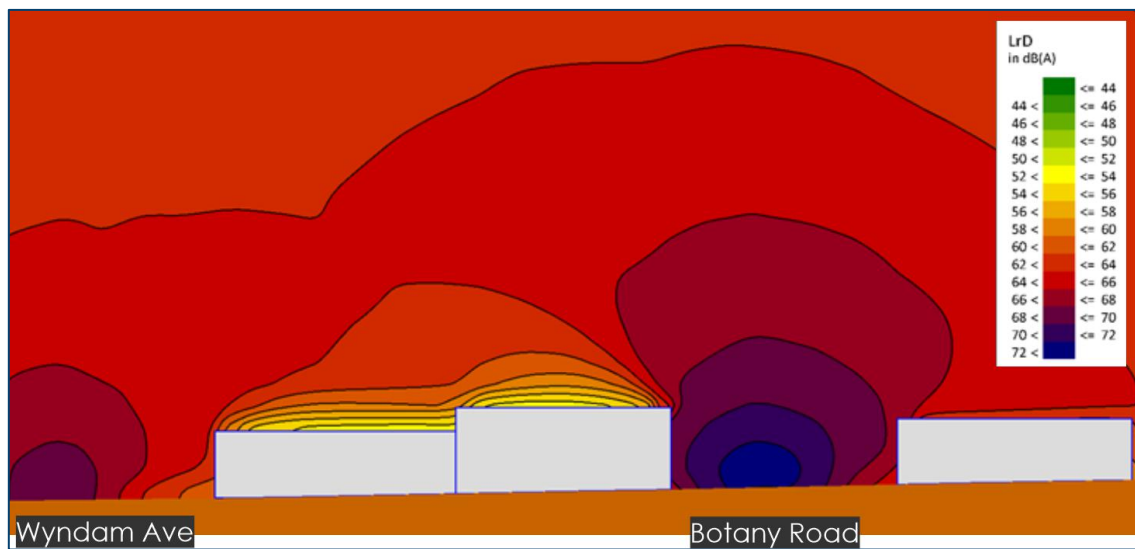


Figure 4-5: Cross-sectional view of predicted noise levels for South McEvoy Street Precinct for day-time

Figure 4-6 presents an aerial view of the proposed South McEvoy Street Precinct built form which would apply to the following sites:

- ✦ 216-220 Wyndham Street;
- ✦ 171B Botany Road;
- ✦ 179-181 Botany Road;
- ✦ 186-202 Botany Road; and,
- ✦ 204-218 Botany Road.

The effect of the proposed built form on predicted noise levels is estimated in **Figure 4-7** showing that noise levels decrease at height from the busy roads, however the noise levels at the façades would remain high along the busy roads.

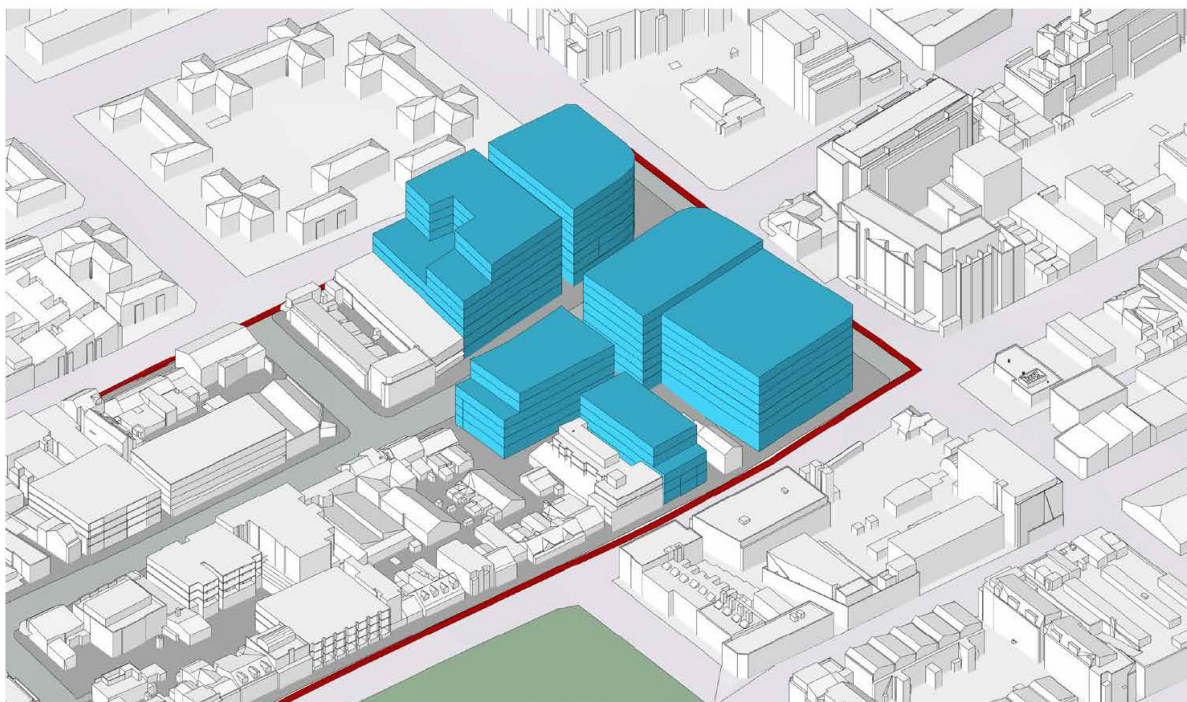


Figure 4-6: Aerial view of South McEvoy Street Precinct built form

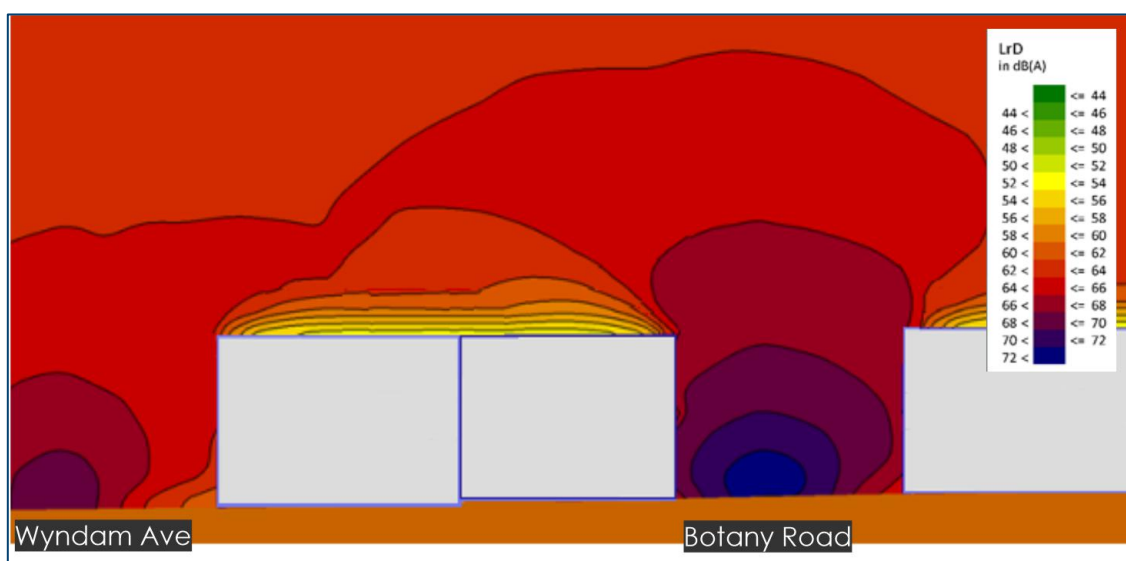


Figure 4-7: Cross-sectional view of estimated noise levels for South McEvoy Street Precinct with proposed built-form for day-time

5 SUMMARY AND CONCLUSIONS

The recommendations for land use, built form and design features in this report are intended to support the planning for the planned growth of the Botany Road Corridor.

The changes to traffic conditions will alter the air quality and noise amenity of the area and the recommendations are intended to minimise potential air and noise impacts associated with road traffic emissions in the area.

Commercial uses are recommended to be preferentially placed in the Rosehill Precinct, Waterloo Metro Quarter Precinct and South McEvoy Precinct. These areas are likely to experience air and noise impacts associated with road traffic emissions and would not be amenable for residential uses. The built form features such as building heights and variable structures can assist with minimising potential air quality and noise impacts from road traffic.



6 REFERENCES

Todoroski Air Sciences (2020)

"Air Quality & Noise Study Botany Road Corridor Urban Design Study – Stage 1 + 2", prepared for TZG Architects for City of Sydney by Todoroki Air Sciences, November 2020.

