



Transport
for NSW

Ashfield Commuter Car Park

Determination Report



Artist's impression of Ashfield Commuter Car Park, subject to detailed design

April 2017



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Ashfield Commuter Car Park Determination Report

**Transport Access Program
Ref - 5652263**

April 2017

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Glossary and abbreviations

| Term | Meaning |
|----------------------------|--|
| CBD | Central Business District |
| CEMP | Construction Environmental Management Plan |
| CoA | Condition of Approval |
| Concept design | The concept design is the preliminary design presented in the REF, which would be refined by the Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance). |
| Contractor | The Contractor for the Proposed Activity would be appointed by TfNSW to undertake the detailed design and construction of the Proposed Activity |
| CPTED | Crime Prevention Through Environmental Design |
| DDA | <i>Disability Discrimination Act 1992</i> (Commonwealth) |
| Detailed design | Detailed design broadly refers to the process that the Contractor undertakes (should the Proposal proceed) to refine the concept design to a design suitable for construction (subject to TfNSW acceptance). |
| DSAPT | <i>Disability Standards for Accessible Public Transport (2002)</i> |
| EPA | NSW Environment Protection Authority |
| EP&A Act | <i>Environmental Planning and Assessment Act 1979</i> (NSW) |
| EP&A Regulation | <i>Environmental Planning and Assessment Regulation 2000</i> (NSW) |
| EPBC Act | <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth) |
| Infrastructure SEPP | <i>State Environmental Planning Policy (Infrastructure) 2007</i> (NSW) |
| INP | NSW EPA Industrial Noise Policy |
| LGA | Local Government Area |
| NCC | National Construction Code |
| NES | Matters of 'National Environmental Significance' under the EPBC Act |
| NSW | New South Wales |
| OEH | NSW Office of Environment and Heritage |
| Proponent | A person or body proposing to carry out an activity under Part 5 of the EP&A Act – in this instance, TfNSW |
| Proposed Activity | The construction and operation of the Ashfield Commuter Car Park |

| Term | Meaning |
|---------------------------|--|
| REF | Review of Environmental Factors |
| Roads and Maritime | NSW Roads and Maritime Services (formerly Roads and Traffic Authority) |
| TfNSW | Transport for NSW (the Proponent) |

Executive summary

Overview of Proposed Activity

Transport for NSW (TfNSW) is responsible for improving the customer experience of transport services, transport policy and regulation, planning and program administration, procuring transport services, and infrastructure and freight.

TfNSW is the Proponent for the Ashfield Commuter Car Park (the 'Proposed Activity'), which is part of the Transport Access Program. The program is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

The Proposed Activity involves:

- construction of a new approximately 235 space multi-storey car park, increasing the existing car park capacity by approximately 124 commuter car parking spaces
- the new multi-storey car park will comprise ground level plus two additional levels on the site of the existing at-grade car park on Brown Street, Ashfield
- approximately 25 existing at-grade parking spaces to the east of the multi-storey car park would be retained to provide approximately 260 commuter parking spaces in total at the Proposed Activity site
- inclusion of urban design and façade treatments in order to integrate the car park with the existing environment
- vehicular entrance and exit off Brown Street in a similar location to existing arrangements
- ancillary works including lifts, stairs, utility adjustments, provision of lighting, CCTV, line marking, wayfinding signage, road works, footpath works and landscaping.

The Proposed Activity includes provisions for the development of two additional levels on the car park if required in the future.

TfNSW, as the Proponent for the Proposed Activity, has undertaken a Review of Environmental Factors (REF) that details the scope of works and environmental impacts associated with the Proposed Activity. The REF was prepared by TfNSW in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

The Ashfield Commuter Car Park REF was placed on public display from 16 February 2017 to 2 March 2017 at three locations, as well as on the TfNSW website and the NSW Government Have Your Say website.

Modifications to the Proposed Activity

Site constraints at the Proposal site as well as ongoing consultation with the community and external stakeholders has resulted in several changes to the project as described in the REF including:

- to improve circulation, the commuter car park has been reconfigured resulting in the total number of new car parking spaces being reduced from approximately 124 to 99. Providing more additional spaces would be investigated during detailed design
- addition of at least 10 motorcycle parking spaces within the multi-storey car park

- an addition of a partial third level of parking added to the car park on the rail corridor side
- an extension of two levels of the multi-storey car park at the south of the site over the existing at-grade car park
- changes to the internal configuration of ramps, location of lift structures and circulation within the multi-storey car park
- a split entrance/exit onto Brown Street
- modifying the pedestrian pathway between the proposed multi-storey car park and Ashfield Station ensure DDA compliance.

The impacts associated with the design modifications have been considered in accordance with clause 228 of the EP&A Regulation.

Should design modifications be required as a result of the detailed design process, these modifications would be assessed to determine consistency with the Approved Project, including significance of impact on the environment. Additional mitigation measures and/or consultation would be undertaken where necessary.

Purpose of this report

The purpose of this Determination Report is for TfNSW, as the Proponent of the Ashfield Commuter Car Park, to determine whether or not to proceed with the Proposed Activity. TfNSW must make a determination in accordance with the provisions of Part 5 of the EP&A Act.

Conclusion

Based on the assessments in the REF, the design changes and a review of the submissions received from the community and stakeholders, it is recommended that the Proposed Activity be approved, subject to the mitigation measures included in the REF and the proposed Conditions of Approval. TfNSW would continue to liaise with the community and other stakeholders as the Proposed Activity progresses through detailed design and into the construction phase.

1 Introduction

1.1 Background

Transport for NSW (TfNSW) is the NSW Government's lead public transport agency that ensures planning and policy is fully integrated across all modes of transport in NSW. It manages a multi-billion dollar budget allocation for train, bus, ferry, light rail and taxi services and related infrastructure in NSW.

TfNSW is responsible for improving the customer experience of transport services, transport policy and regulation, planning and program administration, procuring transport services, infrastructure and freight.

On 23 April 2012, the Minister for Transport announced the Transport Access Program. The program provides a better experience for public transport customers across the State by ensuring infrastructure improvements are delivered in a co-ordinated and integrated way.

The Transport Access Program ensures the integrated planning and delivery of works with the aim of providing:

- stations that are accessible to people with a disability, those who are less mobile and parents/carers with prams
- modern buildings and facilities for all modes that meet the needs of a growing population
- modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers
- safety improvements including extra lighting, help points, fences and security measures for car parks and interchanges, including stations, bus stops and wharves
- signage improvements so customers can more easily use public transport and transfer between modes at interchanges
- other improvements and maintenance such as painting, new fencing and roof replacements.

The Proposed Activity would involve works at Ashfield on land owned by RailCorp. TfNSW is the Proponent for the Ashfield Commuter Car Park (referred to as the 'Proposed Activity' for the purposes of this document).

1.2 Review of Environmental Factors

A Review of Environmental Factors (REF) has been prepared by TfNSW in accordance with sections 111 and 112 of the *Environmental Planning and Assessment 1979* (EP&A Act), and clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), to ensure that TfNSW takes into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposed Activity. The REF is included at Appendix A.

The Ashfield Commuter Car Park REF was placed on public display from 16 February 2017 to 2 March 2017, with 23 submissions received including one from Inner West Council. Issues raised in these submissions are addressed in Section 2.3 of this report.

1.3 Determination Report

Prior to proceeding with the Proposed Activity, the Secretary for TfNSW must make a determination in accordance with Part 5 of the EP&A Act (refer Figure 1).



Figure 1: Planning approval process

The purpose of this Determination Report is to address the following to allow for a determination of the Proposed Activity:

- assess the environmental impacts with respect to the Proposed Activity, which are detailed in the environmental impact assessment (and any proposed modifications, as detailed and assessed in this Determination Report)
- identify mitigation measures to minimise potential environmental impacts
- determine whether potential environmental impacts are likely to be significant
- address whether the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) apply to the Proposed Activity.

This report has been prepared having regard to, among other things, the objectives of TfNSW under the *Transport Administration Act 1988*:

- a) to plan for a transport system that meets the needs and expectations of the public
- b) to promote economic development and investment
- c) to provide integration at the decision-making level across all public transport modes
- d) to promote greater efficiency in the delivery of transport infrastructure projects
- e) to promote the safe and reliable delivery of public transport and freight services.

1.4 Description of the Proposed Activity in the REF

The Proposed Activity is located in the suburb of Ashfield, approximately eight kilometres west of the Sydney CBD, in the Inner West Council LGA (formerly Ashfield Council).

The Transport Access Program is designed to drive a stronger customer experience outcome, to deliver improved travel to and between modes, encourage greater public transport use and better integrate interchanges with the role and function of town centres. The Proposed Activity would also assist in responding to forecasted growth in the region and as such would support growth in commercial and residential development.

The Proposed Activity fulfils the Transport Access Program objectives by proposing to provide:

- additional commuter parking in close proximity to Ashfield Station
- a modern car parking facility which features lighting and CCTV security cameras
- improved access for commuters and customers with disabilities
- improved opportunities to change modes of transport
- integration of the car park with its current and future urban context, taking into account the local environment
- a relative reduction in commuter car parking in local streets, potentially improving traffic and road safety
- clear way-finding signage between the car park and the station
- opportunities for increased use of public transport by increasing convenience and accessibility to and from Ashfield Station
- landscaping and selected finishes to provide a modern structure integrated with the surrounding environment.

The Proposed Activity would also ensure that Ashfield Commuter Car Park would meet legislative requirements under the *Disability Standards for Accessible Public Transport 2002* (DSAPT) and the *Disability Discrimination Act 1992* (DDA).

An overview of the Proposed Activity, which is the subject of the Ashfield Commuter Car Park REF, is provided in the Executive Summary with full details set out in Chapter 3 of the REF. In summary, the Proposed Activity as previously outlined in the REF comprises:

- construction of a multi-storey car park structure, consisting of a ground level, and two decks connected by internal circulation ramps, with provision for approximately 235 spaces (approximately 124 new spaces)
- approximately 78 spaces on the ground level, 78 spaces on Level 1 and 79 spaces on Level 2
- provision for six disabled parking spaces (at least 2 per cent as required under the DDA)
- retention of 25 parking spaces on the ground level to the east of the proposed car park structure in addition to the parking number described above for a total of 260 spaces.
- maintaining the existing access to the adjacent RailCorp signal depot through the car park structure
- a lift and two sets of stairs to the Orchard Crescent footpath
- way-finding signage for pedestrian circulation
- one-way vehicle movements
- separation of vehicle entry/exit points and pedestrian access paths
- reconstructed footpath along the Orchard Crescent and Brown Street frontages
- sympathetic lighting design with consideration of neighbouring residential properties
- new fencing along the northern border of the site
- utility rooms including a communications/electricity/pump utility room and a Sydney Trains store room located on the ground level
- ensuring that access to the existing Ausgrid substation near the Orchard Crescent/Brown Street intersection is maintained
- provision for future expansion of the car park by two additional levels (this would be subject to a separate environmental impact assessment)
- a bike shed would also be built at ground level to the west of the car park using land which is not accessible for car parking. Whether some bicycle parking may be accommodated within the car park structure would be considered during detailed design.

The need for, and benefits of the Proposed Activity are outlined in Chapter 2 of the REF.

Construction is expected to commence in 2017 and take approximately 12 months to complete.

2 Consultation and assessment of submissions

2.1 REF public display

The Ashfield Commuter Car Park REF was placed on public display from 16 February 2017 to 2 March 2017 at three locations, as well as on the [TfNSW website](http://www.transport.nsw.gov.au/projects-tap)¹ and the NSW Government [Have Your Say website](http://www.haveyoursay.nsw.gov.au)².

Community consultation activities undertaken for the public display include:

- distribution of flyers to customers, nearby residents and businesses on 16 February 2017
- public display of the REF at:
 - Inner West Council, Ashfield Service Centre, 260 Liverpool Road, Ashfield
 - Ashfield Library, Level 3, 260 Liverpool Road, Ashfield
 - TfNSW, Zenith Centre, Level 5, Tower A, 821 Pacific Highway, Chatswood
- placement of ads in the following local newspaper
 - Inner West Courier on 21 February 2017
- placement of information on the TfNSW website
- a letter outlining the scope of the Proposed Activity, information on where to view the REF and specialist studies on the TfNSW website, along with details on how to make a submission was sent to Inner West Council as per the consultation requirements under clause 13 and 15 of the Infrastructure SEPP.

2.2 REF submissions

A total of 23 submissions were received by TfNSW, including one from Inner West Council. Submissions included feedback on a range of issues in relation to the Proposed Activity. The key issues raised in submissions were:

- adequacy of the number of car parks to meet current and future demand
- ensuring car park is used for commuters only and not by surrounding residents, construction workers or local shoppers
- ensure adequate motorcycle/scooter parking is incorporated
- increase number of disabled parking spaces
- increased noise and visual impacts due to the close proximity to apartment buildings
- improve pedestrian connection between the Proposed Activity and the station entrance
- additional traffic impacts on Brown Street
- impact on surrounding streets due to loss of parking during construction.

¹ <http://www.transport.nsw.gov.au/projects-tap>

² <http://www.haveyoursay.nsw.gov.au>

2.3 Consideration and response to submissions

Community submissions

A summary of all issues raised by members of the community and associated responses is provided in Table 1.

Table 1: Response to community submissions received

| No. | Submission no. | Issue/s raised | TfNSW response |
|----------|--|---|--|
| 1 | General | | |
| 1.1 | ASH5, ASH6, ASH9, ASH10, ASH12, ASH21 | Support for the Proposed Activity to create additional commuter parking at Ashfield. | Noted. |
| 1.2 | ASH1, ASH3, ASH4, ASH10, ASH12, ASH21 | 260 car parking spaces are not enough to meet current or future demand of Ashfield area. Increase the number of storeys of the car park to achieve this. Car park would still be full before 7am which makes it difficult for out of peak hour commuters to park. | <p>The number of commuter car parking spaces is determined by a number of factors including current demand, site location and constraints, forecasted growth in patronage, and traffic impacts.</p> <p>The updated design (as outlined in Section 3) has identified a reduction in the total number of car parking spaces than what was outlined in the REF due to site constraints.</p> <p>The additional number of car parking spaces for commuters would be 99 spaces with a total of 235 spaces. These commuter car parking spaces would reduce pressure on the existing street parking and assist in providing spaces for forecasted growth.</p> <p>The Proposed Activity includes provision for the development of two additional levels of parking if required in the future.</p> |
| 1.3 | ASH5, ASH6, ASH8, ASH10, ASH13, ASH14, ASH17, ASH21, ASH22 | <p>The car park is utilised by nearby residents, construction workers and local Ashfield workers which takes away spaces for commuters.</p> <p>Consider an option for the car park to be utilised only by commuters (e.g. by using opal 'smart parking', closure overnight, or charges for parking over 10-12 hours).</p> | <p>The Proposed Activity aims to provide additional car parking spaces near Ashfield Station for commuters. The additional 99 spaces would also reduce the impact from non-commuter users. There would be a relative increase in on-street parking for non-commuters to use.</p> <p>The future provision for boom gates at the entrance into the car park has been made which would reduce the use of the car park by other non-commuters.</p> |

| No. | Submission no. | Issue/s raised | TfNSW response |
|-----|----------------|--|--|
| 1.4 | ASH7, ASH21 | <p>The car park is currently being used for illegal U-turns, and as an unsafe drop off/pick up spot. This causes unsafe conditions at the entrance/exit to the existing car park.</p> <p>Improved drop-off/pick-up zones on each side of Brown Street station entrance are required.</p> | <p>A Road Safety Audit would be undertaken as part of the detailed design process and on completion of construction, to ensure adequate pedestrian safety at the driveway entrance/exit to the car park (refer to CoA 31).</p> <p>An existing Kiss and Ride facility is located on Station Road on the northern side of Ashfield Station for pick-up and drop-off of commuters.</p> <p>Additional Kiss and Ride facilities are not included as part of the Proposed Activity due to space constraints within the site footprint.</p> |
| 1.5 | ASH7, ASH8 | <p>Questioned the need to increase car parking in an inner city train station which is already connected to good public transport and interconnected bus services in an area which is already congested by cars.</p> | <p>Commuter Car Park requirements are assessed by TfNSW on a network wide basis on existing and future demand, proximity to other car parking spaces and feasibility of providing parking.</p> <p>The Transport Access Program is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure where it is needed most. The specific objectives of the Ashfield Commuter Car Park are to provide:</p> <ul style="list-style-type: none"> • additional commuter parking in close proximity to Ashfield Station • improved access for commuters and customers with disabilities • improved opportunities to change modes of transport • opportunities for increased use of public transport by improving convenience and accessibility to and from Ashfield Station. <p>TfNSW has assessed parking requirements for commuters in the area based on the forecast Sydney Trains patronage growth (+15 per cent to 2036).</p> |
| 1.6 | ASH21 | <p>Improve reliability of existing bus connections to Ashfield Station for people who do not drive.</p> | <p>Reliability of bus connections is outside the scope of works for the Proposed Activity and would fall under the remit of Sydney Buses.</p> |

| No. | Submission no. | Issue/s raised | TfNSW response |
|----------|----------------|--|---|
| 1.7 | ASH8 | What is the cost of the Proposed Activity and has a cost benefit analysis been undertaken (against what criteria)? | <p>Cost benefit analyses are undertaken for all TfNSW projects.</p> <p>Analysis of the Proposed Activity included assessment against strategic criteria such as</p> <ul style="list-style-type: none"> meeting the 2036 patronage projections project level multi-criteria analysis including distance from the station, availability of space, environmental constraints, urban design outcomes and sustainability benefits. <p>The NSW budget for 2016/17 has set aside \$280M for Transport Access Program funded projects. The Ashfield Commuter Car Park will be funded as required and prioritised against other Transport Access Program projects.</p> <p>The specific funding amount for the project would be determined once a contract to construct the Proposed Activity has been awarded.</p> |
| 1.8 | ASH15, ASH18 | Additional commuter car parking would add to existing overcrowding at Ashfield Station during peak periods. | <p>The additional parking is not anticipated to contribute to overcrowding at Ashfield Station.</p> <p>The additional parking spaces within the Proposed Activity would capture those commuters currently using on-street parking. Therefore this would reduce congestion on surrounding streets.</p> |
| 2 | Design | | |
| 2.1 | ASH4 | Increase the number of bicycle parking spaces around the station. | <p>Bike parking would be included as part of the Proposed Activity.</p> <p>This additional bicycle parking would increase the overall number of bicycle parking spaces around the station.</p> |

| No. | Submission no. | Issue/s raised | TfNSW response |
|-----|--------------------|--|--|
| 2.2 | ASH4 | Make the top floor of the car park into a community open space. | <p>TfNSW has been in regular contact with Council regarding potentially making the top level of the proposed multi-storey car park into community space. The current position of the Council is not to proceed with such an option.</p> <p>Further detail regarding this is available in the Inner West Council Joint Local Representation Advisory Committee Meeting Minute from 8 November 2016 (http://www.innerwest.nsw.gov.au/ArticleDocuments/186/MINUTES%20of%20LRAC%20Meeting%20held%20on%20Tuesday%208%20November%202016.pdf.aspx).</p> <p>Accordingly, TfNSW and Inner West Council have decided not to proceed with the construction of an additional top floor of the car park for community open space.</p> |
| 2.3 | ASH10, ASH11 | Increase number of disabled spaces. | The number of car parking spaces proposed is above the <i>Disability Discrimination Act 1992</i> (DDA) requirement of two per cent. |
| 2.4 | ASH5, ASH16, ASH21 | Pedestrian improvements should be considered between the Proposed Activity and Ashfield Station entrance on Brown Street. The current environment is characterised by poor, narrow pedestrian access and too many potential unsafe conflict points between vehicles and pedestrians (including school students). At night the area is poorly lit and unattractive. | <p>The pedestrian path between the Proposed Activity and Ashfield Station would be made DDA compliant as part of the proposal (as outlined in the modification to the design in Section 3 and in CoA 39).</p> <p>In addition, TfNSW would consult with Council during the Council Ashfield Town Centre upgrade project (as part of the Public Domain Strategy for Ashfield Town Centre) which outlines improvements to pedestrian safety and amenity of crossings and footpaths between the Commuter Car Park and Ashfield Station.</p> <p>A Road Safety Audit would also be undertaken as part of the detailed design process and on completion of construction and would ensure adequate pedestrian safety at the driveway entrance to the car park (refer to CoA 31).</p> |
| 2.5 | ASH19, ASH20 | Allow for 10 dedicated motorcycle/scooter parking spaces (the equivalent of two normal car parking spaces). | As a result of these submissions, the design changes outlined in Section 3, have included at least 10 dedicated motorcycle/scooter parking space as part of the design. |

| No. | Submission no. | Issue/s raised | TfNSW response |
|----------|----------------|--|--|
| 3 | Noise | | |
| 3.1 | ASH2, ASH8 | The Proposed Activity would increase noise emissions as the Proposed car park is very close to existing apartment buildings. | <p>A <i>Noise and Vibration Impact Assessment</i> (NVIA) was undertaken as part of the REF, and updated as a result of the design modifications (refer to Section 3.2 and Appendix D).</p> <p>Construction works are likely to result in some noise impacts which would most likely occur during standard hours of construction (Monday to Friday 7.00am to 6.00pm, Saturday 8.00am to 1.00pm, and no work on Sundays or public holidays). Noise levels are expected to be managed in accordance with a <i>Construction Noise and Vibration Management Plan</i> in accordance with the <i>TfNSW Construction Noise Strategy (2012)</i>, which would seek to ensure that predicted noise levels are maintained where practicable.</p> <p>The amendments to the design and further detailed analysis of operational noise emissions show a reduction in operational noise levels compared with what was assessed in the REF. The resultant noise levels are predicted to comply with the relevant NSW noise policy and guidelines.</p> <p>Design considerations such as façade treatment, car park boundary walls and/or low noise surface coatings to reduce noise impacts would be considered during detailed design to assist in further reducing operational noise for surrounding stakeholders.</p> <p>An <i>Operational Noise and Vibration Management Plan</i> and operational noise compliance monitoring would be undertaken for the Proposed Activity (refer to CoA 37 and 38, respectively)</p> |

| No. | Submission no. | Issue/s raised | TfNSW response |
|----------|----------------|---|--|
| 4 | Traffic | | |
| 4.1 | ASH9, ASH21 | <p>Traffic is already congested at corner of Brown Street and Liverpool Road.</p> <p>Traffic volumes are frequently so large that there is gridlock and very long waits.</p> <p>The road is not wide enough for two buses to park side-by-side. Could the road be widened or redesigned to manage this?</p> | <p>A <i>Traffic and Transport Impact Assessment</i> (TTIA) was undertaken as part of the REF. The TTIA identified that the traffic generated during construction is expected to increase in the short term during construction however the impact would be minimal.</p> <p>During operation the TTIA identified that the traffic would be relocated from the current use of on-street parking in the surrounding streets to the new car park which would result in a minor impact to AM peak hour traffic.</p> <p>Council is responsible for local road management regarding bus parking along Brown Street. This issue will be raised with Council for consideration.</p> |
| 5 | Visual | | |
| 5.1 | ASH2, ASH8 | <p>The Proposed Activity would block views from existing apartment buildings and have additional lighting impacts.</p> | <p>A <i>Visual Impact Assessment</i> (VIA) was undertaken as part of the REF, and updated based on the design modifications (refer to Section 3.2 and Appendix C).</p> <p>The Ground level to Level 3 of the closest Capri Apartment Building was assessed as having a moderate impact as a result of the Proposed Activity. Level 4 and above would have a moderate to low visual impact as a result of the Proposed Activity.</p> <p>Mitigation measures to reduce the visual impacts such as façade treatments and reducing the physical bulk of the design would be considered in the design process.</p> <p>Key stakeholders would be consulted during the detailed design phase and the design will be submitted to TfNSW's Urban Design and Sustainability Review Panel at various stages for comment before being accepted by TfNSW.</p> <p>An <i>Urban Design Plan</i> (UDP) and <i>Public Domain Plan</i> (PDP) (refer to CoA 27 and 28, respectively) would also be prepared, prior to finalisation of detailed design for endorsement by TfNSW.</p> <p>Lighting would be designed to address Australian Standards AS4282 <i>Control of the Obtrusive Effects of Outdoor Lighting</i>, ensuring that all light spill is contained within the boundary limits of the car park wherever possible.</p> |

Other stakeholder submissions

Table 2 outlines issues raised by Inner West Council in their submission, along with TfNSW's response.

Table 2: Response to other stakeholder submissions received

| Issue no. | Issue/s raised | TfNSW response |
|-----------|---|---|
| 1 | Approvals | |
| 1.1 | Orchard Road is a privately owned road (other than the footpath) and the property owner would need to be consulted and their consent obtained for any temporary or permanent works proposed. | Noted. The private owner will be consulted during detailed design. |
| 2 | Design | |
| 2.1 | Provision of public toilets within the Proposed Activity under an agreement to be negotiated with TfNSW and Inner West Council. | TfNSW has been in further consultation with Council regarding this issue and an agreement has been reached that public toilets would not be included in the Proposed Activity. Council would aim to provide additional public toilets as part of the upgrade of the Ashfield Town Centre. It is also noted that accessible public toilets are also available within Ashfield Station. |
| 2.2 | Provision of additional future level for open space as agreed in negotiation with Inner West Council. | The future provision for two additional levels on the Proposed Activity has been incorporated into the design of the car park. Any additional levels would be subject to a separate planning approval process. Should these levels be built, the use of one of the additional levels for open space would be discussed with Inner West Council. |
| 2.3 | Significant pedestrian safety and accessibility issues with the location of the vehicle driveway. Council proposes that the driveway entrance be moved towards the south and that the lift and stairs be relocated to the western side of the building. | The location of the entrance driveway would be considered as part of detailed design. Design changes (refer to Section 3) have moved the stairs and lift to the western side of the car park. Safety measures for pedestrians and cyclists crossing intersections would be considered during detailed design. A Road Safety Audit would be undertaken as part of the detailed design process and on completion of construction. The audit would assess pedestrian safety at the driveway entrance to the car park (refer to CoA 31). |

| Issue no. | Issue/s raised | TfNSW response |
|-----------|---|---|
| 2.4 | Consideration that the car park is part of a public transport interchange including consideration of the area between the car park and the station. | <p>As mentioned above, the pedestrian path between the Proposed Activity and Ashfield Station would be made DDA compliant as part of the proposal (as outlined in the modification to the design in Section 3 and in CoA 39).</p> <p>TfNSW would work with Council during the Ashfield Town Centre upgrade project (as part of the Public Domain Strategy for Ashfield Town Centre) which outlines improvements to pedestrian safety and amenity of crossings and footpaths between the Commuter Car Park and Ashfield Station.</p> |
| 3 | Traffic and Transport | |
| 3.1 | Council considers the loss of parking during construction would have a significant impact on surrounding streets. | <p>There would be a temporary impact on parking within the surrounding streets during the construction of the Proposed Activity, however according to the Traffic Impact Assessment undertaken for the Proposed Activity these impacts are not considered to be significant.</p> <p>Alternative parking options to assist in offsetting the temporary loss of commuter parking during construction would be investigated in consultation with the relevant authorities.</p> |

| Issue no. | Issue/s raised | TfNSW response |
|-----------|---|---|
| 3.2 | <p>Council requests consideration be given to the following additional construction and operational traffic and transport issues including:</p> <ul style="list-style-type: none"> • carry out construction activities within the site boundaries without the needs for a work zone on a public street • cumulative impacts of other construction activities in the area • encourage construction workers to use public transport to access the site • speed of vehicles entering and exiting the car park • safety of pedestrians crossing the driveway access • appropriate treatment to delineate/demarcate the car park access from Brown Street • ensuring Road Safety Audit considers pedestrian safety and accessibility issues • consultation with owners of Orchard Crescent | <p>A <i>Construction Traffic Management Plan</i> (refer to CoA 29) would be prepared that addresses the management of the construction impacts including the issues Council has raised in this submission. It would be provided to Council as the relevant Roads Authority.</p> <p>A Road Safety Audit would be undertaken as part of the detailed design process and on completion of construction. The audit would assess pedestrian safety at the driveway entrance to the car park (refer to CoA 31).</p> |
| 4 | Urban design and visual amenity | |
| 4.1 | <p>Council notes the importance of good urban design and visual amenity including:</p> <ul style="list-style-type: none"> • both the car park and bicycle parking being open to encourage passive surveillance • functionality of links between the car park and Ashfield Station • appearance of the car park in fitting with the Ashfield town centre • consideration of waste management during operation of the car park. | <p>The detailed design would be submitted to TfNSW's Urban Design and Sustainability Review Panel at various stages for comment before being accepted by TfNSW.</p> <p>An <i>Urban Design Plan</i> (UDP) and <i>Public Domain Plan</i> (PDP) (refer to CoA 27 and 28, respectively) would also be prepared, prior to finalisation of detailed design for endorsement by TfNSW.</p> |

| Issue no. | Issue/s raised | TfNSW response |
|-----------|---|--|
| 5 | Biodiversity | |
| 5.1 | Council requests that the removal of all trees within a 1.5 metre of the site boundary in Orchard Crescent is further discussed to determine other options. | <p>23 trees and shrubs may require removal as they are within the direct impact zone (the Proposed Activity footprint).</p> <p>Additionally, three trees, which are dead, would be removed before they become a hazard to the public (these are additional to the vegetation which is required to be removed for the Proposal).</p> <p>The TfNSW <i>Vegetation Offset Guide</i> would be applied to the Proposed Activity during detailed development of the landscape plan to identify any potential to offset within the bounds of the site. Additional offset vegetation planting would be planted at an alternative site in consultation with Council.</p> <p>The current scope of the Proposed Activity does not include the removal of trees or shrubs which are rooted outside of the Proposed Activity footprint. If any vegetation impacts are likely outside of those already assessed, TfNSW would consider those in consultation with Council.</p> |
| 5.2 | Council has adopted a Street Tree Strategy which should be consulted to determine nominated species and standard planting details. | A <i>Public Domain Plan</i> (PDP) (refer to CoA 28) would form part of detailed design and would include information on landscape treatments, prepared prior to the finalisation of detailed design and in consultation with key stakeholders including Inner West Council. |
| 6 | Hydrology and stormwater | |
| 6.1 | Council notes additional hydrology and stormwater runoff measures for consideration within the design. | Council requirements for stormwater and hydrology would be investigated during detailed design in consultation with Council. |
| 7 | Cumulative impacts | |
| 7.1 | Additional cumulative impacts due to numerous residential developments and Council's upgrade of the town centre. | The potential cumulative impacts associated with the Proposed Activity would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed and implemented as appropriate in consultation with Council. |

3 Changes to the Proposed Activity

3.1 Summary of design changes

As a result of the submissions received during the public display and the need to integrate an effective design with space constraints at the Proposal site, the following design changes have been made to the Proposed Activity (refer to Table 3).

Table 3 Design changes

| Item/aspect | Original design | Updated design |
|---|--|--|
| Extent, height, layout and entrance/exit of multi-storey car park | <p>The multi-storey car park included a ground level plus two additional levels on the site of the existing at-grade car park on Brown Street, Ashfield</p> <p>Additionally, approximately 25 existing at-grade parking spaces to the east of the multi-storey car park would be retained.</p> | <p>Site restrictions including space constraints and proximity to the rail corridor posed challenges to the configuration of the car park spaces and ramps in meeting Australian Standards.</p> <p>The design of the proposed multi-storey car park has been re-configured and a number of design changes were required to meet Australian Standards.</p> <p>The updated design of the multi-storey car park includes:</p> <ul style="list-style-type: none"> • a partial third level to the multi-storey car park on the rail corridor (northern) side • an extension of two levels of the multi-storey car park to the south of the site over the existing at-grade car park • changed internal configuration of ramps, lift structures and circulation within the multi-storey car park • a split entrance and exit onto Brown Street. <p>Refer to Figure 2 for the updated design plans.</p> |

| Item/aspect | Original design | Updated design |
|--|---|---|
| Total number of car parking spaces | <p>The original design assessed in the REF included an approximate total of 260 car parking spaces, increasing the existing car park capacity by approximately 124 commuter car parking spaces</p> <p>This included retaining approximately 25 existing at-grade parking spaces to the east of the multi-storey car park.</p> | <p>Due to the re-configured design of the multi-storey car park as outlined above, the total number of car parking spaces at the Proposed Activity site would be a total of 235 spaces (including retaining approximately 20 existing at-grade parking spaces to the east of the car park).</p> <p>This is a reduction of approximately 25 car parking spaces from the number of spaces assessed in the REF.</p> <p>During detailed design, the provision of additional parking spaces above the 235 total would be investigated.</p> |
| Motorcycle parking spaces | <p>No motorcycle spaces were incorporated into the original design.</p> | <p>Two submissions identified motorcycle parking spaces as a key area which was not focused on in the original REF.</p> <p>Due to the re-configured design, at least 10 motorcycle parking spaces are now able to be incorporated into the proposed multi-storey car park.</p> |
| DDA compliant pedestrian path between the multi-storey car park and Ashfield Station | <p>The original design did not incorporate any modifications to the pedestrian path between the Proposed Activity and Ashfield Station.</p> | <p>A number of community and Council submissions called for the upgrade of the pedestrian path between Ashfield Station and the Proposed Activity.</p> <p>The Proposed Activity now includes the modification of the pedestrian path between the entrance/exit of the Proposed Activity and Ashfield station to ensure DDA compliance.</p> |

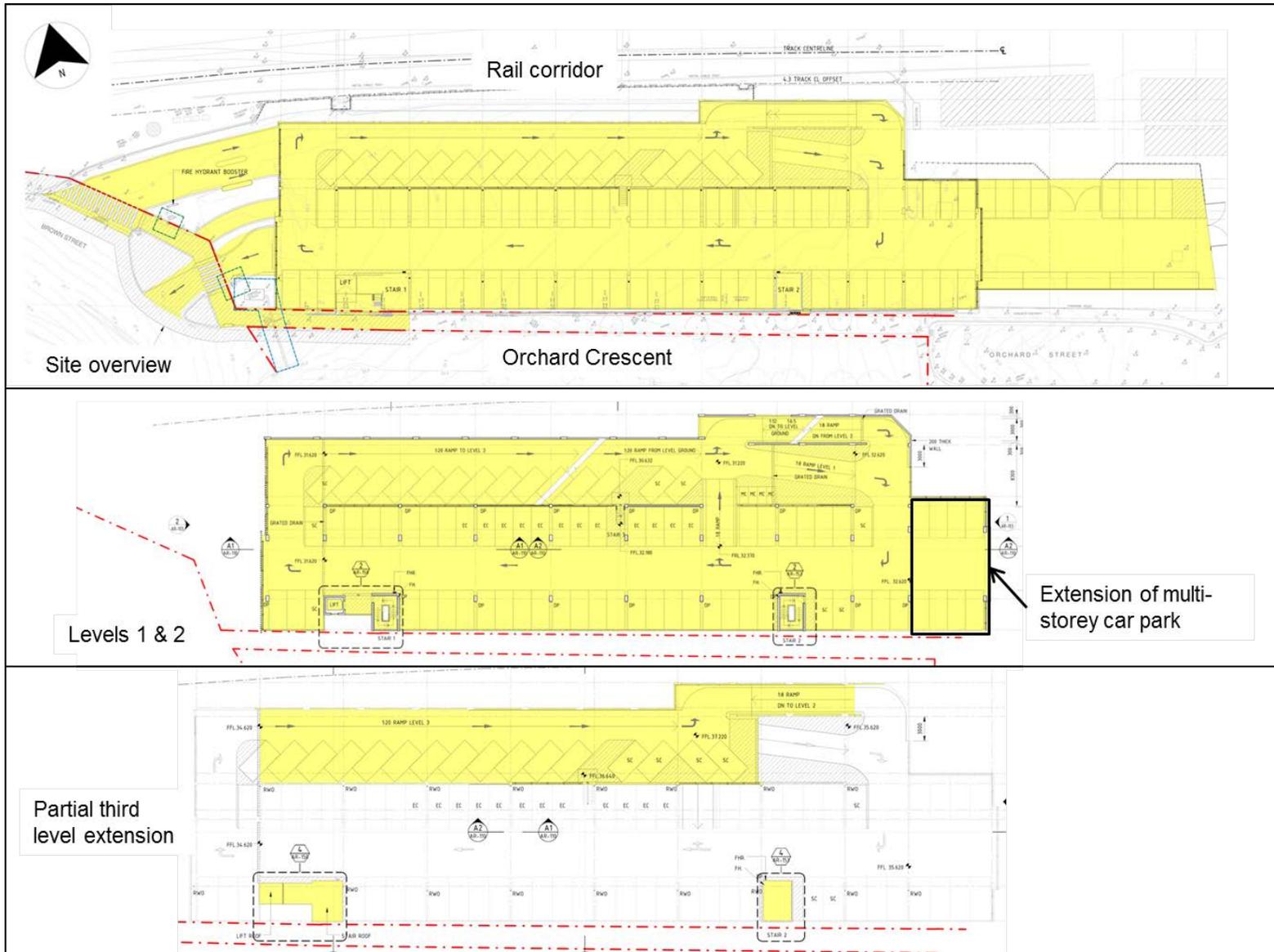


Figure 2 Updated design of Ashfield Commuter Car Park (Subject to detailed design)

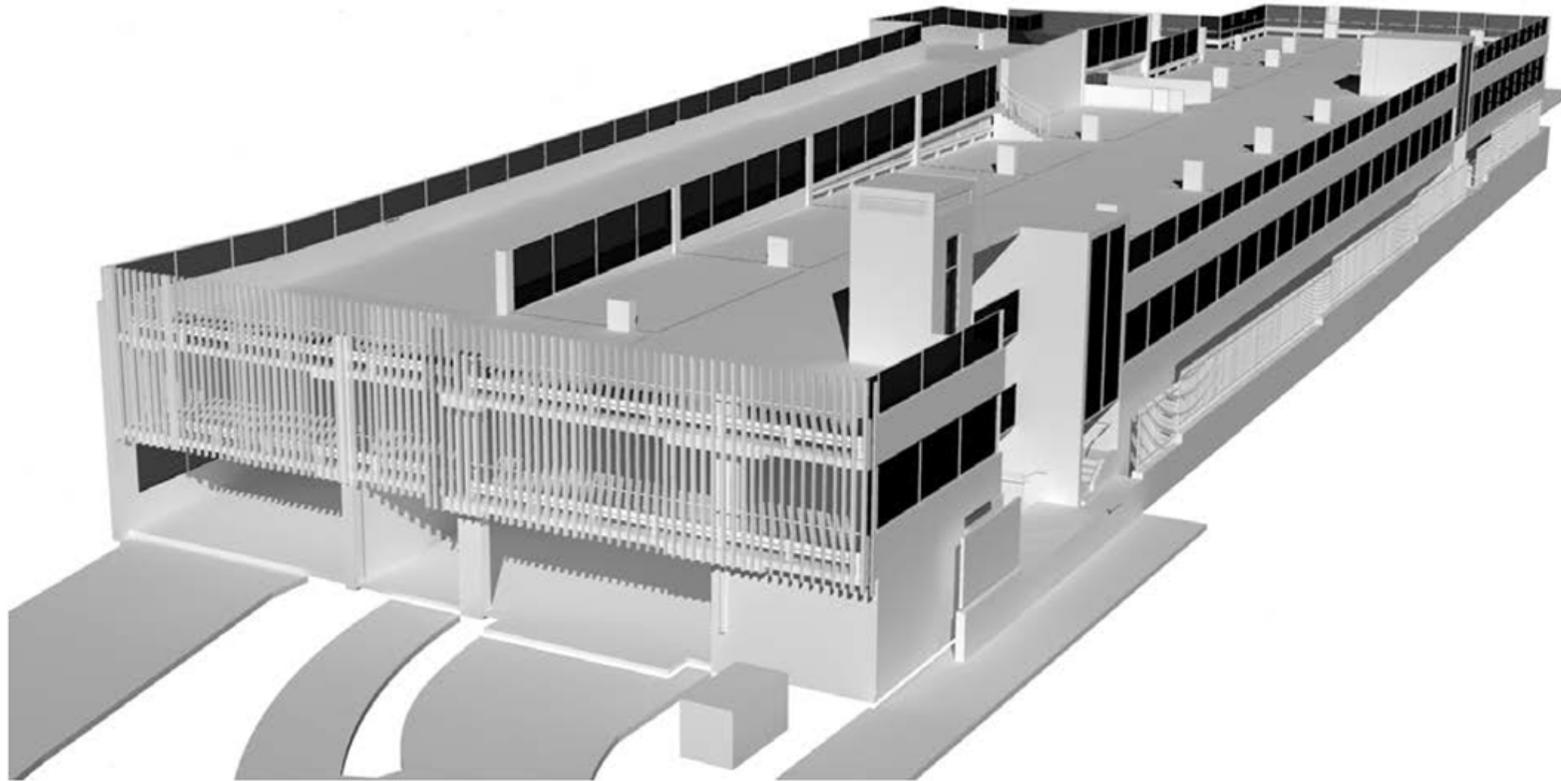


Figure 3 3D view of proposed car park (Subject to detailed design)



Figure 4 Indicative view north from Ashfield Station concourse



Figure 5 Indicative view south from Ashfield Public School entry

3.2 Assessment of design changes

The following section assesses the design changes outlined in Table 3. The four main design changes are assessed individually below.

1. Extent, height, layout and entrance/exit of multi-storey car park

Site restrictions including space constraints and proximity to the rail corridor have posed challenges to the configuration of the car park spaces and ramps in meeting Australian Standards. As such, the design required further review and a number of changes to the extent and layout of the Proposed Activity are now required as a result.

Figure 2 and Figure 3 details the updated design of the multi-storey car park including:

- a partial third level addition to the multi-storey car park on the rail corridor side
- an extension of two levels of the multi-storey car park to the east of the site over the existing at-grade car park
- changed internal configuration of ramps, lift structures and circulation within the multi-storey car park
- a split entrance and exit onto Brown Street.

A review of the updated design identified that potential visual amenity and operational noise impacts to surrounding stakeholders would require further assessment. All other environmental aspects would remain unchanged and therefore the remainder of the environmental impact assessments undertaken as part of the REF (February 2017) would still apply to the updated design. Although the updated design outlines additional changes, there would be negligible environmental impacts including on construction and operational traffic, construction noise and biodiversity.

The following sections outline the results of the updated visual impact assessment and operational noise impact assessment.

Updated Visual Impact Assessment

An updated Visual Impact Assessment (VIA) report (RPS, 2017b) was undertaken for the updated design of the Proposed Activity (refer to Appendix C).

The updated design of the Proposed Activity would not result in the car park being significantly higher, or significantly larger in scale nor radically different in architectural aesthetic. As such, the updated VIA identified that the proposed design amendments to the car park would have the same mix of primarily local visual impacts ranging from Moderate to Low depending on receiver type and location, as per the original design.

As per the original VIA, the Proposed Activity will further contribute to an increasing urban character of the Ashfield commercial and transport precinct. However its use as a car park and its bulk and scale are generally compatible within an area of mixed uses and an urban, inner city character.

Table 4 outlines the operational visual impact assessment for the viewpoints identified in Figure 6. The visual impact assessment in Table 4 represents the overall Proposed Activity, inclusive of the updated design extent.

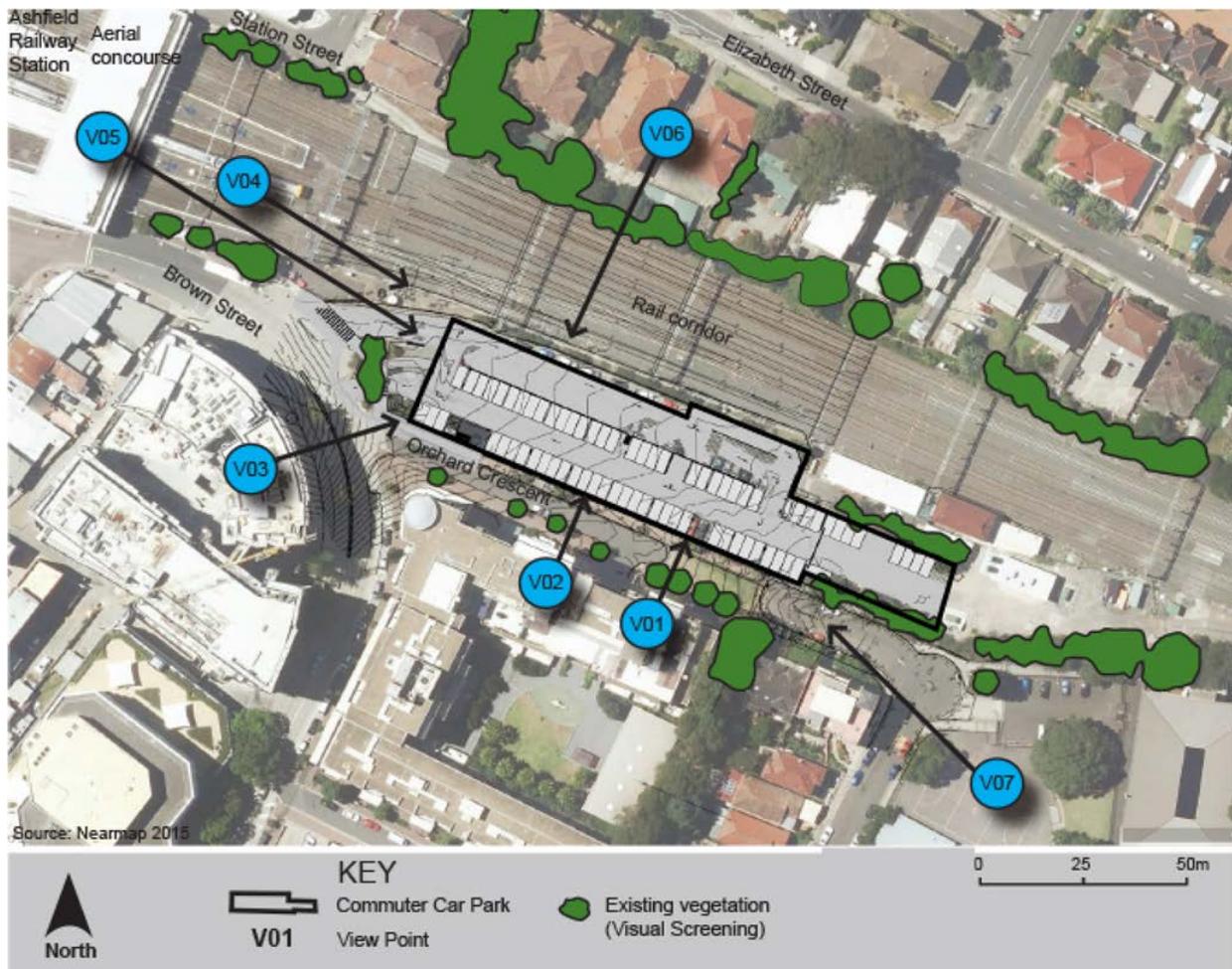


Figure 6 Representative viewpoints

Table 4 Visual impact assessment

| Viewpoint | Summary of visual impact assessment | Overall visual impact |
|--|--|-----------------------|
| V01 Capri Apartments Ground level to level three | The most considerable visual impact would be on the ground, first and second floor dwellings of the Capri development to the south. Visual receivers have been assessed as being of a Moderate rating as visual receivers are residents with potentially long term views of the southern facade of the Proposal. Although the existing visual environment is not of high aesthetic value due to its views of the car park and rail corridor, the Proposed Activity will introduce a large, new visual element in the view, curtailing wider views of areas to the north. If possible, existing trees would be retained to help screen the structure. | Moderate |
| V02 Capri Apartments Levels four and above | Views from upper level apartments in the Capri are expected to have Moderate-Low visual impacts as views of the wider landscape are generally maintained and the type, scale and appearance of the Proposed Activity is generally concordant with existing views of an urban area. | Moderate-low |

| Viewpoint | Summary of visual impact assessment | Overall visual impact |
|---|--|-----------------------|
| V03 Station 2a Residences and ground level commercial units | A moderate visual impact rating would occur at both upper level residences and at ground level commercial spaces. Although employees of the office space will view the proposal intermittently and are relatively unaffected, greater visual receivers are residents with potentially long term views of the southern-western corner of the Proposed Activity. | Moderate |
| V04 & V05 Train Station platform | Low visual impact ratings will occur at the Ashfield train station where visual receivers are temporary. Views from the aerial concourse are considered to be of a low aesthetic value as they consist of strong urban elements such as the rail corridor and gantries in the foreground and large, residential development in the background. | Low |
| V06 Elizabeth Street (Southern side) | Visual receivers in properties along the southern side of Elizabeth Street are assessed as being Moderate-Low. Existing views are of an urban setting that includes the existing car park, rail corridor, trains, station, eight storey buildings, roads and landscape. Although the Proposed Activity replaces an existing car park with the same use, the new car park will introduce a more prominent visual element in the view. | Moderate-low |
| V07 Ashfield Public School entry and grounds | A Low visual impact rating is attributed to the Ashfield Public School entry as the school currently has little visual connection with the car park site and visual receivers are only temporary. If possible, existing trees would be retained to help screen the structure. Moreover, there is larger scale development in closer proximity to the school. | Low |

Overshadowing analysis was also updated as a result of the updated design to determine the extent to which the Proposed Activity would affect neighbouring buildings and structures in terms of the distance and direction of the shadow it casts. Shadow analysis has been addressed for both summer and winter solstice, and also in the Spring Equinox, to provide a thorough interpretation.

Although the design changes to the Proposed Activity have resulted in the structure being taller by approximately 1.4 metres in places, the overshadowing of the proposed car park would remain unchanged. The additional height from the partial third level is located on the northern side adjacent to the rail corridor and therefore would not create any additional overshadowing on surrounding development. The results of the shadow analysis for the updated design remain unchanged:

- March: no notable impact on surrounding development
- June: Minimal to moderate impact on the Capri Apartments. Most notable is at 9am where the car park would cast a shadow onto the north face of the building
- December: no notable impact on surrounding development.

As per the original recommendations, any visual impacts would be managed by the implementation of mitigation measures such as utilising finishes and materials complementary to the locality and retention of all possible existing trees to help screen the structure.

Updated Operational Noise Assessment

An updated Operational Noise Impact Assessment (NIA) report (ERM, 2017b) was undertaken for the updated design of the Proposed Activity (refer to Appendix D).

Existing ambient and background noise levels were quantified in the area and noise design goals were developed in accordance with recognised NSW policy and guidelines.

A quantitative operational noise impact assessment was conducted by predicting noise levels via modelling against applicable assessment scenarios. The predictions were conducted for applicable assessment scenarios and incorporated relevant technical data. Resultant noise levels were then compared to project-specific criteria at each receptor location.

The updated operational noise impact assessment identifies the following (locations of the receptors are outlined in Appendix D):

- The highest predicted $L_{Aeq, 15\text{minute}}$ noise level (general operational usage) is 40 dBA. This noise level is predicted at the nearest sensitive receptor (NCA04_a) directly south of the Proposed Activity. The highest predicted $L_{A1, 1\text{minute}}$ noise level (short-term noise event) is 50 dBA. This noise level is predicted at a receptor (NCA04_b) also located to the south of the Proposed Activity
- For general operational usage, the night time NSW EPA Industrial Noise Policy (INP) noise criteria $L_{Aeq, 15\text{minute}}$ applicable at residential receptors is not exceeded at the most affected locations (NCA04_a and NCA04_b). Predicted general operational noise levels are below the INP noise design goals during all periods (i.e. daytime, evening, night time and the morning shoulder) at all receptors.
- For short-term noise events, the night time short-term noise event INP criteria $L_{A1, 1\text{minute}}$ applicable at residential receptors is not exceeded at the most affected locations (NCA04_a and NCA04_b) during the night time or the morning shoulder periods.
- Predicted short-term noise event levels are below the applicable INP criteria during all periods (ie night time and the morning shoulder) at all residential receptors. The short-term noise event INP criteria do not apply to other sensitive receptors (i.e. commercial properties, schools and childcare centres).

Predicted operational noise levels have been reduced (compared to that assessed in the REF) and impacts have been minimised based on the updated design. This reduction is mostly attributable to the barrier around each level constructed of pre-cast concrete that is providing shielding to some receptors. This includes the most affected receptors where some levels that exceeded criteria were identified in the REF. The lift shaft and mechanical plant room façades have also assisted in reducing overall emissions. The introduction of the partial third level of the multi-storey car park has been considered and noise emissions have not significantly increased as a result, as per the above calculations.

These findings indicate that based on the current design, all operational noise levels associated with the Proposed Activity are below the applicable INP noise design goals for all receptors, during all times of day and assessment periods.

Based on the findings of the REF and updated noise assessment, suitable noise and vibration mitigation and management measures would be implemented to ensure impacts to the community remain compliant with INP noise design goals.

2. Number of car parking spaces

Due to the re-configured design of the multi-storey car park, the total number of car parking spaces at the Proposal site would be a total of approximately 235 car parking spaces. This is a reduction of approximately 25 car parking spaces from the number of spaces assessed in the REF. The reduction in car parking spaces is due to the need to integrate an effective design

with space constraints at the Proposal site including the proximity to the rail corridor and the configuration required to meet Australian Standards for car parking spaces and ramps.

The Proposed Activity presents an overall increase from the existing commuter car parking spaces in close proximity to Ashfield Station by approximately 99 commuter car parking spaces. The traffic impact was assessed in the original REF for the Proposed Activity and it was predicted to result in a minor impact to AM and PM peak hour traffic. There would be no change in traffic impacts assessed as part of the REF as a result of the reduction of car parking spaces or the change in design layout.

The provision of additional parking spaces above the 234 total would be investigated during detailed design. If additional parking spaces were provided, operational noise impacts would be assessed based on the actual number of parking spaces provided.

3. Motorcycle parking spaces

No motorcycle parking spaces were provided in the original design. Motorcycle parking spaces were requested in two community submissions (ASH19, ASH20). The updated design has utilised available space suitable for motorcycle parking to ensure at least 10 spaces would be provided throughout the proposed multi-storey car park.

The provision of dedicated spaces for motorcycles and scooters to park as part of the Proposed Activity is not anticipated to have an impact on the surrounding traffic. As such, this provision of motorcycle parking spaces is a positive improvement to the proposed Ashfield Commuter Car Park.

4. DDA compliant pedestrian path

The modification of the pedestrian path between Ashfield Station and the Proposed Activity was not included in the original design as assessed in the REF. A number of community and Council submissions (ASH5, ASH16, ASH21) called for the upgrade of the pedestrian path between Ashfield Station and the Proposed Activity. The Proposed Activity now includes the modification of the pedestrian path between the entrance/exit of the Proposed Activity and Ashfield station to ensure DDA compliance.

In addition, Inner West Council plans in 2017 to upgrade the Ashfield Town Centre (as part of the Public Domain Strategy) including improvements to pedestrian safety and amenity of crossings and footpaths between the Commuter Car Park and Ashfield Station.

Works would be undertaken on the pedestrian path which would require temporary disturbances to the pedestrian pathway during the construction timeframe. This impact would be minor and temporary in nature and, once completed, would provide a positive outcome for access between the Proposed Activity and Ashfield Station.

3.3 Consultation regarding revised design

As a result of the design changes outlined above, additional consultation has been undertaken to ensure the community are informed about the proposed changes. Targeted consultation included:

- newsletter outlining the updated design was distributed to the surrounding community (as per the circulation for the original REF) as well as all community members who submitted a submission on the original REF proposal
- a specific letter and door knocking for Orchard Gardens apartments on Orchard Crescent.

There were no further questions or issues raised as a result of this targeted consultation. The residents did not raise any concerns regarding the construction or operation of the Proposed Activity.

3.4 Future consultation

Should TfNSW proceed with the Proposed Activity, consultation activities would continue, including consultation with Inner West Council regarding design development. In addition TfNSW would notify residents, businesses and community members in the lead up to and during construction. The consultation activities would help to ensure that:

- local council and other stakeholders have an opportunity to provide feedback on the detailed design
- the community and stakeholders are notified in advance of any upcoming works, including changes to pedestrian or traffic access arrangements and out of hours construction activities
- accurate and accessible information is made available
- a timely response is given to issues and concerns raised by the community
- feedback from the community is encouraged.

The [TfNSW email address](mailto:projects@transport.nsw.gov.au)³ and TfNSW Infoline (1800 684 490) would continue to be available during the construction phase. Targeted consultation methods, such as use of letters, notifications, signage and door knocks, would continue to occur. The [TfNSW website](http://www.transport.nsw.gov.au/projects-tap)⁴ would also include updates on the progress of construction.

³ projects@transport.nsw.gov.au

⁴ <http://www.transport.nsw.gov.au/projects-tap>

4 Consideration of the environmental impacts

Environmental Planning and Assessment Act 1979

The REF addresses the requirements of section 111 of the EP&A Act. In considering the Proposed Activity (including the proposed modifications), all matters affecting or likely to affect the environment are addressed in the REF and the Determination Report and associated documentation.

In accordance with the checklist of matters pursuant to clause 228(3) of the EP&A Regulation, an assessment is provided in Chapter 6 and Appendix B of the REF. A review of the clause 228 checklist was undertaken to consider the impacts of the design modifications, however no changes were required.

In respect of the Proposed Activity (including the proposed modifications) an assessment has been carried out regarding potential impacts on critical habitat, threatened species, populations or ecological communities or their habitats, under section 112 of the EP&A Act.

The likely significance of the environmental impacts of the Proposed Activity (including the proposed modifications) has been assessed in accordance with the then NSW Department of Planning's 1995 best practice guideline [*Is an EIS Required?*](#)⁵ It is concluded that the Proposed Activity is not likely to significantly affect the environment (including critical habitat) or threatened species, populations of ecological communities, or their habitats. Accordingly, an environmental impact statement under Part 5.1 of the EP&A Act is not required.

Environment Protection and Biodiversity Conservation Act 1999

As part of the consideration of the Proposed Activity, all matters of national environmental significance (NES) and any impacts on Commonwealth land for the purposes of the EPBC Act have been assessed. In relation to NES matters, this evaluation has been undertaken in accordance with Commonwealth Administrative Guidelines on determining whether an action has, would have, or is likely to have a significant impact. A summary of the evaluation is provided in Chapter 6 and Appendix A of the REF.

It is considered that the Proposed Activity described in the REF is not likely to have a significant impact on any Commonwealth land and is not likely to have a significant impact on any matters of NES.

⁵ Refer to the National Library of Australia's 'Trove' website
<http://trove.nla.gov.au/work/7003034?selectedversion=NBD11474648>

5 Conditions of Approval

If approved, the Proposed Activity would proceed subject to the Conditions of Approval included in Appendix B.

6 Conclusion

Having regard to the assessment in the REF and consideration of the submissions received, it can be concluded that the Proposed Activity (including the proposed modifications) is not likely to significantly affect the environment (including critical habitat) or threatened species, populations of ecological communities, or their habitats. Consequently, an environmental impact statement is not required to be prepared under Part 5.1 of the EP&A Act.

It is also considered that the Proposed Activity does not trigger any approvals under Part 3 of the EPBC Act.

The environmental impact assessment (REF and Determination Report) is recommended to be approved subject to the proposed mitigation and environmental management measures included in the Conditions of Approval (refer Appendix B).

References

Ashfield Council, 2014, Ashfield Town Centre Renewal – Public Domain Strategy, http://www.ashfield.nsw.gov.au/files/planning_and_devlopment/ashfield_tc_renewal_part_1.pdf

Ashfield Municipal Council, 1995, Stormwater Management Code, <http://www.ashfield.nsw.gov.au/files/dcps/6. Stormwater Management Code.pdf>

Transport for NSW, 2017, Ashfield Commuter Car Park Review of Environmental Factors, February 2017

Appendix A Review of Environmental Factors

Please refer to the TfNSW website to access the Ashfield Commuter Car Park REF:

<https://www.transport.nsw.gov.au/projects/tap/current-works/ashfield>

Appendix B Conditions of Approval

CONDITIONS OF APPROVAL

For Ashfield Commuter Car Park

Note: these conditions of approval must be read in conjunction with the final mitigation measures in the Ashfield Commuter Car Park Review of Environmental Factors.

Schedule of acronyms and definitions used:

| Acronym | Definition |
|---------------------|--|
| CEMP | Construction Environmental Management Plan |
| CIR | Contamination Investigation Report |
| CLP | Community Liaison Plan |
| CMP | Contamination Management Plan |
| CoA | Condition of Approval |
| dBA | Decibels (A-weighted scale) |
| ECM | Environmental Controls Map |
| EIA | Environmental Impact Assessment |
| EPA | NSW Environment Protection Authority |
| EP&A Act | <i>Environmental Planning and Assessment Act 1979</i> |
| EPL | Environment Protection Licence issued by the Environment Protection Authority under the <i>Protection of the Environment Operations Act 1997</i> . |
| EMS | Environmental Management System |
| ICNG | <i>Interim Construction Noise Guidelines</i> (Department of Environment and Climate Change, 2009) |
| INP | <i>NSW Industrial Noise Policy</i> (EPA, 2000) |
| ISO | International Standards Organisation |
| OEH | NSW Office of Environment and Heritage |
| ONVMP | Operational Noise and Vibration Management Plan |
| OOHWP | Out of Hours Works Protocol |
| PCSR | Pre-Construction Sustainability Report |
| PDP | Public Domain Plan |
| PECM | Pre-Construction Environmental Compliance Matrix |
| POCR | Pre-Operational Compliance Report |
| PMEIA | Principal Manager Environmental Impact Assessment (or nominated delegate) |

| Acronym | Definition |
|---------------------------|--|
| PMEM | TfNSW Principal Manager Environmental Management (or nominated delegate) |
| PMS | TfNSW Principal Manager Sustainability (or nominated delegate) |
| RAP | Remedial Action Plan |
| RBL | Rating Background Level |
| REF | Review of Environmental Factors |
| RING | <i>Rail Infrastructure Noise Guideline</i> (EPA, 2013) |
| RNP | <i>NSW Road Noise Policy</i> (Department of Environmental, Climate Change and Water, 2011) |
| Roads and Maritime | NSW Roads and Maritime Service |
| TfNSW | Transport for NSW |
| TMP | Traffic Management Plan |
| UDP | Urban Design Plan |

Schedule of terms and definitions used:

| Term | Definition |
|--|---|
| Construction | Includes all work in respect of the Project, other than survey, acquisitions, fencing, investigative drilling or excavation, building/road dilapidation surveys, or other activities determined by the TfNSW PMEM to have minimal environmental impact such as minor access roads, minor adjustments to services/utilities, establishing temporary construction compounds (in accordance with this approval), or minor clearing (except where threatened species, populations or ecological communities would be affected). |
| Contamination | The presence in, on or under land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment. |
| Designated Works | Includes tunnelling, blasting, piling, excavation or bulk fill or any vibratory impact works including jack hammering and compaction, for Construction. |
| Emergency Work | Includes works to avoid loss of life, damage to external property, utilities and infrastructure, prevent immediate harm to the environment, contamination of land or damage to a heritage (indigenous or non-indigenous) item. |
| Environmental Impact Assessment (EIA) | The documents listed in Condition 1 of this approval. |
| Feasible | A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements. |
| Noise Sensitive Receiver | In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios, places of worship/religious facilities (e.g. churches), and other noise sensitive receivers identified in the environmental impact assessment. |
| Project | The construction and operation of the Ashfield Commuter Car Park as described in the Environmental Impact Assessment. |
| Proponent | A person or body proposing to carry out an activity under Part 5 of the EP&A Act – in the case of the Project, Transport for NSW. |
| Reasonable | Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure. |

**CoA
number**

Type

General

-
- 1** **Terms of Approval**
- The Project shall be carried out generally in accordance with the environmental impact assessment (EIA) for this Project, which comprises the following documents:
- a) *Ashfield Commuter Car Park – Review of Environmental Factors*, (TfNSW, February 2017)
 - b) *Ashfield Commuter Car Park – Determination Report*, (TfNSW, April 2017).
- In the event of an inconsistency between these conditions and the EIA, these conditions would prevail to the extent of the inconsistency.
-
- 2** **Project Modifications**
- Any modification to the Project as approved in the EIA would be subject to further assessment. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised. The assessment shall be subject to approval under delegated authority by TfNSW. The Proponent shall comply with any additional requirements from the assessment of the Project modification.
-
- 3** **Statutory Requirements**
- These conditions do not relieve the Proponent of the obligation to obtain all other licences, permits, approvals and land owner consents from all relevant authorities and land owners as required under any other legislation for the Project. The Proponent shall comply with the terms and conditions of such licences, permits, approvals and permissions.
-
- 4** **Pre-Construction Environmental Compliance Matrix**
- A Pre-Construction Environmental Compliance Matrix (PECM) for the Project (or such stages of the Project as agreed to by the Principal Manager Environmental Management (PMEM)) shall be prepared detailing compliance with all relevant conditions and mitigation measures prior to commencement of construction. The PECM shall also include details of approvals, licences and permits required to be obtained under any other legislation for the Project.
- A copy of the PECM shall be submitted to the PMEM for approval, at least 21 days prior to commencement of construction of the Project (or within such time as otherwise agreed to by the PMEM).
-

5

Construction environmental compliance report

A construction environmental compliance report (CECR) for the Project shall be prepared which addresses the following matters:

- a) compliance with the construction environmental management plan (CEMP), mitigation measures and these conditions
- b) compliance with TfNSW's NSW Sustainable Design Guidelines - Version 3.0 compliance checklist (7TP-FT-249)
- c) compliance with any approvals or licences issued by relevant authorities for construction of the Project
- d) implementation and effectiveness of environmental controls (the assessment of effectiveness should be based on a comparison of actual impacts against performance criteria identified in the CEMP)
- e) environmental monitoring results, presented as a results summary and analysis
- f) details of the percentage of waste diverted from landfill and the percentage of spoil beneficially reused
- g) number and details of any complaints, including summary of main areas of complaint, actions taken, responses given and intended strategies to reduce recurring complaints (subject to privacy protection)
- h) details of any review and amendments to the CEMP resulting from construction during the reporting period
- i) any other matter as requested by the PMEM.

A copy of each CECR shall be submitted to the PMEM for approval. The first CECR shall report on the first six months of construction and be submitted within 21 days of expiry of that period (or at any other time interval agreed to by the PMEM). CECRs shall be submitted no later than six months after the date of submission of the preceding CECR (or at other such periods as requested by the PMEM) for the duration of construction.

6

Pre-operation compliance report

A pre-operation compliance report (POCR) for the Project shall be prepared, prior to commencement of operation of the Project. The POCR shall detail compliance with all conditions of approval, licences and permits required to be obtained under any other legislation for the Project.

A copy of the POCR shall be submitted to the PMEM for approval at least one month prior to the scheduled operation of the Project (or such time as otherwise agreed to by the PMEM).

Communications**7****Community Liaison Plan**

A Community Liaison Plan (CLP) shall be prepared and implemented to engage with government agencies, relevant councils, landowners, community members and other relevant stakeholders (such as utility and service providers, bus companies and businesses). The CLP shall comply with the obligations of these conditions and should include, but not necessarily be limited to:

- a) details of the protocols and procedures for disseminating information and liaising with the community and other key stakeholders about construction activities (including timing and staging) and any associated impacts during the construction period
- b) stakeholder and issues identification and analysis
- c) procedures for dealing with complaints or disputes and response requirements, including advertising the 24 hour construction response line number
- d) details (including a program) of training for all employees, contractors and sub-contractors on the requirements of the CLP.

The CLP shall be prepared to the satisfaction of the Director Community Engagement (or delegate) prior to the commencement of construction and implemented, reviewed and revised as appropriate during construction of the Project.

8**Community Notification and Liaison**

The local community shall be advised of any activities related to the Project with the potential to impact upon them.

Prior to any site activities commencing and throughout the Project duration, the community is to be notified of works to be undertaken, the estimated hours of construction and details of how further information can be obtained (i.e. contact telephone number/email, website, newsletters etc.) including the 24 hour construction response line number.

Construction-specific impacts including information on traffic changes, access changes, detours, services disruptions, public transport changes, high noise generating work activities and work required outside the nominated working hours shall be advised to the local community at least seven days prior to such works being undertaken or other period as agreed to by the Director Community Engagement (or delegate) or as required by the Environment Protection Authority (EPA) (where an Environment Protection Licence (EPL) is in effect).

9**Website**

The Proponent shall provide electronic information (or details of where hard copies of this information may be accessed by members of the public) related to the Project, on dedicated pages within its existing website, including:

- a) a copy of the documents referred to under Condition 1 of this approval
- b) a list of environmental management reports that are publicly available
- c) 24 hour contact telephone number for information and complaints.

All documents uploaded to the website must be compliant with the Web Content Accessibility Guidelines 2.0.

**CoA
number**

Type

10

Complaints Management

The Proponent shall set up a 24 hour construction response line number.

Details of all complaints received during construction are to be recorded on a complaints register. A verbal response to complaints received by phone on what action is proposed to be undertaken is to be provided to the complainant within two hours (unless the complainant agrees otherwise). A verbal response to written complaints (email/letter) should be provided within 48 hours of receipt of the communication. A detailed written response is to be provided to the complainant within seven calendar days for verbal and/or written complaints.

Information on all complaints received during the previous 24 hours shall be forwarded to the TfNSW Community Engagement Manager and the TfNSW Environment and Planning Manager each working day.

Environmental Management**11****Construction Environmental Management Plan**

A Construction Environmental Management Plan (CEMP) shall be prepared prior to commencement of construction which addresses the following matters, as a minimum:

- a) traffic and pedestrian management (in consultation with the relevant roads authority)
- b) noise and vibration management
- c) water and soil management
- d) air quality management (including dust suppression)
- e) indigenous and non-indigenous heritage management
- f) flora and fauna management
- g) storage and use of hazardous materials
- h) contaminated land management (including acid sulphate soils)
- i) weed management
- j) waste management
- k) sustainability
- l) environmental incident reporting and management procedures
- m) non-compliance and corrective/preventative action procedures.

The CEMP shall:

- i) comply with the Conditions of Approval, conditions of any licences, permits or other approvals issued by government authorities for the Project, all relevant legislation and regulations, and accepted best practice management
- ii) comply with the relevant requirements of *Guideline for Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004)
- iii) include an Environmental Policy.

The Proponent shall:

1. consult with relevant government agencies and relevant service/utility providers as part of the preparation of the CEMP
2. submit a copy of the CEMP to the PMEM for approval at least 21 days prior to the commencement of construction (or within such time as otherwise agreed to by the PMEM)
3. review and update the CEMP at regular intervals, and in response to any actions identified as part of Project audits
4. ensure updates to the CEMP are made within seven days of the completion of the review or receipt of actions identified by any audit of the document, and be submitted to the PMEM for approval.

The CEMP must be approved by the PMEM prior to the commencement of construction work associated with the Project.

12**Environmental Management Representative**

Not applicable.

13

Environmental Controls Map

An Environmental Controls Map (ECM) shall be prepared in accordance with TfNSW's *Guide to Environmental Controls Map* (3TP-SD-015) prior to the commencement of construction for implementation for the duration of construction, and may be prepared in stages as set out in the CEMP.

A copy of the ECM must be submitted to the PMEM for approval, at least 21 days prior to commencement of construction of the Project (or within such time as otherwise agreed by the PMEM).

The ECM shall be prepared as a map – suitably enlarged (e.g. A3 size or larger) for mounting on the wall of a site office and included in site inductions, supported by relevant written information.

Updates to the ECM shall be made within seven days of the completion of the review or receipt of actions identified by any audit of the document, and submitted to the PMEM for approval.

Hours of Work

14

Standard Construction Hours

Construction activities shall be restricted to the hours of 7.00am to 6.00pm (Monday to Friday); 8.00am to 1.00pm (Saturday) and at no time on Sundays and public holidays except for the following works which are permitted outside these standard hours:

- a) any works which do not cause noise emissions to be more than 5 dBA higher than rating background level (RBL) at any nearby residential property and/or other noise sensitive receivers subject to approval by the PMEM
- b) out of hours work identified and assessed in the EIA or the approved Out of Hours Work Protocol (OOHWP)
- c) the delivery of plant, equipment and materials which is required outside these hours as requested by police or other authorities for safety reasons and with suitable notification to the community as agreed by the PMEM
- d) Emergency Work to avoid the loss of lives, property and/or to prevent environmental harm
- e) any other work as agreed by the PMEM (or nominated delegate) and considered essential to the Project, or as approved by the EPA (where an EPL is in effect).

15

High Noise Generating Activities

Rock breaking or hammering, jack hammering, pile driving, vibratory rolling, cutting of pavement, concrete or steel and any other activities which result in impulsive or tonal noise generation shall not be undertaken for more than three hours, without a minimum one hour respite period unless otherwise agreed to by the PMEM (or nominated delegate), or as approved by the EPA (where relevant to the issuing of an EPL).

Noise and Vibration

16

Construction Noise and Vibration

Construction noise and vibration mitigation measures shall be implemented through the CEMP, in accordance with TfNSW's *Construction Noise Strategy (7TP-ST-157)* and the EPA's *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009). The mitigation measures shall include, but not be limited to:

- a) details of construction activities and an indicative schedule for construction works
- b) identification of construction activities that have the potential to generate noise and/or vibration impacts on surrounding land uses, particularly sensitive noise receivers
- c) detail what reasonable and feasible actions and measures shall be implemented to minimise noise impacts (including those identified in the EIA)
- d) procedures for notifying sensitive receivers of construction activities that are likely to affect their noise and vibration amenity, as well as procedures for dealing with and responding to noise complaints
- e) an Out Of Hours Work Protocol (OOHWP) for the assessment, management and approval of works outside the standard construction hours identified in Condition 13 of this approval, including a risk assessment process which deems the out of hours activities to be of low, medium or high environmental risk, is to be developed. All out of hours works are subject to approval by the PMEM, or as approved by the EPA (where relevant to the issuing of an EPL). The OOHWP should be consistent with TfNSW's *Construction Noise Strategy (7TP-ST-157)*
- f) a description of how the effectiveness of actions and measures shall be monitored during the proposed works, clearly indicating the frequency of monitoring, the locations at which monitoring shall take place, recording and reporting of monitoring results and if any exceedance is detected, the manner in which any non-compliance shall be rectified.

17

Vibration Criteria

Vibration (other than from blasting) resulting from construction and received at any structure outside of the Project shall be limited to:

- a) for structural damage vibration – German Standard DIN 4150:Part 3 – 1999: *Structural Vibration in Buildings: Effects on Structures* and British Standard BS 7385-2:1993 *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*
- b) for human exposure to vibration – the acceptable vibration values set out in the *Environmental Noise Management Assessing Vibration: A Technical Guideline* (Department of Environment and Conservation, 2006) which includes British Standard BS 7385-2:1993 *Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz to 80 Hz)*.

These limits apply unless otherwise approved by the PMEM through the CEMP.

18

Non-Tonal Reversing Beepers

Non-tonal reversing beepers (or an equivalent mechanism) shall be fitted and used on all construction vehicles and mobile plant regularly used on site (i.e. greater than one day) and for any out of hours work.

19

Piling

Wherever practical, piling activities shall be completed using non-percussive piles. If percussive piles are proposed to be used, approval of the PMEM shall be obtained prior to commencement of piling activities.

Contamination and Hazardous Materials

20

Unidentified Contamination (other than asbestos)

If previously unidentified contamination (excluding asbestos) is discovered during construction, work in the affected area must cease immediately, and an investigation must be undertaken and a report prepared to determine the nature, extent and degree of any contamination. The level of reporting must be appropriate for the identified contamination in accordance relevant EPA guidelines, including *Guidelines for Consultants Reporting on Contaminated Sites* (OEH, 2011).

A copy of any contamination report must be submitted to the PMEM for review for a minimum period of seven days. The PMEM shall determine whether consultation with the relevant council and/or EPA is required prior to continuation of construction works within the affected area.

Note: *In circumstances where both previously unidentified asbestos contamination and other contamination are discovered within a common area, nothing in these conditions shall prevent the preparation of a single investigation report to satisfy the requirements of both Condition 19 and Condition 20.*

21

Asbestos Management

If previously unidentified asbestos contamination is discovered during construction, work in the affected area must cease immediately, and an investigation must be undertaken and a report prepared to determine the nature, extent and degree of the asbestos contamination. The level of reporting must be appropriate for the identified contamination in accordance with relevant EPA and WorkCover guidelines and include the proposed methodology for the remediation of the asbestos contamination. Remediation activities must not take place until receipt of the investigation report.

Works may only recommence upon receipt of a validation report from a suitably qualified contamination specialist that the remediation activities have been undertaken in accordance with the investigation report and remediation methodology.

Note: *In circumstances where both previously unidentified asbestos contamination and other contamination are discovered within a common area, nothing in these conditions shall prevent the preparation of a single investigation report to satisfy the requirements of both Condition 19 and Condition 20.*

22

Storage and Use of Hazardous Materials

Construction hazard and risk issues associated with the use and storage of hazardous materials shall be addressed through risk management measures, which shall be developed by the construction contractor prior to construction as part of the overall CEMP, in accordance with relevant EPA guidelines, TfNSW's *Chemical Storage and Spill Response Guidelines* (9TP-SD-066) and Australian and ISO standards. These measures shall include:

- a) the storage of hazardous materials, and refuelling/maintenance of construction plant and equipment to be undertaken in clearly marked designated areas that are designed to contain spills and leaks
- b) spill kits, appropriate for the type and volume of hazardous materials stored or in use, to be readily available and accessible to construction workers. Kits are to be kept at hazardous materials storage locations, in site compounds and on specific construction vehicles. Where a spill to a watercourse is identified as a risk, spill kits are to be kept in close proximity to potential discharge points in support of preventative controls
- c) all hazardous materials spills and leaks to be reported to site managers and actions to be immediately taken to remedy spills and leaks
- d) training in the use of spill kits to be given to all personnel involved in the storage, distribution or use of hazardous materials.

| CoA number | Type |
|-------------------------------------|--|
| Erosion and Sediment Control | |
| 23 | <p>Erosion and Sediment Control</p> <p>Soil and water management measures shall be prepared and implemented as part of the CEMP for the mitigation of water quality and hydrology impacts during construction of the Project. The management measures shall be prepared in accordance with <i>Managing Urban Stormwater: Soils and Construction - Volume 1</i>, 4th Edition (Landcom, 2004).</p> |
| Heritage Management | |
| 24 | <p>Indigenous and Non-Indigenous Heritage</p> <p>If previously unidentified Indigenous or non-Indigenous heritage/archaeological items are uncovered during construction works, the procedures contained in the TfNSW <i>Unexpected Heritage Finds Guideline</i> (3TP-SD-115) shall be followed and all works in the vicinity of the find shall cease. The TfNSW Environment and Planning Manager shall be immediately notified to co-ordinate a response, which may include seeking appropriate advice from a suitably qualified and experienced heritage consultant (in consultation with the Heritage Division, OEH where appropriate). Works in the vicinity of the find shall not re-commence until clearance has been received from TfNSW and/or the heritage consultant.</p> |
| Flora and fauna | |
| 25 | <p>Removal of trees or vegetation</p> <p>Separate approval, in accordance with TfNSW's <i>Removal or Trimming of Vegetation Application</i> (9TP-FT-078), is required for the trimming, cutting, pruning or removal of trees or vegetation where the impact has not already been identified in the EIA for the Project. The trimming, cutting, pruning or removal of trees or vegetation shall be undertaken in accordance with the conditions of that approval.</p> |
| 26 | <p>Replanting program</p> <p>All cleared vegetation shall be offset in accordance with TfNSW's <i>Vegetation Offset Guide</i> (9TP-ST-149). All vegetation planted on-site is to consist of locally endemic native species, unless otherwise agreed by the PMEM, following consultation with the relevant council, where relevant, and/or the owner of the land upon which the vegetation is to be planted.</p> |

Urban design and landscaping

27

Urban Design Plan

An Urban Design Plan (UDP) shall be prepared which demonstrates design excellence in the essential urban design requirements of the Project, as evident in the following matters:

- a) the appropriateness of the proposed design with respect to the existing surrounding landscape, built form, behaviours and use-patterns (including consideration of Crime Prevention Through Environmental Design principles). This is to include but not be limited to:
 - i) connectivity with surrounding local and regional movement networks including street networks, other transport modes and active transport networks. Existing and proposed paths of travel for pedestrians and bicycles should be shown
 - ii) integration with surrounding local and regional open space and or landscape networks. Existing and proposed open space infrastructure/landscape elements should be shown
 - iii) integration with surrounding streetscape including street wall height, active frontages, awnings, street trees, entries, vehicle cross overs etc. Specific attention is to be paid to the façade treatment and interface with Orchard Crescent to minimise potential negative impacts on streetscape amenity
 - iv) integration with surrounding built form (existing or desired future) including building height, scale, bulk, massing and land use. Specific attention is to be paid to potential negative impacts on outlook from adjacent residential buildings with section drawings showing relationship of proposed development with adjacent residential buildings and mitigation measures such as architectural façade treatments and street trees where impacts on outlook are identified.
- b) design detail that is sensitive to the amenity and character of the local area and heritage items located within or adjacent to the Project site
- c) total water management principles to be integrated into the design where considered appropriate
- d) any other matters which the conditions require the UDP to address.

The UDP shall be:

1. prepared and submitted to TfNSW with the first design submission (System Design Review) and updated and submitted with subsequent design submissions
2. prepared in consultation with councils and relevant stakeholders
3. prepared by a registered architect and/or landscape architect who has appropriate and relevant urban design expertise
4. the plan is to be prepared in consultation with TfNSW's Precincts and Urban Design team as soon as possible after the commencement of the design phase.

28

Public Domain Plan

A Public Domain Plan (PDP) shall be prepared which demonstrates design excellence in the essential urban design requirements of the Project, as evident in the following matters:

- a) materials, finishes, colour schemes and maintenance procedures including graffiti control for new walls, barriers and fences
- b) location and design of pedestrian and bicycle pathways, street furniture including relocated bus and taxi facilities, bicycle storage, telephones and lighting equipment (where relevant)
- c) landscape treatments and street tree planting to integrate with surrounding streetscape which, at a minimum, must address the following:
 - i) landscape details, including details of soil preparation, mulches, plant selection, plant sizes (planting container and expected final sizes)
 - ii) a schedule which details the landscape maintenance requirements to be implemented for the 12 month period following the commencement of operation
- d) opportunities for public art created by local artists to be incorporated, where considered appropriate, into the Project
- e) total water management principles to be integrated into the design where considered appropriate
- f) design measures included to meet TfNSW's NSW *Sustainable Design Guidelines - Version 3.0* (7TP-ST-114)
- g) identification of design and landscaping aspects that will be open for stakeholder input, as required
- h) any other matters which the conditions require the PDP to address.

The PDP shall be:

1. prepared and submitted to TfNSW with the first design submission (System Design Review) and updated and submitted with subsequent design submissions
2. prepared in consultation with Inner West
3. Council and relevant stakeholders
4. prepared with consideration of Inner West Council's Street Tree Strategy
5. prepared by a registered landscape architect
6. the plan is to be prepared in consultation with TfNSW's Precincts and Urban Design team as soon as possible after the commencement of the design phase.

Traffic and access**29****Traffic Management Plan**

A construction Traffic Management Plan (TMP) shall be prepared as part of the CEMP which addresses, as a minimum, the following:

- a) ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised
- b) maximising safety and accessibility for pedestrians and cyclists
- c) ensuring adequate sight lines to allow for safe entry and exit from the site
- d) ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made)
- e) managing impacts and changes to on and off street parking, and requirements for any temporary replacement parking
- f) parking locations for construction workers away from stations and busy residential areas, and details of how this will be monitored for compliance
- g) routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses
- h) details for relocating kiss and ride, taxi ranks bus stops (and rail replacement bus stops if required), including appropriate signage to direct customers, in consultation with the relevant taxi/bus operator. Particular provisions should also be considered for the accessibility impaired
- i) measures to manage traffic flows around the area affected by the Project, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the construction TMP
- j) cumulative impacts of other construction activities in the area
- k) encouragement of construction workers to use public transport to access the site.

The Proponent shall consult with the relevant roads authority during preparation of the TMP, as required and obtain any approvals as required under the *Roads Act 1993*. The performance of all Project traffic arrangements must be monitored during construction.

30**Road condition reports**

Prior to construction commencement, the Proponent shall prepare road condition surveys and reports on the condition of roads and footpaths affected by construction. Any damage resulting from the construction of the Project, aside from that resulting from normal wear and tear, shall be repaired at the Proponent's expense.

31**Road safety audit**

A Road Safety Audit shall be undertaken as part of the detailed design process and on completion of construction.

The Road Safety Audit is to be submitted to and accepted by TfNSW.

**CoA
number****Type****Property****32****Property condition surveys**

Subject to landowner agreement, property condition surveys shall be completed prior to piling, excavation or bulk fill or any vibratory impact works including jack hammering and compaction (Designated Works) in the vicinity of the following buildings/structures:

- a) all buildings/structures/roads within a plan distance of 20 metres from the edge of the Designated Works
- b) all heritage listed buildings and other sensitive structures within 50 metres from the edge of the Designated Works.

Property condition surveys need not be undertaken if a risk assessment indicates that selected buildings/structures/roads identified in (a) and (b) will not be affected as determined by a qualified geotechnical and construction engineering expert with appropriate registration on the National Professional Engineers Register prior to commencement of Designated Works.

Selected potentially sensitive buildings and/or structures shall first be surveyed prior to the commencement of the Designated Works and again immediately upon completion of the Designated Works.

All owners of assets to be surveyed, as defined above, are to be advised (at least 14 days prior to the first survey) of the scope and methodology of the survey, and the process for making a claim regarding potential property damage.

A copy of the survey(s) shall be given to each affected owner. A register of all properties surveyed shall be maintained.

Any damage to buildings, structures, lawns, trees, sheds, gardens, etc. as a result of construction activity direct and indirect (i.e. including vibration and groundwater changes) shall be rectified at no cost to the owner(s).

Lighting**33****Lighting scheme**

A lighting scheme for the construction and operation of the Project is to be developed by a suitably qualified lighting designer.

The proposed lighting scheme is to be submitted to and endorsed by TfNSW's Urban Design Team prior to finalisation of the design.

Sustainability**34****Sustainability officer**

The Proponent shall identify a suitably qualified and experienced sustainability officer who is responsible for implementing sustainability objectives for the Project.

Details of the sustainability officer, including defined responsibilities, duration and resource allocation throughout the appointment consistent with the Proponent's sustainability objectives are to be submitted to the satisfaction of the PMS prior to preparation of the PCSR (if applicable).

35 Pre-Construction Sustainability Report

Prior to commencement of construction, a Pre-Construction Sustainability Report (PCSR) shall be prepared to the satisfaction of the PMS. The Report shall include the following minimum components:

- a) a completed electronic checklist demonstrating compliance with TfNSW's *NSW Sustainable Design Guidelines – Version 3.0 (7TP-ST-114)*
- b) a statement outlining the Proponent's own corporate sustainability obligations, goals, targets, in house tools, etc
- c) a documented process to identify and progress innovation initiatives on the Project as appropriate. Areas of innovation that have been confirmed, and those subject to ongoing evaluation for implementation on the Project, are to be identified.

The Proponent shall submit a copy of the PCSR to the PMS for approval, at least 14 days prior to the commencement of construction (or within such time as otherwise agreed to by the PMS).

Additional Conditions**36 Graffiti and advertising**

Hoardings, site sheds, fencing, acoustic walls around the perimeter of the site, and any structures built as part of the Project are to be maintained free of graffiti and advertising not authorised by the Proponent during the construction period. Graffiti and unauthorised advertising will be removed or covered within the following timeframes:

- a) offensive graffiti will be removed or concealed within 24 hours
- b) highly visible (yet inoffensive) graffiti will be removed or concealed within a week
- c) graffiti that is neither offensive or highly visible will be removed or concealed within a month
- d) any unauthorised advertising material will be removed or concealed within 24 hours.

Site Specific Conditions**37****Operational noise and vibration**

Prior to commencement of construction of the multi-storey car park surface (ie concrete pouring or other applicable construction method), or the construction of physical noise mitigation structures (whichever occurs sooner), an operational noise and vibration management plan (ONVMP) shall be prepared to confirm the final mitigation measures for operational noise and vibration that would be implemented.

The ONVMP shall be prepared in consultation with Sydney Trains and other relevant stakeholders. The ONVMP shall:

- a) consider any changes to the predicted noise and vibration levels identification in the EIA as a result of the detailed design process and any changes to the proposed multi-storey car park operations plan
- b) examine all reasonable and feasible noise and vibration mitigation measures consistent with *NSW Industrial Noise Policy (EPA, 2000)*
- c) identify specific physical and other mitigation measures for controlling noise and vibration at the source and at the receiver (if relevant) including location, type and timing of implementation of the proposed operational noise and vibration mitigation measures
- d) seek feedback from directly affected receivers on the final mitigation measures proposed in the review.

The Proponent shall submit a copy of the ONVMP to the PMEM (or nominated delegate) for approval, at least one month prior to commencement of laying of the multi-storey car park surface or the construction of physical noise mitigation structures (or such time as is otherwise agreed to by the PMEM).

The approved physical mitigation measures are to be installed prior to the commencement of operations, unless otherwise agreed by the PMEM.

38**Operational noise compliance monitoring**

In order to validate the predicted noise levels identified in the EIA, monitoring shall be undertaken by the Proponent within three months of commencement of operation. The noise and vibration monitoring shall be undertaken to confirm compliance with the predicted noise and vibration levels, or as modified by the ONVMP.

Should the results of monitoring identify exceedances of the predicted noise and vibration levels, additional reasonable and feasible mitigation measures would be implemented by the Proponent in consultation with the affected property owners.

39**DDA compliance of pedestrian path between the Proposed Activity and Ashfield Station**

The Proponent shall ensure the pedestrian path between the Proposed Activity and Ashfield Station on the northern side of Brown Street, Ashfield is made DDA compliant.

END OF CONDITIONS

Appendix C Visual Impact Assessment

Ashfield Station Commuter Car Park Upgrade

Transport Access Program
Visual Impact Assessment Report

IMPORTANT NOTE

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In preparing this report we have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

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Approval for Issue

| Name | Signature | Date |
|----------------|---|------------|
| Benjamin Ewins |  | 18/04/2017 |

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Glossary and Abbreviations

| | |
|--------------------------|---|
| CPTED | Crime Prevention Through Environmental Design |
| EP&A Act | NSW Environmental Planning and Assessment Act 1979 |
| FFL | Finished Floor Level |
| GST | Ground Services Trough – An above ground, galvanised trough which generally houses electrical and communications cables |
| Landform | The shape and form of the land surface which is the result of the action and interaction of natural and/or human factors. |
| Landscape Character | A distinct recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse |
| LED | Light Emitting Diode |
| LEP | Local Environment Plan |
| Low rise housing | Single dwelling houses, semi-detached houses town-houses and walk-up apartments, typically 2-4 storeys |
| LIEMA | UK Landscape Institute and Institute of Environmental Management & Assessment |
| Magnitude of Effect | A term that combines the judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration |
| Medium-high rise housing | Residential apartment buildings, sometimes with cafes or small shops at ground level, typically 8 storeys |
| Medium rise housing | Residential apartment buildings, sometimes with cafes or small shops at ground level, typically 5-7 storeys |
| MSCP | Multi-storey car park. Referring to the proposed multi-level, commuter car development subject of this study |
| REF | Review of Environmental Factors |
| RMS | New South Wales Roads and Maritime Services |
| Sensitivity | Applied to visual receivers, combining judgments of susceptibility of the receiver to the specific type of change or development proposed and the value related to that receptor |
| Spatial Volume | The theoretical area that a three-dimensional object occupies |
| Stage 1 | refers to the early works proposal for removal of overhead High Voltage wires and poles |
| the proposal | Refers to the proposed multi-storey commuter car park development in Ashfield |
| TAP | Transport Access Program |
| TfNSW | Transport for New South Wales |
| Visual amenity | The overall pleasantness of views people enjoy of their surroundings, that provides an attractive visual setting for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area. |
| Visibility Envelope | A map, usually digitally produced, showing areas of land within which a development is theoretically visible. |
| Visual receiver | Individuals / groups of people who have the potential to be affected by a proposal. |

I Introduction

Transport for NSW (TfNSW) has engaged RPS to prepare a Visual Impact Assessment (VIA) report for a proposed three storey split-level commuter car park (the Proposal) near Ashfield Station in Ashfield, NSW. The proposal will replace an open, ground-level only public commuter car park on land under RailCorp ownership.

The design for the commuter car park has been amended a number of times to suit various stakeholder requirements. This is the third iteration which includes 235 parking spaces and includes the addition of a third split-level. This proposal does not result in the car park being significantly higher, or larger in scale nor radically different in architectural aesthetic. The resulting findings presented within the Visual Impact Assessment Table reflects this outcome.

I.1 Background

The proposed upgrade is part of the Transport Access Program (TAP). TAP is a government initiative that is providing accessible, modern, secure and integrated transport infrastructure throughout the wider Sydney rail network.

The NSW Government has identified the need to augment the existing commuter car parking facilities through consideration of previous studies of commuter needs and public feedback with the following architectural and urban design objectives highlighted as informing the development of a preliminary design proposal;

- Maintain elegant simplicity in the architectural planning and detailing
- Ensure compliance with functional and design specification requirements
- Respond sensitively to the current and likely future surrounding built environment
- Design elements for easy maintenance
- Integrate the car park considering the surrounding heritage and biodiversity
- Create a high quality, positive addition in the public domain
- If possible, minimise walking distances to the station
- Respond to security and safety issues and requirements
- If possible, accommodate potential for future growth

I.2 Purpose of the Report

This report is a preliminary visual assessment of the proposal concept design and related Stage 1 early works. The purpose of this report is to identify and summarise the likely visual impacts and outline mitigation measures that will assist in the development of detailed design for the Proposal that would provide for an integrated urban design.

The purpose of the assessment is therefore to help ensure that the Proposal's implementation and operation are considered early in the design process with the ambition of achieving best practice urban design outcomes. This report identifies and advises on key principles that can be considered through further development and refinement of the preliminary concept design.

The updated VIA is being undertaken after the REF has been on public display to assess changes in the design and will be included as part of the Determination of the proposal. The VIA is being undertaken in accordance with Director's General clause 228 Guidelines under the NSW Environmental Planning and Assessment Regulations 2000.

1.3 Scope and Limitations

This assessment is intended to be an objective report based on professional analysis of the design. It seeks to establish the anticipated visual impacts of the Proposal on a wide range of viewers. The assessment has been undertaken based on **conceptual** level information and therefore is generally broad in its approach.

Landscape and visual assessment requires qualitative (subjective) judgements to be made. The assessment process aims to be objective and describe any changes factually. Potential changes as a result of the Project have been defined, however the significance of these changes requires qualitative (subjective) judgements to be made. The conclusions of this assessment therefore combine objective measurement and subjective professional interpretation.

The services and the purpose undertaken by RPS under the Contract in connection with preparing this report were limited to those specifically detailed in the Contract and this report, and are subject to the scope limitations set out in the Contract and this report.

Other than as expressly stated in this report to the contrary, the opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. RPS has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by RPS described in this report. RPS disclaims liability arising from any of the assumptions being incorrect.

2 Context

2.1 Site Location

The Ashfield train station and commuter car park are located within the Inner West Local Government Area (formerly Ashfield Council) approximately 8 kilometres west of Central Station and the Sydney CBD on the T1 (North Shore, Northern and Western) and T2 (Airport, Inner West and Southern) lines. Ashfield station is located between Summer Hill and Croydon stations (Figure 1) and is the 19th busiest station on the Sydney Train Network (TfNSW, 2012).

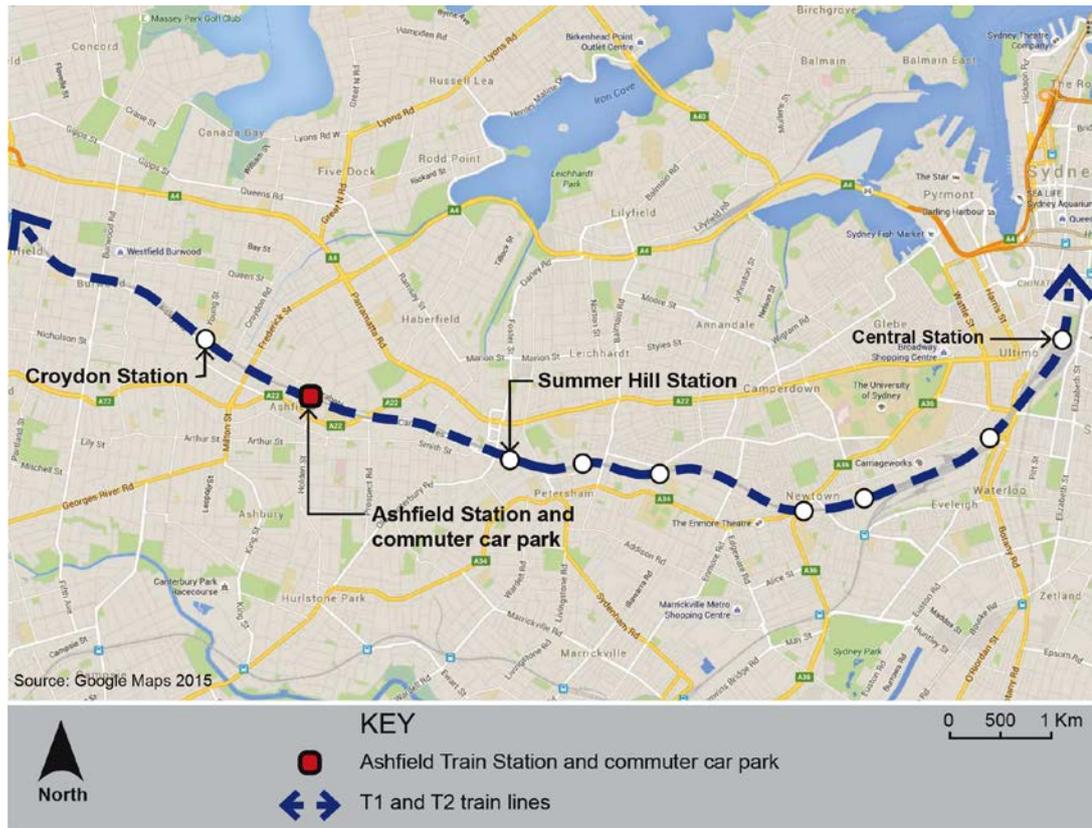


Figure 1: Site Plan

2.2 Local Setting

The existing commuter car park is located near the Ashfield commercial and civic centre which is generally located along Liverpool Road and Hercules Street to the south and west.

Areas to the north are predominantly two to three storey walk-up apartments and single storey residences, some of which are used for commercial activities. Refer also Figure 2.



Figure 2: Local Context

Other notable uses in the immediate surrounding context include:

- Orchard Crescent is a cul-de-sac south of the Proposal providing vehicle access to the Capri Apartment building
- “Capri” is a medium-high rise development with apartment dwellings and ground level commercial activities facing Brown Street. Some of Capri’s north facing dwellings have views towards the existing car park and are within close visual proximity
- Immediately north of the Proposal is the rail corridor. The corridor is generally flat and roughly 30-35 metres in width and accommodates 7 tracks
- North of the railway corridor the land rises abruptly forming an embankment along the corridor’s edge. At the top of the embankment are residential apartment buildings with south-facing apartments along Elizabeth Street with views towards the Proposal
- Brown Street provides vehicle access to the existing car park from the south and west. Visual links along Brown Street to the car park diminish as the ground drops away to the west beyond the train station entry to the west and as it rises towards Liverpool Road to the south
- The “Station 2A Apartments” are an apartment development southwest of the Proposal. Some of the dwellings face northeast towards the Proposal and are within close visual proximity. The development also has commercial uses and a public car park entry that are accessed along Brown Street

- Ashfield Station is located approximately 90 metres to the west of the existing commuter car park. Pedestrians can access the station and platforms via stairs and lifts at the northern and southern ends of the station. The station’s aerial concourse is glazed and has full or partial views towards the Proposal
- The Metro South Ashfield Signals Depot is located immediately to the east. The depot is accessed through the existing car park and also via a restricted access road to the east. The depot property is fenced with controlled access
- Ashfield Public School and the Ashfield Boys High School grounds are located to the southeast of the existing car park. School buildings and grounds are accessed at the corner of Orchard and Murrell Streets but currently have little visual connection to the Proposal primarily due to existing trees & vegetation between the car park & the school

2.3 Local Planning

The planning instrument relevant to the Proposal site is the Inner West Council’s (formerly Ashfield Council) Local Environment Plan, 2013.

The Proposal is within the area designated B4 – Mixed Use, please see Section 2.4. Refer also Figure 3.

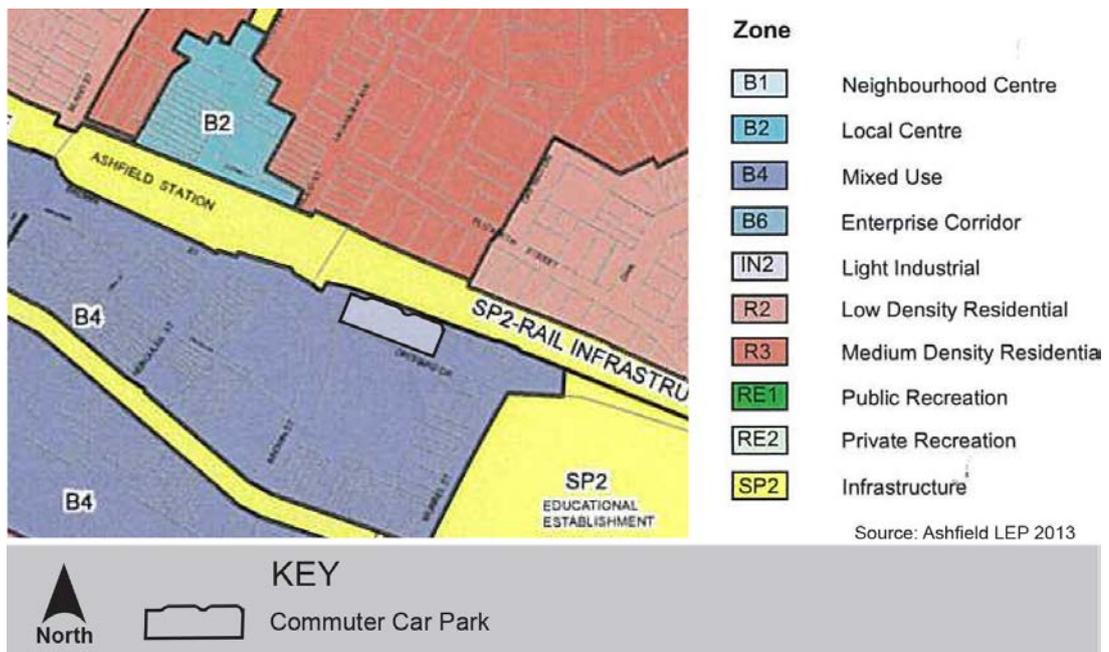


Figure 3: LEP & Zoning Map

2.4 Zone B4 Mixed Use

Objectives of the zone are;

- To provide a mixture of compatible land uses
- To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling

- To enhance the viability, vitality and amenity of Ashfield town centre as the primary business activity, employment and civic centre of Ashfield
- To encourage the orderly and efficient development of land through the consolidation of lots
- The maximum allowable height for buildings on the site designated within Inner West Council's (formerly Ashfield Council) LEP is 15 (fifteen) metres. The Proposal is well within the height allowance with the second level being approximately 7.15 metres and the top of the lift shaft reaching approximately 10.0 metres above the adjacent ground level.

3 Project Description

The Proposal constitutes the replacement of an existing, open, ground-level commuter car park with a three storey split-level car park. This includes three primary levels: ground level, first floor level, and roof top car park level. The main features of the Proposal include:

- Vehicle access/egress is via Brown Street in a one way clockwise circulation direction through all car park levels
- Extending from the eastern façade at ground level is an additional parking area with 13 parking spaces and access into the rail corridor
- Continuous horizontal concrete wall facades
- Averaged Finished Floor Levels (FFL): Ground: 28.500m. First: 32.180m. Roof: 35.180m
- Stair wells with mesh security screen panels on all levels. Stair access within the Proposal and a ramp/stair connection to Orchard Crescent
- A windowed lift shaft adjacent the western stair well. Accessibility is from within the car park with a ramp connection to Orchard Crescent
- The northern façade consists of monolithic-looking linear walls with vertical protruding ribs every 6m which break-up the façade. The façade is somewhat variable, assisting to break-up its horizontal nature
- The eastern façade is very open and the levels are visible, however through the mesh
- The southern façade is horizontally linear. The existing metal fencing is to remain. All levels are largely open. The stairwell and lift tower are also visible from the south of the proposal
- The western façade features vertical louvres covering the two upper levels. The ground level is open to view
- Each of the three floors is split into two levels, with parking on a flat larger platform and additional 45 degree parking located on the ramps leading up to the next higher level. This is the same for the rooftop level.

Figure 5 below indicates the physical qualities of the proposal

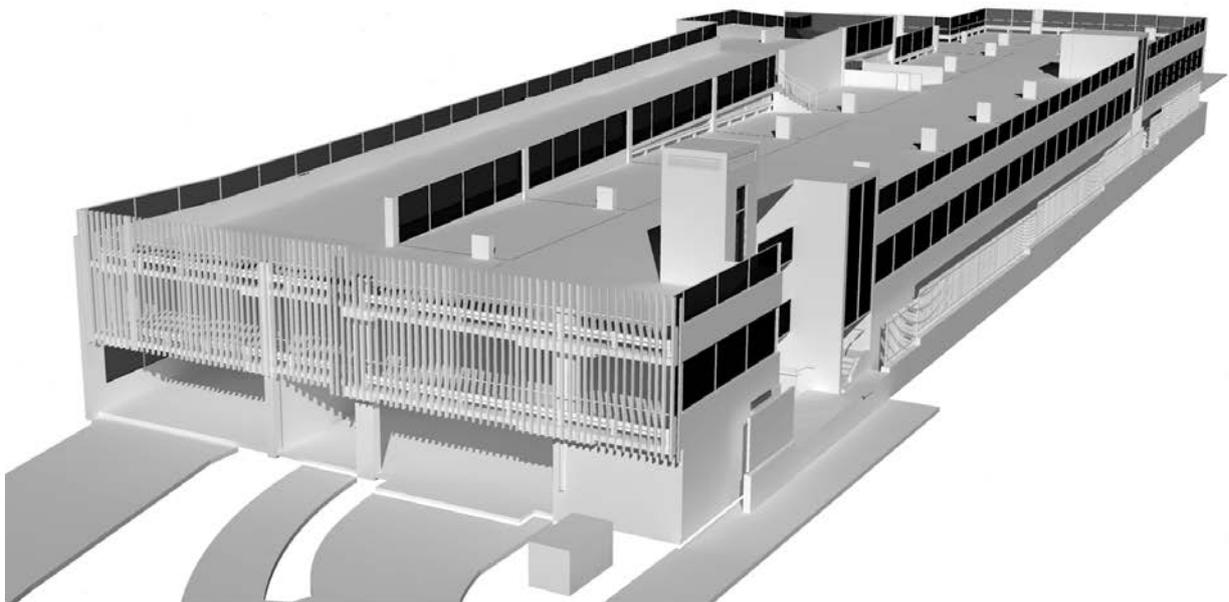


Figure 4: Axonometric view of proposed car park

3.1 Appearance

The current concept information provides an overall indication of the appearance of the Proposal, which is generally consistent with a modern car park in an urban setting. The following is a summary of the main elements that contribute to the Proposal's appearance:

- Use of concrete walls with flat face and mesh screens as the predominant facade materials
- Semi-open structure on all sides, with see-through opportunities
- The western vehicle entry side is defined by vertical louvres which contribute to softening the facade
- Articulated vehicle & pedestrian access with angled, cantilevered, portal style vehicle entry
- Two vertical stairwells and one lift that extends above the roof car park level de-emphasizes a strong horizontal form

3.2 Bulk and Scale

The concept design for the Proposal is a split-level structure generally contained within the extent of the existing car park footprint area with the ground level at an approximately similar ground level.

The overall form of the Proposal is strongly linear which is expressed in its greater proportional width compared to its height.

The overall plan dimension of the Proposal is roughly 30 metres by 132 metres. The adjacent rail corridor to north is also of a similar width at approximately 30-35m metres. Figure 5 shows the scale relationships of the adjacent land uses with the Proposal.

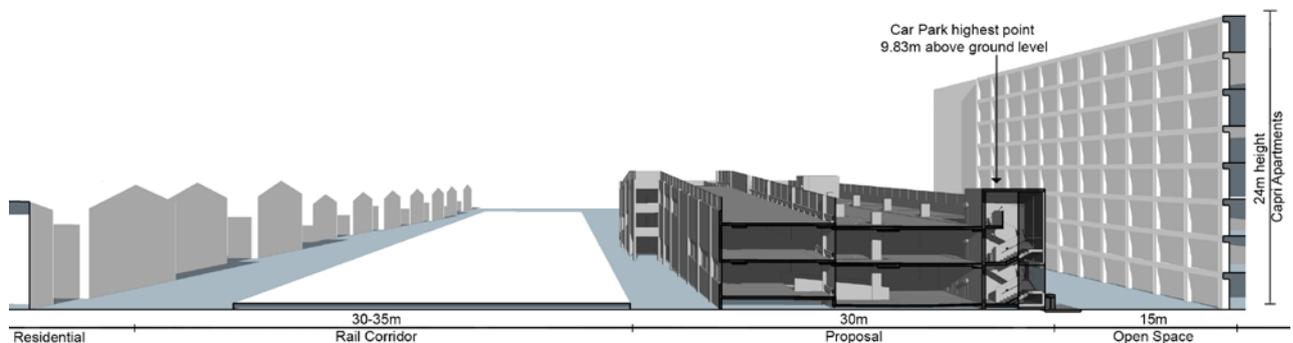


Figure 5: Section showing scale relationships with adjacent uses

The diagram above indicates that the Proposal is of a similar scale to the rail corridor and much lower in height than the nearby Capri apartments to the south.

The top level of the car park does not appear as a full level as it includes a 1.0 metre high safety barrier along the outer edge with another 1.0m of anti-throw screen giving an overall barrier height of approximately 9.0 metre.

At the southwest corner is an expressed stairwell and lift, the roof of which represents the highest part of the structure at approximately 12 metres above existing ground level.

Concept designs indicate the proposed façades along the south, east and west consist of a semi-open ground floor and a continuous horizontal opening with screening infill. The lift, stair wells and support columns will help balance an otherwise strongly horizontal structural form.

The northern facade edge of the Proposal has a strong visual connection with the rail station and corridor and will also be seen by some of the dwellings to the north of the rail corridor.

3.3 Pedestrian Access and Circulation

Key to the design of the Proposal is its connectivity to the train station and wider area. NSW Government guidelines such as *Sydney's Walking Future 2013* and Inner West Council's (formerly Ashfield Council) LEP B4 zoning objectives place importance on the consideration of pedestrian amenity. Therefore, the current design needs to adequately address the safety for expected pedestrian movements that will occur from the development of the Proposal.

Figure 7 highlights key vehicle & pedestrian connectivity from entry points along Brown Street and Orchard Crescent to the car park stairwells and lift entry along Orchard Crescent.

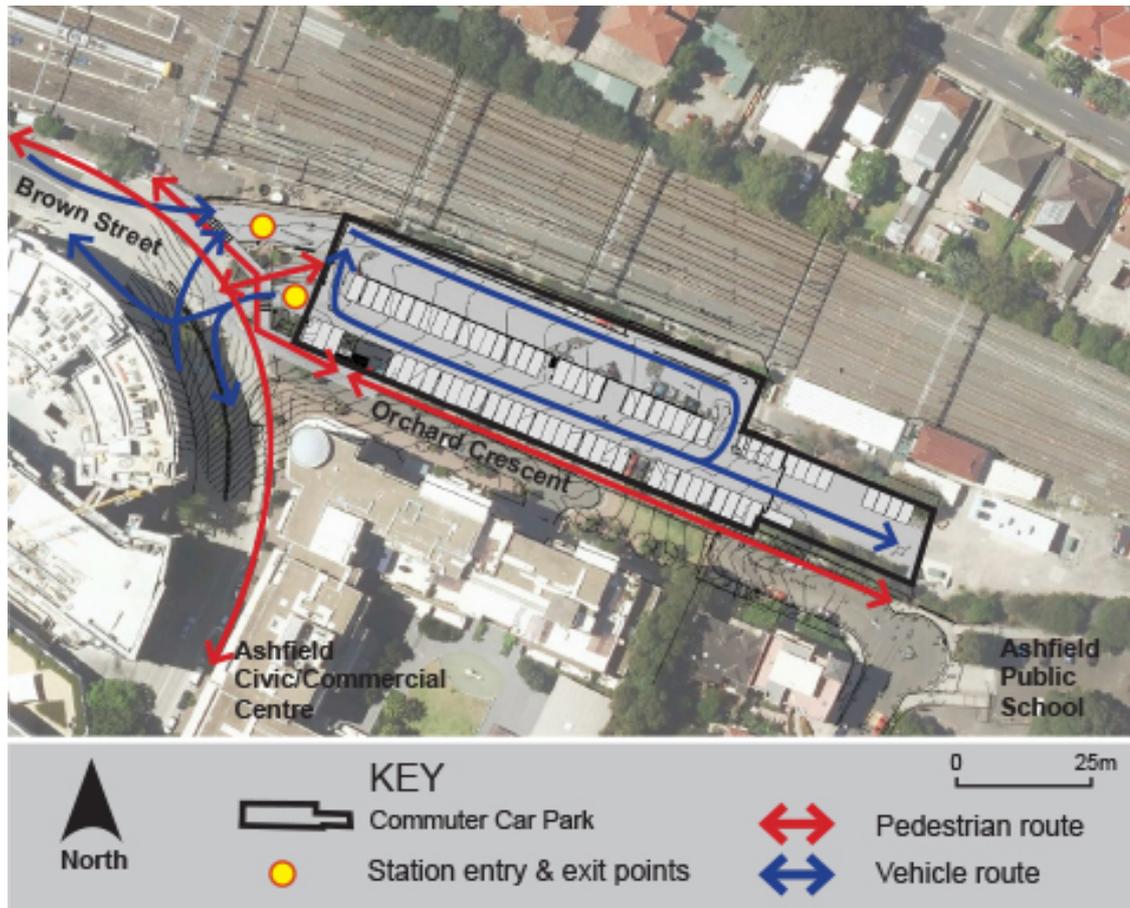


Figure 6: Vehicle and Pedestrian Connectivity

The Proposal will also need to address the connections further east to Ashfield Public School as well as the commercial and residential areas further south of Brown Street.

Safety should also be considered for pedestrians accessing the car park. The current proposed locations of the stair wells may influence pedestrians to short cut along the vehicle ramps to access the station rather than accessing the stairs or lift along the southern edge of the car park.

3.4 Public Domain

Enhancement of the public domain areas near the Proposal plays an important part in the successful integration of the Proposal. The area directly west of the Proposal is of considerable importance as it is visually prominent from its position along Brown Street from the south and west. Refer also Plate 1.



Plate 1: View north of the area west of the proposed MSCP.

Urban and landscape design solutions can seek to integrate the Proposal with the surrounding landscape, refer also Figure 8.

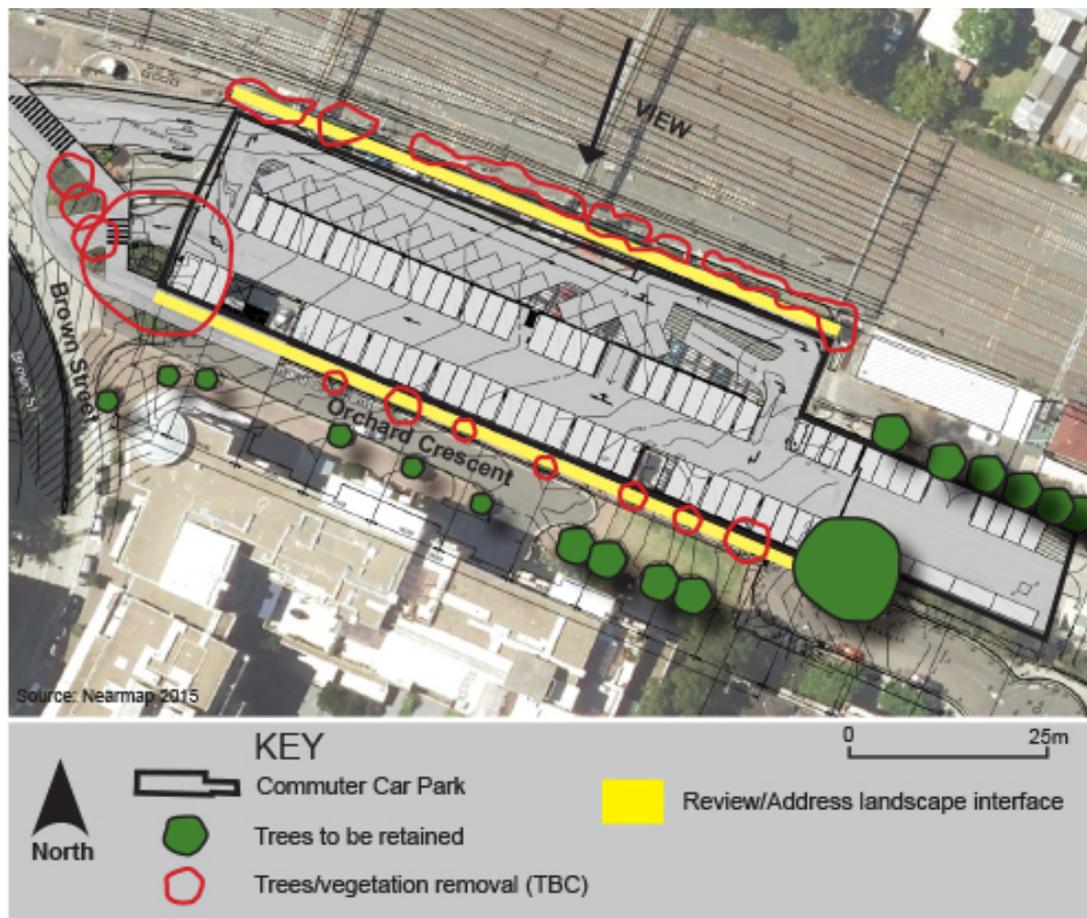


Figure 7: Urban and Landscape Design Considerations Plan

Surrounding Areas that could be considered for improvement and better integrated with the Proposal are:

- The landscape interface of the public domain areas between the Proposal and Orchard Crescent including: the footpath, street trees, paving, fencing and level changes from the street to the ground level car park
- The Signals Depot area interface and access
- Fencing and/or vegetative screening along the railway corridor to replace existing
- Selected tree removal will be required where impacted by the construction of the Stage 2 Proposal. Removal may be needed along the boundaries where excavation may occur as a part of construction.

3.5 Lighting

Lighting for both the construction and operation of the Stage 2 Proposal will be required for safety. The Proposal will therefore need to consider the light spill to nearby areas generated from the Proposal such as headlights and pole top lighting.

The existing car park is currently lit via floodlights mounted on wooden telegraph poles. Street lamps along Brown Street and pole top lights along Orchard Crescent would also likely contribute to lighting of the car park and of the surrounding areas.

Visual impacts from the introduction of new lighting in and around the Proposal must be considered in light of their possible impacts on the surrounding residential dwellings particularly to the south, southwest and north of the site as it may affect existing residents' visual amenity.

Lighting design information has not been reviewed as part of this assessment however all lighting must be designed and installed in accordance with the requirements of AS4282 Control of the Obtrusive Effects of Outdoor Lighting.

3.6 Construction

Construction work for Stage 1 and Stage 2 is likely to be sequential with the early Stage 1 works commencing for undergrounding works prior to the construction of the Stage 2 car park Proposal.

Exact timing of the implementation is not currently known but will likely be governed by budget, site and vehicle access requirements and timing of required approvals.

Activities that would be expected to occur as part of the construction development for both stages and that will likely have visual impacts on the surrounding areas include:

- Placement of temporary barriers around the site such as fencing, signage and hoardings
- Pedestrian and traffic diversions along Brown Street and potentially Orchard Crescent
- Alternate (parking arrangements) including a temporary reduction of vehicle commuter parking
- Construction vehicles
- Temporary site office
- Material stockpiling
- Erection of scaffolding
- Night time lighting for security.

Early works may involve the partial (or full) closure of the Brown Street footpath and/or westbound carriageway to accommodate works along Brown Street. Construction work would likely consist of trenching, hoarding, safety fencing, signage and material stockpiling in areas along or near Brown Street.

Most visual impacts created by construction activities in both Stages 1 and 2 will be temporary and consistent with what might be expected for similar projects. Proposed mitigation strategies regarding construction activities are included in chapter 7.

3.7 Safety and Security

The implementation of Crime Prevention through Environmental Design (CPTED) principles will assist in reducing opportunities for crime. Guiding CPTED principles typically address issues relating to surveillance, access control, territorial reinforcement and space management. These principles are, or can be, incorporated in the design of the Proposal in the following ways:

3.7.1 Surveillance

The design of the Proposal generally allows for surveillance opportunities on all levels due to the open nature of the design. This is demonstrated in generous openings in the facades on four sides at each level which will allow good visual connection to the surrounding areas. The use of a fully glazed lift shaft and seamless mesh security panels to the street for the stair wells also provides visual transparency.

3.7.2 Access control

The Proposal is designated for public use therefore will be accessible to both vehicles and pedestrians. The design of the car park could potentially control vehicle entry via a control gate system which might provide some degree of access control for vehicles wanting to access the car park if needed.

3.7.3 Space management

Space management refers to the operational stage of the car park. This principle can be addressed through ongoing maintenance of the car park to remove vandalism and graffiti, fixing lighting and keeping up with necessary repairs and upgrades.

4 Approach and Methodology

4.1 Assessment Process

This report uses a common approach to visual quality assessment that is systematic, consistent & based on professional, value judgement of commonly accepted & adopted criteria in the industry.

Methods used in this VIA are from the NSW Roads and Maritime Services (2013) *Environmental Impact Assessment Practice Note - Guideline for Landscape Character* and the *Visual Impact Assessment* and involved:

- Desktop study using aerial photography to identify potential the visual catchment and possible visual receivers
- Ground-truthing of assumptions reached through initial desktop studies. Ground-truthing involved visiting the site and reviewing the surrounding vantage points from publicly accessible areas
- Describing and evaluating the existing landscape character and visual environment in order to establish a baseline for the visual assessment
- Mapping the visual envelope based on field studies and data while identifying sensitive visual receivers. Sensitive visual receivers are people who would might experience a visual impact
- Undertaking a visual impact assessment using the grading matrix in Table 1 below, considering visual **sensitivity** (of the visual amenity or viewpoints) and the **magnitude** of the visual change, to arrive at an overall level of effect or impact

Table 1: Landscape Character and Visual Impact Grading Matrix

| | | Magnitude | | | | | |
|-------------|---------------|---------------|---------------|---------------|---------------|--------------|------------|
| | | High | Moderate-High | Moderate | Moderate-Low | Low | |
| Sensitivity | High | High Impact | High Impact | Moderate-High | Moderate-High | Moderate | Negligible |
| | Moderate-High | High Impact | Moderate-High | Moderate-High | Moderate | Moderate | Negligible |
| | Moderate | Moderate-High | Moderate-High | Moderate | Moderate | Moderate-Low | Negligible |
| | Moderate-Low | Moderate-High | Moderate | Moderate | Moderate-Low | Moderate-Low | Negligible |
| | Low | Moderate | Moderate | Moderate-Low | Moderate-Low | Low | Negligible |
| | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

4.2 Visual Impact Grading Matrix

Once a visual sensitivity level and magnitude are determined, they are combined into a visual impact grading matrix to identify an overall level of impact on key viewpoints.

An assessment is largely qualitative and determines the potential level of impact to the visual amenity of the site and its surrounds in general terms, as well as more specific impacts to key surrounding viewpoints such as from residential and other publicly and privately accessible locations. This provides a general understanding of the level of visual impact and is utilised in the assessment of predicted visual impacts.

4.3 Visual Sensitivity

An assessment of the landscape character was undertaken to develop an understanding of the context and the sensitivity of the area’s landscape character.

Visual sensitivity refers to the character of a setting, the quality of the view, and how sensitive it is to the proposed change (RMS, 2013). Combined with magnitude, sensitivity provides a measure of impact. Visual sensitivity relates to the direction of view and the composition of the view.

The following terms and definitions are from the Landscape Institute and Institute of Environmental Management & Assessment (LIIEMA 2013). These are generally accepted within the industry to identify visual receiver sensitivity;

| | |
|-----------------|--|
| High | Private residents at home with prolonged viewing opportunities, heritage properties and landscapes. |
| Moderate | Commercial properties, Travellers on road, rail or other transport routes with an interest in their environment. |
| Low | Transient type spaces & people at their place of work whose attention is on their work. |

4.4 Magnitude of Effect

The magnitude of a visual effect is the degree of change the visual landscape undergoes as a result of the proposed development. It is the measurement of the overall scale, form and character of a development Proposal when compared to the existing condition (RMS, 2013). Magnitude also takes into consideration the distance between the viewer(s) and the Proposal. Judging the magnitude of visual effects takes account of:

- The scale of the change within the view with respect to the addition (or loss) of elements in the view and change to its composition. This includes the proportion of the view that is taken up by the proposed development
- The degree of change and/or integration of any new features or changes in the landscape in terms of form, scale and mass, line height, colour and texture
- The nature of the view of the proposed development and whether the views are permanent, full, partial or glimpses (LIIEMA 2013)

4.5 Visual Absorption Capacity

Visual Absorption Capacity (VAC) is an estimation of the capacity of the landscape to absorb development without creating substantial visual changes resulting in a reduction in the existing scenic quality. The capacity to absorb development is primarily dependent on vegetation cover, landform and the presence of other development.

The site and surrounding area of the Proposal at Ashfield would generally be considered to have a relatively **High** visual absorption capacity as it is a complex, urban landscape which includes a mix of building scales, types, densities, forms and surrounding vegetation cover both within and in the surrounding visual environment.

5 Landscape Character Assessment

The landscape character provides a picture or sense of the landscape and is defined by the area of visually distinct common features. Defining the landscape character and its values aids in determining the capacity for the landscape to accommodate any changes from the introduction of development (RMS 2013).

An understanding of the visual character of the existing landscape and the type and extent of potential views acts as a baseline for the visual impact assessment. A landscape character assessment aids in understanding how the Proposal will affect the elements that make up the existing landscape, the aesthetic and perceptual aspects of the landscape and its unique character.

In order to gain a full understanding of the site's visual character in Ashfield, it was first necessary to undertake an assessment that determined its individual site features and that contributed to the overall character of the area. Site visits to the local area identified the visual "catchment" or areas that would have the predominant visual connection with the site including any key view-points.

5.1 Existing Environment

The site and surrounding area is generally typical of a Sydney inner-city area near an active train station and a commercial and civic centre hub. The existing character in the areas immediately surrounding the Proposal is largely defined by multi-storey residential building development to the south and north of the site, refer also Plates 2, 3, 4 and 5.



Plate 2: View south west from the existing car park.



Plate 3: View south east from the existing car park towards the Signals Depot.



Plate 4: View north from the Capri Apartments western entry.



Plate 5: View north east from Orchard Crescent at Brown Street.

The existing train station and railway corridor forms the northern edge of the Proposal and strongly contributes to the urban character of the area. Views of trains, gantries, platforms, tracks as well as other infrastructure are possible from the areas surrounding the existing commuter car park. Refer also Plate 6.



Plate 6: Existing view north of Ashfield Train Station and aerial concourse.

Existing telegraph poles & wires, light poles, street signs, a radio tower, mobile phone tower, ventilation stacks, bollards, chain wire fencing, electrical kiosks & other ancillary urban infrastructure elements help to reinforce the urban character of the area. Refer also Plate 7.



Plate 7: View east from Brown Street.

5.2 Landform

The railway is cut into the existing landform creating a flat corridor with an embankment along its northern edge. The embankment is partly retained by a continuous retaining wall along the northern edge of the rail corridor and is vegetated. Residential apartment blocks are positioned along the crest of the embankment with views towards the Proposal. Refer also Plate 8.



Plate 8: View north across railway corridor of wall and embankment.

Existing ground levels fall away from the Proposal towards the west becoming more pronounced from near the station's main entrance on Brown Street. Areas west of the train station entry on Brown Street quickly lose their visual connection from the site due to landform and other factors like buildings, structures, trees and vegetation. Refer also Plate 9.



Plate 9: View east from Foxs Lane near station entry.

Ground levels rise to the east along Orchard Crescent but the existing commuter car park is cut into the landscape in order to maintain a continuous ground level. The result is that ground levels are higher in areas to the south and east of the Proposal.

Retaining walls are therefore used along the southern car park edge in order to absorb the transition in levels between the car park and Orchard Crescent. The result of this change in level is that some of the car park in the south eastern corner is visually hidden or has only partial views of the tops of vehicles, Refer also Plate 10.



Plate 10: View northwest from the Orchard Crescent open space.

Ground levels also rise south along Brown St towards Liverpool Rd allowing greater visual exposure of the western end of the Proposal from street level. Refer also Plate 11. The existing Capri Apartment building (at right in photo) prevents visibility of most of the Proposal to the east.



Plate 11: View north from Brown Street.

5.3 Existing Trees and Vegetation

Areas surrounding the Proposal consist of a mix of native and exotic tree and plant species of varying size, age and condition.

Street trees have been planted along Brown Street and Orchard Crescent in the areas immediately south and southwest of the Proposal. Many of the street trees are either small species such as *Tristania* (Water Gum) or *Callistemon* (Bottle Brush) or have been planted relatively recently and therefore have only a small visual presence in the landscape.

It is likely necessary to remove trees in the footpath on the northern edge of Orchard Crescent adjacent the Proposal to facilitate construction of the car park. A small tree in the eastern end of the car park will also require removal, refer also Plate 12.



Plate 12: View North-West from Orchard Crescent toward carpark.

An existing semi-mature *Platanus* species (Plane Tree) will also require removal due to its proximity to the construction envelope. Refer also Plate 13.



Plate 13: Plane tree (Platanus) to be removed.

Boundary screening vegetation along the northern edge of the car park that currently provides visual screening between the railway corridor and dwellings to the north and the Proposal, will also likely need to be removed due to its proximity to the Proposal.

Large, mature trees are visible to the north, east and south east in the surrounding visual catchment. These trees moderate the urban character of the area created by residential building development as well as the station and rail corridor. Refer also Plate 14.



Plate 14: View of the urban tree canopy to the east of the car park.

5.4 Surrounding Built Form

Surrounding buildings play an important part in defining the urban character of the area. The most visually overbearing are two, eight storey buildings south and south east of the commuter car park, the “Capri” and “Station 2A” apartments. The buildings visually define the areas south of the Proposal, blocking views to and from beyond.

The “Capri” building at 1 Brown Street, has dwellings that face north towards Orchard Crescent and the Proposal over eight levels. The building is accessed from two entries and a car park entry from Orchard Crescent as well as gated entries to individual ground floor courtyards. Refer also Plate 15. Northern oriented dwellings and the open streetscape of Orchard Crescent promote a strong visual link between the building and the Proposal.



Plate 15:View of typical Capri apartment courtyards and vehicle entries.

The *Station 2A Apartments* on Brown Street have dwellings above street level that orientate towards the north and north east along a curved facade. These apartments therefore also have a strong visual connection with the car park site and the Proposal.

Ashfield rail station is a large, modern structure. The station and its adjacent brick boundary walls, ganties and original station buildings provide strong urban forms along the street edge and to the local area.

The station has a cantilevered roof and glazed façades that create a distinctive visual landmark for the immediate surrounding area. Its aerial concourse has direct visual connections to the Proposal through its east facing windows. Refer Plate 16.



Plate 16:View east from the Ashfield Station aerial concourse.

More traditional brick, two and three storey apartment buildings and residential dwellings line Elizabeth Street north of the railway corridor and the landscape embankment provide visual definition to the north of the Proposal, refer also Plate 17.

Residences along Elizabeth Street are at a higher ground level than the Proposal resulting direct or partial views towards the Proposal from a higher level. Views however from each dwelling are dependent on orientation, existing screening vegetation, out-buildings, garages and fencing.



Plate 17:View south between properties from Elizabeth Street.

5.5 Heritage

An understanding of the area's historic landscape is considered important in a landscape character assessment as it looks at the material remains of the past in order to help understand the present-day landscape and inform the overall landscape character.

The only heritage item within the vicinity of the Proposal is the Ashfield Railway Station Group, listed by RailCorp on their register of heritage items under s170 of the *Heritage Act 1977*. The curtilage however does not include the existing commuter car park. Refer Figure 9.

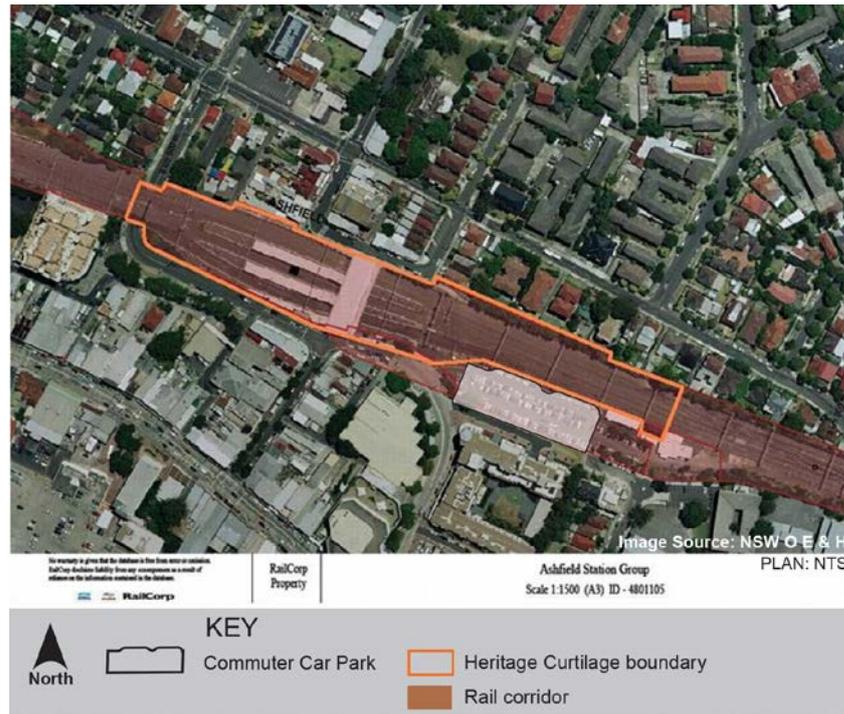


Figure 8: Ashfield Railway Station Group Curtilage

Although a large area has been included in the curtilage, this seems to be so that a number of disparate heritage elements comprising the station group are captured in the listing, including station buildings to the west and a signal box in the east. The signal box within the curtilage of the station group is located approximately 35 metres to the east of the boundaries of the commuter car park.

Three of the items within the station group have been assessed as having aesthetic heritage significance, being the former parcel office, the signal box and the Bland Street underbridge. Both the former parcel office and the Bland Street Underbridge are located near the station platforms, approximately 100 metres to the west of the commuter car park.

Given the amount of relatively recent construction between these structures and the proposed car park, there is little to no impact to the aesthetic significance of these buildings and therefore no visual impact on the Proposal. In relation to the former signal box, it is now surrounded by modern ancillary buildings which provide a buffer to the heritage listed signal box. The Proposal therefore is not anticipated to have a visual impact on the signal box.

The removal of the overhead high voltage wires and poles in the Stage 1 early works is a positive visual amenity outcome as it reduces the overall amount of competing infrastructure elements near the Bland Street underbridge and the former parcel office thereby simplifying the overall visual environment. Construction work for the Stage 1 early works will be temporary and therefore have only a short term visual impact on the existing heritage fabric.

The visual impact from the possible introduction of a GST will depend on its location, size and extent. These design parameters are not currently known however given the existing urban and industrial nature of the railway station and its corridor, it may be possible to minimise any impacts by incorporating it near the rail corridor boundary.

5.6 Landscape Character Impact

The landscape character of the site and surrounding area of the Proposal was assessed in order to determine the degree of change that would occur from the result of the development.

The overall landscape character has been assessed as being predominantly an urban character due to the amount and general density of the built elements. This includes tall and relatively

modern buildings, paved surfaces, railway corridor and related infrastructure and limited amount of tree canopy within the site and immediate surrounding area.

Because of the diversity of land uses and built form, the local area does not have a particularly cohesive character, nor does it have a character or visual qualities that would generally be highly valued by the local community. In this regard, the Sensitivity to change of the landscape character is considered to be **Low**.

The height of the Proposal is low in comparison to the apartment buildings to the south and south west and the overall scale and bulk is consistent with the apartment's railway station concourse, platforms and rail corridor to the north and west.

Furthermore, the site's existing character is already largely defined by its use as a car park and this remains unchanged, therefore the Magnitude of change introduced by the Proposal is assessed as being **Moderate-Low**.

Taking into account both the Sensitivity and Magnitude, the overall impact on the existing landscape character is assessed as being **Moderate-Low**.

Table 2: Landscape Character Impact Assessment

| | | Magnitude | | | | | |
|---------------|---------------|---------------|---------------|---------------|---------------|--------------|------------|
| Impact Rating | | High | Moderate-High | Moderate | Moderate-low | Low | Negligible |
| Sensitivity | High | High Impact | High Impact | Moderate-High | Moderate-High | Moderate | Negligible |
| | Moderate-High | High Impact | Moderate-High | Moderate-High | Moderate | Moderate | Negligible |
| | Moderate | Moderate-High | Moderate-High | Moderate | Moderate | Moderate-Low | Negligible |
| | Moderate-Low | Moderate-High | Moderate | Moderate | Moderate-Low | Moderate-Low | Negligible |
| | Low | Moderate | Moderate | Moderate-Low | Moderate-Low | Low | Negligible |
| | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

6 Visual Impact Assessment

The availability of views to a new element in the environment is a prerequisite for visual impact. The severity of visual impact is determined by the relative importance of such views in the context of the view shed and the value placed on the landscape in and around the site where the element is placed.

A qualitative assessment of the visual impact for this project was undertaken. The process aims to be objective and describe any changes factually. However, rating these changes requires subjective judgements to be made. The conclusions of this assessment therefore combine objective measurement and subjective professional interpretation.

6.1 Project Visibility

The visual catchment of a site is the extent of the landscape that can be viewed from the site and, by extension, the extent of locations from which the site can be seen. Landscape vegetation, land use and landform all play large roles in determining the visual catchment.

An initial desktop survey was undertaken to identify and consider possible representative viewing points from which the Proposal may be visible. A field survey was then conducted to 'ground truth' the desktop survey. Ground truth means to check and confirm decisions made in the desktop survey by visiting locations and confirming that the conclusions are generally as anticipated. This might also include discounting expected views and/or adding others.

LiDAR digital imagery was then used to create a Visual Envelope Map (VEM) showing areas of land within which a development is theoretically visible.

LiDAR is specialised Radar, Light Detection and Ranging (LiDAR) data and satellite imagery which depict height information, vegetation and other special conditions and features. LiDAR sensors use light to profile ground contours and also the elevation of buildings, trees, and other objects on the ground. From LiDAR data, depictions of multiple surfaces can be generated – for instance, the tree canopy surface relative to the ground surface.

Figure 10 is an indicative Visual Envelope Map (VEM) for the Proposal. It shows the potential visual catchment of the Stage 2 proposed car park based on existing topography, buildings and vegetation. The VEM gives an indication of potential views helping to inform the selection of representative viewpoints for assessment.

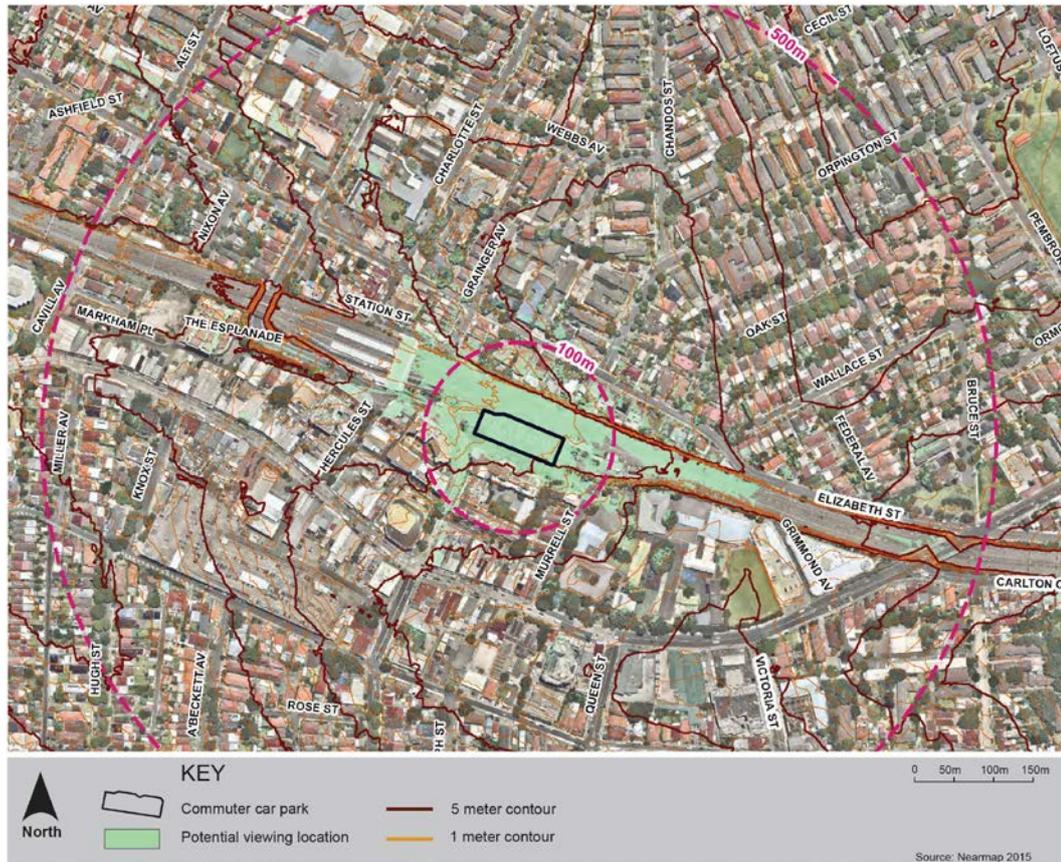


Figure 9: Visual Envelope Map (VEM).

The Visual Envelope Map (VEM) represented by figure 10 is based on a three storey car park with a highest point roof level of 39.6m. The VEM indicates that the primary visual envelope is limited to view opportunities predominantly within 100 metres of the Proposal due to;

- Buildings to the south and southwest
- The train station to the west
- Trees, vegetation, buildings and landform to the north
- Trees and existing vegetation to the east

6.2 Representative Viewpoints

The viewpoints selected in this assessment are intended to represent selected views and not every possible view of the Stage 2 Proposal. Figure 11 indicates the location of the selected viewpoints from which assessments of visual impacts were made.

The viewpoints chosen are representative and aggregate anticipated visual impacts from dwellings. Furthermore, north facing views from the Capri building were divided between upper and lower floors due to the varying nature of visual impacts expected and types of views expected from different levels.

Views from the rear of the Elizabeth Street dwellings are also aggregated into a single representative viewpoint. Viewpoint assessments from view locations V02 and V03 are assumed based on the available information as access to private dwellings is not included as part of this visual assessment scope. In this regard, some assumptions were made with regard to the anticipated visual impacts based on field assessments.

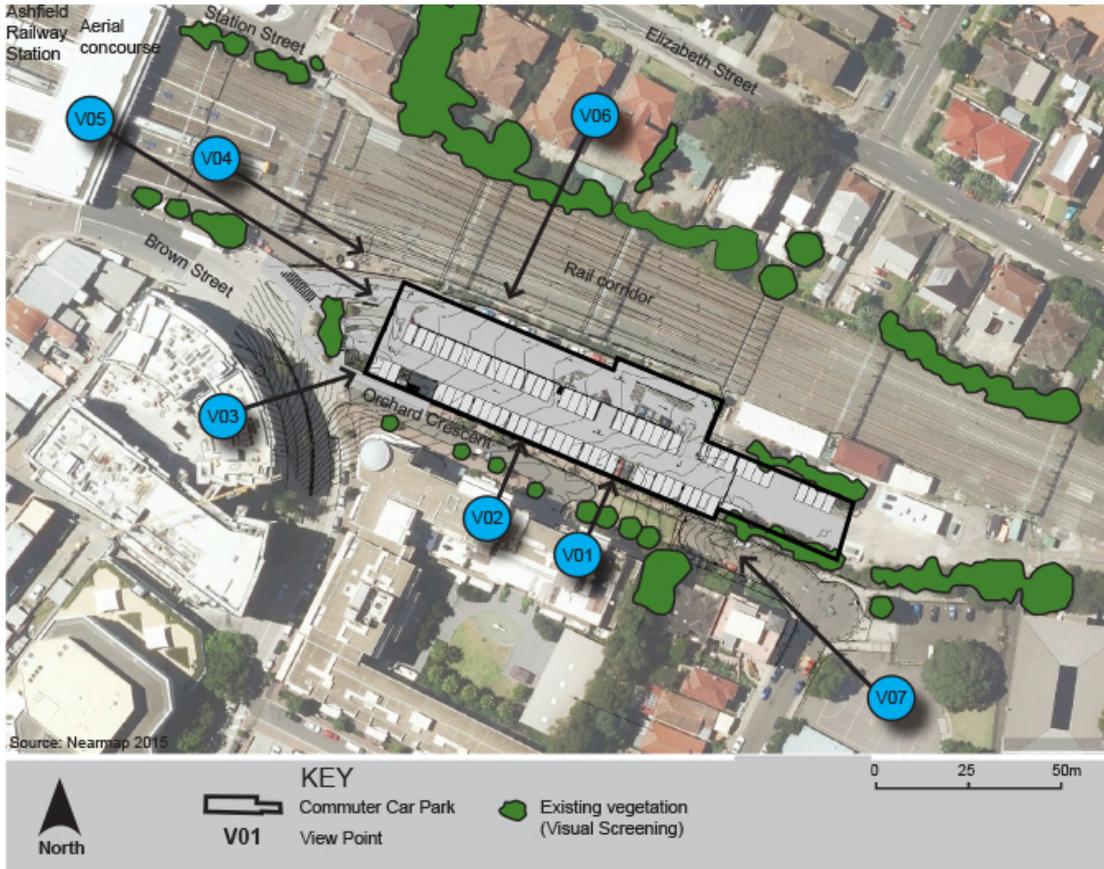


Figure 10: Representative Viewpoints

6.3 Viewpoint Assessment

The extent of visual impact of the Proposal is largely determined by the visual prominence of the Proposal, the extent the Proposal reduces pre-existing views and the number and distance of visual receivers likely to be impacted by any change in the visual landscape character of the site post development.

In making a judgement about what is a high impact, the following points were taken into consideration:

- The sensitivity to changes in views and visual amenity
- Large-scale changes which introduce new, non-characteristic, discordant or intrusive elements into a view

The assessment of permanent visual impacts associated with the Proposal on the representative viewpoints are summarised in Table 3 below. For purposes of clarity, the assessment reviews the impacts from the Stage car park proposal only. Stage 1 visual impacts are discussed in Section 3.1.

Table 3 Visual Impact Assessment

| Table 3: Visual Impact Assessment | | | |
|--|-----------------------------------|-------------------------------------|------------------------------|
| V01 Capri Apartments Ground level to level three | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| <p>This viewpoint is representative of visual receivers at the Capri development entry and of lower level north-facing residences with potentially long duration views towards the Proposal. Views are generally from internal living spaces, courtyards and balconies at a distance of approximately 30 metres. Existing views are of an urban landscape characterised by residential buildings, vehicles, the rail corridor, trains and other urban infrastructure. Sensitivity therefore is considered to be Moderate-Low. The Proposal is a new, three storey, functional use structure that replaces an existing at-grade car park. The Magnitude rating is therefore considered to be Moderate.</p> | Moderate | Moderate-Low | Moderate |
| <p>Construction: Tree removal both within the project boundaries and on Orchard Crescent will allow open and unobstructed views of the site. There will be either direct or indirect views of site security fencing and signage and possibly material and earth stockpiles and heavy machinery. People viewing from the residences above ground level may also see cleared and excavated ground prior to construction of the structure and scaffolding as the project progresses through the construction of the car park structure.</p> <p>Construction and delivery vehicles will result in moderate visual impacts if they access the site from Orchard Crescent. Visual receivers in residences may also incur a loss in visual amenity as a result of the introduction of site security lighting. Removal of existing telegraph poles and wires, flood lighting and existing boundary fencing would be undertaken in the Stage 1 early works and are considered a positive, however relatively minor, improvement to the existing visual amenity.</p> | | | |
| <p>Operation: The Proposal introduces a new element in the foreground of the view. Potential visual impacts include direct or partial views of the visually broken southern facade of the three storey parking structure including the stair wells and a lift shaft, moving and stationary vehicles and people using the facility which will replace longer distance views of the railway corridor, trains, vegetated embankment and dwellings north of the rail corridor. The wider view of the urban landscape being replaced by a closer view of a car park structure is considered to be a reduction in visual amenity. Visual receivers in residences may also incur a loss in visual amenity as a result of the introduction of security lighting at night.</p> | | | |





Figure 11 Artist impression looking north from Capri Apartment Entry.

Note: The height and location of the proposal has been established by using references such as the approximate location of the northern and western car park boundaries and other vertical elements such as the Capri building to the south. The image is intended only to give a general indication of the view.

| Table 3: Visual Impact Assessment | | | |
|--|-----------------------------------|-------------------------------------|------------------------------|
| V02 Capri Apartments Levels four and above | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| The viewpoint is representative of visual receivers at the Capri development upper level north-facing residences with potentially long duration views towards and over the Proposal. Views are direct from balconies as well as indirect or partial views from internal living spaces at a distance of approximately 30 metres or more. | Low | Moderate-Low | Moderate-Low |
| Existing views are of an urban landscape characterised by residential buildings, vehicles, the rail corridor, trains and other urban infrastructure. Sensitivity therefore is considered to be Moderate-Low. | | | |
| The Proposal is a new, three storey, functional use structure that replaces an existing at-grade car park. The more elevated views of visual receivers take in wider and more distant views of the landscape therefore the Magnitude rating is reduced to Low. | | | |
| Construction: Potential visual impacts are greatest from external balconies and north facing windows where they are open and direct of all aspects of the construction. The removal of telegraph poles, flood lights and overhead wires will contribute to a minor improvement in visual amenity initially. As the project progresses through construction, views of open excavated ground and ground works would be replaced predominant by views of scaffolding surrounding the exterior however little, if any, of the proposal's construction will occupy views from internal residences until construction of the upper levels of the proposal. | | | |
| Operation: Visual impacts from higher level residences as views to the surrounding areas will largely be maintained with only the top of the roof structure, lift shaft and vehicles visible. Visual receivers in residences may incur a loss in visual amenity as a result of the introduction of site security lighting on the roof level at night. Existing views of the wider landscape are generally maintained and the Proposal will only introduce a relatively low loss of visual amenity of existing views. | | | |
| Please note: Photographs from private residences in V02 have not been taken as they are not included as part of the scope of this report. | | | |
| | | | |

| Table 3: Visual Impact Assessment | | | |
|---|-----------------------------------|-------------------------------------|------------------------------|
| V03 Station 2a Residences and ground level commercial units | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| <p>The viewpoint is represents a number of visual receivers both in upper level residences and in ground level commercial spaces with potentially long duration views towards the northeast. Views of the Proposal are possible from internal living and working spaces and external balconies at a distance of approximately 50 metres or more.</p> | Moderate | Moderate-Low | Moderate |
| <p>Current views include; Brown Street, a car park and an urban landscape characterised by apartment buildings, vehicles, trains, the rail corridor and urban infrastructure. Sensitivity therefore is considered to be Moderate-Low. The Proposal is a new, three-storey, functional use structure that replaces an existing at-grade car park. The Magnitude rating is therefore considered to be Moderate.</p> | | | |
| <p>Construction: Viewers will be able to see directly into the construction site. A majority of views are from elevated positions with open views of the site security fencing and signage, material and earth stockpiles. A group of existing Bottlebrush trees at the corner Orchard Crescent and Brown Street will assist in screening views from ground and lower level residences of the southwest corner. Viewers in residences above ground level may also see cleared and excavated ground prior to construction of the structure and scaffolding as the project progresses through the construction of the car park structure. Construction and delivery vehicles accessing the site may also create a visual impact depending on frequency, time of day, type of vehicle and site access point. Visual receivers in residences may also incur a loss in visual amenity as a result of the introduction of site security lighting. Removal of existing telegraph poles and wires, flood lighting and existing boundary fencing would be undertaken early in the project and are considered a positive, but relatively minor, improvement to the existing visual amenity.</p> | | | |
| <p>Operation: The Proposal introduces a new element in the foreground of the view. Potential visual impacts include direct or partial views of the southern and western facades of a three storey parking structure including the western stair wells and lift shaft and vehicle entry, moving and stationary vehicles and people using the facility. Ground and lower level views of the Proposal will partially obscure longer distance views of the railway corridor, trains, vegetated embankment and dwellings north of the rail corridor. Wider views of the landscape from upper level residences, above level three, are preserved and lower level views of the rail corridor will be buffered resulting in a minor improvement in visual amenity. Visual receivers in residences may also incur a loss in visual amenity as a result of the introduction of security lighting at night.</p> | | | |
| <p>Please note: Photographs from private residences in V03 have not been taken as they are not included as part of the scope of this report.</p> | | | |

| Table 3: Visual Impact Assessment | | | |
|--|-----------------------------------|-------------------------------------|------------------------------|
| V04 Ashfield Train Station aerial concourse | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| The viewpoint is indicative of views from the Ashfield train station elevated, aerial concourse. Visual receivers are primarily users of the station with only temporary views as well as station workers with longer duration views. | Low | Low | Low |
| Gantries, platforms, trains and the rail activities occupy the foreground of the view while an eight storey residential development is also a prominent visual element. Sensitivity of this view is considered to be Low. | | | |
| The Proposal replaces an existing at-grade car park with a three storey car park structure. The overall bulk and scale of the Proposal is much less than the adjacent apartment development in the view. Magnitude is therefore considered to be Low. | | | |
| During construction, there will be partially obstructed views of construction activities which are in the middle ground of the view. Viewers are elevated above the site and so will be able to see most aspects of the construction and related activities such as; site security fencing, stockpiling of materials, plant and machinery, site sheds, heavy machinery including; dump trucks, excavators, cement mixers, flatbed trucks, cranes as well as other vehicles supplying materials to the site, machinery and workers. | | | |
| Operation: From this view, the western facade and vehicle entry and northern facade will be visible as well as the lift well above the rooftop level. The proposal is in the middle ground of the view and views are partially obstructed by the existing rail gantries in the foreground. The overall bulk and scale of the Proposal will be visible however the type of development is visually consistent with adjacent rail and civic precinct uses. At night there will be additional lighting created by the Proposal however light levels will be seen in the context of other lighting from streets, residences and the rail station. The Proposal therefore presents only a small loss of visual amenity in the view. | | | |



Figure 12: Indicative view north from Station concourse.

Note: The height and location of the proposal has been established by using references such as the approximate location of the northern and western car park boundaries and other vertical elements such as the Capri building to the south. The image is intended only to give a general indication of the view.

| Table 3: Visual Impact Assessment | | | |
|---|-----------------------------------|-------------------------------------|------------------------------|
| V05 Train Station platform eastern end | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| The viewpoint represents views from the eastern ends of the Ashfield Station central platforms at a distance of approximately 50-70 meters. Visual receivers are primarily users of the station and platforms as well as station workers with longer duration views. | Low | Low | Low |
| Gantries, platforms, trains and the rail infrastructure occupy the foreground of the view while an eight storey residential development is also a prominent visual element. Sensitivity of this view is considered to be Low. | | | |
| Existing views are of a high use rail corridor, an eight storey apartment development with tree canopies in the background of the view. The Proposal is a new three storey structure occupying a generally large portion of the mid-foreground view. Magnitude is therefore considered to be Low. | | | |
| Construction: Views of the early works will be of the site security fencing and signage positioned near the northern and western boundaries and possibly also of the site vehicle access if entering off of Brown Street. Views may also be evident of material and earthwork stockpiles depending on their location as well as views of scaffolding as the project progresses through the construction of the car park structure. | | | |
| Operation: From this location, views will be of the western vehicle entry and facade and the northern facade although partially obstructed by the existing rail gantries, rail infrastructure and temporarily by trains. The Proposal will become a prominent visible element in the view however the type of development is visually consistent with adjacent rail infrastructure use. Views of the Capri development will be partially obscured by the Proposal. This could be considered as having a neutral overall visual impact on the amenity of the view however the loss of the ability to see existing trees in the background of the view is considered to contribute to a minor loss of visual amenity. | | | |
| At night there will be additional lighting created by the Proposal however light levels will be seen in the context of other ambient lighting from streets, surrounding buildings and the rail station. | | | |

| Table 3: Visual Impact Assessment | | | |
|--|-----------------------------------|-------------------------------------|------------------------------|
| V06 Elizabeth Street (Southern side) | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| <p>The viewpoint is indicative of visual receivers in south facing properties along the southern side of Elizabeth Street with potentially long duration views towards the Proposal from internal living spaces, balconies, rear and side yards. There are direct and indirect views of the Proposal possible at distances beyond 60 metres. Views however may be partially screened by existing trees, vegetation, fences and/or other structures.</p> | Moderate | Moderate-Low | Moderate-Low |
| <p>Sensitivity is considered to be Moderate-Low due to the urban nature of the view including a rail corridor with trains, views of the existing car park and eight storey residential buildings. The overall bulk and height of the proposal is generally lower than nearby buildings also in the view. Magnitude is therefore considered to be Low.</p> | | | |
| <p>Construction: Potential visual impacts will be on views from external balconies and north facing windows where they are open and direct of all aspects of the construction. The removal of telegraph poles, flood lights and overhead wires will initially contribute to a minor improvement in visual amenity. Removal of trees and vegetation, within the project boundaries and along the northern boundary edge will increase views of the site. As the project progresses through construction, views of open excavated ground and ground works would be replaced predominant by views of scaffolding surrounding the exterior. During construction there would be additional light and heavy vehicular traffic seen in the background of this view.</p> | | | |
| <p>At night there will be security lighting of the site which might lead to a loss of visual amenity depending on location and extent.</p> | | | |
| <p>Operation: There will be open or partial views of the northern facade the eastern lift shaft, the rooftop, moving and stationary vehicles and people using the facility. The Proposal will become a prominent visible element in the view however the type of development is visually consistent with adjacent rail infrastructure and existing use as a car park. Views of lower level residences in the Capri development and Brown Street will be obscured by the Proposal. This however is not considered to have either a positive or negative impact on visual amenity.</p> | | | |
| <p>At night there will be additional lighting created by the Proposal however light levels will be seen in the context of other ambient lighting from streets, surrounding buildings and the rail station.</p> | | | |



Figure 13: Indicative view east from Elizabeth Street through apartments

Note: The height and location of the proposal is generalised in the view and assumed using existing buildings as reference points. The image is intended only to give a general indication of the view.

| Table 3: Visual Impact Assessment | | | |
|--|-----------------------------------|-------------------------------------|------------------------------|
| V07 Ashfield Public School entry and grounds | Magnitude of Visual Effect | Sensitivity of the viewpoint | Overall Visual Impact |
| Visual receivers are students, staff and visitors to the school using the school grounds and school entry from at a distance greater than 70 metres. Views will be only of short duration and only of the southern edge as views are blocked by existing trees and/or buildings. Because of the short term nature of the views, distance and lack of visual connection due to tree cover, Sensitivity is considered to be Low. | Low | Low | Low |
| The Proposal is lower than adjacent developments in the left of the view as well as existing surrounding vegetation. Views of the Proposal are generally at oblique angles. The Magnitude rating of the Proposal is therefore considered to be Low. | | | |
| Construction: Views of the construction are limited by the existing vegetation with only the southern edge visible. Views will initially be of security fencing and signage however views of scaffolding will be possible as the project progresses through construction of the structure. | | | |
| Operation: Views from the school ground entry are of the southern facade including the eastern stair well and western lift and stair well. The new structure will form a prominent visual edge to Orchard Crescent particularly if existing trees on Orchard crescent are removed. | | | |
| The Proposal will prevent a visual connection with the train station although this is considered only a minor visual impact. The likely visual impact from this location is Low due to there being only a minor deterioration in the amenity of the existing view. | | | |



Figure 14: Indicative view south from Ashfield Public School entry

Note: The height and location of the proposal has been established by using site references such as existing trees along the southern car park boundary. The image is intended only to give a general indication of the view.

6.4 Summary of Visual Impacts

Table 4: Summary of Visual Impact Assessment

| | Sensitivity | Magnitude | Overall Score |
|------------|--------------------|------------------|----------------------|
| V01 | Moderate | Moderate-Low | Moderate |
| V02 | Low | Moderate-Low | Moderate-Low |
| V03 | Moderate | Moderate-Low | Moderate |
| V04 | Low | Low | Low |
| V05 | Low | Low | Low |
| V06 | Moderate | Moderate-Low | Moderate-Low |
| V07 | Low | Low | Low |

The Proposal will further contribute to an increasing urban character of the Ashfield commercial and transport precinct however its use as a car park and its bulk and scale are generally compatible within an area of mixed uses and an urban, inner city character.

There are few, if any visual impacts beyond 100 metres, therefore the majority of visual receivers in the wider area are not impacted by the Proposal. This is largely due to a contained view catchment area that limits external views of the Proposal.

The study has determined that the Proposal will have a mix of primarily local visual impacts ranging from Moderate to Low depending on receiver type and location.

6.4.1 V01 Capri Apartments Ground Level To Level Three

The most considerable visual impact will be on the ground, first and second floor dwellings of the Capri development to the south. Visual receivers have been assessed as being of a Moderate rating as visual receivers are residents with potentially long term views of the southern facade of the Proposal. Although the existing visual environment is not of high aesthetic value due to its views of the car park and rail corridor, the Proposal will introduce a large, new visual element in the view, curtailing wider views of areas to the north.

6.4.2 V02 Capri Apartments Levels four and above

Views from upper level apartments in the Capri are expected to have Moderate-Low visual impacts as views of the wider landscape are generally maintained and the type, scale and appearance of the Proposal is generally concordant with existing views of an urban area.

6.4.3 V03 Station 2a Residences and Ground Level Commercial Units

A moderate visual impact ratings will occur at both upper level residences and at ground level commercial spaces. Although employees of the office space will view the proposal intermittently and are relatively unaffected, greater visual receivers are residents with potentially long term views of the southern-western corner of the Proposal.

6.4.4 V04 & V05 Train Station platform

Low visual impact ratings will occur at the Ashfield train station where visual receivers are temporary. Views from the aerial concourse are considered to be of a low aesthetic value as they consist of strong urban elements such as the rail corridor and gantries in the foreground and large, residential development in the background.

6.4.5 V06 Elizabeth Street (Southern side)

Visual receivers in properties along the southern side of Elizabeth Street are assessed as being Moderate-Low. Existing views are of an urban setting that includes the existing car park, rail corridor, trains, station, eight storey buildings, roads and landscape. Although the Proposal replaces an existing car park with the same use, the new car park will introduce a more prominent visual element in the view.

6.4.6 V07 Ashfield Public School entry and grounds

A Low visual impact rating is attributed to the Ashfield Public School entry as the school currently has little visual connection with the car park site and visual receivers are only temporary. Moreover, there is larger scale development in closer proximity to the school.

6.4.7 Early Works & Construction

Option 2b of the early works is expected to have a low to negligible visual impact.

Construction will be temporary but may potentially create visual impacts on residences to the north and south depending on placement and extent of any security lighting, equipment, sheds and the site access point(s). Construction activities should therefore seek to limit these impacts wherever possible during the course of the entire construction period.

7 Overshadowing

7.1 Overshadowing

Overshadowing analysis has been undertaken to determine the extent to which the proposed development will affect neighbouring buildings and structures in terms of the distance and direction of the shadow it casts.

Shadow analysis has been addressed for both summer and winter solstice, and also in the Spring Equinox, to provide a thorough interpretation:

1. March 9:00am, 12:00pm and 3:00pm (Spring Equinox)
2. June 9:00am, 12:00pm and 3:00pm (Winter Solstice)
3. December 9:00am, 12:00pm and 3:00pm (Summer Solstice)

The shadow analysis diagrams overleaf illustrate the influence of the proposed development, which is summarised below, and further in Table 5:

- March: no notable impact on surrounding development
- June: Minimal to moderate impact on the Capri Apartments. Most notable is at 9:00am where the car park would cast a shadow onto the north face of the building.
- December: no notable impact on surrounding development

Table 5: Summary of overshadowing analysis

| | Month & Time | Period | Influence |
|---|-------------------------|-----------------|------------------|
| 1 | March 9:00am | Spring Equinox | None |
| 2 | March 12:00pm | Spring Equinox | None |
| 3 | March 3:00pm | Spring Equinox | None |
| 4 | June 9:00am | Winter Solstice | Moderate |
| 5 | June 12:00pm | Winter Solstice | Moderate |
| 6 | June 3:00pm | Winter Solstice | Minimal |
| 7 | December 9:00am | Summer Solstice | None |
| 8 | December 12:00pm | Summer Solstice | None |
| 9 | December 3:00pm | Summer Solstice | None |

Although the latest iteration of the proposal is overall taller by approximately 1.4m in places, the overshadowing of the proposed commuter car park structure will still have an overall minimal influence on adjoining/surrounding development. There will be a moderate influence in June where the proposed car park will cast a shadow on the road/open space to the north of the Capri Apartment complex.

Changes in Solar Access to the site resulting from the proposed development will be minimal, due to the overall low height of the complex, and the articulated nature of the car parking facilities façade. During June, when overshadowing is the greatest, solar access will be slightly reduced.

7.2 Shadow Diagrams

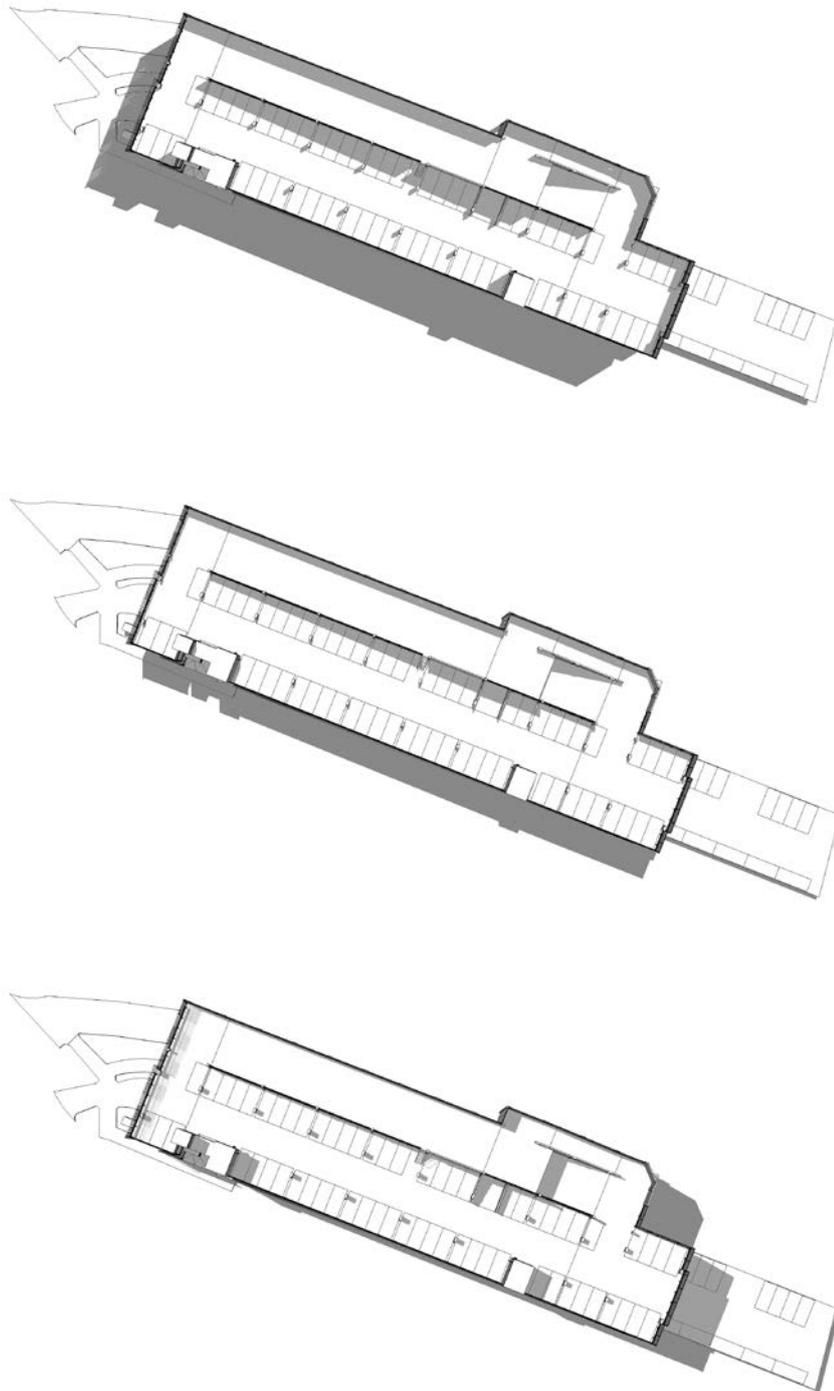


Figure 15: Spring Equinox Overshadowing in March, 9:00am, 12:00pm and 3:00pm.

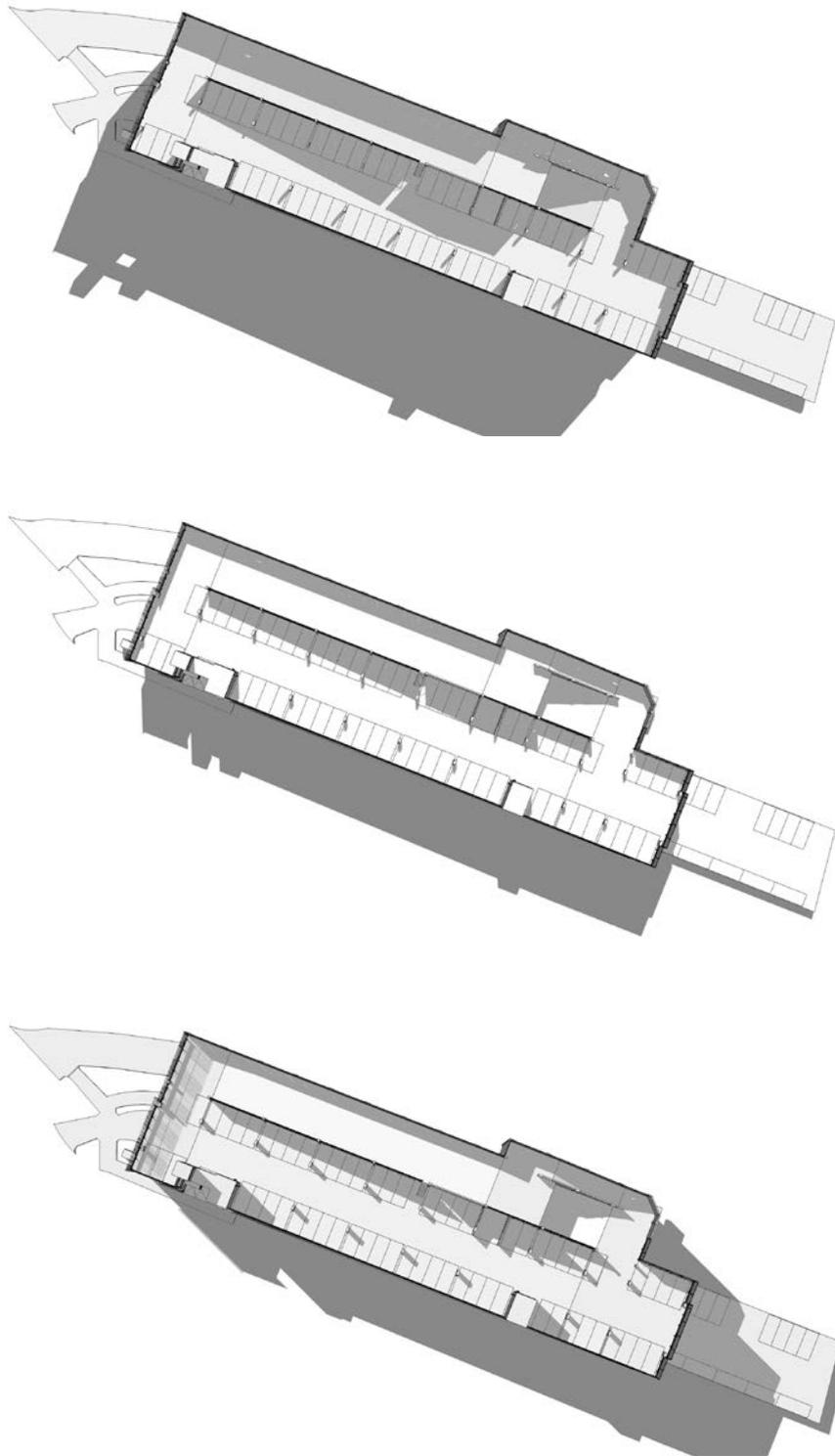


Figure 16: Winter Solstice Overshadowing in June, 9:00am, 12:00pm and 3:00pm.

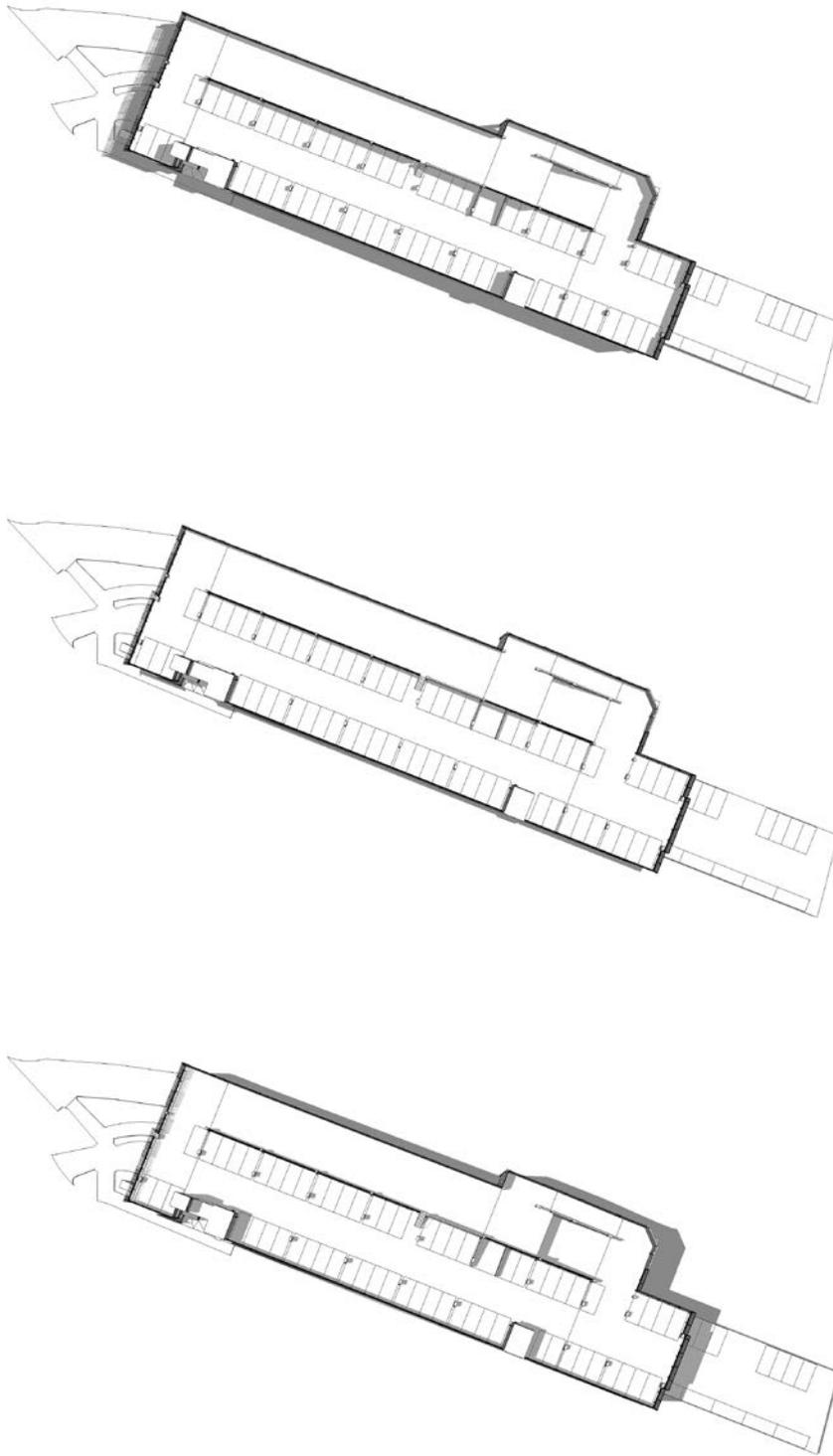


Figure 17: Summer Solstice Overshadowing in December, 9:00am, 12:00pm and 3:00pm.

8 Mitigation Measures and Recommendations

The following mitigation measures and urban design recommendations are based on the findings in this report. Mitigation measures are proposed in response to the Moderate and Moderate-Low assessment ratings in order to help moderate visual impacts of the Proposal for both the construction and operational stages.

Design recommendations relate to the findings of the urban design issues discussed in this report with the aim of meeting the following key urban design objectives;

- Integration of the car park with its current and future urban context
- Creation of a high quality, positive addition to the public domain

8.1 Mitigation Measures

The following measures may help in reducing the Moderate-Low assessment ratings if successfully implemented:

- Utilise finishes and materials of a high standard complementary to the existing locality and landscape
- Minimise reflective surfaces with a preferred use of muted/less intrusive colours particularly regarding the northern and western facades
- Where feasible, use trees and/or other screening vegetation to assist in reducing the visual prominence of the structure particularly along the northern and southern facade
- Prepare lighting models for the proposed lighting of the car park during its operation. Develop lighting that addresses Australian Standards AS4282 *Control of the Obtrusive Effects of Outdoor Lighting*. Ensure that all light spill is contained within the boundary limits of the car park wherever possible
- Locate the GST in a location that will be the least visually obtrusive

8.2 Construction

- Retain and protect existing trees and vegetation wherever practicable
- Construction and delivery vehicles to avoid using Orchard Crescent and instead access via the current car park entry off Brown Street
- Minimise or eliminate light spill, wherever possible, on adjacent properties
- The site to be kept tidy and well maintained, including removal of all rubbish at regular intervals. There should be no storage of materials beyond the construction boundaries
- Locate site sheds away from residences to avoid disturbance
- Graffiti to be removed during construction in accordance with TfNSW's standard requirements
- Work/site compounds should be screened, with shade cloth or similar material (where necessary) to minimise visual impacts on key viewing locations
- Temporary hoardings, barriers, traffic management and signage to be removed when no longer required
- Restore any areas that are impacted by construction with appropriate landscape treatments

8.3 Operation

- Implement ongoing maintenance and repairs of the car park and any other elements that form part of the development
- Replace damaged or missing elements as required
- Undertake regular landscape maintenance works
- Address vandalism, such as graffiti, by removing it in a timely manner

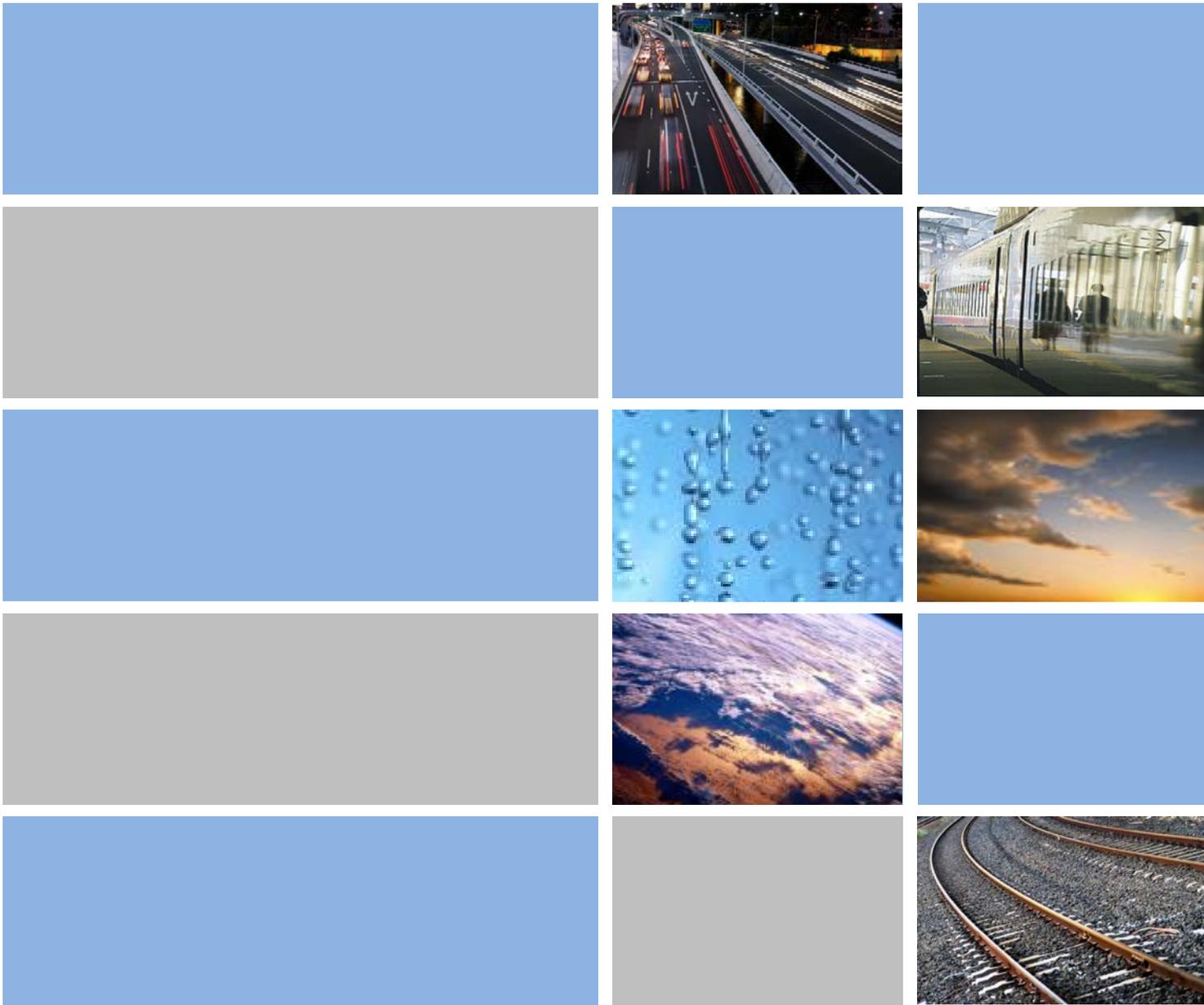
8.4 Design Recommendations

- The vertical louvres to the western façade are a welcome addition to the proposed commuter car park structure. If feasible, replicating this element in additional places to the car park façade will further assist in helping the structure blend into its surrounds. This would be applicable, for example, on the northern façade to further break-up the monolithic nature of the facade appearance
- Although views from residences to the north and south of the Proposal have been assessed as Moderate, there is likely to be little opportunity to screen views using trees or vegetation. It is therefore a recommendation of this report to provide a higher standard of design resolution to these facades as well as the western facade
- Consider further safety measures for pedestrians and cyclists crossing road intersections at Orchard Crescent and Brown Street
- Enhance the public spaces relating to the car park, such as the area west of the car park given its direct visual relationship with the Proposal and Brown Street. Consider its use as an urban plaza/arrival point and meeting place that incorporates public art, seating, cycle parking and shade planting

9 Reference Documents

1. ARUP/Design Inc., February 2015, Appendix D, 30% Concept Design Report.
2. ARUP/Design Inc., 2015, Design drawings package, Ashfield_TAP_0770_ binder Rev B_150218.
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Appendix D Operational Noise Impact Assessment



Transport for NSW

Ashfield Commuter Car Park

Operational Noise - Detailed Design Addendum

0388226RP02_F01

Approved as final April 2017
Approved for release April 2017

ERM DOCUMENT CONTROL RECORD

0388226RP01 - TAP Ashfield - Noise and Vibration Impact Assessment

| Version | Revision | Author | Reviewed by | ERM Approval to Issue: Name | ERM Approval to Issue: Date | Comments |
|---------|----------|--------|-------------|-----------------------------|-----------------------------|---|
| DRAFT | D01 | NL/SD | NL/NM | Neville Moran | 24 January 2017 | Draft report prepared by ERM |
| FINAL | F01 | SD | NL/NM | Neville Moran | 13 April 2017 | Final report prepared by ERM following TfNSW review |

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| Date: | <i>13 April 2017</i> |

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Ashfield Commuter Car
Park

*Operational Noise –
Detailed Design
Addendum*

April 2017

Reference: 0388226RP02_F01

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REFERENCES

EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Transport for NSW (TfNSW) to complete a noise impact assessment for operational aspects of the Ashfield Commuter Car Park (the CCP) as part of the Transport Access Program (TAP).

The noise impact assessment has been conducted with due regard to and in accordance with the New South Wales (NSW) policy and guidelines relevant to noise. The noise impact assessment is technical in nature, a glossary of relevant acoustical concepts and terminology is provided in Annex A of this noise impact assessment report.

ERM previously conducted a Noise and Vibration Impact Assessment (NVIA) for the CCP as part of the Review of Environmental Factors (REF) submission. The previous assessment is documented in the 0388226RP01_F01 – TAP Ashfield Commuter Car Park - Noise and Vibration Impact Assessment (ERM 2017a), prepared by ERM and dated February 2017. The purpose of the ERM 2017a study was to assess and report on the noise and vibration impacts of the CCP and to identify the mitigation measures required as a result of the impacts.

The previous assessment was undertaken during the concept design stage to support the REF and to assist define potential impacts and any future acoustics works that was deemed necessary as the design progressed, and ultimately during the detailed design of the CCP.

Since then changes to the overall CCP design have occurred and TfNSW required an experienced and suitably qualified consultancy to update the operational noise assessment to reflect the revised design.

The overall objective of this additional assessment work is to assist ensure that the operational noise results and impact assessment reflect this current design, and to support the determination report being prepared by TfNSW. The outcomes of this updated operational noise assessment are documented in this report, prepared as an addendum to the original ERM 2017a assessment.

ERM quantified existing ambient and background noise levels in the area and developed noise design goals in accordance with recognised NSW policy and guidelines as applicable to the Commuter Car Park (CCP) operational activities, and developed applicable assessment scenarios.

A quantitative operational noise impact assessment was conducted by predicting noise levels via modelling. The predictions were conducted for applicable assessment scenarios and incorporated relevant technical data. Resultant noise levels were then compared to project-specific criteria or at each receptor location.

Operational noise levels (general car park usage (car movements, lift and mechanical plant) and short-term noise events) were found to be compliant and impacts are not anticipated.

Predicted operational noise levels have been reduced and impacts minimised based on the current detailed design (April 2017). This reduction (compared to that assessed in the ERM 2017a report) is mostly attributable to the barrier around each level constructed of pre-cast concrete that is providing shielding to some receptors. This includes the most affected receptors where some levels that exceeded criteria were identified in the ERM 2017a report. The lift shaft and mechanical plant room façades have also assisted to reduce overall emissions. The introduction of the third floor (above the ground level) has been considered and emissions have not significantly increased as a result.

Provided that no significant changes (relevant to noise) are made to the current CCP design (April 2017) or where changes occur but have limited or no potential to increase noise levels at nearby receptors, no additional actions are required to those already incorporated into the current design. No further recommendations for mitigation and management measures (or monitoring options) to those established by the findings of this operational noise impact assessment, and documented in this report, are warranted or provided.

1 INTRODUCTION

This report has been prepared by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of Transport for NSW (TfNSW). It presents the methodology, findings and any recommendations of the updated operational noise impact assessment (ERM 2017b) conducted based on the revised Ashfield Commuter Car Park (CCP) design.

1.1 BACKGROUND

Nuisance, or an unacceptable level of noise and vibration amenity, may arise from construction, operational or road traffic activities associated with new or existing developments.

ERM previously conducted a Noise and Vibration Impact Assessment (NVIA) for the CCP as part of the Review of Environmental Factors (REF) submission. The previous assessment is documented in the *0388226RP01_F01 - TAP Ashfield - Noise and Vibration Impact Assessment* (ERM 2017a), prepared by ERM and dated February 2017. The purpose of the ERM 2017a study was to assess and report on the noise and vibration impacts of the CCP and to identify the mitigation measures required as a result of the impacts.

The previous assessment was undertaken during the concept design stage to support the REF and to assist define potential impacts and any future acoustics works that was deemed necessary as the design progressed, and ultimately during the detailed design of the CCP. The previous assessment considered both construction and operational noise and vibration aspects of the CCP.

The outcomes of the ERM 2017a assessment included recommendations for potential noise and vibration mitigation and management measures, and monitoring options designed to ensure that an acceptable amenity can be achieved for residential (dwelling) occupants and other sensitive receptors surrounding the site and in the broader community.

1.2 PURPOSE AND OBJECTIVES

Since the REF and NVIA were prepared changes to the overall CCP design have occurred and TfNSW required an experienced and suitably qualified consultancy to update the operational noise impact assessment to reflect the revised design.

The overall objective of this additional assessment work is to assist ensure that the operational noise results and impact assessment reflect this current design, and to support the determination report being prepared by TfNSW. The outcomes of this updated operational noise impact assessment are documented in this report, prepared as an addendum to the original ERM 2017a assessment.

The operational noise impact assessment was completed with due regard to and in accordance with the NSW Environment Protection Authority – *NSW Environmental Noise Management – Industrial Noise Policy (INP)*, dated January 2000 and relevant application notes, with other relevant noise standards applied as necessary. The full set of applicable policy, guidelines and standards are listed in the reference section of this addendum report. The existing ERM 2017a report was utilised and adapted as relevant to the assessment of the current CCP design.

A glossary of relevant acoustical concepts and terminology is provided in *Annex A* of this report.

All sound pressure levels presented in this report (eg noise levels predicted at a receptor) are in decibels referenced to 2×10^{-5} Pa, with A-weighting applied. All sound power levels presented in this report (eg noise levels assigned to specific sources) are decibels referenced to 10^{-12} W, with A-weighting applied.

1.3 SCOPE OF THE ASSESSMENT

The operational noise impact assessment scope of works included:

- Reviewing operational activities to confirm noise generating plant, equipment, machinery or activities to be undertaken as part of the CCP.
- Referencing the ERM 2017a report to confirm potentially affected receptor locations, quantify existing noise conditions and establish project-specific operational noise goals.
- Revising the existing 3D noise model to reflect the current design and predict noise levels that may occur as a result of the operation (general car park usage and mechanical plant) of the CCP at identified receptors.
- Providing a comparison of predicted noise levels to the project-specific operational noise goals and assessing the potential impacts.
- Providing recommendations (to be implemented by TfNSW to manage impacts) for feasible and reasonable noise mitigation and management measures, and monitoring options, where noise goals may be exceeded, or where impacts warrant.

2

PROJECT DESCRIPTION

The existing at grade car park, will be re-developed by installing three levels above the at grade ground level. The redeveloped car park will provide 235 multi-storey spaces.

This includes approximately 79 spaces allocated for the ground level, 63 spaces allocated for both levels one and two, 14 spaces allocated for the ramp between level one and level two and 16 spaces allocated for level three. This is inclusive of approximately 21 at-grade spaces to the east of the car park on the ground floor that will be retained from the existing car park.

The car park will have a lift that services the first two levels above ground. Two stair wells will also service these levels and will be located on the southern boundary. The third level will be accessible via ramps from the second level.

2.1

DESIGN CHANGE OVERVIEW

A description of the original CCP proposal assessed in the REF (and NVIA) was provided in Chapter 2 of the ERM 2017a report. The key design changes that have occurred include the following:

- An additional level has been included in the detailed design. This third level will be a smaller size than levels one and two, and will provide 16 parking spaces along the northern boundary of the CCP.
- The location of the lift and the stair wells have been identified in the current design.
- A barrier around each level constructed of pre-cast concrete has been identified in the current design.
- The mechanical plant noise sources have also been identified in the current design.

Structural materials to be used will be predominantly reinforced concrete, structural steelwork and masonry. The lift shaft design includes a glass panel along the southern wall.

Each of these features will affect how noise propagates and the overall operational noise emission of the CCP. All items noted above have been considered in this revised assessment in the context of the overall CCP design.

The additional (third) level, lift and mechanical plant are expected to have a minimal effect on noise but may increase levels for some receptors, whilst the pre-cast concrete barriers are expected to reduce noise for receptors where shielding is provided.

2.2 PROJECT DESIGN NOISE FEATURES

Ashfield railway station is located on the T2 Airport, Inner West & South Line and T1 North Shore, Northern & Western Lines. This station is currently served by these two lines. There are seven tracks served by five platforms connected to the adjacent streets by a footbridge.

The station is situated in the suburb of Ashfield, and is located alongside Brown Street and Orchard Crescent. The station is approximately 8.4km from Central Station. It was first opened on 26th September 1855.

As part of the TAP initiative the Ashfield Station commuter car park is proposed to be upgraded. The CCP site is situated 90 metres (m) from Ashfield Station and is located on land currently under the ownership of RailCorp, directly accessible from Brown Street. The site is currently utilised as an at grade commuter car park and as an entrance point to a RailCorp signals depot.

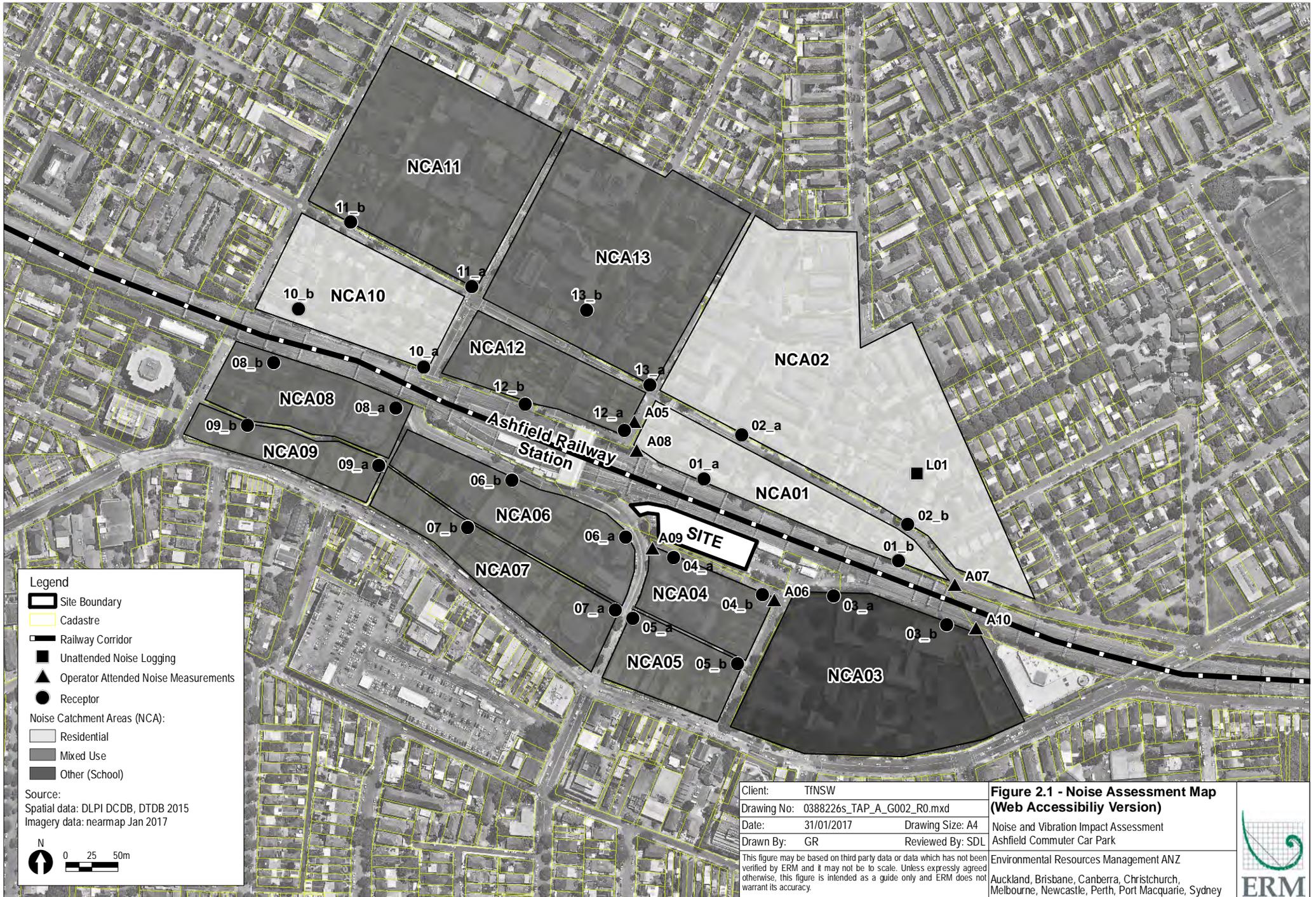
The existing car park site is subject to the provisions set out in the Ashfield Local Environmental Plan 2013 (ALEP 2013). Under the ALEP 2013 the site is zoned B4 Mixed Use. Other land uses in proximity to the site are zoned B4 Mixed Use (south of the Railway Station) and B2 Local Centre and R3 High Density Residential (north of the Railway Station).

Ashfield station, the CCP site, existing railway and road networks, surrounding area, and other items of importance to this assessment are shown in *Figure 2.1*.

2.2.1 Hours of Operation

For the purposes of this noise impact assessment it has been assumed that the car park will operate 24 hours per day and seven days per week.

This approach has been adopted to comprehensively assess potential impacts and inform any recommendations, despite the very limited usage of the car park that is envisaged during the night time period.



Client: TfNSW
 Drawing No: 0388226s_TAP_A_G002_R0.mxd
 Date: 31/01/2017 Drawing Size: A4
 Drawn By: GR Reviewed By: SDL

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

ERM

3 ASSESSMENT METHODOLOGY

This chapter summarises the assessment methodology. It describes the closest and/or potentially most affected noise sensitive receptors situated within the potential area of influence of the CCP, the existing noise levels of the area, the operational noise design goals, the noise modelling approach and other acoustical considerations.

The noise measurement methodology (to quantify existing noise levels) and resultant baseline ambient and background noise levels established for each receptor was provided in Chapter 3 of the ERM 2017a report. Key features of the baseline noise impact assessment and existing noise levels of the area are reproduced here.

3.1 EXISTING CONDITIONS

The existing noise environment in the vicinity of residential and commercial receptors near the CCP is best described as 'urban', being an area with an acoustical environment that:

- is dominated by 'urban hum' or industrial source noise
- has through traffic with characteristically heavy and continuous traffic flows during peak periods
- is near commercial districts or industrial districts
- has any combination of the above, where 'urban hum' means the aggregate sound of many unidentifiable, mostly traffic-related sound sources.

3.1.1 Potentially Sensitive Receptors

The following sensitive receptors were identified to be the closest and/or potentially most affected locations situated within the potential area of influence of the CCP, as described in *Table 3.1* and identified in *Figure 2.1*.

These locations were established based on observations made on site, review of land use zoning and cadastre data and the results of preliminary noise modelling, where receptor positions were optimised to ensure representative worst-case levels were being predicted.

These locations do not represent all receptors located in the vicinity of the CCP but have been selected for the purposes of this noise impact assessment. They are considered to be representative of locations that will potentially experience the highest impacts associated with the CCP construction, and will be the most affected during operation.

GUIDANCE NOTE

The built environment surrounding the CCP is generally characterised by multistorey mixed use buildings, with commercial receptors (shops etc) on the ground floors and residential (dwelling) receptors on the floors above. To the south-east of the CCP are a school and childcare, both of which consist of multistorey buildings. This feature is more prevalent directly south of and adjacent to the CCP (where a number of multistorey buildings (three or more floors) were identified) than to the north where most buildings are single or double storey.

In accordance with the relevant NSW noise policy and guidelines an assessment height of 1.5 metres (above the ground) has been adopted at all receptors. Background noise levels (used to establish criteria) are measured at 1.5 meters and hence levels are predicted at the same height to provide a valid assessment of compliance and potential impacts.

Given the number of mixed use buildings near the CCP, this assessment has focused on the comparison of predicted noise levels to the most stringent operational noise goals for residential receptors. Where the receptor type was not easily identifiable, the predicted values are also compared to the 'other sensitive receptors' ie schools or commercial premises noise goals to provide an indication of potential impacts at these other receptors. Where the receptor type was clearly identifiable ie to be a school or commercial property, no comparison to the residential noise goals is warranted or has been provided.

3.1.2 Noise Catchment Areas

'Noise Catchment Areas' (NCA) were identified for 13 discrete areas surrounding the CCP. These NCA were established to approximate areas of land that:

- may experience similar existing noise levels
- may experience similar noise levels to receptor locations where values are predicted via modelling
- to inform the extent of any notification area boundary that may be required.

These NCA are an important feature of the assessment as it is not feasible or useful to predict noise levels at every building or dwelling within the potential area of influence of the CCP. Additional information detailing the selection of NCAs and receptor locations was provided in Chapter 3 of the ERM 2017a report. All receptors and NCA applicable to this assessment are described in *Table 3.1*.

Table 3.1 Sensitive Receptors and NCA

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|---|---|-----------------|----------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA01 | Residential receptors situated in the first row of buildings north of the CCP. NCA 01 is north of the rail line and south of Elizabeth Street. | There are approximately 20 residential buildings in this catchment area. | NCA01_a | Residential Receptor | 326811 | 6248702 | 32 |
| NCA01 | Residential receptors situated in the first row of buildings north of the CCP. NCA 01 is north of the rail line and south of Elizabeth Street. | There are approximately 20 residential buildings in this catchment area. | NCA01_b | Residential Receptor | 326997 | 6248624 | 33 |
| NCA02 | Residential receptors situated in the second row of buildings north-east of the CCP. NCA 02 is north of Elizabeth Street and south of Webbs Avenue. | There are approximately 20 multi-storey residential buildings in this catchment area. | NCA02_a | Residential Receptor | 326847 | 6248744 | 36 |
| NCA02 | Residential receptors situated in the second row of buildings north-east of the CCP. NCA 02 is north of Elizabeth Street and south of Webbs Avenue. | There are approximately 20 multi-storey residential buildings in this catchment area. | NCA02_b | Residential Receptor | 327006 | 6248659 | 36 |

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|---|---|-----------------|-----------------------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA03 | Other sensitive receptors (School) situated in the first and second row of buildings south east of the CCP. NCA 03 is south of the rail line and north of Liverpool Road. | There are approximately nine multi-storey school buildings in this catchment area. | NCA03_a | Other Sensitive Receptor (School) | 326935 | 6248591 | 35 |
| NCA03 | Other sensitive receptors (School) situated in the first and second row of buildings south east of the CCP. NCA 03 is south of the rail line and north of Liverpool Road. | There are approximately nine multi-storey school buildings in this catchment area. | NCA03_b | Other Sensitive Receptor (School) | 327043 | 6248564 | 36 |
| NCA04 | Residential receptors and mixed use receptors situated in the first row of buildings south of the CCP. NCA04 is south of the rail line and includes the first and second row of buildings to the CCP. | There are approximately four mixed use/residential (multi-storey) buildings in this catchment area. | NCA04_a | Mixed Use (Residential Receptor) | 326782 | 6248628 | 28 |
| NCA04 | Residential receptors and mixed use receptors situated in the first row of buildings south of the CCP. NCA04 is south of the rail line and includes the first and second row of buildings to the CCP. | There are approximately four mixed use/residential (multi-storey) buildings in this catchment area. | NCA04_b | Residential Receptor | 326867 | 6248592 | 31 |
| NCA05 | Residential receptors and mixed use receptors situated in the third row of buildings south of the CCP. NCA 05 is south of NCA04 and north of Liverpool Road. | There is one mixed use/residential (multi-storey) building in this catchment area, plus approximately 20 two storey mixed use/residential buildings in this catchment area. | NCA05_a | Mixed Use (Residential Receptor) | 326743 | 6248570 | 47 |

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|--|---|-----------------|----------------------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA05 | Residential receptors and mixed use receptors situated in the third row of buildings south of the CCP. NCA 05 is south of NCA04 and north of Liverpool Road. | There is one mixed use/residential (multi-storey) building in this catchment area, plus approximately 20 two storey mixed use/residential buildings in this catchment area. | NCA05_b | Residential Receptor | 326843 | 6248527 | 34 |
| NCA06 | Residential receptors and mixed use receptors situated in the first row of buildings south west of the CCP. NCA06 is south of the rail line and includes the first and second row of buildings to the CCP. | There are approximately four mixed use/residential (multi-storey) building in this catchment area, plus approximately 10 two storey mixed use/residential buildings in this catchment area. | NCA06_a | Mixed Use (Residential Receptor) | 326736 | 6248647 | 52 |
| NCA06 | Residential receptors and mixed use receptors situated in the first row of buildings south west of the CCP. NCA06 is south of the rail line and includes the first and second row of buildings to the CCP. | There are approximately four mixed use/residential (multi-storey) building in this catchment area, plus approximately 10 two storey mixed use/residential buildings in this catchment area. | NCA06_b | Mixed Use (Residential Receptor) | 326627 | 6248701 | 25 |
| NCA07 | Residential receptors and mixed use receptors situated in the third row of buildings south west of the CCP. NCA07 is south of NCA06 and north of Liverpool Road. | There is one commercial (multi-storey) building in this catchment area, plus approximately 26 two storey mixed use/residential buildings in this catchment area. | NCA07_a | Commercial Receptor | 326726 | 6248578 | 32 |
| NCA07 | Residential receptors and mixed use receptors situated in the third row of buildings south west of the CCP. NCA07 is south of NCA06 and north of Liverpool Road. | There is one commercial (multi-storey) building in this catchment area, plus approximately 26 two storey mixed use/residential buildings in this catchment area. | NCA07_b | Mixed Use (Residential Receptor) | 326585 | 6248656 | 28 |

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|--|---|-----------------|-------------------------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA08 | Residential receptors and mixed use receptors situated in the first row of buildings south of the rail line. NCA 08 is south of the rail line and west of NCA06 and the CCP. | There is one mixed use/residential (multi-storey) building in this catchment area, plus approximately 10 two storey mixed use/residential buildings in this catchment area. | NCA08_a | Residential Receptor | 326516 | 6248769 | 23 |
| NCA08 | Residential receptors and mixed use receptors situated in the first row of buildings south of the rail line. NCA 08 is south of the rail line and west of NCA06 and the CCP. | There is one mixed use/residential (multi-storey) building in this catchment area, plus approximately 10 two storey mixed use/residential buildings in this catchment area. | NCA08_b | Residential Receptor | 326399 | 6248812 | 24 |
| NCA09 | Residential receptors and mixed use receptors situated south of NCA08. NCA09 is south of NCA08 and west of NCA07. | There are approximately 25 two storey mixed use/residential buildings in this catchment area. | NCA09_a | Mixed Use (Residential Receptor) | 326500 | 6248715 | 25 |
| NCA09 | Residential receptors and mixed use receptors situated south of NCA08. NCA09 is south of NCA08 and west of NCA07. | There are approximately 25 two storey mixed use/residential buildings in this catchment area. | NCA09_b | Mixed Use (Residential Receptor) | 326374 | 6248753 | 24 |
| NCA10 | Residential receptors situated in the first row of buildings north of the CCP. NCA 01 is north of the rail line and south of Elizabeth Street. | There are approximately 27 residential buildings in this catchment area. | NCA10_a | Residential Receptor | 326543 | 6248808 | 22 |

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|---|---|-----------------|-------------------------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA10 | Residential receptors situated in the first row of buildings north of the CCP. NCA 01 is north of the rail line and south of Elizabeth Street. | There are approximately 27 residential buildings in this catchment area. | NCA10_a | Residential Receptor | 326423 | 6248863 | 20 |
| NCA11 | Residential receptors, mixed use receptors and other sensitive receptors situated north of NCA10. NCA 11 is north of Elizabeth Street and south of Albert Parade. | There are approximately ten multi-storey residential buildings, plus ten residential; buildings, plus six multi-storey school buildings in this catchment area. | NCA11_a | Mixed Use (Residential Receptor) | 326589 | 6248884 | 25 |
| NCA11 | Residential receptors, mixed use receptors and other sensitive receptors situated north of NCA10. NCA 11 is north of Elizabeth Street and south of Albert Parade. | There are approximately ten multi-storey residential buildings, plus ten residential; buildings, plus six multi-storey school buildings in this catchment area. | NCA11_b | Residential Receptor | 326473 | 6248945 | 20 |
| NCA12 | Residential receptors and mixed use receptors situated in the first row of buildings north of the CCP. NCA 12 is north of the rail line, south of Elizabeth Street and west of NCA01. | There are approximately 30 residential and mixed use buildings in this catchment area. | NCA12_a | Residential Receptor | 326735 | 6248748 | 30 |
| NCA12 | Residential receptors and mixed use receptors situated in the first row of buildings north of the CCP. NCA 12 is north of the rail line, south of Elizabeth Street and west of NCA01. | There are approximately 30 residential and mixed use buildings in this catchment area. | NCA12_b | Mixed Use (Residential Receptor) | 326640 | 6248773 | 24 |

| NCA | Description | Potential Number of Noise Affected Buildings | Receptor | Type | GPS Co-ordinates - Easting | GPS Co-ordinates - Northing | Estimated Ground Height |
|------------|---|---|-----------------|-----------------------------------|-----------------------------------|------------------------------------|--------------------------------|
| NCA13 | Residential receptors, mixed use receptors and other sensitive receptors situated north of NCA12. NCA 13 is north of Elizabeth Street and south of Webbs Ave. | There are approximately 15 multi-storey residential buildings, plus six multi-storey school buildings in this catchment area. | NCA13_a | Residential Receptor | 326759 | 6248791 | 33 |
| NCA13 | Residential receptors, mixed use receptors and other sensitive receptors situated north of NCA12. NCA 13 is north of Elizabeth Street and south of Webbs Ave. | There are approximately 15 multi-storey residential buildings, plus six multi-storey school buildings in this catchment area. | NCA13_b | Other Sensitive Receptor (School) | 326699 | 6248862 | 31 |

1. All heights are Australian Height Datum (AHD) in metres.
2. All GPS are in UTM, Zone 56H

3.2

OPERATIONAL NOISE DESIGN GOALS

For this assessment the INP is the key document for considering potential noise impacts associated with operational aspects of the CCP. First published by the EPA in January 2000, the INP provides a framework and methodology for assessing industrial noise and deriving limit conditions for consent and licence conditions.

Using this policy the EPA regulates premises that are scheduled under the *Protection of the Environment Operations Act, 1997* (POEO Act). The INP is designed for large and complex industrial sources and outlines processes designed to strike a feasible and reasonable balance between the operations of industrial activities and the protection of the community from noise levels that are intrusive or unpleasant.

The INP is also widely adopted, and is readily accepted as, a useful guideline document for the assessment of other (non-industrial) noise generating sites in NSW. In this case, the INP is the applicable guideline for the assessment of operational noise associated with the CCP. The specific INP objectives that justify the documents application are to:

- Establish limiting noise criteria that would protect the community from 1) excessive intrusive noise and 2) preserve amenity for specific land uses.
- Use the two part criteria as the basis for deriving project-specific limiting criteria.
- Promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- Outline a range of mitigation measures that could be used to minimise noise impacts.
- Provide a formal process to guide the determination of feasible and reasonable noise limits for consent or licence conditions that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- Carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the POEO Act.

The INP also provides a standardised method for the measurement and evaluation of existing ambient and background noise levels that may then be applied to establish operational criteria. This method may also be used to establish management levels and impact thresholds for other noise factors such as emissions from construction, as documented in the ERM 2017a report.

The INP measurement and evaluation methodology to quantify existing ambient and background noise levels has been adopted for this operational noise impact assessment, with background noise level values utilised to derive operational noise criteria. The INP assessment approach has then been adopted for operational noise aspects of the CCP.

3.2.1 Operational Design Goals

All project-specific operational noise design goals are identified in *Table 3.2* for all receptors considered in this noise impact assessment. These values have been determined with due regard to the INP utilising the measured ambient and background noise levels described in Chapter 3 of the ERM 2017a report, as applicable to the receptor type.

General Operational Noise

General operational noise goals are expressed as the $L_{Aeq, 15 \text{ minute}}$ noise level parameter. Residential noise goals were established by applying the limiting INP intrusiveness criterion of $L_{A90} + 5 \text{ dB}$; following consideration of existing industrial noise of the area (amenity values did not apply).

Other sensitive receptor noise goals ie schools or commercial premises, are fixed values based on usage that do not require measured ambient and background noise levels, although representative values were nominated in the ERM 2017a report.

For the purposes of this assessment the $L_{Aeq, 15 \text{ minute}}$ parameter has been adopted for all receptors (including other sensitive receptors) assuming that emissions will generally occur throughout the total duration of any given assessment period, and at any time of day.

An INP noise criteria level of 45 dBA has been established for school receptors, by applying a correction factor of 10 dBA to convert from the internal INP criteria of 35 dBA to external noise criteria that allows for simplified comparison of noise levels predicted via modelling at external assessment locations. The 10 dBA correction factor approximates the reduction provided by the building façade with windows open.

Short-Term Noise Events and Sleep Disturbance

Sleep disturbance noise goals are expressed as the $L_{A1, 1 \text{ minute}}$ noise level parameter. The sleep disturbance operational noise goals were established based on the INP application notes criteria of $L_{A90} + 15 \text{ dBA}$. These noise goals only apply during the night time (or morning shoulder) assessment periods, and only apply at residential (dwellings) receptors.

Internal 'Sleep Disturbance' Noise Design Goals

It should also be noted that the INP application notes reference the RNP which states that from the research on sleep disturbance to date it can be concluded that:

- Maximum internal noise levels below 50 to 55 dBA are unlikely to awaken people from sleep.
- One or two noise events per night, with maximum internal noise levels of 65 to 70 dBA, are not likely to affect health and wellbeing significantly.

Maximum noise levels (L_{Amax}) and $LA_{1, 1}$ minute levels are broadly similar and are commonly used in NSW to assess potential sleep awakening or disturbance issues.

External Noise Design Goals

Applying a correction factor of 10 dBA to the RNP internal 'sleep disturbance' values above, to convert them from internal to external levels results in the following:

- Maximum external noise levels below 60 to 65 dBA are unlikely to awaken people from sleep.
- One or two noise events per night, with maximum external noise levels of 75 to 80 dBA, are not likely to affect health and wellbeing significantly.

These 'sleep disturbance' values reproduced from the RNP (and adapted to external values in this assessment) are not utilised here for quantitative assessment and hence are not included in *Table 3.2* below. The focus is achieving the INP $LA_{90} + 15$ dBA goals but the RNP values may be referenced where necessary to evaluate potential impacts.

As above for the $LA_{eq, 15}$ minute general operational noise design goals (at other sensitive receptors) this 10 dBA correction factor approach to convert internal to external values allows for simplified comparison of noise levels predicted via modelling at external assessment locations. Again, the correction factor of 10 dBA approximates the reduction provided by the building façade with windows open. With windows closed reductions of more than 30 dBA could be achieved.

Table 3.2 INP Operational (LAeq, 15 minute) and Sleep Disturbance (LA1, 1minute) Noise Design Goals

| NCA | Receptor | Type | Operational Noise Criteria - Daytime | Operational Noise Criteria - Evening | Operational Noise Criteria - Night time | Operational Noise Criteria - Morning Shoulder | Sleep Disturbance Noise Criteria - Night time | Sleep Disturbance Noise Criteria - Morning Shoulder |
|-------|----------|-----------------------------------|--------------------------------------|--------------------------------------|---|---|---|---|
| NCA01 | NCA01_a | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA01 | NCA01_b | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA02 | NCA02_a | Residential Receptor | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA02 | NCA02_b | Residential Receptor | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | 45 | n/a | n/a | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | 45 | n/a | n/a | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA04 | NCA04_b | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA05 | NCA05_b | Residential Receptor | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA07 | NCA07_a | Commercial Receptor | 65 | n/a | n/a | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA08 | NCA08_a | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA08 | NCA08_b | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |

| NCA | Receptor | Type | Operational Noise Criteria - Daytime | Operational Noise Criteria - Evening | Operational Noise Criteria - Night time | Operational Noise Criteria - Morning Shoulder | Sleep Disturbance Noise Criteria - Night time | Sleep Disturbance Noise Criteria - Morning Shoulder |
|-------|----------|-----------------------------------|--------------------------------------|--------------------------------------|---|---|---|---|
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA10 | NCA10_a | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA10 | NCA10_b | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA11 | NCA11_b | Residential Receptor | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA12 | NCA12_a | Residential Receptor | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | 49 | 49 | 45 | 47 | 55 | 57 |
| NCA13 | NCA13_a | Residential Receptor | 44 | 44 | 40 | 42 | 50 | 52 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | 45 | n/a | n/a | n/a | n/a | n/a |

1. In accordance with the INP the assessment periods are defined as follows: Daytime is the period from 7am to 6pm - Monday to Saturday; or 8am to 6pm on Sundays and Public Holidays, Evening is the period from 6pm to 10pm and Night time is all remaining periods. The morning shoulder period is within the night time period, specifically between 5am and 7am.

3.3

NOISE MODELLING

Brüel & Kjær's Predictor 7810 (Version 11.1) noise modelling software package was utilised to calculate noise levels using the International Organisation for Standardisation (ISO) 9613-2:1996 (ISO9613:2) - *Acoustics - Attenuation of Sound during Propagation Outdoors - Part 2: General Method of Calculation* noise propagation algorithms (international method for general purpose, 1/1 octaves) for construction and operations.

For sound calculated using ISO9613:2, the indicated accuracy is ± 3 dBA at source to receptor distances of up to 1000 metres and unknown at distances above 1000 metres.

The Predictor software package allowed topographic details to be combined with ground and foliage regions, significant building structures or barriers etc and receptor locations, to create a detailed and accurate representation of a site and surrounding area. The revised CCP noise model incorporated these features and allowed for the quantification of noise levels from multiple sources, based on sound power or pressure levels emitted from each source. The model computed the noise propagation in the assessment area of influence to specifically quantify A-weighted decibels at identified receptors.

All predicted noise levels in this document are expressed as the $L_{Aeq, 15\text{minute}}$ or $L_{A1, 1\text{ minute}}$ parameters in dBA. Noise levels at known receptor points were calculated at a height of 1.5 metres, as described in *Section 3.1.1*.

The inputs and assumptions that have informed the operational noise modelling for the current CCP design (April 2017) are outlined below:

- The model included a temperature of 12°C and humidity of 70%, representative of conservative noise enhancing conditions. Further information is provided below regarding prevailing meteorological conditions. A ground factor of 0.6 was adopted for the modelling area (0.0 is hard, 1.0 is soft) representative of general ground conditions.
- The ground level and the three levels above have been included into the model as a reflective building surface. The relative height of each level has been adopted into the model based on the current design.
- The lift and stair wells have been identified in the current design and included into the model to represent their effect on noise propagation, both reflection and shielding effects.

- A barrier around each level constructed of pre-cast concrete has been identified in the current design and included in the model with an indicative height of 1.1 metres. The current design identifies 150mm thick pre-cast concrete panels topped with anti-throw screens however these screens are expected to have limited acoustics performance (if any at all) and have been excluded from the model.
- Structural materials to be used will be predominantly reinforced concrete, structural steelwork and masonry. Therefore the surfaces of the CCP in the model have been represented by hard reflective building surfaces.
- Mechanical plant for the CCP has been identified within the “SSR / Comms” room in the current design. The mechanical plant is a potential noise emission source and is situated in the north-eastern portion of the CCP. It will be enclosed within the “SSR / Comms” room. This plant has been included in the model as an emitting façade representing the noise radiated from the “SSR / Comms” room external wall, a reduction representing the reinforced concrete, structural steelwork and/or masonry construction of the room was applied.
- The lift is also a potential noise emission source and its location has been identified in the current design. It is situated on the southern boundary of the CCP. The lift shaft will enclose the lift itself and the current design includes a glass panel in the design. The lift has been included in the model as an emitting façade representing the noise radiated from the lift shaft external wall, a reduction representing the partial glass construction of the lift shaft was applied. A 10mm single pane glass panel was modelled to provide a conservative approximation of emissions from the lift.

3.3.1 Noise Emission Data

Sound Power Level (L_w , dBA) and frequency (Hz) data incorporated into the CCP noise model was adopted from the ERM 2017a assessment, obtained from publically available reference sources such as other noise impact assessments of similar sites, or (where no data was available) obtained from the ERM noise database for items of similar duty.

L_w is a measure of the total power radiated by a source. The “sound power” of a source is a fundamental property of the source and is independent of the surrounding environment. This differs from the Sound Pressure Level (L_p) which is the level of “sound pressure” as measured at distance by a standard sound level meter with a microphone. L_p is the received sound as opposed to L_w that is the sound ‘intensity’ at the source itself.

Noise Modelling Emission Types

The ISO9613:2 noise propagation algorithms allow the use of a number of source types, such as point sources, area sources, moving point sources, line sources; emitting façades or roofs etc.

As noted above “emitting façades” were used to represent the emission from the lift shaft and mechanical plant room in the CCP noise model. Emitting facades are a vertical area with an overall Lw value (as well as other features) assigned, with point sources evenly distributed throughout its layout. To accurately represent general operational emissions capturing the size and layout of the lift and plant room separate area sources were utilised to predict LAeq,15minute noise levels, concurrent to the car movement emissions described below.

For the key operational emission sources (car movements etc) “area sources” were adopted. An area source is a horizontal area with an overall Lw value (as well as other features) assigned, with point sources evenly distributed throughout its layout; in this case the car park area. To accurately represent general operational emissions capturing the size, layout and number of car park floors (ground, first, second and third floors) four separate area sources were utilised to predict LAeq, 15minute noise levels. A separate area source was placed in the model for each level of the CCP to accurately represent the distribution of noise across the overall car park design.

To predict LA1, 1 minute noise levels six “point sources” were placed at representative locations across the site. This approach was adopted to accurately represent noise levels associated with the instantaneous emissions (which occur at a particular place for a short duration) that are related with this feature of the assessment. Point sources are a single multi-directional emission sources with an Lw value (as well as other features) assigned to each.

A conservative approach was adopted for the general operational noise modelling with all sources assumed to be operating concurrently, which in reality may not occur. This conservative approach was adopted at this design stage to inform and provide recommendations for noise mitigation, management measures or monitoring options that could be necessary to minimise impacts.

3.3.2 Meteorological Conditions

Adverse meteorological conditions have the potential to increase noise levels, for example wind speeds up to 3 m/s blowing in the direction of a receptor from the site or temperature inversions. Wind speeds above 3 m/s tend to increase ambient noise emissions to the extent that a site’s contribution is masked. This increase in

noise level is more significant for receptors situated at greater distances e.g. 500 to >1000 m from a noise source.

In this case and due to the close proximity (<150 m) of the closest and/or potentially most affected receptors only calm conditions have been modelled. Where compliance at these most affected locations can be demonstrated, it is expected that noise levels associated with the site will comply at other locations despite the potential effects of adverse meteorological conditions.

This is primarily due to the reduction in noise over distance, where it is expected that levels will be approximately 10 to 15 dBA lower at distances of 500 and 1000 m (from a point source) when compared to receptors at 150 m. In addition it is expected that further reductions in noise (which are more difficult to estimate) would occur at other locations due to the attenuation associated with building structures and foliage regions that provide further shielding to noise.

3.4 OTHER ACOUSTICAL CONSIDERATIONS

Based on the findings of the ERM 2017a report, the potential for operational rail and road traffic noise and vibration impacts to occur is limited if any at all. Therefore operational rail and road traffic impacts have been excluded from this assessment.

The ERM 2017a report also provided a robust assessment of construction noise and of construction and operational vibration. The design changes will not significantly affect the outcomes of the assessment and the impacts will be unchanged, and hence the existing mitigation remains relevant to the current design and associated works. Therefore construction noise, and construction and operational vibration impacts have been excluded from this assessment.

The focus of this assessment is associated with potential operational noise impacts generated by the CCP general usage e.g. noise from vehicles, the lift and mechanical plant.

OPERATIONAL NOISE ASSESSMENT

To assess potential operational noise impacts of the CCP two key assessment scenarios comprising typical car park usage and emissions have been developed. These reflect the current 'worst case' scenario of a car park with three levels above ground, as described below.

General Operational Noise: considers emissions associated with normal car park usage, the lift and mechanical plant. In accordance with the INP the LAeq, 15minute parameter is applied. As described in *Section 3.3* a combination of emitting facades and area sources were utilised to reflect potential impacts for the various locations that general vehicle emissions can occur within the boundary (and at each floor) of the CCP. The lift and mechanic plant are well defined in the current design and are fixed locations. All predicted noise levels are presented in *Table 4.2*.

Short-term Noise Events: considers emissions associated with excessive engine noise (accelerating, starting), vehicle movement noise (wheel squeal etc) and cars doors being closed. Each of these has the potential to cause sleep disturbance impacts at residential receptors, and in accordance with the INP the LA1, 1minute parameter is applied. Six representative noise event locations were adopted, using point sources, positioned in close proximity to receptors on the ground level to reflect potential worst-case impacts. The predicted noise levels for the short-term noise events assessed are presented in *Table 4.3*.

Predictions for both types of noise impacts include emissions from all sources occurring concurrently ie noise from all four car park levels (ground, first, second and third), or noise from all six representative short-term noise event locations.

These assessment scenarios have been developed based on the project description outlined in *Section 2*. It has been assumed that the car park will operate 24 hours per day and seven days per week, or be accessible during any INP daytime, evening, night time or morning shoulder period. The operational noise impact assessment scenarios are identified in *Table 4.1* and have been adopted for the purposes of predicting levels for comparison to the project-specific assessment criteria. The 'Sound Power Level' (LW) allocated to each item assessed is also identified in *Table 4.1*.

This assessment has been undertaken based on the information available for current design (April 2017). A conservative assessment approach has been adopted and any impacts identified here are based on a worst case scenario, therefore noise levels actually experienced during operation of the CCP may be lower than predicted.

Table 4.1 Operational Noise Assessment Scenarios

| ID | Emission Type | Location | Noise Emission Description | LW Value – LAeq, 15minute | INP Penalty |
|----|--|--|--|---------------------------|-------------|
| A | General Car Park Usage LAeq, 15 minute ¹ | Ground Floor | Vehicle noise, five cars per floor travelling less than 20 km/h, including tyre squeal and engine revving. | 77 | - |
| A | General Car Park Usage LAeq, 15 minute ¹ | First Floor | Vehicle noise, five cars per floor travelling less than 20 km/h, including tyre squeal and engine revving. | 77 | - |
| A | General Car Park Usage LAeq, 15 minute ¹ | Second Floor | Vehicle noise, five cars per floor travelling less than 20 km/h, including tyre squeal and engine revving. | 77 | - |
| A | General Car Park Usage LAeq, 15 minute ¹ | Third Floor | Vehicle noise, five cars per floor travelling less than 20 km/h, including tyre squeal and engine revving. | 77 | - |
| A | General Car Park Lift Usage | Ground Floor to Second Floor | General noise associated with lift usage e.g. lift motor drives. | 70 | - |
| A | General Mechanical Plant | Ground Floor | General mechanical plant noise within the SSR/Comms Room e.g. Air Conditioning Units | 70 | - |
| B | Short-term noise events LA1, 1minute ² | Emissions sources placed at six worst-case locations near residential receptors. | Car accelerating | 87 | - |
| B | Short-term noise events LA1, 1minute ² | Emissions sources placed at six worst-case locations near residential receptors. | Car starting | 86 | - |
| B | Short-term noise events LA1, 1minute ² | Emissions sources placed at six worst-case locations near residential receptors. | Car door closing | 82 | - |
| B | Short-term noise events LA1, 1minute ² | Emissions sources placed at six worst-case locations near residential receptors. | Car moving | 79 | - |

1. These impacts are developed based on general vehicle noise and vehicle tyre squeal noise associated with a total 15 vehicles within the car park. The following maximum instantaneous Lw values were utilised to determine LAeq, 15minute emissions source values: General vehicle (car) noise: 80 dBA and Vehicle (car) tyre squeal noise: 98 dBA.
2. These impacts are developed based on short-term noise events (vehicle noise and vehicle tyre squeal noise) associated with a total 15 vehicles within the car park. The following maximum instantaneous Lw values were utilised to determine LA1, 1minute emissions source values: Car accelerating: 98 dBA, Car starting: 97 dBA, Car door closing: 93 dBA, and Car moving: 90 dBA.

4.1 CAR PARK NOISE ASSESSMENT

The predicted LAeq, 15minute operational noise levels, identified as emission type A, for general operational noise are presented in *Table 4.2*. The predicted LA1, 1minute operational noise levels, identified as emission type B, for short-term noise events are presented in *Table 4.3*.

In *Table 4.2* and *Table 4.3* the predicted values are compared to the project-specific operational noise design goals (operational criteria), with any exceedances (predicted noise level minus criteria) highlighted in **bold** typeset.

Table 4.2 Predicted Operational Noise Levels – General Operational Usage (Emission Type A)

| NCA | Receptor | Description | Predicted LAeq,15minute Noise Level | INP Daytime Criteria LAeq 15 minute | INP Evening Criteria LAeq 15 minute | INP Night time Criteria LAeq 15 minute | INP Mourning Shoulder Criteria LAeq 15 minute | Comparison to Daytime Criteria | Comparison to Evening Criteria | Comparison to Night time Criteria | Comparison to Mourning Shoulder Criteria |
|-------|----------|-----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|---|--------------------------------|--------------------------------|-----------------------------------|--|
| NCA01 | NCA01_a | Residential Receptor | 33 | 49 | 49 | 45 | 47 | -16 | -16 | -12 | -14 |
| NCA01 | NCA01_b | Residential Receptor | 25 | 49 | 49 | 45 | 47 | -24 | -24 | -20 | -22 |
| NCA02 | NCA02_a | Residential Receptor | 24 | 44 | 44 | 40 | 42 | -20 | -20 | -16 | -18 |
| NCA02 | NCA02_b | Residential Receptor | 23 | 44 | 44 | 40 | 42 | -21 | -21 | -17 | -19 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | 30 | 45 | n/a | n/a | n/a | -15 | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | 21 | 45 | n/a | n/a | n/a | -24 | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | 40 | 49 | 49 | 45 | 47 | -9 | -9 | -5 | -7 |
| NCA04 | NCA04_b | Residential Receptor | 37 | 49 | 49 | 45 | 47 | -12 | -12 | -8 | -10 |
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | 19 | 44 | 44 | 40 | 42 | -25 | -25 | -21 | -23 |
| NCA05 | NCA05_b | Residential Receptor | 21 | 44 | 44 | 40 | 42 | -23 | -23 | -19 | -21 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | 34 | 49 | 49 | 45 | 47 | -15 | -15 | -11 | -13 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | 23 | 49 | 49 | 45 | 47 | -26 | -26 | -22 | -24 |
| NCA07 | NCA07_a | Commercial Receptor | 16 | 65 | n/a | n/a | n/a | -49 | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | 12 | 44 | 44 | 40 | 42 | -32 | -32 | -28 | -30 |
| NCA08 | NCA08_a | Residential Receptor | 15 | 49 | 49 | 45 | 47 | -34 | -34 | -30 | -32 |
| NCA08 | NCA08_b | Residential Receptor | 13 | 49 | 49 | 45 | 47 | -36 | -36 | -32 | -34 |
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | 16 | 44 | 44 | 40 | 42 | -28 | -28 | -24 | -26 |
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | 14 | 44 | 44 | 40 | 42 | -30 | -30 | -26 | -28 |
| NCA10 | NCA10_a | Residential Receptor | 11 | 49 | 49 | 45 | 47 | -38 | -38 | -34 | -36 |
| NCA10 | NCA10_b | Residential Receptor | 10 | 49 | 49 | 45 | 47 | -39 | -39 | -35 | -37 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | 17 | 44 | 44 | 40 | 42 | -27 | -27 | -23 | -25 |
| NCA11 | NCA11_b | Residential Receptor | 11 | 44 | 44 | 40 | 42 | -33 | -33 | -29 | -31 |
| NCA12 | NCA12_a | Residential Receptor | 28 | 49 | 49 | 45 | 47 | -21 | -21 | -17 | -19 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | 13 | 49 | 49 | 45 | 47 | -36 | -36 | -32 | -34 |
| NCA13 | NCA13_a | Residential Receptor | 21 | 44 | 44 | 40 | 42 | -23 | -23 | -19 | -21 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | 20 | 45 | n/a | n/a | n/a | -25 | n/a | n/a | n/a |

1. All noise levels and noise level comparisons are expressed using the LAeq, 15minute parameter and are in decibels, dBA.

Table 4.3 Predicted Operational Noise Levels – Short-term Noise Events (Emission Type B)

| NCA | Receptor | Description | Short Term Noise Event | Predicted LA1, 1minute Noise Level | INP Night time Sleep Disturbance Criteria LA1, 1 minute | INP Mourning Shoulder Sleep Disturbance Criteria LA1, 1 minute | Comparison to Night time Sleep Disturbance Criteria | Comparison to Mourning Shoulder Sleep Disturbance Criteria |
|-------|----------|-----------------------------------|------------------------|------------------------------------|---|--|---|--|
| NCA01 | NCA01_a | Residential Receptor | Car Accelerating | 41 | 55 | 57 | -14 | -16 |
| NCA01 | NCA01_b | Residential Receptor | Car Accelerating | 35 | 55 | 57 | -20 | -22 |
| NCA02 | NCA02_a | Residential Receptor | Car Accelerating | 31 | 50 | 52 | -19 | -21 |
| NCA02 | NCA02_b | Residential Receptor | Car Accelerating | 30 | 50 | 52 | -20 | -22 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | Car Accelerating | 41 | n/a | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | Car Accelerating | 29 | n/a | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | Car Accelerating | 40 | 55 | 57 | -15 | -17 |
| NCA04 | NCA04_b | Residential Receptor | Car Accelerating | 50 | 55 | 57 | -5 | -7 |
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | Car Accelerating | 37 | 50 | 52 | -13 | -15 |
| NCA05 | NCA05_b | Residential Receptor | Car Accelerating | 28 | 50 | 52 | -22 | -24 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | Car Accelerating | 44 | 55 | 57 | -11 | -13 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | Car Accelerating | 34 | 55 | 57 | -21 | -23 |
| NCA07 | NCA07_a | Commercial Receptor | Car Accelerating | 33 | n/a | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | Car Accelerating | 20 | 50 | 52 | -30 | -32 |
| NCA08 | NCA08_a | Residential Receptor | Car Accelerating | 20 | 55 | 57 | -35 | -37 |
| NCA08 | NCA08_b | Residential Receptor | Car Accelerating | 20 | 55 | 57 | -35 | -37 |
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | Car Accelerating | 26 | 50 | 52 | -24 | -26 |
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | Car Accelerating | 24 | 50 | 52 | -26 | -28 |
| NCA10 | NCA10_a | Residential Receptor | Car Accelerating | 19 | 55 | 57 | -36 | -38 |
| NCA10 | NCA10_b | Residential Receptor | Car Accelerating | 19 | 55 | 57 | -36 | -38 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | Car Accelerating | 22 | 50 | 52 | -28 | -30 |
| NCA11 | NCA11_b | Residential Receptor | Car Accelerating | 20 | 50 | 52 | -30 | -32 |
| NCA12 | NCA12_a | Residential Receptor | Car Accelerating | 39 | 55 | 57 | -16 | -18 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | Car Accelerating | 23 | 55 | 57 | -32 | -34 |
| NCA13 | NCA13_a | Residential Receptor | Car Accelerating | 28 | 50 | 52 | -22 | -24 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | Car Accelerating | 30 | n/a | n/a | n/a | n/a |
| NCA01 | NCA01_a | Residential Receptor | Car Starting | 40 | 55 | 57 | -15 | -17 |
| NCA01 | NCA01_b | Residential Receptor | Car Starting | 34 | 55 | 57 | -21 | -23 |
| NCA02 | NCA02_a | Residential Receptor | Car Starting | 30 | 50 | 52 | -20 | -22 |
| NCA02 | NCA02_b | Residential Receptor | Car Starting | 29 | 50 | 52 | -21 | -23 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | Car Starting | 40 | n/a | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | Car Starting | 28 | n/a | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | Car Starting | 39 | 55 | 57 | -16 | -18 |
| NCA04 | NCA04_b | Residential Receptor | Car Starting | 49 | 55 | 57 | -6 | -8 |

| NCA | Receptor | Description | Short Term Noise Event | Predicted LA1, 1minute Noise Level | INP Night time Sleep Disturbance Criteria LA1, 1 minute | INP Mourning Shoulder Sleep Disturbance Criteria LA1, 1 minute | Comparison to Night time Sleep Disturbance Criteria | Comparison to Mourning Shoulder Sleep Disturbance Criteria |
|-------|----------|-----------------------------------|------------------------|------------------------------------|---|--|---|--|
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | Car Starting | 36 | 50 | 52 | -14 | -16 |
| NCA05 | NCA05_b | Residential Receptor | Car Starting | 27 | 50 | 52 | -23 | -25 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | Car Starting | 43 | 55 | 57 | -12 | -14 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | Car Starting | 33 | 55 | 57 | -22 | -24 |
| NCA07 | NCA07_a | Commercial Receptor | Car Starting | 32 | n/a | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | Car Starting | 19 | 50 | 52 | -31 | -33 |
| NCA08 | NCA08_a | Residential Receptor | Car Starting | 19 | 55 | 57 | -36 | -38 |
| NCA08 | NCA08_b | Residential Receptor | Car Starting | 19 | 55 | 57 | -36 | -38 |
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | Car Starting | 25 | 50 | 52 | -25 | -27 |
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | Car Starting | 23 | 50 | 52 | -27 | -29 |
| NCA10 | NCA10_a | Residential Receptor | Car Starting | 18 | 55 | 57 | -37 | -39 |
| NCA10 | NCA10_b | Residential Receptor | Car Starting | 18 | 55 | 57 | -37 | -39 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | Car Starting | 21 | 50 | 52 | -29 | -31 |
| NCA11 | NCA11_b | Residential Receptor | Car Starting | 19 | 50 | 52 | -31 | -33 |
| NCA12 | NCA12_a | Residential Receptor | Car Starting | 38 | 55 | 57 | -17 | -19 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | Car Starting | 22 | 55 | 57 | -33 | -35 |
| NCA13 | NCA13_a | Residential Receptor | Car Starting | 27 | 50 | 52 | -23 | -25 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | Car Starting | 29 | n/a | n/a | n/a | n/a |
| NCA01 | NCA01_a | Residential Receptor | Car Door Closing | 36 | 55 | 57 | -19 | -21 |
| NCA01 | NCA01_b | Residential Receptor | Car Door Closing | 30 | 55 | 57 | -25 | -27 |
| NCA02 | NCA02_a | Residential Receptor | Car Door Closing | 26 | 50 | 52 | -24 | -26 |
| NCA02 | NCA02_b | Residential Receptor | Car Door Closing | 25 | 50 | 52 | -25 | -27 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | Car Door Closing | 36 | n/a | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | Car Door Closing | 24 | n/a | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | Car Door Closing | 35 | 55 | 57 | -20 | -22 |
| NCA04 | NCA04_b | Residential Receptor | Car Door Closing | 45 | 55 | 57 | -10 | -12 |
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | Car Door Closing | 32 | 50 | 52 | -18 | -20 |
| NCA05 | NCA05_b | Residential Receptor | Car Door Closing | 23 | 50 | 52 | -27 | -29 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | Car Door Closing | 39 | 55 | 57 | -16 | -18 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | Car Door Closing | 29 | 55 | 57 | -26 | -28 |
| NCA07 | NCA07_a | Commercial Receptor | Car Door Closing | 28 | n/a | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | Car Door Closing | 15 | 50 | 52 | -35 | -37 |
| NCA08 | NCA08_a | Residential Receptor | Car Door Closing | 15 | 55 | 57 | -40 | -42 |
| NCA08 | NCA08_b | Residential Receptor | Car Door Closing | 15 | 55 | 57 | -40 | -42 |
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | Car Door Closing | 21 | 50 | 52 | -29 | -31 |

| NCA | Receptor | Description | Short Term Noise Event | Predicted LA1, 1minute Noise Level | INP Night time Sleep Disturbance Criteria LA1, 1 minute | INP Mourning Shoulder Sleep Disturbance Criteria LA1, 1 minute | Comparison to Night time Sleep Disturbance Criteria | Comparison to Mourning Shoulder Sleep Disturbance Criteria |
|-------|----------|-----------------------------------|------------------------|------------------------------------|---|--|---|--|
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | Car Door Closing | 19 | 50 | 52 | -31 | -33 |
| NCA10 | NCA10_a | Residential Receptor | Car Door Closing | 14 | 55 | 57 | -41 | -43 |
| NCA10 | NCA10_b | Residential Receptor | Car Door Closing | 14 | 55 | 57 | -41 | -43 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | Car Door Closing | 17 | 50 | 52 | -33 | -35 |
| NCA11 | NCA11_b | Residential Receptor | Car Door Closing | 15 | 50 | 52 | -35 | -37 |
| NCA12 | NCA12_a | Residential Receptor | Car Door Closing | 34 | 55 | 57 | -21 | -23 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | Car Door Closing | 18 | 55 | 57 | -37 | -39 |
| NCA13 | NCA13_a | Residential Receptor | Car Door Closing | 23 | 50 | 52 | -27 | -29 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | Car Door Closing | 25 | n/a | n/a | n/a | n/a |
| NCA01 | NCA01_a | Residential Receptor | Car Moving | 33 | 55 | 57 | -22 | -24 |
| NCA01 | NCA01_b | Residential Receptor | Car Moving | 27 | 55 | 57 | -28 | -30 |
| NCA02 | NCA02_a | Residential Receptor | Car Moving | 23 | 50 | 52 | -27 | -29 |
| NCA02 | NCA02_b | Residential Receptor | Car Moving | 22 | 50 | 52 | -28 | -30 |
| NCA03 | NCA03_a | Other Sensitive Receptor (School) | Car Moving | 33 | n/a | n/a | n/a | n/a |
| NCA03 | NCA03_b | Other Sensitive Receptor (School) | Car Moving | 21 | n/a | n/a | n/a | n/a |
| NCA04 | NCA04_a | Mixed Use (Residential Receptor) | Car Moving | 32 | 55 | 57 | -23 | -25 |
| NCA04 | NCA04_b | Residential Receptor | Car Moving | 42 | 55 | 57 | -13 | -15 |
| NCA05 | NCA05_a | Mixed Use (Residential Receptor) | Car Moving | 29 | 50 | 52 | -21 | -23 |
| NCA05 | NCA05_b | Residential Receptor | Car Moving | 20 | 50 | 52 | -30 | -32 |
| NCA06 | NCA06_a | Mixed Use (Residential Receptor) | Car Moving | 36 | 55 | 57 | -19 | -21 |
| NCA06 | NCA06_b | Mixed Use (Residential Receptor) | Car Moving | 26 | 55 | 57 | -29 | -31 |
| NCA07 | NCA07_a | Commercial Receptor | Car Moving | 25 | n/a | n/a | n/a | n/a |
| NCA07 | NCA07_b | Mixed Use (Residential Receptor) | Car Moving | 12 | 50 | 52 | -38 | -40 |
| NCA08 | NCA08_a | Residential Receptor | Car Moving | 12 | 55 | 57 | -43 | -45 |
| NCA08 | NCA08_b | Residential Receptor | Car Moving | 12 | 55 | 57 | -43 | -45 |
| NCA09 | NCA09_a | Mixed Use (Residential Receptor) | Car Moving | 18 | 50 | 52 | -32 | -34 |
| NCA09 | NCA09_b | Mixed Use (Residential Receptor) | Car Moving | 16 | 50 | 52 | -34 | -36 |
| NCA10 | NCA10_a | Residential Receptor | Car Moving | 11 | 55 | 57 | -44 | -46 |
| NCA10 | NCA10_b | Residential Receptor | Car Moving | 11 | 55 | 57 | -44 | -46 |
| NCA11 | NCA11_a | Mixed Use (Residential Receptor) | Car Moving | 14 | 50 | 52 | -36 | -38 |
| NCA11 | NCA11_b | Residential Receptor | Car Moving | 12 | 50 | 52 | -38 | -40 |
| NCA12 | NCA12_a | Residential Receptor | Car Moving | 31 | 55 | 57 | -24 | -26 |
| NCA12 | NCA12_b | Mixed Use (Residential Receptor) | Car Moving | 15 | 55 | 57 | -40 | -42 |
| NCA13 | NCA13_a | Residential Receptor | Car Moving | 20 | 50 | 52 | -30 | -32 |
| NCA13 | NCA13_b | Other Sensitive Receptor (School) | Car Moving | 22 | n/a | n/a | n/a | n/a |

1. All noise levels and noise level comparisons are expressed using the LA1, 1minute parameter and are in decibels, dBA

4.1.1 Summary of Findings

The results presented in *Table 4.2* and *Table 4.3* identifies the following:

- The highest predicted LAeq, 15minute noise level (general operational usage) is 40 dBA. This noise level is predicted at receptor NCA04_a, directly south of the CCP. The highest predicted LA1, 1minute noise level (short-term noise event) is 50 dBA. This noise level is predicted at receptor NCA04_b, also located to the south of the CCP, east of receptor NCA04_a.
- For general operational usage (emission type A), the night time (INP) noise criteria LAeq, 15minute applicable at residential (dwelling) receptors is not exceeded at the most affected locations (NCA04_a and NCA04_b). Predicted general operational noise levels are below the (INP) noise design goals during all periods (ie daytime, evening, night time and the morning shoulder) at all receptors.
- For short-term noise events (emission type B), the night time short-term noise event (INP) criteria LA1, 1minute applicable at residential (dwelling) receptors is not exceeded at the most affected locations (NCA04_a and NCA04_b) during the night time or the morning shoulder periods.
- Predicted short-term noise event levels are below the applicable (INP) criteria during all periods (ie night time and the morning shoulder) at all residential receptors. The short-term noise event (INP) criteria do not apply to other sensitive receptors (ie commercial properties, schools and childcare centres).

These findings indicate that based on the current design all operational noise levels associated with the CCP are below the applicable INP noise design goals for all receptors, during all times of day and assessment periods.

4.1.2 Discussion

General Car Park Usage

Noise impacts potentially associated with general car park usage are acceptable as LAeq, 15minute levels exceeding the INP criteria are not predicted. The noise levels predicted here are based on the current design (April 2017). Where changes to the design occur that do not affect noise, no further actions may be required.

Short Term Noise Events

Noise impacts potentially associated with short-term noise events are acceptable as LA1, 1minute levels exceeding the INP criteria were not predicted.

The highest predicted LA1, 1minute noise level is below the RNP adapted external noise design goals where, maximum external noise levels below 60 to 65 dBA are unlikely to awaken people from sleep and one or two noise events per night, with maximum external noise levels of 75 to 80 dBA, are not likely to affect health and wellbeing significantly.

The noise levels predicted here are based on the current design (April 2017). Where changes to the design occur that do not affect noise, no further actions may be required.

Outcomes and Recommendations

The ERM 2017a assessment included recommendations for potential noise mitigation and management measures designed to ensure that an acceptable amenity can be achieved for residential (dwelling) occupants and other sensitive receptors surrounding the site.

Since the ERM 2017a assessment a detailed design of the CCP has been developed incorporating the recommendations provided in the ERM 2017a report. Following assessment of the current detailed design (April 2017) predicted noise levels comply with the project-specific operational noise design goals. Therefore no impacts are anticipated based on the current detailed design of the CCP.

Predicted operational noise levels (general car park usage (car movements, lift and mechanical plant) and short-term noise events) have been reduced and impacts minimised based on the current detailed design (April 2017). This reduction is mostly attributable to the barrier around each level constructed of pre-cast concrete that is providing shielding to some receptors, including the most affected receptors where some levels that exceeded criteria were identified in the ERM 2017a report. The lift shaft and mechanical plant room façades have also assisted to reduce overall emissions. The introduction of the third floor (above the ground level) has been considered and emissions have not significantly increased as a result.

Provided that no significant changes are made to the current design of the CCP, no further recommendations for noise mitigation, management measures or monitoring options are warranted however some recommended safe guards and acoustic provisions are provided here. These recommendations are provided in Section 5 of this report.

5 RECOMMENDATIONS

This chapter presents general recommendations, safeguards and provisions for operational noise mitigation, management measures or monitoring options. The recommended safeguards and provisions, and monitoring options that are documented here are provided to minimise impacts to the community should the potential for noise impacts to occur be identified.

5.1 FUTURE DESIGN CHANGES

The design considerations previously described in the ERM 2017a report were made to ensure that noise levels during operation of the CCP remain compliant. The ERM 2017a suggested the following design considerations be included in future designs such as low noise surface coatings to reduce wheel squeal, or car park boundary walls to reduce wheel squeal events and engine noise at receptors. Pre-cast concrete panels (with anti throw screens above) forming a barrier along the edges of each car park level have been incorporated into the CCP design and as verified by this assessment is assisting to reduce noise to compliant levels at all receptors.

Should significant changes to the CCP design occur (with the potential to increase noise levels at nearby receptors) the changes should be reviewed and evaluated by a qualified acoustics specialist. A revised operational noise impact assessment should be conducted where the extent of changes warrant it, and where a qualitative evaluation cannot confirm that emissions will remain at compliant levels.

Where changes to the CCP design occur but have limited or no potential to increase noise levels at nearby receptors, no further actions are required ie additional noise mitigation and management measures (to that already incorporated into the CCP design) are not required.

5.2 MECHANICAL PLANT

Mechanical plant and other noise sources such as lift drives or motors, mechanical plant or air conditioning systems should be reviewed and selected to avoid potentially annoying noise characteristics such as low frequency content, tonal characteristics, impulsiveness and intermittency.

These sources should remain enclosed, as per the current design. The shielding provided by barriers, and the internal location of the lift and mechanical plant emission sources, as verified by this assessment is assisting to reduce noise to compliant levels at all receptors.

It is recommended that the selected mechanical equipment should be reviewed for compliance with the INP operational noise design goals prior to construction of the CCP when specific plant selection is finalised and appropriate noise mitigation measures (if any) can be implemented, noting that the overall noise emission from the CCP should be considered when determining compliance and any necessary mitigation options.

It is recommended these plant noise sources should be reviewed and selected to avoid potentially annoying noise characteristics such as low frequency content, tonal characteristics, impulsiveness and intermittency.

Should these recommended provisions for mechanical plant (incorporating the lift) not be achievable and a potential to increase noise levels at nearby receptors is identified, the significance should be reviewed and evaluated by a qualified acoustics specialist. A revised operational noise impact assessment should be conducted where warranted, and where a qualitative evaluation cannot confirm that emissions will remain at compliant levels.

Where mechanical plant and emission source changes are identified but have limited or no potential to increase noise levels at nearby receptors, no further actions are required ie additional noise mitigation and management measures (to that already incorporated into the CCP design) are not required.

5.3 OTHER NOISE SOURCES

Any additional noise emission sources (not identified in this assessment report) should be considered as the design progresses.

Should additional noise emission sources (with the potential to increase noise levels at nearby receptors) be identified, their significance should be reviewed and evaluated by a qualified acoustics specialist. A revised operational noise impact assessment should be conducted where the extent of additional items warrant it, and where a qualitative evaluation cannot confirm that emissions will remain at compliant levels.

Where additional sources of noise are identified but have limited or no potential to increase noise levels at nearby receptors, no further actions are required ie additional noise mitigation and management measures (to that already incorporated into the CCP design) are not required.

5.4

OPERATIONAL NOISE MONITORING REQUIREMENTS

At this stage noise compliance monitoring during operations may not be required unless significant noise emission sources are introduced into the design to warrant the monitoring, or complaints are received once the CCP is operational. Noise compliance monitoring may however be undertaken to ensure compliance with the operational noise criteria outlined in *Section 3.2*.

The methodology for any operational monitoring should be determined by a suitably qualified acoustics engineer or environmental specialist, the findings should inform any additional noise mitigation or management measures that are necessary to reduce noise levels or minimise impacts.

ERM was engaged by TfNSW to complete a noise impact assessment for operational aspects of the CCP as part of the Transport Access Program (TAP), an initiative by TfNSW.

The assessment was conducted to achieve a scope of works that allowed for the successful identification of potential receptors situated in the vicinity of site emission sources and identification of significant noise generating plant, equipment and/or activities associated with the CCP operation and their likely/known emissions.

Existing ambient and background noise levels were quantified for the area and noise criteria were developed in accordance with recognised NSW policy and guidelines as applicable to the CCP operational activities.

A quantitative operational noise impact assessment was conducted by predicting noise levels via modelling. The predictions were conducted for applicable assessment scenarios and incorporated relevant technical data. Resultant noise levels were then compared to project-specific criteria at each receptor location. Operational noise levels (general car park usage (car movements, lift and mechanical plant) and short-term noise events) were found to be compliant and impacts are not anticipated.

Predicted operational noise levels have been reduced and impacts minimised based on the current detailed design (April 2017). This reduction (compared to that assessed in the ERM 2017a report) is mostly attributable to the barrier around each level constructed of pre-cast concrete that is providing shielding to some receptors. This includes the most affected receptors where some levels that exceeded criteria were identified in the ERM 2017a report. The lift shaft and mechanical plant room façades have also assisted to reduce overall emissions. The introduction of the third floor (above the ground level) has been considered and emissions have not significantly increased as a result.

Provided that no significant changes (relevant to noise) are made to the current CCP design (April 2017) or where changes occur but have limited or no potential to increase noise levels at nearby receptors, no additional actions are required to those already incorporated into the current design. No further recommendations for mitigation and management measures (or monitoring options) to those established by the findings of this operational noise impact assessment, and documented in this report, are warranted or provided.

REFERENCES

Environmental Resources Management Australia Pty Ltd (ERM, 2017a) - **Ashfield Commuter Car Park - Noise and Vibration Impact Assessment**, 0388226RP01_F01, dated February 2017

NSW Environment Protection Authority – **NSW Environmental Noise Management – Industrial Noise Policy** (INP), January 2000 and relevant application notes

NSW Environment Protection Authority – **NSW Rail Infrastructure Noise Guideline** (RING), May 2013

NSW Department of Environment, Climate Change and Water – **NSW Road Noise Policy** (RNP), March 2011

Standards Australia AS1055–1997™ (AS1055) – **Description and Measurement of Environmental Noise**

Standards Australia AS IEC 61672.1–2004™ (AS61672) – **Electro Acoustics - Sound Level Meters Specifications Monitoring** or Standards Australia AS1259.2-1990™ (AS1259) – **Acoustics – Sound Level Meters – Integrating/Averaging** as appropriate to the device

Standards Australia AS/IEC 60942:2004/IEC 60942:2003 (IEC60942) – Australian Standard™ – **Electroacoustics – Sound Calibrators**

Project data provided by TfNSW

Annex A

Acoustics Glossary

A1 ACOUSTICS - GLOSSARY OF TERMS, DEFINITIONS AND METHODOLOGY

A.1.1 What Is Noise And Vibration?

Noise

Noise is often defined as a sound, especially one that is loud or unpleasant or that causes disturbance¹ or simply as unwanted sound, but technically, noise is the perception of a series of compressions and rarefactions above and below normal atmospheric pressure.

In New South Wales, noise pollution is typically regulated through the Protection of the Environment Operations Act 1997 (POEO Act) as the key piece of environment protection legislation. Noise pollution is defined under the POEO Act as:

'the emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances, is harmful (or is likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted'.

Under the POEO Act, the 'POEO (Noise Control) Regulation 2008' addresses common noisy activities that occur in residential situations; it limits the time of day that noisy articles (such as lawn mowers, stereos and leaf blowers) are permitted to be heard in neighbouring residences, however it does not specify noise limits and an applicable approach for the assessment of existing sites.

Various noise and vibration assessment guidelines endorsed by NSW regulators (as outlined in Chapter 4 of this report) provide a guideline framework and methodology for deriving acceptable levels and standard methods for assessing and measuring construction impacts with due regard to the POEO Act.

Vibration

Vibration refers to the oscillating movement of any object. In a sense noise is the movement of air particles and is essentially vibration, though in regards to an environmental assessment vibration is typically taken to refer to the oscillation of a solid object(s). The impact of noise on objects can lead to vibration of the object, or vibration can be experienced by direct transmission through the ground, this is known as ground-borne vibration.

¹ Copyright © 2011 Oxford University Press

Essentially, noise can be described as what a person hears, and vibration as what they feel.

A.1.2 What Factors Contribute To Environmental Noise?

The noise from an activity, like construction works, at any location can be affected by a number of factors, the most significant being:

- how loud the activity is
- how far away the activity is from the receiver
- what type of ground is between the activity and the receiver location eg concrete, grass, water or sand
- how the ground topography varies between the activity and the receiver (is it flat, hilly, mountainous) as blocking the line of sight to a noise source will generally reduce the level of noise
- any other obstacles that block the line of sight between the sources to receiver eg buildings or purpose built noise walls.

A.1.3 How To Measure And Describe Noise?

Noise is measured using a specially designed 'sound level' meter which must meet internationally recognised performance standards. Audible sound pressure levels vary across a range of 10^7 Pascals (Pa), from the threshold of hearing at $20\mu\text{Pa}$ to the threshold of pain at 200Pa. Scientists have defined a statistically described logarithmic scale called Decibels (dB) to more manageably describe noise.

To demonstrate how this scale works, the following points give an indication of how the noise levels and differences are perceived by an average person:

- 0 dB - represents the threshold of human hearing (for a young person with ears in good condition).
- 50 dB – represents average conversation.
- 70 dB – represents average street noise, local traffic etc.
- 90 dB – represents the noise inside an industrial premises or factory.
- 140 dB - represents the threshold of pain – the point at which permanent hearing damage may occur.

A.1.4 Human Response to Changes in Noise Levels

The following concepts offer qualitative guidance in respect of the average response to changes in noise levels:

- Differences in noise levels of less than approximately 2 dB) are generally imperceptible in practice, an increase of 2 dB is hardly perceivable
- Differences in noise levels of around 5 dBA are considered to be significant
- Differences in noise levels of around 10 dBA are generally perceived to be a doubling (or halving) of the perceived loudness of the noise. An increase of 10 dB is perceived as twice as loud. Therefore an increase of 20 dB is four times as loud and an increase of 30 dB is eight times as loud etc
- The addition of two identical noise levels will increase the dB level by about 3 dB. For example, if one car is idling at 40 dB and then another identical car starts idling next to it, the total dB level will be about 43 dB
- The addition of a second noise level of similar character which is at least 8 dB lower than the existing noise level will not add significantly to the overall dB level
- A doubling of the distance between a noise source and a receiver results approximately in a 3 dB decrease for a line source (for example, vehicles travelling on a road); and a 6 dB decrease for a point source (for example, the idling car discussed above). A doubling of traffic volume for a line source results approximately in a 3 dB increase in noise, halving the traffic volume for a line source results approximately in a 3 dB decrease in noise.

A.1.5 Terms to Describe the Perception of Noise

The following terms offer quantitative and qualitative guidance in respect of the audibility of a noise source:

- **Inaudible / Not Audible** - the noise source and/or event could not be heard by the operator, masked by extraneous noise sources not associated with the source. If a noise source is 'inaudible' its noise level may be quantified as being less than the measured LA90 background noise level, potentially by 10 dB or greater.
- **Barely Audible** – the noise source and/or event are difficult to define by the operator, typically masked by extraneous noise sources not associated with the source. If a source is 'barely audible' its noise level may be quantified as being 5 - 7 dB below the measured LA90 or LAeq noise level, depending on the nature of the source eg constant or intermittent.

- **Just Audible** – the noise source and/or event may be defined by the operator. However there are a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.
- **Audible** - the noise source and/or event may be easily defined by the operator. There may be a number of extraneous noise sources contributing to the measurement. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.
- **Dominant** – the noise source and/or event are noted by the operator to be significantly 'louder' than all other noise sources. The noise level should be quantified based on instantaneous noise level contributions, noted by the operator.

The following terms offer qualitative guidance in respect of acoustic terms used to describe the frequency of occurrence of a noise source during an operator attended environmental noise measurements:

- **Constant** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible for the duration of the noise measurement eg an air-conditioner that runs constantly during the measurement.
- **Intermittent** – this indicates that the operator has noted the noise source(s) and/or event to be audible, stopping and starting intervals for the duration of the noise measurement eg car pass-bys.
- **Infrequent** – this indicates that the operator has noted the noise source(s) and/or event to be constantly audible, however; not occurring regularly or at intervals for the duration of the noise measurement eg a small number of aircraft are noted during the measurement.

A.1.6 ***How to Calculate or Model Noise Levels?***

There are two recognised methods which are commonly adopted to determine the noise at particular location from a proposed activity. The first is to undertake noise measurements whilst the activity is in progress and measure the noise, the second is to calculate the noise based on known noise emission data for the activity in question.

The second option is preferred as the first option is largely impractical in terms of cost and time constraints, notwithstanding the meteorological factors that may also influence its quantification. Furthermore, it is also generally considered unacceptable to create an environmental impact simply to measure it. In addition, the most effective mitigation measures are determined and implemented during the design phase and often cannot be readily applied during or after the implementation phase of a project.

Because a number of factors can affect how 'loud' a noise is at a certain location, the calculations can be very complex. The influence of other ambient sources and the contribution from a particular source in question can be difficult to ascertain. To avoid these issues, and to quantify the direct noise contribution from a source/site in question, the noise level is often calculated using noise modelling software packages. The noise emission data used in each noise model of this assessment has been obtained from ERM's database of measured noise emissions.

A.1.7 Acoustic Terminology & Statistical Noise Descriptors

Environmental noise levels such as noise generated by industry, construction and road traffic are commonly expressed in dBA. The A-weighting scale follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics. Time varying noise sources are often described in terms of statistical noise descriptors. The following descriptors are commonly used when assessing noise and are referred to throughout this acoustic assessment:

- **Decibel (dB is the adopted abbreviation for the decibel)** – The unit used to describe sound levels and noise exposure. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.
- **dBA** - unit used to measure 'A-weighted' sound pressure levels. A-weighting is an adjustment made to sound-level measurement to approximate the response of the human ear.
- **dBC** – unit used to measure 'A-weighted' sound pressure levels. C-weighting is an adjustment made to sound-level measurements which takes account of low-frequency components of noise within the audibility range of humans.
- **dBZ or dBL** – unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear.
- **Hertz (Hz)** - the measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz.

- **Octave** – a division of the frequency range into bands, the upper frequency limit.
- **1/3 Octave** – single octave bands divided into three parts.
- **Leq** - this level represents the equivalent or average noise energy during a measurement period. The $L_{eq, 15\text{minute}}$ noise descriptor simply refers to the L_{eq} noise level calculated over a 15 minute period. Indeed, any of the below noise descriptors may be defined in this way, with an accompanying time period (eg $L_{10, 15\text{minute}}$) as required.
- **Lmax** - the absolute maximum noise level in a noise sample.
- **LN** - the percentile sound pressure level exceeded for N% of the measurement period calculated by statistical analysis.
- **L10** - the noise level exceeded for 10 per cent of the time and is approximately the average of the maximum noise levels.
- **L90** - the noise level exceeded for 90 per cent of the time and is approximately the average of the minimum noise levels. The L_{90} level is often referred to as the “background” noise level and is commonly used as a basis for determining noise criteria for assessment purposes.
- **Sound Power Level (Lw)** - this is a measure of the total power radiated by a source. The Sound Power of a source is a fundamental property of the source and is independent of the surrounding environment.
- **Sound Pressure Level (Lp)** - the level of sound pressure; as measured at a distance by a standard sound level meter with a microphone. This differs from L_w in that this is the received sound as opposed to the sound ‘intensity’ at the source.
- **Background noise** – the underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor.
- **Ambient noise** – the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
- **Cognitive noise** – noise in which the source is recognised as being annoying.
- **Masking** – the phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.

Industrial Noise Policy Terminology

- **Assessment Background Level (ABL)** - is defined in the INP as a single figure background level representing each assessment period (day, evening and night). Its determination is by the tenth percentile method (of the measured LA90 statistical noise levels) described in *Appendix B* on the INP.
- **Rating Background Level (RBL)** - is defined in the INP as the overall single figure background level representing each assessment period (day, evening and night) over the whole monitoring period (as opposed to over each 24hr period used for the ABL). This is the level used for assessment purposes. It is defined as the median value of:
 - All the day assessment background levels over the monitoring period for the day.
 - All the evening assessment background levels over the monitoring period for the evening.
 - All the night assessment background levels over the monitoring period for the night.
- **Extraneous noise** – noise resulting from activities that are not typical of the area. Atypical INP activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
- **Most affected location(s)** – locations that experience (or will experience) the greatest noise impact from the noise source under consideration. In determining these locations, one needs to consider existing background levels, exact noise source location(s), distance from source (or proposed source) to receiver, and any shielding between source and receiver.
- **Noise criteria** – the general set of non-mandatory noise level targets for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (for example, noise levels for various land uses).
- **Noise limits** – enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.

- **Project Specific Noise Levels** – target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility.
- **Compliance** – the process of checking that source noise levels meet with the noise limits in a statutory context.
- **Non-compliance** – development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit by more than 2 dB.
- **Feasible and Reasonable measures** – feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors:
 - Noise mitigation benefits (amount of noise reduction provided, number of people protected).
 - Cost of mitigation (cost of mitigation versus benefit provided).
 - Community views (aesthetic impacts and community wishes).
 - Noise levels for affected land uses (existing and future levels, and changes in noise levels).
- **Meteorological Conditions** – wind and temperature inversion conditions.
- **Temperature Inversion** – an atmospheric condition in which temperature increases with height above the ground.
- **Adverse Weather** – weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Appendix E Determination

Ashfield Commuter Car Park

APPROVAL

I, LOUISE SUREDA, as delegate of the Secretary, Transport for NSW:

1. Have examined and considered the Proposed Activity in the Ashfield Commuter Car Park Review of Environmental Factors (February 2017) and the Ashfield Commuter Car Park Determination Report (April 2017) in accordance with section 111 of the *Environmental Planning and Assessment Act 1979*.
2. Determine on behalf of Transport for NSW (the Proponent) that the Proposed Activity may be carried out in accordance with the Conditions of Approval in this Determination Report, consistent with the Proposed Activity described in the Ashfield Commuter Car Park Review of Environmental Factors (February 2017) as amended by this Determination Report.



Louise Sureda
Director, Planning and Environment Services
Infrastructure and Services Division
Transport for NSW

Date: 27.4.17