COMMUNITY AND OTHER SUBMISSIONS

CHAPTER EIGHT

8 Community and other submissions

This chapter provides responses to issues raised in submissions from the community and other stakeholders.

8.1 Planning and assessment process

8.1.1 Assessment process

Six submissions raised issues regarding the assessment process.

Stakeholder identification numbers

20, 62, 171, 173, 273, 301

Issue raised

Submissions raised concerns regarding the assessment process documented in the Environmental Impact Statement. In summary, the submissions raised the following issues:

- The Environmental Impact Statement and the community drop in session at McMahons Point provided clarity around the implementation of the project
- Only public submissions that support the proposal will be considered in the decision-making process
- The time period provided for public exhibition of the Environmental Impact Statement is not sufficient

Response

The Environmental Impact Statement and associated process has been carried out in accordance with the provisions of the *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000*. The assessment carried out complies with the requirements of the Secretary's environmental assessment requirements.

Transport for NSW has considered and provided a response to all issues raised in submissions. Further, the Department of Planning and Environment will consider all submissions in making a decision whether to approve the project and, if approved, in issuing conditions of approval.

The minimum public exhibition period for State significant infrastructure is 30 days, as per clause 194 of the *Environmental Planning and Assessment Regulation 2000*. The Sydney Metro City & Southwest Chatswood to Sydenham Environmental Impact Statement was placed on public exhibition for a period of 48 days.

8.1.2 Adequacy of the Environmental Impact Statement

Thirty five submissions raised issues regarding the adequacy of the Environmental Impact Statement.

Stakeholder identification numbers

15, 43, 46, 47, 74, 77, 85, 88, 110, 112, 151, 173, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 193, 194, 195, 196, 197, 204, 221, 236, 238, 262, 263, 264, 273

Issue raised

Submissions relating to the adequacy of the Environmental Impact Statement raised the following issues:

- Damage to the local environment is trivialised in the Environmental Impact Statement
- The proposal as described in the Environmental Impact Statement is imprecise, inaccurate and inconsistent – for example:
  - The exact position of the tunnels is unclear
  - There are inconsistencies between the Project Summary and the Technical Appendices
  - There are several labelling errors around the proposed Crows Nest Station
  - There are several drawing errors concerning the existing environment at Blues Point.

- The Environmental Impact Statement lacks detail, critical analysis and meaningful assessment on the short and long terms impacts of the proposal – for instance, the consideration of the impact on local residents of trucks using the Sydney Yard Access Bridge
- Some issues are not addressed in the Environmental Impact Statement – for instance, issues concerning the Chatswood dive site are not dealt with in the conclusions
- The Environmental Impact Statement does not adequately assess impacts of the proposal on future environments and land-uses
- The Environmental Impact Statement should have included evaluation by a behavioural scientist to investigate how people interact with the built environment
- The air quality assessment, waste assessment and construction environmental management plan in the Environmental Impact Statement are inadequate and should be revised – there are particular concerns with regard to the Pitt Street Station site and the risk of contamination from demolition activities. Community consultation should be extended to allow for consideration of the revised assessment.

Response

The assessment carried out as part of the Environmental Impact Statement complies with the Secretary's environmental assessment requirements. Appendix A of the Environmental Impact Statement provides a cross-reference to where each of the Secretary's environmental assessment requirements have been addressed, and each chapter provides further details regarding relevant Secretary's environmental assessment requirements.

8.2 Strategic need and justification

8.2.1 Support for the project

Twenty-eight submissions raised issues regarding support for the project in terms of both general comment and specific elements.

Stakeholder identification numbers

9, 17, 20, 51, 69, 71, 73, 75, 83, 93, 100, 102, 106, 107, 113, 126, 143, 157, 174, 206, 231, 240, 253, 255, 259, 271, 297, 301

Issue raised

In summary, these submissions included a statement of support for the project, or for specific elements of the project.

Response

Support for the project is noted.

8.2.2 Need for the project

Eight submissions raised issues regarding the need for the project.

Stakeholder identification numbers

1, 4, 25, 108, 171, 174, 218, 301

Issue raised

Support the need for the project

In summary, the submissions raised the following issues:

- The project is needed as effective, frequent and high capacity public transport for Sydney
- The project is necessary if Sydney is to become a truly international player
- Need for the Crows Nest Station is recognised as overdue

Did not support the need for the project

In summary, the submissions raised the following issues:

- The existing heavy rail network can handle the demand for rail transport
- Concern regarding the ongoing viability of the existing heavy rail network once the Sydney Metro network is operational
- The project serves to justify redevelopment of large tracts of the CBD and suburbs along the existing T3 Bankstown Line rather than providing additional rail capacity.

Response

The support for the need for the project is noted.

The need for the project is provided in Chapter 3 of the Environmental Impact Statement.

It identifies the constraints on the existing rail network in meeting future transport demand. These constraints, among others, include:

- A large number of junctions on the rail network
- A large number of tracks entering Sydney's CBD
- A limitation on the number of services (generally limited to 20 per hour per line)
- Crowded stations and narrow platforms in busy Sydney CBD stations.

Without investment, Sydney's rail network will reach capacity in the Sydney CBD and on critical suburban lines by the mid to late 2020s.

To cater for this demand and to meet the transport needs of Sydney, a number of strategic alternatives were investigated as part of *Sydney's Rail Future*. This identified that use of the existing suburban rail network would not meet short term or long term demand. Sydney Metro was identified as the preferred solution as it would:

- Be more flexible and provide frequent services that would benefit customers
- Provide the required capacity and flexibility to respond to growing demand for rail in Sydney
- Create a more modern, resilient and faster service
- Deliver a seamless and less disruptive way of modernising Sydney's rail
- Deliver transport benefits more cost effectively.

This assessment of strategic alternatives is documented in Chapter 4 of the Environmental Impact Statement.

Notwithstanding, the existing heavy rail network would continue to provide an important public transport function for Sydney.

The need for the project is clearly established based on public transport capacity requirements for Sydney. Section 3.4.1 of the Environmental Impact Statement identifies the additional rail capacity which would be provided by the introduction of Sydney Metro. This section identifies that Sydney Metro, together with signalling and infrastructure upgrades across the existing network, would increase the capacity of the rail network through the Sydney CBD from about 120 services per hour during peak periods today, to up to 200 services per hour beyond 2024, including capacity for up to 60 metro trains per hour during peak periods (or 30 trains per hour in each direction). This would equate to an increase of up to 60 per cent capacity across the network.

Along with these, and other, public transport benefits, Sydney Metro would also provide city building opportunities in relation to a higher intensity of land uses around new and converted stations.

8.2.3 Benefits of the project and the broader metro network

Thirty-six submissions raised issues regarding the benefits of the project and the broader metro network.

Stakeholder identification numbers

11, 14, 108, 110, 118, 122, 171, 218, 221, 230, 239, 240, 251, 257, 258, 271, 272, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 296, 301

Issue raised

Support the benefits of the project and the broader metro network

In summary, the submissions raised the following issues:

- The project will benefit customers by providing an additional Sydney Harbour crossing and bypass the CBD bottleneck
- The project and the metro network will benefit customers by providing interchanges with the existing heavy rail network
- The project will provide benefits to customers through separation from existing heavy rail infrastructure and operational issues
- The metro network will relieve pressure and limitations on the existing heavy rail network, particularly across Sydney Harbour
- The metro network will provide direct connection from the North Shore to the eastern areas of the CBD
- The new line will align through new living areas and destress the existing Chatswood to Sydney CBD section
- The metro network will reduce congestion
- The metro network provides the travel time standards required and expected of an international city and provides economic advantages
- International visitors expect the same level of service they are accustomed to

Did not support the benefits of the project and the broader metro network

In summary, the submissions raised the following issues:

- The project will not increase the capacity and coverage of Sydney's rail network, with the exception of providing new stations at Crows Nest and Waterloo
- The benefits of the project and the metro network to increase capacity are misleading. Double deck trains would provide higher capacity
- Sydney public transport users will have access to only five new train stations. It is misleading for the government to claim it will deliver "31 metro stations" through Sydney Metro Northwest and City & Southwest when a majority of these stations are simply expanded or converted existing stations.
- The 'city building' benefits of the project as stated in the Environmental Impact Statement are not proven and should be removed
- The benefits of the metro network put forward in the Environmental Impact Statement are easily countered based on international experience and current transport initiatives
- The benefits of the metro network will not be realised as it will not integrate effectively with the existing heavy rail network
- The stated benefit of the metro network supporting mode shift from car to public transport will not be realised, as almost all of the areas serviced by the metro network have existing heavy rail or bus services
- The metro network will not benefit suburbs between Chatswood and Sydney CBD as the existing transport system is regular and reliable
- North Sydney Council will benefit more from the metro network than Willoughby Council, as the former will gain two additional stations.

Response

The following responses are provided to the specific issues raised:

- Support for the benefits of the project and the broader metro network are noted.
- The opportunity to expand the rail catchment was an important consideration in the station locations assessment. This was part of the balanced consideration with the other project objectives to provide a robust assessment and optimum outcome. This process is documented in Section 4.4 of the Environmental Impact Statement
- Section 3.4.1 of the Environmental Impact Statement identifies that the reliable capacity of an existing Sydney Trains double deck train is about 1,200 passengers. With the Sydney Trains network generally being limited to 20 trains per line per hour this equates to a reliable capacity of around 24,000 passengers per line per hour. In contrast, a Sydney Metro single deck train would have an ultimate capacity of 1,500 passengers. At the ultimate capacity of 30 trains per hour, this equates to around 45,000 passengers per hour
- The Chatswood to Sydenham project would deliver five new underground metro stations. The conversion of 11 existing stations to metro operations represents an important investment decision to realise wider strategic transport and land use benefits for Sydney, as well as significant economic benefits as described in Chapter 3 of the Environmental Impact Statement. The specific benefits of the Sydenham to Bankstown component will be described further in the Environmental Impact Statement to be prepared for that component.

- The city building benefits are considered as secondary to the public transport benefits of the project. However, the project would provide real city building opportunities through improved business connectivity and transit orientated development
- The benefits anticipated by the Sydney Metro network have been realised in cities throughout the world that have modern metro rail systems
- The benefits of the metro network as described in Section 3.4 of the Environmental Impact Statement are based on the network proposed with strategic points of integration with the existing network. Section 4.3 provides analysis of the strategic alternatives and the reasons for the differentiated service with strategic integration points with the existing network
- Although some areas that would be serviced by the metro network have existing rail or bus services, the metro network would improve public transport capacity and facilitate a shift from road to rail. Additionally, the station location assessment considered the desire to expand the metro network which would be achieved through new stations at Crows Nest, Barangaroo, Pitt Street and Waterloo
- The metro network would benefit suburbs between Chatswood and Sydney CBD by providing additional rail capacity through this constrained section of the network. The metro network would also provide direct access to parts of the Sydney CBD which are not serviced by the Sydney Trains network
- The station location assessment was based on the needs of Sydney for public transport services, not on council boundaries. Willoughby Council would also benefit from the introduction of metro services at Chatswood (as part of Sydney Metro Northwest) and Crows Nest Station.

8.2.4 Consistency with strategic planning and transport policy

One submission raised issues regarding consistency with strategic planning and transport policy.

Stakeholder identification number

28

Issue raised

The submission raised the issue that there has been an unacceptable lack of integrated planning with regard to this project.

Response

Section 3.7 of the Environmental Impact Statement provides a consideration of the project against strategic planning and transport policy. These strategic planning documents perform the role of integrated planning between land use and transport infrastructure. The project is consistent with the objectives and goals of these documents. Further, Section 12.5 of the Environmental Impact Statement identifies locations where the project would support broader land use. For example, the provision of a station at Waterloo directly supports the proposed revitalisation of public housing, and the station at Barangaroo provides public transport connectivity to the new development and public open space.

8.2.5 Project cost and funding

Thirty-three submissions raised issues regarding project cost and funding.

Stakeholder identification numbers

20, 108, 122, 131, 149, 160, 171, 216, 218, 239, 251, 257, 258, 272, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 296, 298

Issue raised

In summary, the submissions raised the following issues:

- Suggestion that the cost of converting the T3 Bankstown Line from heavy rail to metro rail could be redistributed to other transport projects
- Expense should be avoided on items that do not deliver any significant benefit, with funding redistributed to other transport projects
- The project is a very expensive way to increase track capacity through the Sydney CBD
- The Sydney Metro City & Southwest project is a questionable investment if the end goal is to expand rail access to as many people as possible
- Increased rail capacity could be achieved at a cheaper price by increasing capacity on the existing heavy rail network rather than the construction of the metro network
- The government should release full costing details to allow the public to be convinced of the economic benefits of the project before it proceeds
- The metro will be operated privately and for profit, but is being constructed using public funding. Private interests are dominating what should be a public utility. Particular concern raised regarding the location of Barangaroo Station to provide access to the proposed casino development at Barangaroo Central
- It is not in the public interest to invest billions of dollars of public money in a privately operated transport project that will funnel profits to private corporations. NSW has a long history of public-private partnership fiascos, such as the Cross City Tunnel and the Airport Line, where corporations get the benefits, while the public underwrite the risk and foot the bill. There is no reason to believe that the Sydney Metro will be any different
- Concern regarding possible deals with developers as part of the project and possible project funding through associated high-rise development
- The business case for the project should be publicly available.

Response

The cost of the project is considered to be justified based on the need for the project, and the anticipated benefits as identified in Chapter 3 of the Environmental Impact Statement.

The Sydney Metro network would be operated and maintained under a Public Private Partnership with ownership of the infrastructure remaining with the NSW State Government.

Public Private Partnerships are one of the options the Government uses to procure infrastructure and offers opportunities to improve services and provide better value for money, primarily through appropriate risk transfer, encouraging innovation, greater asset utilisation and integrated whole-of-life management.

The procurement of infrastructure and associated services through Public Private Partnerships by any NSW Government agency need to comply with:

- The National Public Private Partnerships Policy and Guidelines
- NSW specific requirements in the *NSW Public Private Partnerships Guidelines* (2012).

The business case has been prepared for the Chatswood to Sydenham project and endorsed by the NSW Government. This document includes an assessment of economic benefits. This has not been publicly released as certain details are considered commercial-in-confidence. Relevant information from the business case has been incorporated into the Environmental Impact Statement.

The *State Infrastructure Strategy* (Infrastructure NSW, 2012) proposes a variety of funding strategies to realise infrastructure priorities within a sustainable budgetary framework. These include:

- Tolls on new and upgraded motorway links
- Restart NSW funding, using net proceeds of asset sales and other windfall gains
- Reduction of public transport subsidies, consistent with regulatory determinations
- Limited reprioritisation of current capital plans
- Commonwealth contributions for projects that align with Infrastructure Australia's key themes
- Value capture from beneficiaries of new infrastructure where feasible.

The cost and economic benefits of the proposed Sydenham to Bankstown component of Sydney Metro City & Southwest will be provided as part of the separate assessment for that project.

8.3 Project development and alternatives

8.3.1 Alternatives and options assessment process

Two submission raised issues regarding alternatives and the options assessment process.

Stakeholder identification number

96, 239

Issue raised

In summary, the submissions raised the following issues:

- The options assessment documented in the Environmental Impact Statement does not pursue options in enough depth to demonstrate their inferiority on a cost / benefit ratio
- The business case and cost-benefit analysis that assess the various alternatives should be released
- There is no optimisation study based on recent experience on the North West Metro construction
- A base case and independent assessment of additional options is required and should be monitored by the Auditor General's office
- The justification for how crucial transport decisions around station location options for Sydney University versus Waterloo were made must be made public.

Response

The strategic alternatives and options assessment provided in Chapter 4 the Environmental Impact Statement meets the Secretary's environmental assessment requirements. This includes consideration of the consequences of not proceeding with the project (or the do-nothing option). The consequences of not proceeding with the project would include:

- Insufficient transport capacity would prevent Sydney from reaching its economic potential, leading to worse economic outcomes for the State and nation
- Sydney's transport network will not provide the minimum standard of service expected by rail customers and there will be major impacts on the operational efficiency, reliability and capacity of the suburban rail network in the medium to long term.

The project has also been subject to relevant NSW Treasury Guidelines for Capital Business Cases that identify a robust process for the preparation, review, and approval of final business cases. This has not been publicly released as certain details are considered commercial-in-confidence. Relevant information from the business case has been incorporated into the Environmental Impact Statement.

The factors influencing the decision of a station at Waterloo is outlined in Section 4.4.3 of the Environmental Impact Statement. In summary, this location was preferred as it would take pressure off Redfern and Green Square stations, provide local residents with more public transport options and encourage the introduction of new homes, jobs, parks and community facilities to meet the needs of a growing Sydney. Whilst a station at The University of Sydney performed well against the project objectives and would provide connectivity to the university as well as health and retail precincts, a station at Waterloo was preferred based on the above factors.

8.3.2 Strategic alternatives

Twenty three submissions raised issues regarding strategic alternatives.

Stakeholder identification numbers

1, 8, 22, 23, 25, 35, 52, 69, 107, 108, 110, 111, 131, 146, 150, 159, 160, 171, 172, 180, 216, 218, 271

Issue raised

Strategic alternatives

In summary, the submissions raised the following issues:

- A cheaper alternative to the metro network should be pursued
- Ultra-fast rail should be developed instead of metro technology – for instance, Hyperloop technology
- The metro network should not be built and the existing double deck heavy rail system should be retained
- Investment should be made to upgrade and expand the existing heavy rail network
- Double deck trains should be used on the metro network to provide additional capacity
- Capacity should be increased on the existing heavy rail network by increasing the frequency of trains
- The metro network should be constructed using the same gauge as the existing heavy rail network to ensure the two networks can be integrated
- The heavy rail network and the metro network should be integrated and linked around Alexandria
- The Sydney Harbour crossing should utilise Cahill Expressway rather than a new tunnel

- Waterloo Station should have been provided on the existing heavy rail network to allow the metro network to service to The University of Sydney Station option
- The metro network should service Sydney Airport, directly or via Wolli Creek
- The metro network should provide rail services where there are currently no existing heavy rail services, rather than replace the existing T3 Bankstown Line
- The metro network should service other inner and middle-ring areas of Sydney that currently need rail services
- The metro network should follow a different alignment from that proposed, including:
  - The University of Sydney, Sydenham, Regent Park, Ashbury, South Strathfield, Belfield, Greenacre and Chullora
  - Sydenham to Tempe, Wolli Creek, Earlwood, Belmore, South Strathfield, Strathfield, Five Dock
  - Central, Victoria Park (The University of Sydney East), Royal Prince Alfred Hospital (The University of Sydney West), Newtown, Enmore Park, Sydenham
  - Parramatta Road alignment
  - The University of Sydney, South Strathfield, Sefton, Regents Park, Liverpool
  - Epping, Ryde, Gladesville, Abbotsford, Ashfield, Campsie, Kingsgrove, Hurstville, Blakehurst
  - Chatswood to Sydenham and Stanmore, utilizing road capacity on the Harbour Bridge
  - Eastern suburbs areas that have no rail services
- The metro network should be constructed to service the Central Coast, Central West and/or Eastern Sydney, with connections to the Sydney CBD.

T1 North Shore Line

In summary, the submissions raised the following issues:

- The realignment of the T1 heavy rail line should occur north of Chatswood Station
- Grade separation of the existing T1 rail line and metro line should be preferred over the construction of a rail bridge at the Chatswood dive site

Response

Strategic alternatives

Section 4.3 of the Environmental Impact Statement provides the assessment of strategic alternatives to the project. Key points are provided below.

Sydney's Rail Future, the long term rail strategy for Sydney, investigated a number of strategic alternatives. This identified that use of the existing suburban rail network (or an upgrade to the network) would not meet short term or long term demand. Sydney Metro was identified as the preferred solution as it would:

- Be more flexible and provide frequent services that would benefit customers
- Provide the required capacity and flexibility to respond to growing demand for rail in Sydney
- Create a more modern, resilient and faster service
- Deliver a seamless and less disruptive way of modernising Sydney's rail
- Deliver transport benefits more cost effectively.

The preferred Sydney Metro option would operate independently of the existing Sydney Trains network, however it would provide strategic integration and interchange points with the existing rail network.

The proposed broad alignment of Sydney Metro through Sydney's North Shore, under Sydney Harbour, through the Sydney CBD and the conversion of the T3 Bankstown Line was determined as the best option to address the constraints and need for the project as established in Chapter 3 of the Environmental Impact Statement.

Sections 4.5 and 4.6 of the Environmental Impact Statement provide consideration of a number of alignment options, including different methods to cross Sydney Harbour. The use of the Sydney Harbour Bridge was not a preferred option as the necessary alignment would have replicated the catchment of the existing T1 North Shore Line and operational limitations of using the bridge would not have met long term capacity requirements. Options using the Sydney Harbour Bridge were also estimated to cost substantially more than tunnelling options.

Sydney's Rail Future also identified the conversion of the T3 Bankstown Line between Sydenham and Bankstown as Stage 5 (Southern Sector Conversion) of the five-stage plan.

A number of options for converting existing lines to metro operation were considered. The investigation identified the T3 Bankstown Line as the next stage of the Sydney Metro network as it would provide a significant increase in Sydney CBD rail capacity, enable increased frequencies on the T2 (Airport, Inner West and South) Line, and simplify the rail network by removing the T3 Bankstown Line from the existing, complex rail network. The conversion of the T3 Bankstown Line would remove the need for Bankstown services to use the City Circle, providing for additional train paths for other lines using the City Circle.

The increase in network capacity and ability to make a significant change to how the existing rail network operates would provide the following benefits:

- Reduced train crowding
- Decreased station crowding at key CBD stations during peak periods
- Improved network resilience.

The construction of a new metro line to the southwest of Sydenham, rather than the conversion of the T3 Bankstown Line, would not enable increased frequencies on the T2 Airport, Inner West and South Line or the simplification of the existing rail network to be achieved.

Section 4.4.3 of the Environmental Impact Statement summarised the assessment of additional station options including a station between Central and Sydenham. Of the long list of station options identified, it was decided to further consider two locations: The University of Sydney and Waterloo. Both station locations supported the Sydney Metro project objectives; however a new metro station at Waterloo was chosen as it would revitalise the Waterloo precinct and would also:

- Provide a high quality connection with bus services along Botany Road
- Provide additional connectivity to Australian Technology Park and Redfern Station
- Contribute to the NSW Government objective to transform Waterloo and Redfern.

A metro station at Waterloo would also allow further development and expansion of the Global Economic Corridor between the Sydney CBD and Green Square.

The CBD and South East Light Rail, currently under construction, will offer very frequent, high capacity transit from the Eastern Suburbs to the Sydney CBD and serve areas of the Eastern Suburbs not currently serviced by rail. In addition, the *NSW Long Term Transport Master Plan* identifies the need for further investigation of potential extensions of the light rail line to Malabar as well as feasibility investigations of mass transit options to Malabar and Maroubra.

T1 North Shore Line

As described in Section 4.7.1 of the Environmental Impact Statement, a number of options were investigated for the location of the northern dive structure and tunnel portal. In summary, the location was chosen as it would (compared to the other options) avoid the acquisition of residential properties, reduce the amount of work within the T1 North Shore Line and impacts to Sydney Trains operations, and reduce construction impacts in relation to heritage and noise and vibration.

The T1 North Shore Line needs to be realigned to the south of Chatswood Station to enable efficient cross-platform interchange at Chatswood Station between metro and Sydney Trains services. The rail bridge near the Chatswood dive site is required to enable the grade separation of the services. This would allow the metro and Sydney Trains services to efficiently operate together without a physical interface (which may result in delays on both lines).

8.3.3 Alternative station locations

Seventy-two submissions raised issues regarding station location options.

Stakeholder identification numbers

2, 3, 6, 10, 11, 13, 16, 17, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 39, 41, 45, 67, 72, 78, 79, 82, 83, 86, 89, 100, 101, 103, 104, 106, 107, 109, 115, 116, 117, 119, 120, 121, 123, 124, 130, 131, 132, 133, 136, 138, 140, 144, 146, 147, 148, 149, 156, 160, 162, 163, 164, 165, 175, 177, 205, 206, 218, 228, 236, 239, 249, 253

Issue raised

Station location options assessment process

In summary, submissions raised issues that the station location process has provided an inadequate model for future value creation and the preservation of health and amenity of inner city neighbourhoods.

Suggestions for additional stations

In summary, submissions raised the following issues:

- More stations should be built on the metro network to attract maximum patronage and revenue
- An additional station at Artarmon should be considered to service the business park, Royal North Shore Hospital and residents that are not within the existing heavy rail catchment, to relieve traffic and parking congestion in the local area and to make the area more attractive for potential employees. It was argued that the limited capacity for development around the station prevented the station from being pursued, even though it would have improved access for the many people who work in this area.
- An additional station at Lane Cove should be considered to service new apartments and reduce strain on existing bus services
- An additional station at Gore Hill should be considered to service office developments and to align the tunnel under the industrial area and away from residential areas in Artarmon
- An additional station at Sydney Opera House should be considered

- New underground metro platforms at Green Square Station should be considered to provide connection to Sydney Airport
- Additional stations in the inner southern suburbs and between Waterloo and Sydenham (Alexandria, Erskineville, St Peters, Mascot) should be constructed for the following reasons:
  - To reduce the distance between metro stations
  - To provide a mass transit system and increase cross-town connectivity
  - To provide more public transport in the local area that is not road-based
  - To provide interchange facilities with existing bus services
  - To cater for increasing residential population and high-density housing development, including the redevelopment of public housing at Waterloo and the Ashmore Estate development
  - To cater for development at Australian Technology Park and Alexandria Super School
  - To address overcrowding at Erskineville Station, St Peters Station and at other inner-city heavy rail stations
  - To diversify and strengthen the rail network
  - To reduce road traffic impacts, including flow-on effects from WestConnex
  - To reduce pollution and preserve local amenity
  - If a metro station is not provided, people will want to leave this area
- Metro tunnels will be built under residences in Newtown, but the metro network will not be used by Newtown residents due to the proximity of the existing heavy rail network compared to metro stations.

Issues regarding proposed metro station locations

In summary, submissions raised to following issues in relation to the location of the proposed metro stations:

- Crows Nest Station is not required as the area is serviced by St Leonards Station on the heavy rail network
- Barangaroo Station should be reconsidered to achieve the objects stated in the Environmental Impact Statement. The current location is within the Wynyard Station walking catchment and is not close enough to the Darling Harbour precinct
- Barangaroo Station should include an additional platform for future expansion, with possible integration with the heavy rail network or future metro network extension west to Parramatta
- Station development at Pitt Street should be located under existing buildings and utilise existing basement entries for construction access to minimise aboveground impacts
- Waterloo Station should not be constructed for the following reasons:
  - The area is already congested with residents, shops and cars
  - The station development would create major adverse impacts on natural and built environments
  - The area is already serviced by Redfern Station and Green Square Station on the heavy rail network
  - The existing Green Square Station on the heavy rail network should be expanded instead

- There should be a station at The University of Sydney rather than Waterloo. The University of Sydney is considered to be a larger trip generator than Waterloo. Concerns raised that this location decision included impacts on the T3 Bankstown Line, general public transport issues and political support for developers.
- The Sydenham metro station should be underground and the dive site constructed west of the existing Sydenham Station to remove construction and operational complexities and maintain greater flexibility on the heavy rail network at this location.

Response

Station location options assessment process

As described in Section 4.4 of the Environmental Impact Statement, all station locations were evaluated against eight project objectives to provide a balanced consideration of the station options. These objectives included serving and stimulating urban development, among a number of transport related objectives.

Suggestions for additional stations

Section 4.4 of the Environmental Impact Statement provides a detailed station location options evaluation process. This involved a balanced consideration of all potential station locations against the project objectives.

Stations between Central and Sydenham

Planning for urban renewal in the South Sydney area predates the proposed Sydney Metro City & Southwest. Masterplanning for the area has been led by the City of Sydney and has included detailed technical studies, including traffic and parking studies. In particular, an Infrastructure Plan identifies the strategic infrastructure requirements to support development of the Ashmore precinct.

During the development stage of the Sydney Metro City & Southwest, consideration was given to opportunities to improve transport accessibility, consistent with the Department of Planning and Environment's A Plan for Growing Sydney and UrbanGrowth NSW's Central to Eveleigh Urban Transformation and Transport Program. During this stage, the opportunity to include an additional station between Central and Sydenham was subject of a strategic evaluation of station locations.

The evaluation subjected the Sydney Metro City & Southwest to a Strategic Merit Test. A Strategic Merit Test is used to quantify expected broad benefits of a transport option against project objectives. As part of the Strategic Merit Test, Sydney Metro investigated a number of station locations between Central and Sydenham.

A range of station locations in the South Sydney area were evaluated against the project objectives. The locations included at the Australian Technology Park, Waterloo, McEvoy Street, Green Square, Erskineville, Ashmore, and St Peters. The evaluation results are provided in Section 4.4.3 of the Environmental Impact Statement. In summary, where there is an existing rail station, or the potential station location is within close proximity to an existing station there would be limited increase in rail catchment, limited change to public transport from private vehicles and no significant relief to existing public transport services.

In addition, the station location options were part of a broad public consultation process between 4 June and 17 July 2015. During this time Transport for NSW hosted an online forum and sought feedback on Sydney Metro and particularly the station options around The University of Sydney and Waterloo. The results of the consultation were considered in Section 5.6 of the Environmental Impact Statement and influenced the overall decision of the station location between Central and Sydenham.

In response to the submission from the City of Sydney, a further Strategic Merit Test has been conducted to investigate the opportunity for an additional metro station near the junction of McEvoy Street and Euston Road, Alexandria. A station at this location would serve a predominantly residential catchment with some mixed use developments and provide a new connection to the City of Sydney's Southern Employment Lands. It would have some overlapping catchments with Green Square Station, Erskineville Station and the new Waterloo Metro station, so would serve a partial new rail catchment. The size of the new catchment is relatively small and contains very limited potential for employment and population growth.

As demonstrated in Figure 8-1, this station location at Alexandria performed similarly to the Strategic Merit Test results of a metro station location at Ashmore, Australian Technology Park, Erskineville, Newtown, Redfern, St Peters and Wilson Street (Eveleigh) (as referred to in Section 4.4.3 of the Environmental Impact Statement).

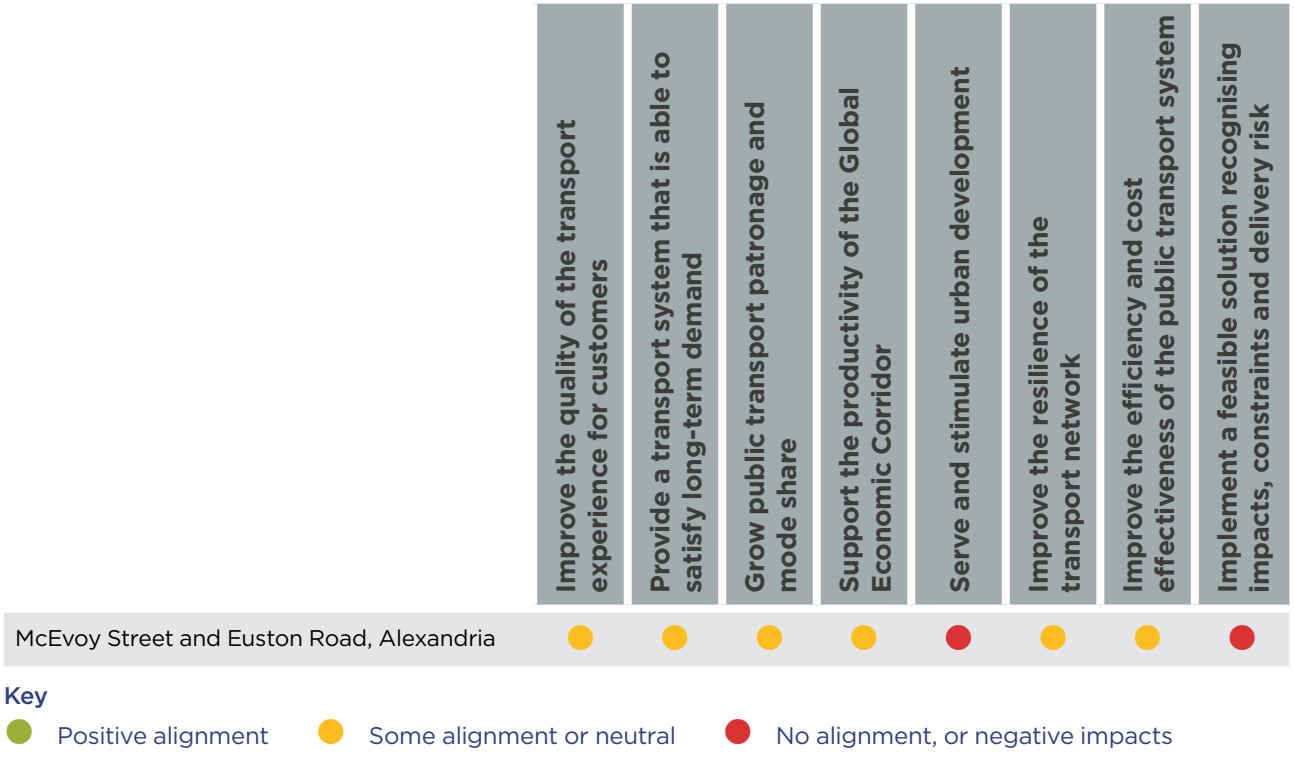

Figure 8-1 Performace of a station at Alexandria

In response to the objective noted in the table above to 'improve the resilience of the transport network', analysis of Erskineville Station patronage in 2014 found that customers can experience train loading of above 135 per cent, which is the benchmark beyond which passengers start to experience crowding and dwell times can impact on-time running. However, it was one of the lower patronised stations on the Sydney Trains network (ranked 118th) with the average number of customers using Erskineville Station during the morning 3.5 hour AM peak period was 1,360 (entries and exits). A station in Alexandria may attract customers from Erskineville Station; however the number of customers would not be high.

Therefore, a more appropriate response to the overcrowding is to increase services or reduce the load on the line. Changes to the train timetable along the Bankstown Line are expected to provide some relief to St Peters (through increased services) and Erskineville stations (through reduced line loads).

It is therefore recommended to not pursue a station at this as part of the Sydney Metro City & Southwest as it would not contribute strongly to the Sydney Metro City & Southwest objectives.

Further, land use change around the McEvoy Street area would occur regardless of a new station, and would be in close proximity to a new Waterloo Metro station and the existing Green Square Station.

Waterloo Metro station is forecast to relieve Green Square Station once operational. The addition of another metro station in the South Sydney area would have significant technical, property, operational, and cost implications. On balance of all these issues to consider, the inclusion of another metro station as part of the project at this location is not supported.

Notwithstanding the above, it is noted the Central to Eveleigh is subject to significant urban transformation and studies are being progressed between Transport for NSW and Urban Growth NSW on how best to grow the active and public transport modes within the broader area.

Additional stations north of Sydney Harbour

A range of station locations north of Sydney Harbour were investigated as part of the stations options evaluation process described in Section 4.4 of the Environmental Impact Statement.

The round of consultation in June 2015 also sought feedback on the station locations to the north of Sydney Harbour.

A station in the Artarmon Industrial Area was considered as part of the station options evaluation process. The Artarmon Industrial Area provides an important role with light industrial, and specialist health and media activities. This area supports about 11,000 jobs and has an estimated contribution of $1.6 billion to the NSW economy each year. There are limited alternative industrial locations in the region, and none play as significant role as Artarmon, in part because they do not offer the same locational benefits for a range of industries. The benefits of this station would be dependent on the urban renewal of the area. Consultation with stakeholder indicated that there was limited support for such a major land use change due to the importance of the existing industrial use. As a result of the above factors, a station within the Artarmon Industrial Area was not pursued.

Lane Cove was suggested as a station location during community consultation however it was not investigated as a station option as part of the Sydney Metro City & Southwest project, as the area is outside the footprint of the project. A station at Lane Cove would have resulted in a substantial increase in tunnel length and associated travel time on Sydney Metro, and may have precluded stations at Crows Nest and Victoria Cross. In addition, the Lane Cove area is currently served efficiently by bus services directly to the Sydney CBD.

Sydney Opera House

A station at Sydney Opera House would be broadly consistent with the Macquarie Place Station that was evaluated as part of the stations evaluation process in Section 4.4 of the Environmental Impact Statement. Compared to other Sydney CBD station location options, this location would have a smaller catchment and would overlap with the existing Circular Quay Station. Further, it is not possible to provide a station at Barangaroo and also near the Sydney Opera House, given the geometry requirements.

Issues regarding proposed metro station locations

The station locations options evaluation is described in Section 4.4 of the Environmental Impact Statement. This process involved a balanced consideration of the project objectives and the results of stakeholder and community consultation.

The design development of each proposed station, and the location of specific station elements, considered a range of factors including potential construction impacts, potential operational impacts and property acquisition requirements. The potential impacts of each station and station facilities is described and assessed in the Environmental Impact Statement.

Responses to the specific issues raised are as follows:

- Crows Nest Station would extend the rail catchment and facilitate employment and dwelling growth in areas currently beyond the catchment of St Leonards Station
- Although there would be some cross over with the catchment of Wynyard Station, a station at Barangaroo would extend the rail catchment, provide a direct public transport connection to the Barangaroo development, deliver a unique east-west connection between Martin Place and Barangaroo, improve travel times within the Global Economic Corridor and serve special events. Barangaroo Station would also help reduce future passenger demand at Wynyard Station
- Potential methods to expand the metro network in the future are discussed in Section 9.5 of this report
- Construction access to Pitt Street Station using existing building basements would not provide the necessary space to support construction works. This would likely result in a substantial increase in the construction program due to inefficient excavation rates and methodology
- Waterloo Station would take pressure off Redfern and Green Square stations, provide local residents with more public transport options and encourage the introduction of new homes, jobs, parks and community facilities to meet the needs of a growing Sydney
- Expansion of Green Square Station on the Airport Line would not meet the needs of the area around Waterloo Station and would not support the revitalisation of the Waterloo public housing estate
- While a station at The University of Sydney performed well against the project objectives and would provide connectivity to the university as well as health and retail precincts, a station at Waterloo was preferred based on the above factors. The round of consultation in June 2015 also sought feedback on stations a Waterloo or The University of Sydney
- The design details of the metro platforms at Sydenham Station will be described and assessed as part of the Sydenham to Bankstown Environmental Impact Statement. Underground metro platforms at Sydenham and a dive structure further south or west would likely have resulted in increased acquisition of residential properties or public open space, additional construction impacts to residential areas and more complex construction at Sydenham Station (and associated impacts to Sydney Trains services and customers).

8.3.4 Station design development

One submission raised issues regarding station design development.

Stakeholder identification number

24

Issue raised

This submission raised an alternative design option for Central Station, including the use of existing heavy rail platforms under Central Station for metro operations, the use of a binocular mined technique in construction, and to rebuild any affected platforms above the new metro station at Central as soon as possible following construction.

Response

The design development of the metro platforms at Central Station is described in Section 4.8.2 of the Environmental Impact Statement.

The use of the existing disused platforms at Central Station was discounted as the associated tunnel alignment would have resulted in impacts to the T4 Eastern Suburbs and Illawarra Line and an Ausgrid cable tunnel, and sub-optimal customer outcomes with respect to customer comfort and connectivity.

A mined construction technique was considered at Central Station for the platforms, however some cut-and-cover excavation would be unavoidable to provide suitable vertical transport for interchange purposes.

The existing Sydney Trains platforms would be reinstated as soon as feasible following construction of the metro platforms at Central Station.

8.3.5 Alignment options

Thirty-six submissions raised issues regarding alignment options.

Stakeholder identification numbers

21, 42, 43, 46, 47, 49, 59, 60, 62, 64, 68, 73, 76, 77, 81, 85, 87, 88, 93, 99, 107, 134, 143, 151, 204, 247, 248, 253, 255, 261, 262, 263, 264, 265, 267, 269

Issue raised

In summary, the submissions raised the following issues:

- Request for the metro tunnels at St Leonards to be realigned to avoid impacts to the residential Forum East building
- Suggestion that the North Shore alignment include Willoughby, Naremburn, Crows Nest, North Sydney and Neutral Bay to maximise the rail catchment
- Objection to the tunnel alignment between Victoria Cross and Barangaroo at Blues Point
- Suggestion to realign the metro tunnels at Blues Point to align with Blues Point Road to reduce potential impacts on residential properties – the suggestion was to align under the former Pacific Magazines building (which is a commercial receiver)
- Concern from residents in Millers Point regarding the metro tunnel alignment under buildings on Dalgety Road, Towns Place and Hickson Road, specifically the proximity of the tunnel to basement car parking facilities and related noise, vibration and structural impacts. Request that tunnels be realigned to avoid these properties. Suggestions for realignment include Barangaroo Reserve or sandstone cliffs to the west of the current alignment
- The rail alignment in the Sydney CBD passes under residential buildings on Kent Street that are misidentified in the Environmental Impact Statement
- Support for the University of Sydney alignment option over the Waterloo alignment option due to the immediate need of transport facilities at The University of Sydney and the proximity of Green Square and Redfern stations to the proposed Waterloo Station
- Request for the metro tunnels between Waterloo and Sydenham to be realigned to avoid residential properties
- Concern regarding the tunnel alignment under residential properties on Lawrence and Belmont streets and Sydney Park Village, Alexandria

Response

Alignment options are described in Section 4.5 of the Environmental Impact Statement. In general, the tunnel alignment is influenced by:

- Station locations
- Design criteria such as vertical and horizontal alignment requirements
- Avoidance of underground constraints such as deep basements and major utilities.

Wherever possible, the tunnels have been aligned along other transport infrastructure such as under road alignments rather than under residential properties. However, passing under residential properties is unavoidable in some circumstances.

In relation to the rail alignment through Millers Point, Figure 6-2d of the Environmental Impact Statement identifies that the depth from the ground surface to the top of the tunnel at Towns Place is around 37 metres. Taking into account a 20 metre deep car park basement, the offset distance to the tunnels would be around 17 metres.

The operational noise and vibration assessment, presented in Chapter 11 of the Environmental Impact Statement, predicts that noise levels from trains would comply with the relevant guidelines. As part of the detailed design process, additional operational noise modelling would be carried out which would take into account the presence of basements.

8.3.6 Location of the Chatswood dive structure

Six submissions raised issues regarding the location of the Chatswood dive structure.

Stakeholder identification numbers

15, 19, 94, 110, 241, 253

Issue raised

In summary, the submissions raised the following issues:

- The water tower site on the corner of the Pacific Highway and Mowbray Road at Chatswood should be considered as a location for the Chatswood dive site
- Support for the alternative options for the Chatswood dive site identified in the Environmental Impact Statement as better options that retain the Nelson Street bridge
- Support for retaining the Nelson Street bridge at the Chatswood dive site to enable pedestrian and cycle connectivity and to avoid re-routing services and utilities
- Suggestion to increase the length of the Chatswood dive site to avoid the need to construct a rail bridge near Nelson Street
- The Chatswood dive site should be moved to avoid structural impacts to residential properties at Nelson Street
- Chatswood dive site is wrongly placed and should have been evaluated during Epping to Chatswood Rail Link work
- Suggestion to move the Chatswood dive site south to allow for an above-ground metro station using the existing platforms at St Leonards Station.

Response

Section 4.7.1 provides the options process for the location of the Chatswood dive site. This includes evaluation of two options at St Leonards and three options at Chatswood. The location of the proposed Chatswood dive site was preferred as it would:

- Avoid acquisition of residential properties
- Avoid impacts on a heritage listed item and Chatswood Heritage Conservation Zone
- Reduce the extent, intensity and duration of construction work next to and impact upon operational Sydney Trains assets
- Avoid impacts to Mowbray Road Bridge during construction
- Provide for the establishment of a tunnel support site away from surrounding residential properties, which would reduce construction noise and other amenity impacts on adjacent receivers

It was also recognised that this location would result in a number of impacts, including:

- The need to permanently close the road bridge at Nelson Street
- Acquisition of an Ausgrid property, containing one heritage listed property ('Mowbray House' located at 339 Mowbray Road) and a number of business properties along the eastern side of the Pacific Highway (571 585 Pacific Highway)
- Acquisition of up to five commercial premises
- The need to tunnel beneath a heritage listed water reservoir, a substation and a communications tower
- Impacts on a major Telstra utility adjacent to the Ausgrid facility / rail corridor boundary.

The proposed location represents the best balance between environmental, economic, social and engineering requirements.

8.3.7 Issues associated with the Sydenham to Bankstown project

Nineteen submissions raised issues associated with the Sydney Metro City & Southwest Sydenham to Bankstown project.

Stakeholder identification numbers

1, 13, 20, 22, 38, 40, 83, 129, 131, 150, 159, 172, 176, 203, 216, 221, 224, 230, 301

Issue raised

In summary, the submissions raised the following issues:

- Opposition to the Chatswood to Sydenham project as it provides a precedent for the approval of Sydenham to Bankstown project
- The T3 Bankstown Line should not be converted to metro rail. The T3 Bankstown Line is currently underutilised and services could be increased to provide additional capacity
- The Sydenham to Bankstown metro line should align with new developments between the centres
- Consideration should be given to using shorter metro rail cards to enable use of existing station infrastructure on the Bankstown Line and reduce associated costs
- The duplication of an existing line and functional stations is wasteful and not justified. It would not increase the rail catchment of Sydney
- The operation of metro services on the T3 Bankstown Line every few minutes is a waste of power

- Concern regarding the operation of heavy rail and metro rail together on the T3 Bankstown Line
- The conversion of the T3 Bankstown Line to metro rail would require new construction to connect with Liverpool
- Concern regarding the closure of the T3 Bankstown Line for six to 12 months and relevant delays and disruption to local communities, including increased travel time for local commuters and local business impacts
- The conversion of the T3 Bankstown Line to metro rail would permanently disadvantage customers due to the requirement to change trains
- Concern regarding air quality and traffic impacts from additional road traffic during the closure of the T3 Bankstown Line
- Transport strategies for the T3 Bankstown Line during the Sydenham to Bankstown project should be included for comment in this Environmental Impact Statement
- Optimisation options for Sydenham to Bankstown, costs, and impacts of the Sydenham to Bankstown project should be considered in this Environmental Impact Statement
- Concern regarding the location of additional concourses at Sydenham, Campsie and Canterbury stations for metro services
- Concern regarding the suitability of the existing Sydenham Station for metro operations and constraints posed by nearby infrastructure to the south and south-west of Sydenham Station. Suggestion for a cross-platform interchange between metro and heavy rail services at Sydenham for ease of access
- Concern regarding the need to expand and relocate station elements (such as platforms, stairs, ramps etc) at existing stations on the T3 Bankstown Line to cater to metro operations, including at Canterbury, Cabramatta and Warwick Farm
- Concern regarding the privatisation of larger parts of the heavy rail network in the future
- Concern regarding the impact to the Illawarra Line and remaining stations on the T3 Bankstown Line (Erskineville and St Peters)
- Concern regarding the future viability of the heavy rail line between Birrong and Lidcombe after the Bankstown Line is converted to metro operations
- Concern regarding the impact of the conversion of the T3 Bankstown Line on any existing plans for redevelopment around Campsie Station
- The Sydenham to Bankstown project presents an opportunity to improve cycle parking facilities.

Response

Sydney's Rail Future, the long term rail strategy for Sydney, identified the conversion of the T3 Bankstown Line between Sydenham and Bankstown as Stage 5 (Southern Sector Conversion) of the five-stage plan.

A number of options for converting existing lines to metro operation were considered. The investigation identified the T3 Bankstown Line as the next stage of the Sydney Metro network as it would provide a significant increase in CBD rail capacity, enable increased frequencies on the T2 (Airport, Inner West and South) Line, and simplify the rail network by removing the Bankstown Line from the existing, complex rail network. The conversion of the T3 Bankstown Line would remove the need for Bankstown services to use the City Circle, providing for additional train paths for other lines using the City Circle.

The increase in network capacity and ability to make a significant change to how the existing rail network operates would provide the following benefits:

- Reduced train crowding
- Decreased station crowding at key CBD stations during peak periods
- Improved network resilience.

The construction of a new metro line to the southwest of Sydenham, rather than the conversion of the T3 Bankstown Line, would not enable increased frequencies on the T2 Airport, Inner West and South Line or the simplification of the existing rail network to be achieved.

The Sydenham to Bankstown project will be subject to a separate environmental assessment process. This process will detail the works required at each station to convert the existing rail line to the standards required for metro services. This process will also provide further details on the potential for cumulative impacts between the two projects, particularly in the area around Sydenham and Marrickville. The trains will be compatible with Sydney Metro Northwest to allow for direct services to and beyond the CBD, thereby avoiding the need for large numbers of customers to interchange at stations such as Chatswood.

8.3.8 Issues associated with the broader metro network

Nine submissions raised issues associated with the broader metro network.

Stakeholder identification numbers

1, 13, 30, 96, 135, 159, 216, 240, 260

Issue raised

In summary, the submissions raised the following issues:

- A larger bus interchange will be required to accommodate services during the closure of the Epping Line during metro construction
- The arrangement of the T1 Line and metro tracks should have been considered at the same time as the Epping to Chatswood Rail Link
- The rail system should have sub-tiers to identify suburban and intercity services
- The metro network should be extended to Lidcombe and link with the existing T1 Western Line on the heavy rail network
- The metro network should be integrated with broader CBD mass transit initiatives to maximise positive socio-economic impacts
- Suggestion that stub tunnels should be constructed between Central and Waterloo to enable future metro extensions with minimal disruption to services
- Future metro expansion plans are unclear in the Environmental Impact Statement
- Support for the conversion of the Epping to Chatswood Line and the T3 Bankstown Line to metro rail

Response

Issues associated with other parts of the metro network (such as Sydney Metro Northwest and the conversion of the Epping to Chatswood Rail Line) have been described and assessed in their relevant planning documents. These do not form part of the Chatswood to Sydenham project.

Section 6.3.1 of the Environmental Impact Statement identifies the need to accommodate stub tunnels to the north of Victoria Cross Station and between Waterloo Station and the Marrickville dive structure. The stub tunnels are one method to ensure any potential future extensions to the network can be constructed in the future. However, given the complexity of designing for this long term potential, an alternative approach is proposed that establishes a more flexible tunnel design and track alignment with the ability to build extensions in the future. This approach could result in disruption to the operating metro network during construction of any potential future extensions to the network, which would need to be considered at the time of any proposed extension. Further information regarding safeguarding for future extensions to the network is provided in Section 9.5 of this report.

The preferred approach reduces tunnelling impacts, complexity, and costs; and provides more flexibility in the future to accommodate any potential future extensions consistent with *Sydney's Rail Future* and the Northern Beaches Transport Action Plan. Any construction impacts associated with future extensions (in the long term) would be assessed at that time.

The project also provides integration with the existing Sydney Trains network and other transport modes to allow efficient interchange at strategic locations including Martin Place and Central stations.

The NSW Government is investigating how to improve transport connections between Bankstown and Liverpool including a possible extension of Sydney Metro. The benefits of providing mass public transit between Bankstown and Liverpool include reducing growth pressure on road infrastructure and the rail network and the potential to relieve crowding on the T1 Western Line, T2 South Line and T2 Airport Line. It would also support growth in Sydney's south west by connecting communities, businesses, jobs and services.

8.3.9 Out of scope

Fifty-six submissions raised issues that were considered outside of the scope for assessment in the Environmental Impact Statement.

Stakeholder identification numbers

1, 4, 13, 38, 40, 56, 83, 94, 96, 100, 118, 122, 125, 131, 139, 140, 145, 150, 153, 159, 172, 181, 206, 216, 218, 224, 228, 230, 251, 253, 257, 258, 271, 272, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 294, 296, 297, 298, 301

Issue raised

In summary, the submissions raised the following issues:

- High Speed Rail should be provided between all capital cities
- Australia's transport infrastructure is at least 30 years behind Spain
- Redfern Station should be upgraded to include accessible lifts to all platforms
- 1 Lawson Square, Redfern should be upgraded to include accessible lifts
- The heavy rail line between Strathfield and Chatswood via Concord West should be converted to light rail or a metro line
- An additional pedestrian and cycle bridge over Bayview Road, Earlwood, should be constructed

- Concern regarding how a Hurstville metro service and how Illawarra trains would go through to the CBD, and the need for a turn back at Penshurst
- A Bondi Junction to Hurstville rapid service would require undergrounding of the Wolli Creek and Turrella platforms to untangle tracks
- The existing Birrong to Lidcombe heavy rail line could be converted to light rail following the development of Sydney Metro, based on the assumption that Clyde to Carlingford in part would be converted to light rail
- A direct footpath corridor involving ramps and avoiding stairs and steep gradients is required between Canterbury Station and the playground on Cooks River near former Sugar Mill.
- Concern regarding the Sydenham to Bankstown Urban Renewal Corridor, including:
  - Insufficient consultation on rezoning around the Sydenham to Bankstown corridor. It is unclear why there is no Environmental Impact Statement process for rezoning
  - Effective community consultation (which reaches culturally and linguistically diverse communities and people who do not use information and computer technology) is required regarding the Sydenham to Bankstown Corridor
  - The destruction of communities, heritage and resources (waste, water, air)
  - Traffic flow planning around Marrickville
  - Additional schools and pre-schools
  - Lack of affordable housing and gentrification of Marrickville
  - Sustainability is not included in this plan
  - Road network concerns during the Sydenham to Bankstown construction in the context of population increases and higher density development
  - Heritage protection in relation to re-zoning
  - Consideration and compliance with the Urban Renewal Strategy is required
  - Development strategy, heritage preservation and infrastructure needs should be incorporated
  - The population and dwelling forecasts by the Government do not fully account for proposed developments and underestimate growth
  - The Government needs to assess impacts and infrastructure needs of future residents and businesses that are expected in the region
- Objection to the density levels proposed for redevelopment around Eveleigh and Waterloo
- Concern regarding servicing Erskineville and St Peters by existing Sydney Trains services, including the East Hills Line and Illawarra Line
- Concern regarding heavy rail capacity in the vicinity of Erskineville, St Peters and Sydenham following conversion of the T3 Bankstown Line to metro rail
- Support for the construction of a stub tunnel to enable extension of metro rail to Hurstville
- Governments should commit to long term infrastructure planning. Sydney needs a second airport and improved intercity trains

- Chatswood interchange needs to be re-constructed. The current bus terminal does not provide as many stops as the previous bus terminal and is dispersed from the train station and shopping areas.
- This has resulted in the loss of the village shops.
- Issues raised regarding freeway planned for the St Peters / Erskineville area which will destroy the area
- Opposition to Sydney Metro as it will result in more high density housing along the route resulting in more congestion and be detrimental to quality of health and life
- Concern regarding the overdevelopment around stations on the T3 Bankstown Line
- Suggestion that Sydney is being sold to developers and being destroyed for profit and power
- Suggestion that the metro line, mass rezoning plans and the forced council amalgamations are linked
- Concern that the existing noise train noise levels around Chatswood are excessive
- Concern regarding the redevelopment of the community housing at Waterloo, as two thousand public housing residences are set to be demolished to make way for the development built around the Waterloo metro station. The Environmental Impact Statement does not address the public housing redevelopment
- There has been very little information provided on this topic
- Concern regarding increasing development densities around stations on the T3 Bankstown Line in conjunction with the Sydenham metro line construction. Increased densities driven by metro would smash nuance and cogency from the existing planned densification in these areas
- Project staff should have the same industrial rights as current NSW Government employees. Work health and safety of employees is a number one priority
- Support to integrate Platform 15 at Central as a terminating suburban platform. Suggestion to rebuild Platform 15 track during construction of the Sydney Yard access. Support for reinstatement of Platforms 13-15 following Metro construction
- Suggestions for an integrated public transport plan that includes a Sydney Metro connection to the Northern Beaches and light rail lines connecting Crows Nest and Brookvale to Balmoral Beach and Manly. This would make Victoria Cross a 'metro hub' and reduce congestion and greenhouse gas emissions
- Concern regarding the restoration of footpath and commemorative plaque on the south-east corner of the Pacific Highway-Mowbray Road
- The Environmental Impact Statement does not give adequate consideration to capacity issues on the western lines, and Strathfield to Central in particular. An extension of the metro or a second metro could relieve pressure on the train line
- Concern regarding social impacts of relocation of Waterloo residents
- Concern regarding overdevelopment of Bankstown with high-rise towers
- Suggestion to operate a circle line, closing the gap between the North West Growth Centre (Rouse Hill, Riverstone and Schofields) and the South West Growth Centre (Leppington, Austral, Oran Park)
- Concern regarding the overdevelopment of Waterloo, Sydenham and stations on the T3 Bankstown Line. Associated development would displace existing residents and create high-rise slums

- Concern regarding strategic planning for rail in Sydney to cater for future provisions. Train travel should not necessitate going through the city and be more like the London Underground with interconnecting lines
- North Sydney Council should try to ensure that the development of the Hume Street Car Park and park area is carried out at the same time as Crows Nest Station to reduce impacts and increase design cohesion
- Concern regarding noise through residential areas of Wollstonecraft and Waverton due to an increase in heavy rail services until the completion of metro in 2024. Noise monitoring by state rail is requested and dampening mechanisms proposed to reduce noise impact
- The Waterloo Precinct redevelopment as part of the Central to Eveleigh Corridor Renewal Project will enable substantial uplift of the development density in and around Waterloo
- Careful coordination is required between Roads and Maritime Services, City of Sydney Council, UrbanGrowth NSW and the Department of Family and Community Services to ensure all public infrastructure within the Waterloo Precinct is upgraded.
- Accessibility upgrades at Redfern must be made a priority, to allow equitable use of the train network by all. The construction of new transport services like the Sydney Metro cannot come at the expense of improving the accessibility of existing services
- The Environmental Impact Statement only addresses the immediate construction implications of the metro rail corridor and metro station at Waterloo. It does nothing to allay concerns around the associated development and population increase in Waterloo. Those concerns must be properly addressed, with thorough and meaningful community consultation throughout the planning process
- Barangaroo caters to a gap in our international standing for "high-end" gambling.

Response

The issues raised are considered to be outside the scope of the Chatswood to Sydenham project.

8.4 Stakeholder and community engagement

8.4.1 Consultation prior to exhibition

Thirty-one submissions raised issues regarding consultation prior to exhibition of the Environmental Impact Statement.

Stakeholder identification numbers

10, 15, 28, 31, 32, 33, 67, 82, 104, 106, 110, 115, 116, 117, 119, 121, 122, 123, 124, 135, 143, 144, 160, 162, 163, 177, 239, 241, 249, 266, 269

Issue raised

In summary, the submissions raised the following issues:

- Not enough information has been provided to the community and the community has not been involved in the planning process
- Government is encouraged to listen to residents about their needs and concerns. The current government has a poor track record in managing both environmental impacts and community consultation in respect of projects such as WestConnex and the CBD and South East Light Rail

- There has been inadequate consultation with residents around Alexandria, St Peters and Erskineville regarding additional stations and transport needs
- Those to be most impacted by the project at the Chatswood dive site were not properly consulted with at the outset
- The options leading to the decision for the current Chatswood dive structure option 3 was not brought to the attention of the public until at the first public meetings. As a consequence the bulk of the public to be impacted by the dive structure options were not in attendance at that meeting. The feedback from the public at those meeting led to the decision of the dive structure location being moved away from St Leonards
- Concern regarding the lack of information regarding noise issues at the Chatswood dive site provided during previous contact with Sydney Metro
- Residents and tenants around Crows Nest Station have not been consulted
- Concern as to whether the community has been consulted regarding the proposed changes at Unwin's Bridge Road (new right turn from May Street), and the removal of parking on Edinburgh Road around the Marrickville dive site
- There has been inadequate notification of landowners above the tunnels. As a result there has not been sufficient time to make a submission
- Concern regarding lack of consultation with residents in Lord Street, Newtown about property damage, values, and acquisition
- There has been inadequate notification of tunnelling activities associated with the project
- Concern regarding the level of publicity and consultation held for Victoria Cross Station.

Response

As outlined in Chapter 5 of the Environmental Impact Statement, community engagement around the extension to the Sydney Metro network, including Chatswood to Sydenham, commenced in June 2014.

Almost two years of engagement around an extension to the Sydney Metro network occurred, prior to the statutory required consultation. The aim of this consultation was to gather feedback during the development of the project and feed into the preparation of the environmental impact assessment.

Information has been provided to the community via stakeholder meetings, three media releases, 41 advertisements, seven fact sheets, two newsletters delivered to 220,000 properties within one kilometre of the proposed route, five project booklets (Environmental Impact Statement Summary, brochures, project overviews, project updates), two online forums, updates across three website, and information provided at two community information centres. The community was also invited to attend eight community information sessions in June 2015, and six sessions and two information stalls in May and June 2016.

Properties immediately adjacent to future construction sites or identified as being potentially affected by the project were either doorknocked by Transport for NSW Place Managers or meetings requested with major landowners and tenants to ensure they were aware of the project, the extent of the works and were provided with information to help them make a submission on the project.

Project scope consultation and engagement with the community and stakeholders occurred in June 2015. During this project scope engagement period, the online forum sought public feedback on the proposed station options under consideration (Artarmon Industrial Area, Crows Nest or St Leonards, Barangaroo, Waterloo or The University of Sydney). Further consultation was undertaken in November 2015 which confirmed stations at Crows Nest and Barangaroo and advised of the ongoing investigations into a proposed metro station at either Waterloo or The University of Sydney. This was followed by the announcement of Waterloo Station in February 2016. Consultation in June 2015 also sought feedback on the potential locations of the northern dive structure. The majority of feedback at this time supported the project being in tunnel from the Chatswood area rather than from St Leonards.

Transport for NSW will continue to engage closely with stakeholders and affected properties owners and occupiers through all stages of design, planning, and construction. Further information regarding consultation during construction is provided in Chapter 4 of this report.

8.4.2 Consultation during exhibition

Twenty-three submissions raised issues regarding consultation during exhibition.

Stakeholder identification numbers

43, 46, 47, 76, 77, 85, 87, 88, 94, 104, 121, 143, 151, 173, 204, 248, 255, 262, 263, 264, 267, 273, 301

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the process available to objectors which impacts on the nature and detail of submissions
- The time period allowed for exhibition of six weeks is simply not feasible for objectors to consider the implications of the proposal, obtain legal and expert advice, and subsequently time to call meetings to consider that advice and the impacts of the proposal
- The exhibition period should be extended to allow more time for community engagement
- Request for the exhibition period to be extended
- The community information sessions for the Chatswood dive site were useful
- Appreciation for the opportunity to attend the drop in session at McMahons Point in May 2016 to meet with industry providers
- Support for the opportunity to contribute feedback to the community engagement process
- There was inadequate time between the public meeting regarding Central Station and the close of Environmental Impact Statement exhibition to construct a submission

Response

The minimum public exhibition period for State significant infrastructure is 30 days, as per clause 194 of the *Environmental Planning and Assessment Regulation 2000*. The Sydney Metro City & Southwest Chatswood to Sydenham Environmental Impact Statement was placed on public exhibition for a period of 48 days.

Six community information sessions and two community information stalls were held across the project alignment during the exhibition period and available for all stakeholders and the community to attend. Attendance at an information sessions was not essential. All information available at the sessions and stalls was also available on the project website and the project team was available and continues to be available to answer any questions or requests for information by phone and email.

8.4.3 Future consultation

Eleven submissions raised issues regarding future consultation.

Stakeholder identification numbers

104, 110, 121, 142, 143, 155, 206, 228, 236, 266, 297

Issue raised

In summary, the submissions raised the following issues:

- A local community consultative committee should be formed for the Chatswood dive site
- Request for staff with cross-cultural communication skills be appointed to the Chatswood dive site. This person should be available in person, by phone or by email
- Request for a community meeting with a metro representative for Chatswood West Ward Progress Association
- Request that an Engineers Report be provided to receivers around Crows Nest on the regular basis during construction
- Request for consultation in writing of any release of future information for commercial properties at 7-39 Mandible Street and 27-41 Hiles Street, Alexandria
- Suggestion that additional public meetings be held closer to the Victoria Cross site
- Suggestion to undertake regular meetings with an Owners Group around Victoria Cross Station and Martin Place Station to inform affected parties about imminent works, road closures, pedestrian impacts and general updates on the progress of the project
- Detailed stakeholder consultation with the Ethnic Communities Council (ECC) and land owners must be carried out prior to construction works at Waterloo, including:
  - Involvement in preparing mitigation measures
  - Ongoing consultation with the website updated on a regular basis, including details for construction timeframes, work zones, road closures and complaint handling procedures
  - Bus stop location and bus service changes to be sent to ECC, residents and landowners to allow time to adjust travel arrangements
  - Involvement in any future consultation regarding the metro project in Waterloo
- Request more meaningful consultation with residents of Alexandria, St Peters and Erskineville

Response

Transport for NSW would continue to engage closely with stakeholders and affected properties owners and occupiers through all stages of design, planning, and construction.

The Construction Environmental Management Framework (Appendix B of this report) provides the communication and consultation strategy for the project. A range of communication methods would be used including construction notifications, doorknocks, emails, newsletters, advertising, meetings and briefings to communicate the progress of works, impacts and mitigation measures to affected stakeholders. Further information on consultation during construction is provided in Chapter 4 of this report.

Transport for NSW uses the Australian Government Translating and Interpreting Services. Any member of the community requiring interpreting services to understand project information can contact the project team via the interpreting service on 131 450.

8.5 Project description – operation

8.5.1 Characteristics of the metro product

Sixty submissions raised issues regarding characteristics of the metro product.

Stakeholder identification numbers

9, 13, 43, 46, 47, 76, 77, 81, 85, 87, 88, 96, 114, 118, 122, 125, 131, 146, 149, 151, 160, 171, 172, 180, 204, 216, 218, 221, 229, 236, 240, 248, 250, 251, 257, 258, 261, 263, 264, 267, 271, 272, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 296

Issue raised

In summary, the submissions raised the following issues:

- Support for straight platforms with secure passenger barriers
- Support for single deck trains with short dwell time and good ingress / egress from stations
- At least half of the train carriages should be quiet zones
- Concern regarding safe train access arrangements for people with special needs
- The proposal indicates that the metro tracks and wheels will be constructed from steel even though rubber tracks and wheels are best modern practice (examples in Paris, Montreal, Kobe and Mexico City)
- The current Environmental Impact Statement does not include a seating plan or carriage dimensions
- Suggestion of car style seats in at least some carriages and seat displays showing arrival time at destinations
- Concern regarding the comfort and safety of seating and standing arrangements on metro trains with a higher proportion of customers standing, particularly for customers with limited mobility, customers with prams, customers with children and women
- Concern regarding the small number of seats in the metro product and the height of the standing support 'hangers' provided
- Single deck trains should be fitted with traverse seating to increase the seating capacity by at least 50 per cent
- Concerns that the metro line is only being designed to cater for single deck trains. Suggestion that tunnels be designed to cater for double deck trains
- Suggestion that more capacity can be achieved with double deck trains compared with the single deck metro product
- Suggestion that double deck trains can run at the same or similar frequency to the metro product
- Concern that the metro product will downgrade the existing double deck train system and result in a deterioration of comfort and capacity by requiring passengers to stand
- Concern regarding driverless trains and reduction of staff at stations, particularly regarding efficiency of emergency procedures and assistance for customers in medical, violent or otherwise dangerous situations. Suggestion that a staff member in on board metro trains for 'incident control'
- The metro product does not effectively integrate with Sydney's existing train network
- Safe entry, exit and storage of bicycles should be accounted for in train design
- Suggestion to integrate the metro product with the Opal ticketing system

Response

The metro product characteristics are described in Section 6.2.2 of the Environmental Impact Statement.

The metro product would provide level access between the platform and the train, reduced gaps between the platform and the train and three double doors per side per carriage. These features allow efficient and safe boarding and alighting for customers with special needs. The Operations Control Centre is responsible for monitoring railway operations, including activities on platforms and trains. If customers with special needs require additional time to board and alight trains, they may contact Customer Service Attendants or the Operations Control Centre, and the Operations Control Centre will extend the time the train is held at the platform. Station staff would also be available to provide assistance. The metro trains would provide a comfortable, reliable and safe service for customers. Other features of the metro would include:

- Air conditioned trains
- A mixture seating and standing room to maximise personal space
- Plenty of grab handles for standing customers
- Space on trains for the mobility impaired, the elderly and parents with prams
- Customer service assistants at every station and moving through the network
- Communication-based train control and advanced technology to safely run driverless trains
- Platform screen doors to keep people and objects away from the edge
- Designing for bicycles on trains
- Integration with the opal ticketing system.

The metro network would include interchange capability with the existing Sydney Trains network at strategic locations. This includes Martin Place and Central stations. Interchange would also be available at Epping, Chatswood and Sydenham stations as part of other stages of Sydney Metro.

The metro trains would be able to carry more customers per hour than the current trains on the Sydney Trains network. Chapter 3 of the Environmental Impact Statement identifies that the reliable capacity of an existing Sydney Trains double deck train is about 1,200 passengers. With the Sydney Trains network generally being limited to 20 trains per line per hour, this equates to a reliable capacity of around 24,000 passengers per line per hour. In contrast, a Sydney Metro single deck train would have an ultimate capacity of 1,500 passengers. At the ultimate capacity of 30 trains per hour, this equates to around 45,000 passengers per hour.

Some other metro authorities specify rubber wheeled vehicles for a range of considerations. Strict operational noise levels have been specified for Sydney Metro. Potential operational noise and vibration impacts are assessed in Chapter 11 of the Environmental Impact Statement and conclude that the project would comply with the operational ground-borne noise and vibration design objectives at all receivers. The project has also been designed to minimise potential airborne noise impacts.

8.5.2 Tunnel design

Thirty-three submissions raised issues regarding tunnel design.

Stakeholder identification numbers

50, 51, 53, 82, 96, 114, 122, 143, 172, 218, 249, 251, 257, 258, 272, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 296

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the location of any proposed fire escapes from the metro tunnels
- Safety concerns regarding the evacuation procedures within the tunnel as it does not cater for customers with limited mobility
- Suggestion that the tunnel depth under buildings is overstated
- Concern regarding the tunnel alignment passing directly under properties
- Concern regarding the size and setbacks of the tunnels
- Request for the depth of Crows Nest Station to be increased
- Suggestion that tunnels should be a vertical pair rather than horizontal between stations in the Sydney CBD.

Response

The proposed tunnel alignment is shown on Figure 6-2 in Section 6.3.1 of the Environmental Impact Statement. This figure also provides the depth of the tunnel to the existing ground surface. It is recognised that in some locations building basements and footing would extend beyond the existing ground surface.

Wherever possible, the tunnels have been aligned along other transport infrastructure such as under road alignments rather than under residential properties. However, passing under residential properties is unavoidable in some circumstances. The operational noise and vibration assessment, presented in Chapter 11 of the Environmental Impact Statement predicts that noise levels from trains would comply with the relevant guidelines (in particular the *Rail Infrastructure Noise Guideline*). The alignment through the Sydney CBD, with the tunnels being arranged horizontally, allows each tunnel to be aligned beneath a road reserve (to avoid building basements) and keeps the stations at acceptable depths. Potential issues associated with the presence of unknown basements are addressed in Sections 8.3.5 and 8.10.5 of this report.

The depth of the tunnels has been influenced by the vertical grade requirements of the running track, the need to avoid existing underground structures and the desire to keep stations as shallow as possible to facilitate easy access to the stations.

Section 6.3.2 of the Environmental Impact Statement details the anticipated emergency access and exit arrangements from the tunnels. A raised walkway would be provided throughout the tunnels to provide emergency access and exit. These walkways would be the same height as the train floor so customers could evacuate in an emergency. Cross-passages would also be provided between the two tunnels at interval of around 240 metres.

8.5.3 Surface track

Six submissions raised issues regarding the surface track.

Stakeholder identification numbers

15, 110, 206, 228, 236, 241

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding construction of the Chatswood dive site on two sides of the rail corridor – the dive site to the south and surface track to the east
- Suggestion to replace the existing steel bridge with a low-noise concrete bridge to span Brand Street, Artarmon, which has the benefit of allowing Sydney Trains better graded and curved tracks at Brand Street
- Recommendation to separate metro and existing heavy rail tracks near Chatswood
- Do not build the rail cross-over at Nelson Street / Gordon Avenue to avoid removal of Nelson Street bridge
- Concern regarding the removal of an existing maintenance point south of Chatswood Station and the staircase from Nelson Street bridge which is used for police, rail maintenance teams, graffiti removalists and the digital radio tower maintenance teams. The removal of this access point will reduce the level of safety for these workers.

Response

The surface tracks at Chatswood are required to integrate the metro tracks with the existing Sydney Trains tracks between Chatswood Station and the dive structure. To provide efficient operation this would require the relocation of the Sydney Trains tracks to provide space for the metro tracks and grade separation between the two tracks. This work is described and assessed in the Environmental Impact Statement.

The grade separation needs to occur to the south of Chatswood Station to allow trains to get back to the required grade at Chatswood Station. This grade separation results in the need to demolish Nelson Street bridge. Impacts of the demolition of Nelson Street bridge are assessed in the relevant chapters of the Environmental Impact Statement, particularly Chapter 8 (Construction traffic and transport) and Chapter 9 (Operational traffic and transport).

The relocation of the Sydney Trains tracks also requires the removal of the existing Hopetoun Avenue maintenance access point. Consultation has been carried out with Sydney Trains to ensure that alternative maintenance access points are available and that maintenance works can be carried out safely.

The replacement of the existing rail bridge over Brand Street is outside the scope of the Sydney Metro City & Southwest Chatswood to Sydenham project.

8.5.4 Station design

Fourteen submissions raised issues regarding station design.

Stakeholder identification numbers

1, 9, 13, 30, 69, 71, 96, 137, 159, 179, 216, 221, 240, 250

Issue raised

General station design

In summary, the submissions raised the following issues:

- Request to ensure that escalators and station entry / exit gates to have copious spare capacity to enable speedy entry and exit of passengers
- Concern regarding the provision of accessible toilets, or identification of nearby accessible toilets outside the station
- The metro system lacks a siding at stations for express services to pass. Inner city stations should have two levels – one for northbound and one for southbound
- There should be three platforms to allow passenger to exit or enter on both side of the train
- Concern regarding the design of the city stations to accommodate large crowds during events like Vivid and New Year's Eve
- The current Environmental Impact Statement does not show how passengers will be able to enter and exit the metro stations
- The station design does not integrate with current rail networks or future metro lines. No time-saving cross platform interchanges have been suggested to improve passenger transits
- Access locations should be designed for convenience and to minimise walking distances and overall travel time for passengers
- The project description does not show or describe where services to "assist customers achieve their daily tasks" are in the interchange or precinct
- More detail is needed on each station to understand the operational stage of the project and, hence, the impact of the project.

Design of Crows Nest Station

In summary, the submissions raised the following issues:

- Underground access between the services building and development sites should be seriously considered at Crows Nest Station as there is much traffic along Hume Street. Close cooperation with Roads and Maritime Services will be required to improve the crossing with the Pacific Highway
- The Environmental Impact Statement does not say what the Crows Nest Station buildings will have at street level. Suggestion for retail or similar uses facing the street for passive surveillance and interest on Pacific Highway and Hume Street.

Design of Victoria Cross Station

In summary, the submissions raised the following issues:

- The Environmental Impact Statement does not give adequate consideration to the extension of the existing underground pedestrian links to provide for a more efficient and weather-protected link to the existing North Sydney Station via Greenwood Plaza
- The Environmental Impact Statement does not provide any contingency measures in the event that Denison Street, North Sydney, cannot be fully pedestrianised due to the existing loading arrangements
- Concern regarding the design and scale of the future services building at Victoria Cross.

Design of Martin Place Station

In summary, the submissions raised the following issues:

- Concern regarding the underground Martin Place Station platforms
- Suggestion to retain some form of underground access between Martin Place at Castlereagh Street and the existing Martin Place Station concourse
- Support for an additional station entry / exit at Bligh Street and O'Connell Street for the Martin Place Station
- Entry point to Martin Place Station and bus layover area suggested at O'Connell Street
- The Tom Bass Sculpture should be re-installed where it is now or on the Martin Place Station façade by Transport for NSW.

Design of Pitt Street Station

In summary, the submissions raised the following issues:

- Location of the Park Street entry to Pitt Street Station loses proximity to the future public square between Pitt Street and George Street. Integration of Pitt Street Station with an underground retail arcade connection should be pursued

Design of Central Station

In summary, the submissions raised the following issues:

- The northern entry plaza at Central Station should be enlarged as it is already crowded during peak hours. This could be achieved by removing the eastern commercial shops
- A southern entry plaza at Central Station should also be considered off Railway Square and Devonshire Street tunnel to increase links to the bus interchange at Railway Square
- The Central metro platforms need improved access at the southern end of Railway Square because this is where there is more public transport patronage from universities and future developments
- Suggestion to number metro platforms at Central Station 14 and 15 and re-number existing heavy rail platforms appropriately
- Concern regarding the increase in passenger numbers at Central Station. The metro design does not appear to increase the capacity of the station or passenger movements
- Clarification is sought as to whether a pedestrian connection at Central Station from the southern end of the new metro concourse into the existing pedestrian network would be constructed
- Suggestion that dual-sided entry / exit from metro trains at Central be provided to increase efficiency of passenger movements.

Design of Waterloo Station

In summary, the submissions raised the following issues:

- The entry plaza at Waterloo should be enlarged to connect Cope Street and Botany Road to the bus stops on Botany Road and make access easier and more visible to Australian Technology Park and residents
- Waterloo Station should have an entrance to connect directly with Botany Road bus stops
- Suggestion to incorporate a pedestrian underpass under Botany Road at Waterloo.

Response

General station design

The proposed station features and designs are described in Section 6.6 of the Environmental Impact Statement. Further details and guiding principles for ongoing design development of each station is provided in the Chatswood to Sydenham Design Guidelines (Appendix A of this report).

In general, interchange arrangements at stations have been designed following the station access hierarchy which prioritises walking and cycling, followed by public transport.

The details of how customers would enter and exit each stations are subject to detailed design, however indicative arrangements have been provided in Section 6.6 of the Environmental Impact Statement. Some key design features and principles of the stations include:

- All stations have been designed with sufficient vertical transport and internal space for anticipated customer demand in 2056
- Relevant stations have been designed to cater for special events (for example, Barangaroo Station)
- Efficient interchange has been provided at relevant stations (for example, Martin Place Station provides a platform to platform connection to the existing Sydney Trains platforms)
- All stations would provide accessible toilet facilities behind the gateline
- Convenient interchange with existing Sydney Trains services is provided at strategic points including Martin Place and Central Station. Although cross platform interchange is not feasible at these locations, cross platform interchange is provided at Chatswood Station as part of Sydney Metro Northwest.

Design of Crows Nest Station

Transport for NSW is conducting further work to determine the feasibility of safeguarding a link from Crows Nest Station to the western side of Pacific Highway. There are a number of constraints which are being investigated including:

- The link would be into the paid side of station and would require an extra gateline
- The shallow station depth constrains potential opportunities for an underground pedestrian link
- Unknown services underneath Pacific Highway
- Potential conflict with existing underground car parks
- Customer catchment on the western side of the Pacific Highway is limited due to steep grades and relatively easier access to Wollstonecraft Station.

Street level building use at Crows Nest Station would be determined during detailed design in consultation with relevant stakeholder. This would follow the place-making principles described in the Chatswood to Sydenham Design Guidelines (Appendix A of this report).

Design of Victoria Cross Station

Victoria Cross Station is not proposed to provide a significant interchange function with the Sydney Trains network. This capability is provided at other stations on the Sydney Metro network including Central, Martin Place and Chatswood. As such, there are no plans to provide an underground connection between the metro station and the existing North Sydney Station. Notwithstanding, customers who wish to interchange in this location would be able to walk between the stations using the existing footpath network.

Transport for NSW is working with North Sydney Council and other relevant stakeholders regarding potential upgrades to Denison Street to provide an optimum outcome for pedestrian movements and access arrangements to existing buildings.

The design of the services building at Victoria Cross Station would be guided by the Chatswood to Sydenham Design Guidelines (Appendix A of this report). These guidelines provide specific requirements in relation to services, as well as requirements regarding land use and heritage integration.

Design of Martin Place Station

Transport for NSW is proposing to reinstate areas of Martin Place affected by construction consistent with the City of Sydney's masterplan. This includes the relocation of the station entries within Martin Place to improve the public domain. The addition of a new metro entrance, with a direct connection to the existing Martin Place Station would provide the opportunity to fulfil this desire while maintaining suitable station entries.

Transport for NSW is safeguarding an additional station entry from O'Connell Street. Further details regarding this future pedestrian link and safeguarded entry are provided in Section 3.3 of this report.

Street level activation at Martin Place Station would be determined during detailed design in consultation with relevant stakeholders. This would follow the place-making principles described in the Chatswood to Sydenham Design Guidelines (Appendix A of this report).

Mitigation measure LV15 in the Environmental Impact Statement identifies that the P&O Fountain at 55 Hunter Street (the Tom Bass sculpture) would be reinstated at a location determined in consultation with City of Sydney Council. Additionally, consultation has commenced with the Tom Bass Studio and access to his archives relating to this piece has been provided. Further notification would occur regarding moral rights.

Design of Pitt Street Station

The design of the station entry locations at Pitt Street would be subject to detailed design. This would consider the anticipated passenger distribution around the station and efficiency of interchange with other transport modes. The design of Pitt Street Station would safeguard a potential future underground connection to the future Town Hall Square.

The design of the above ground station buildings would be guided by the Chatswood to Sydenham Design Guidelines (Appendix A of this report). This includes consideration of adjacent heritage items.

Design of Central Station

The enlargement of the Eddie Avenue plaza entry, eastern entry and western entry are outside the scope of the Sydney Metro project. Transport for NSW is currently investigating options to improve pedestrian movements within Central Station.

The metro stations and trains would facilitate efficient boarding and alighting by providing platform screen doors and three doors per carriage per side. There is no need to provide dual sided entry and exit platforms to cater for the boarding and alighting at Central Station.

Design of Waterloo Station

The urban design of Waterloo Station is being carried out in consultation with UrbanGrowth NSW and other stakeholders to provide a good amenity for customers. The station entry design would facilitate easy transfers between Sydney Metro and buses along Botany Road.

8.5.5 Design of ancillary facilities

Seven submissions raised issues regarding the design of ancillary facilities.

Stakeholder identification numbers

50, 74, 173, 206, 228, 236, 273

Issue raised

In summary, the submissions raised the following issues:

- Suggestion for the Artarmon substation to be built in the Artarmon Industrial Area to limit impacts on future residents
- Concern regarding the presence of mobile phone transmitters in the tunnels and request for them not be located below Blues Point
- Concern regarding the construction of any permanent above-ground structures proposed in McMahons Point in connection with the metro tunnels, including any proposed air vents
- Physical details of Sydney Yard Access Bridge construction are unclear.

Response

In response to the issues raised by Council and local residents surrounding the site at Barton Road / Butchers Lane, Artarmon, Transport for NSW has commenced investigations into an alternative site for the Artarmon substation within the Artarmon Industrial Area. Confirmation of an alternative site would be dependent on meeting criteria for siting. These criteria include:

- being directly located above the track running tunnels
- be accessible by a public road
- be located such that compliance with relevant NSW noise policy guidance may be achieved.

It is anticipated the site location and property requirements would be identified following determination of the project and a supplementary environmental review / assessment would be carried out and, if necessary, the appropriate approvals obtained.

Confirmation of a suitable alternative site would result in the requirement for the land at Barton Road / Butchers Lane being removed from the project.

The location of any mobile phone transmitters within the tunnels would be determined during detailed design. This provision of this infrastructure would not have any impact on people above the tunnels. The Environmental Impact Statement commits to meeting the exposure standards of the *Draft Radiation Standard – Exposure Limits for Magnetic Fields* (Draft Radiation Standard) (Australian Radiation Protection and Nuclear Safety Agency, 2006).

There are no plans for any permanent infrastructure at the Blues Point temporary site. This site would be used to support construction only and would be reinstated following construction activities.

Section 6.9.2 of the Environmental Impact Statement provides an indicative plan and long section of the Sydney Yard Access Bridge, along with preliminary design principles. Section 2.5 of this report provides a more detailed set of design principles and guidelines in recognition of the sensitive visual and heritage setting in which the bridge would be placed.

8.5.6 Design guidelines

Seven submissions raised issues regarding the Chatswood to Sydenham Design Guidelines.

Stakeholder identification numbers

25, 75, 131, 159, 271, 297

Issue raised

In summary, the submissions raised the following issues:

- New stations should incorporate Aboriginal heritage and identity (both traditional and contemporary) of the area. Relevant stakeholders should be included such as the Metropolitan Local Aboriginal Land Council, NSW Aboriginal Education Consultative Group and Aboriginal Heritage Office
- Concern regarding power use from partitioned off platforms, video surveillance and other technology
- The preferred project should include sufficient detail on the design intent of the new underground CBD stations. Any above-station commercial activation should be a secondary consideration which supports, rather than competes with, the achievement of public accessibility goals
- Concern regarding adequate seating at stations for waiting passengers
- Suggestion that an education program could be developed around the project construction similar to Barangaroo
- Pitt Street Station should be renamed Park Street Station to better reflect its location
- Crime Prevention Through Environmental Design (CPTED) principles must be considered and implemented as part of the design of Waterloo Station

Response

The Chatswood to Sydenham Design Guidelines (Appendix A of this report) would guide the ongoing design development of the project. These guidelines have been updated in response to submissions to the Environmental Impact Statement (refer to Appendix A of this report). The following responses are provided to specific issues raised:

- The design guidelines include consideration of Aboriginal and non-Aboriginal interpretation into the design. This is also reflected in mitigation measures NAH8 and AH4
- The design guidelines provide for consideration of minimising energy use. Further mitigation measure SUS10 identifies that 100 per cent of greenhouse gas emissions associated with consumption of electricity during operation would be offset
- The design intent of each proposed station is provided in the design guidelines. Over station development would be subject to a separate planning approval process. It is intended that the Sydney Metro Design Review Panel would also apply to the over station development, particularly to ensure its integration with the station elements
- The provision of seating at stations would be subject to detailed design. This would be carried out in accordance with the design guidelines
- Wayfinding and signage would be carried out in accordance with the design guidelines. The design guidelines specific that information displayed in wayfinding and signage would include destinations in the local precinct
- The potential for education programs would be considered by construction contractors

- The proposed name of the metro stations would be subject to consultation with the Geographical Names Board of NSW
- The dive sites would be located within the existing rail corridor and therefore would not be available for development as public open space
- All aspects of the project would be subject to Crime Prevention Through Environmental Design principles.

8.5.7 Metro operations

Seven submissions raised issues regarding metro operations.

Stakeholder identification numbers

13, 179, 216, 230, 239, 253, 271

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the performance and interruption of driverless trains during heavy rain and flooding
- Suggestion to operate the metro network for 24 hours per day
- The Environmental Impact Statement does not adequately provide information on the depot, stabling or maintenance facilities
- Concern regarding lengthy shutdown, start-up and maintenance procedures without a metro stabling facility close to the southern terminus
- Concern regarding the adequacy of maintenance and stabling facilities associated with the project and related impacts including time and maintenance efficiencies
- Concern regarding the integration of ticketing with the existing public transport system and whether there will there be two tiers of ticket prices for the two rail systems
- The metro network would be operated from a new centralised operations control centre at Rouse Hill, while the government is spending $276 million on developing a new Sydney Trains Rail Operations Centre at Green Square. The operation of the metro network should be integrated with the Sydney Trains network to ensure safety and cost efficiencies are maximised.

Response

The following responses are provided to specific issues raised:

- The risk of flooding affecting operations of the project is very small, as the tunnels would be designed to avoid water ingress. The aboveground track between the Marrickville dive site and Sydenham Station are part of the Sydenham to Bankstown upgrade project. The Sydenham to Bankstown upgrade project will be subject to a separate environmental assessment process which will consider flooding impacts and mitigation
- Section 6.11.4 of the Environmental Impact Statement provides information regarding the expected operational hours of the metro network. The operating hours would be determined as part of the development of the services schedules for the project taking into account customer and maintenance access requirements

- Information on stabling and maintenance is provided in Section 6.11.7 of the Environmental Impact Statement. This section identifies that stabling and maintenance would occur at the Sydney Metro Trains Facility in Rouse Hill which has sufficient capacity to serve the Chatswood to Sydenham project. Any additional stabling requirements to serve the expanded Sydney Metro network would be delivered and assessed as part of the Sydenham to Bankstown upgrade project
- The project would be integrated with the existing Opal electronic ticketing system. Ticket pricing for all transport is determined by Independent Pricing and Regulatory Tribunal of New South Wales (IPART), and by NSW Government policy. The NSW Government reviews this pricing annually and may consider a change to the Opal policy at any time. Any Sydney Metro service pricing would be in line with pricing review in the same way as other trains, buses, light rail and ferry services are considered
- The Sydney Metro network would operate within a fully integrated transport network. In the event of service disruptions on the metro network, segregated operations would allow other heavy rail services to be maintained. The Transport Management Centre will remain central to the coordination of all modes of transport, whether normal daily running or when problems occur. The Transport Management Centre has multi-modal coverage extending beyond the Sydney Trains rail network, and covers multiple bus operators, light rail and other road traffic, as well as emergency services. There will be interface agreements in place between the Metro operator and Sydney Trains to ensure coordinated operations at key locations such as Martin Place, much like the interface arrangements in place between Sydney Trains and ARTC, whose operations are controlled remotely from Junee near the NSW border.

8.6 Project description – construction

8.6.1 Construction program

Nine submissions raised issues regarding the construction program.

Stakeholder identification numbers

82, 84, 94, 98, 105, 142, 239, 249, 297

Issue raised

In summary, the submissions raised the following issues:

- The seven year construction program at the Chatswood dive site will impact on day to day living
- Request the construction timeframe be clearly defined and reduced at Crows Nest Station
- Concern regarding 24 hour per day construction for four years at Crows Nest Station
- Concern regarding the length of the rehabilitation period for the reserve land at Blues Point after work is completed
- A detailed construction timetable for Waterloo Station should be prepared in close liaison with Roads and Maritime Services, City of Sydney Council, Urban Growth NSW and the Department of Family and Community Services.

Response

The construction program provided in the Environmental Impact Statement represents a realistic timeframe to complete construction of the project. The construction program aims to provide a balance between the efficient completion of construction and minimising impacts to adjacent receivers. Issues regarding the construction program are commonly related to the duration of amenity impacts. Specific amenity impact issues raised in the context of the program are addressed in the other sections of this report, including:

- Construction traffic and transport in Section 8.7
- Construction noise and vibration in Section 8.9
- Construction visual amenity impacts in Section 8.15
- Air quality impact in Section 8.21.

Blues Point temporary site would be rehabilitated in consultation with North Sydney Council. The duration of these works would be refined as part of this process.

Further, detailed construction programs would be developed during construction planning. This would take into account the issues raised, including conditions of approval from the Minister for Planning.

Consultation with the community regarding the construction program would continue prior to and during the construction of the project. Further information regarding consultation during construction is provided in Chapter 4 of this report.

8.6.2 Tunnel construction

One submission raised issues regarding tunnel construction.

Stakeholder identification numbers

96

Issue raised

In summary, the submission raised the following issues:

- Request for further detail on the method of tunnel construction
- Concern regarding the tunnelling approach under Sydney Harbour and the belief that it is likely sediment will liquefy on disturbance – it is unlikely that grout injection will suffice

Response

Section 7.6 of the Environmental Impact Statement provides a description of the tunnel construction methodology. This section describes the proposed tunnelling methods, equipment types, launch and support sites, fit-out and ancillary tunnelling construction methods. Further construction information would be developed as part of detailed construction planning.

The proposed method of tunnelling under Sydney Harbour and the preferred approach for ground improvement has been determined based on geotechnical investigations and the current understanding of the ground conditions. The options assessment for different ground improvement methods is provided in Section 4.6.3 of the Environmental Impact Statement.

8.6.3 Station construction

Two submissions raised issues regarding station construction.

Stakeholder identification numbers

14, 142

Issue raised

In summary, the submissions raised the following issues:

- Request for a different construction method to be used at Crows Nest other than cut-and-cover
- Concern regarding the demolition of buildings around Martin Place to provide access to the metro stations. Suggestion that these buildings should remain and the entrance to the station should be built within the buildings or relocated elsewhere

Response

The decision regarding the construction method at each station considers a range of factors including the depth of the station and existing land use constraints above the station. To provide optimal customer outcomes, a design objective has been to keep stations as shallow as possible to minimise vertical transport travel times. The optimal station depth is around 20-25 metres. This depth cannot be constructed using a mined technique.

At Crows Nest Station, there are few underground constraints meaning an optimal station depth of around 25 metres can be provided by cut-and-cover technique.

In relation to Martin Place, the retention of buildings above the station would not provide the necessary space to support construction works. This would likely result in a substantial increase in the construction program due to inefficient excavation rates and methodology.

8.6.4 Location and layout of construction sites

Twenty-four submissions raised issues regarding the location and layout of construction sites.

Stakeholder identification numbers

48, 50, 58, 66, 70, 74, 84, 91, 92, 95, 112, 166, 173, 178, 190, 200, 212, 213, 215, 228, 239, 242, 247, 273

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the proximity of the Chatswood dive site to residential properties and the impact of associated construction activities
- Concern regarding the water treatment plant, dangerous goods storage and workshop and impacts on residents located close to the Artarmon substation
- Objection to the location of the Crows Nest Station construction site
- Opposition to the use of Blues Point as a construction site
- The government must explore other options for the establishment of a construction site at Blues Point
- The Blues Point site appears to be unnecessary and will impact local residents

- Further investigation should be carried out into alternatives to the use of Blues Point as a construction site such as:
  - Victoria Cross Station
  - Barangaroo Station
  - The disused rail line along Sawmillers Reserve
  - Dismantle the tunnel boring machine equipment underground (within the tunnel) and retrieve via the tunnel back to Victoria Cross and Barangaroo
  - Bury the equipment after use
  - Use barges instead of trucks to transport equipment
- Request for email notification as to where the sites are planned to bring rock waste to the surface in Blues Point and North Sydney
- Request for information on what other options were considered for the retrieval site other than Blues Point and why were they dismissed
- Request for the shaft at Blues Point to be located as far away from neighbouring residential properties as possible
- Concern regarding amenity impacts to the 54 Regent Street apartment building due to the location of the Sydney Yard Access Bridge construction site

Response

Construction sites have generally been co-located with the operational infrastructure such as stations and dive structures to minimise property acquisition requirements. The options assessment process for these elements is provided in Section 3.4.4 and 4.7 of the Environmental Impact Statement.

The location of infrastructure within the Artarmon substation site would consider the potential impacts to nearby receivers. For example, plant and equipment would be located and orientated to minimise noise impacts to adjacent receivers. Storage of dangerous goods would be located to meet State environmental policy requirements – namely *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*. Additionally, Transport for NSW is continuing to investigate an alternative site for the Artarmon substation within the Artarmon Industrial Area.

The Blues Point temporary site is required due to the tunnelling methodology and anticipated ground conditions under Sydney Harbour which requires a specialised tunnel boring machine. This requires sites on either side of the harbour for the launch and retrieval of the machine, with the majority of work required at the launch site. As the tunnelling process involves the erection of tunnel lining as tunnelling progresses, it is not feasible to retrieve the cutter head and shield of the tunnel boring machine at the launch site. Barangaroo Station was chosen for the launch site due to its proximity to the harbour, its inclusion as part of the project as a station site and as it provides the necessary space to support the tunnelling activity.

A smaller site would be required on the other side of the Sydney Harbour to retrieve the tunnel boring machine components. Blues Point was chosen as it is located directly above the tunnels, thereby minimising the generation of spoil, and would not require the acquisition of private property.

Further responses to the specific issues raised in relation to Blues Point temporary site are as follows:

- The use of Barangaroo Station for the retrieval works was not feasible as the retrieval site needs to be located at the end of the tunnel drive. Barangaroo Station is proposed to be used as the launch site (ie the beginning of the drive)

- The use of Victoria Cross Station would result in the specialised tunnel boring machine operating through rock for a longer distance. This would result in a longer duration of impacts to residents surrounding the Barangaroo and Victoria Cross stations
- The disused rail line along Sawmillers Reserve is not located directly above the tunnels and would result in the generation of more spoil. Additionally, road access to this site would require the use of a number of local roads (rail access is not feasible as train paths are not available on the T1 North Shore Line)
- Burying the equipment underground is not a feasible solution as the tunnel boring machine would need to pass underneath Sydney Harbour twice to bore the two separate tunnels
- The use of barges to transport equipment has been investigated. Further details are provided in Section 3.2 of this report.
- The shaft at Blues Point would be positioned considering a range of factors, including minimising impacts to the community and providing an optimal construction outcome.

Potential amenity impacts associated with the Sydney Yard Access Bridge have been considered in the Environmental Impact Statement. Further responses to amenity issues in this location are provided in the relevant sections of this report.

8.6.5 Power supply routes

One submission raised issues regarding power supply routes.

Stakeholder identification number

236

Issue raised

The submission raised concern regarding the new power cables on the Pacific Highway near the Chatswood dive site.

Response

The proposed power supply route to the Chatswood dive site is shown in Figure 7-23 of the Environmental Impact Statement. The proposed route is from the Chatswood substation on the corner of Mowbray Road and Hampden Road directly across Mowbray Road to the site. There are no plans to run new power cables along the Pacific Highway in this location.

8.6.6 Construction hours

Four submissions raised issues regarding construction hours.

Stakeholder identification numbers

112, 130, 235, 236

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding noise associated with demolition and excavation work undertaken outside of standard construction hours at the Chatswood dive site
- Suggestion to stop noise generating construction activities between 6-7 pm on Fridays and 8.30 am-12.30 pm on Saturdays at Pitt Street Station
- Concern regarding tunnelling works occurring 24/7 in the vicinity of Waterloo Station

Response

The proposed construction working hours are provided in Section 7.11.3 of the Environmental Impact Statement. Generally, construction works would be restricted to the standard daytime construction hours of:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturday
- No work on Sundays and Public Holidays.

However, some activities such as tunnelling, station excavation and their supporting activities are proposed to be carried out up to 24 hours per day and seven days per week.

These proposed hours aim to provide a balance between minimising the intensity of impacts to the community, the duration of impacts to the community and the efficiency of the construction work. Responses to issues raised regarding the construction duration and program are provided in Section 8.6.1 of this report. Responses to the specific issues raised are provided below:

- Demolition works are generally proposed to be carried out during standard daytime hours. Excavation of stations is proposed to be carried out up to 24 hours per day and seven days per week. Since the development of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would not be required outside of standard construction hours. Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report
- Tunnelling works are proposed to be carried out up to 24 hours per day and seven days per week. Section 10.4 of the Environmental Impact Statement provides an assessment of the potential ground-borne noise impacts. In the vicinity of Waterloo Station, there are predicted to be exceedances of the ground-borne noise management levels of up to 10 dB. These exceedances would be expected to occur for a few days for each tunnel boring machine. These impacts would be managed in accordance with the Construction Noise and Vibration Strategy (Appendix C of this report).

Responses to specific issues raised regarding construction noise issues and the duration of construction noise issues are provided in Section 8.9 of this report

8.6.7 Other construction issues

Three submissions raised other construction issues.

Stakeholder identification numbers

50, 74, 231

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding impacts on residents from tunnelling and station construction and fitout in Chatswood and Naremburn. Mitigation measures to minimise duration and severity of impacts should be implemented
- Concern regarding any blasting proposed in the vicinity of the Blues Point site
- Concern regarding strong winds at Blues Point blowing fencing and equipment onto the road

- Confirmation sought regarding the location of the proposed on-shore site facility for the treatment of slurry from the Sydney Harbour ground improvement works
- Concern regarding construction at Pitt Street Station, including:
  - Potential presence of hazardous substances
  - Protection of adjoining buildings (safe work, access, structural integrity, vibration, concussion, weather proofing, air quality controls, noise mitigation and maintenance of common / public services)

Response

The potential impacts of construction work for the project are described and assessed in the Environmental Impact Statement. Potential impacts would be managed through the implementation of the mitigation measures in Chapter 27 of the Environmental Impact Statement and the Construction Environmental Management Framework (Appendix B of this report).

Responses to other specific issues raised are provided below:

- Section 10.4 provides an assessment of the potential ground-borne noise impacts. In the area between Chatswood and Artarmon, there are predicted to be exceedances of the ground-borne noise management levels of up to 10 dB. These exceedances would be expected to occur for a few days for each tunnel boring machine. These impacts would be managed in accordance with the Construction Noise and Vibration Strategy (Appendix C of this report)
- In the event that blasting is required for the Blues Point site, blasts would be designed to meet the applicable noise and vibration criteria
- All construction sites and equipment would be kept secure to avoid issues such as winds blowing fencing onto surrounding roadways
- The location of the on-shore facility to support the ground improvement works has not been determined at this stage. Section 7.6.1 of the Environmental Impact Statement provides criteria which would be met when determining the location for this facility should it be needed.
- Any works to utilities would be managed to eliminate or minimise the duration of any interruption of supply to users. Where interruption would be required, potentially affected users would be notified in advance
- All hazardous substances would be located to meet the requirements of *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development*
- Property condition surveys would be offered to the owners of all buildings with potential to be affected by construction works. The process for property condition surveys is described in the Construction Environmental Management Framework (Appendix B of this report).

8.7 Construction traffic and transport

8.7.1 Assessment method

Five submissions raised issues regarding the assessment method.

Stakeholder identification numbers

67, 104, 112, 121, 141

Issue raised

In summary, the submissions raised the following issues:

- The traffic and transport assessment is inadequate as it does not consider the relationship between metro and WestConnex and the ability for metro to offset the impact of WestConnex traffic
- Concerns with the construction traffic methodology around Blues Point including:
  - There are no specifications for construction vehicles
  - The Environmental Impact Statement is silent on the impact of fully laden trucks travelling up the steep, narrow Blues Point Road
- The Environmental Impact Statement does not address the combined impact of trucks from multiple sites using the same roads, beyond the closest arterial road, for the Blues Point site.

Response

The potential cumulative impacts of construction traffic from the project and WestConnex are considered in Section 26.3.12 of the Environmental Impact Statement. At this stage of the project, it is not possible to determine the exact volume of traffic each of these projects would generate at the same time as this is subject to construction staging by the relevant contractors. As detailed construction planning develops, Transport for NSW would manage and co-ordinate the interface with projects under construction at the same time. This would include:

- Provision of regular updates to the detailed construction program, construction sites and haul routes
- Identification of key potential conflict points with other construction projects
- Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve:
  - Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects
  - Co-ordination of traffic management arrangements between projects.

The potential for Sydney Metro to improve conditions for road users is described in Section 3.4.1 of the Environmental Impact Statement. This section identifies that there could be a reduction of up to 20 million car trips in 2026 as a result of the project. Any offset by the project of the traffic impacts of WestConnex would be a benefit.

The anticipated truck types at each site are provided in Section 3.1.1 of Technical Paper 1 of the Environmental Impact Statement. For Blues Point, the anticipated truck type is single unit trucks with a capacity of 10 cubic metres. In relation to trucks using Blues Point Road, the Environmental Impact Statement provides a traffic assessment in Section 8.4.10 and a noise assessment in Section 10.4.5. The assessments found that:

- Construction traffic impacts on Blues Point Road would be negligible
- Construction traffic noise levels on Blues Point Road would exceed the baseline criteria by one decibel.

The traffic assessment for the Environmental Impact Statement considered the potential impact to intersections along the proposed construction routes between the construction sites and the arterial road network. This is consistent with the approach taken on other major infrastructure projects. Traffic routes have generally been designed to avoid overlap as far as feasible and reasonable. Where vehicles from multiple construction sites use the same arterial road, the combined impact is anticipated to be minor. The potential combined impact of trucks from multiple construction sites would be further considered during the development of Construction Traffic Management Plans.

8.7.2 Alternative spoil transport options

Forty-one submissions raised issues regarding alternative spoil transport options.

Stakeholder identification numbers

43, 46, 47, 48, 50, 61, 63, 65, 66, 70, 74, 76, 77, 81, 85, 87, 88, 93, 95, 102, 110, 112, 151, 190, 200, 204, 213, 215, 236, 240, 242, 245, 254, 261, 263, 264, 265, 267, 268, 275, 294

Issue raised

In summary, the submissions raised the following issues:

- Objection to the upgrade of the existing T1 North Shore Line near the Chatswood dive site to freight capability for spoil removal due to increased noise and impact on visual amenity
- Suggestion that spoil should not be brought back to Chatswood for disposal
- Suggestion to undertake analysis of use of the T1 North Shore Line for removal of construction waste from Chatswood dive site
- Suggestion that spoil and equipment should be delivered and removed by barge or train from Blues Point and that a temporary wharf and conveyor be constructed to assist
- Suggestion that spoil and equipment from Blues Point be delivered and removed at either Victoria Cross Station or Barangaroo Station
- Waste should be removed by barge from Blues Point as was done for work at HMAS Penguin
- Question as to whether barge transport will be adopted at Blues Point if public safety issues arise from trucks
- Concern regarding how the cost to residents at Blues Point has been accounted for in the consideration of spoil transport options
- If spoil is to be removed by barge from Barangaroo, it should happen from the harbour side of Central Barangaroo to avoid double handling.

Response

Consideration of alternative spoil transport options was provided in Section 8.2.3 of the Environmental Impact Statement. This concluded that:

- For spoil transport by rail from the Chatswood dive site, space would need to be found in the rail corridor for spoil loading activities for the construction of new rail sidings and related infrastructure during scheduled track possessions. The use of the spoil loading facility and spoil transport would need to work around regular night-time maintenance on the T1 North Shore line and may impact passenger rail operations, reducing the flexibility of spoil removal. The Chatswood dive site is in close proximity to residential dwellings and there would be potentially substantial noise impacts on local residents. While none of the above reasons fully preclude the use of rail for spoil transport at this site, when they are viewed in combination and with the capacity of existing road network for spoil haulage, it is not the preferred solution

- Spoil transport by barge from the Blues Point site may be feasible subject to further investigations. This would need to consider aspects such as the infrastructure necessary to load spoil onto barges and the proposed destination of spoil
- Spoil transport by barge from the Barangaroo site may be feasible subject to further investigations and consultation with Barangaroo Delivery Authority. Further work has been carried out on the potential to barge spoil from Barangaroo Station site (refer to Section 3.2 of this report).

8.7.3 Haul routes

Two submissions raised issues regarding haul routes.

Stakeholder identification numbers

168, 271

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the display of a haul route for the Chatswood dive site when no contractor had been appointed to move the spoil and no direction to the dump site is known
- Concern regarding noise and parking impacts from the haul route for Victoria Cross site at McLaren Street, North Sydney
- Concern regarding heavy traffic management at Victoria Cross
- Concern regarding the suitability of the northern construction site at Victoria Cross and significant consistent adverse impacts that are exacerbated by truck movements. Limiting heavy construction access at the intersection of Berry Street would assist and should be investigated.

Response

The haul routes identified in Section 8.4 the Environmental Impact Statement are based on current construction planning carried out for the project and consider factors such as providing the most efficient route to the arterial road network and minimising the overlap of haul routes between construction sites. More detailed construction planning will be carried out by the appointed contractor and any changes to proposed haul routes would be reviewed with regard to the impacts identified in the Environmental Impact Statement.

An assessment of the potential impact from trucks using haul routes is provided in the relevant chapters of the Environmental Impact Statement, in particular Chapter 8 (Construction traffic and transport), Chapter 10 (Construction noise and vibration) and Chapter 21 (Air quality). This includes a range of mitigation measures to minimise and manage the potential impacts from heavy vehicle use.

Responses to the specific issues raised regarding Victoria Cross Station are provided below:

- Around two to four on street car parking spaces would be removed on Miller Street. This would mainly be associated with construction site access and egress points
- Noise from heavy vehicles is considered in Section 10.4 of the Environmental Impact Statement. For McLaren Street, this assessment found that the increase in traffic noise would comply with the relevant criteria
- The introduction of construction vehicles would not result in a deterioration of intersection performance around Victoria Cross Station.

8.7.4 Pedestrian, cyclist and motorist safety

Twenty-six submissions raised issues regarding pedestrian, cyclist and motorist safety.

Stakeholder identification numbers

15, 48, 50, 61, 65, 66, 70, 82, 84, 91, 95, 98, 102, 105, 110, 112, 142, 166, 178, 190, 200, 242, 245, 249, 254, 268

Issue raised

In summary, the submissions raised the following issues:

- The impact to the safety of disabled people, pedestrians, skateboard users, cyclists, motorists and rail workers at the Chatswood dive site is understated in the Environmental Impact Statement. The real impact to public safety is largely ignored
- The alternative routes when Frank Channon Walk is closed near the Chatswood dive site are not suitable for disabled people, pedestrians, skateboard users and cyclists. The paths and roads are extremely narrow in comparison to Frank Channon Walk, resulting in a dangerous environment for pedestrians (including those with disabilities and limited mobility), cyclists and nearby motorists
- Clarke Lane, Crows Nest is very narrow and trucks using this lane will make entering and exiting the adjacent residential building driveway dangerous
- Concern regarding safety of people around Crows Nest, particularly the elderly, and families with young children, due to trucks around Crows Nest Station
- Concern regarding conflicts and safety risks from the location of major construction activities at Victoria Cross Station and on Miller Street, North Sydney, due to the highly pedestrianised environment
- Concern regarding potential pedestrian hazards while travelling north of McLaren Street in North Sydney near the Victoria Cross Station site
- Concern regarding reduction in width of the Miller Street footpath and pedestrian safety implications
- Given the volume of movements in and out of the northern construction site at Victoria Cross, the proposed strategy to mitigate risks to Monte Sant' Angelo Mercy College and the broader community is inadequate. No measures or commitments are proposed to manage safety and security.
- Concern regarding increased risk of pedestrian accidents in McMahons Point and North Sydney
- Concern regarding public safety due to trucks at Blues Point and around the Blues Point site, particularly to road users and motorists on Blues Point Road and to pedestrians (especially the elderly and children). Suggest trucks be required to travel at slow speed to avoid incidents
- Concern regarding traffic snarls around Blues Point and the potential to cause casualties
- Concern regarding traffic safety of trucks turning right out of Henry Lawson Drive at Blues Point

Response

Pedestrian, cyclist and motorist safety is assessed in Section 8.4.1 of the Environmental Impact Statement. This section identifies general safety impacts for all construction sites mainly associated with the interface of construction access and egress points with pedestrians and cyclists. This section also identifies that access and egress arrangements have been developed with consideration of pedestrian, cyclist and motorist safety.

In addition to the requirements for management of chain of responsibility (heavy haulage) requirements, the Contractor would be required to adopt applicable vulnerable road user initiatives to enhance pedestrian, cyclist and motorist safety in the vicinity of construction sites. These may include measures such as deployment of speed awareness signs in conjunction with variable message signs, enhanced blind spot visibility and other construction vehicle safety features / devices (including side under-run guards and telematics systems to monitor driver behaviour), Sydney Metro City & Southwest specific heavy vehicle driver training and community educational events and initiatives. Where construction sites would have an impact on footpaths, consideration would be given to the requirements of all pedestrians and especially vulnerable users (school children, elderly and mobility impaired). *Disability Discrimination Act* requirements would be adopted with kerb ramps or other measures provided at road crossings. Footpath widths are required to allow for two way pedestrian traffic allowing for prams / strollers and wheelchairs.

Where high numbers of vulnerable users are using a footpath, special provision and design consideration may be required to mitigate any impacts.

Mitigation measure T7 has been revised to the following:

Additional enhancements for pedestrian, cyclist and motorist safety in the vicinity of the construction sites would be implemented during construction. This would include measures such as:

- *Use of speed awareness signs in conjunction with variable message signs near construction sites to provide alerts to drivers*
- *Community educational events that allow pedestrians, cyclists or motorists to sit in trucks and understand the visibility restrictions of truck drivers, and for truck drivers to understand the visibility from a bicycle; and a campaign to engage with local schools to educate children about road safety and to encourage visual contact with drivers to ensure they are aware of the presence of children*
- *Specific construction driver training to understand route constraints, expectations, safety issues, human error and its relationship with fitness for work and chain of responsibility duties, and to limit the use of compression braking*
- *Use of IVMS (telematics) to monitor vehicle location and driver behaviour*
- *Safety devices on construction vehicles that warn drivers of the presence of a vulnerable road user located in the vehicles' blind spots and warn the vulnerable road user that a vehicle is about to turn.*

Additional mitigation measures which have been specifically developed to manage potential pedestrian, cyclist and motorist safety issues include:

- Mitigation measure T2 – Road Safety Audits would be carried out at each construction site. Audits would address vehicular access and egress, and pedestrian, cyclist and public transport safety.
- Mitigation measure T3 – Directional signage and line marking would be used to direct and guide drivers and pedestrians past construction sites and on the surrounding network. This would be supplemented by Variable Message Signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternate routes.
- Mitigation measure T6 – Vehicle access to and from construction sites would be managed to ensure pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasions, police presence.

The safety of pedestrians, cyclists and motorists would be a key consideration during detailed construction planning and in the development of Construction Traffic Management Plans

In relation to reduction in footpath widths, the project would generally maintain a minimum 2.4 metre wide footpath around the construction sites in accordance with Austroads guidelines.

8.7.5 Emergency services

One submission raised issues regarding emergency services.

Stakeholder identification numbers

65

Issue raised

In summary, the submission raised concerns regarding access for emergency vehicles along Blues Point Road.

Response

Potential disruption to emergency services access is considered in Section 8.4.2 of the Environmental Impact Statement. This section identifies that:

- There is not anticipated to be a substantial change to emergency vehicle access during construction
- Construction sites would be arranged to ensure emergency access to nearby buildings and precincts is maintained (including access to emergency firefighting infrastructure)
- There would be ongoing consultation with emergency service providers in relation to changed traffic conditions around construction sites.

8.7.6 Special events

One submission raised issues regarding special events.

Stakeholder identification numbers

66

Issue raised

In summary, the submission raised an objection to the timing of the rehabilitation of Blues Point site and the impact of the site on New Years Eve celebrations.

Response

A process for managing construction works during special events is described in Section 8.4.3 of the Environmental Impact Statement. This section identifies that liaison would occur with the organisers of class 1 and 2 events and (as relevant) the CBD Coordination Office and Roads and Maritime Services to provide appropriate management of construction vehicles to manage potential impacts to event goers, the general public and the construction works.

The construction program for Blues Point is indicative at this stage. Options would be investigated to minimise the footprint of the works during key harbour viewing activities such as New Year's Eve. As identified in Section 7.10.5 of the Environmental Impact Statement, public access to the foreshore would be maintained during works at this site.

8.7.7 Construction worker parking

Five submissions raised issues regarding construction worker parking.

Stakeholder identification numbers

66, 206, 215, 228, 236

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the impacts of additional trades vehicles on resident parking in Chatswood
- Request for all construction worker parking to be accommodated within the boundary of the Chatswood dive site
- Suggestion that all construction workers be encouraged to use public transport to address concerns regarding impacts on parking in Chatswood during construction
- Suggestion for a 'park and shuttle' service for construction workers to avoid impacts on residential parking in Chatswood
- Suggestion that workers at Blues Point use parking contained within the site, use public transport or a shuttle service from an alternative parking area
- Suggestion to acquire an adjoining property to the Blues Point site at 1 Henry Lawson Avenue for site parking, and then rezone as public space when the project is completed.

Response

Section 8.4.4 of the Environmental Impact Statement identifies that construction worker parking would generally not be provided at the majority of the sites, although around 300 car parking spaces may be provided at each of the dive sites to facilitate a park and shuttle service, and a small number of spaces would be provided at all sites.

Further, the use of private vehicles by construction workers would be discouraged by Transport for NSW. As such, options such as acquiring additional property for construction worker parking was not considered.

Mitigation measure T12 commits to managing construction sites to minimise construction staff parking on surrounding streets. The following measures would be implemented:

- Encouraging staff to use public or active transport (through the use of incentive systems)
- Encouraging ride sharing
- Provision of alternative parking locations and shuttle bus transfers where feasible and reasonable.

8.7.8 Active transport impacts

Five submissions raised issues regarding active transport impacts.

Stakeholder identification numbers

69, 71, 82, 249, 270

Issue raised

In summary, the submissions raised the following issues:

- Concern that Clarke Lane, Crows Nest, is very narrow and trucks using this lane will make entering and exiting the building driveway difficult for pedestrians

- Concern that the six month closure of the existing Martin Place Station entrance to the south of Elizabeth Street will place additional pressure on remaining entrances, reduce their level of performance, inconvenience commuters and present a potential safety issue in an emergency situation
- Suggestion that the temporary pedestrian bridge at Central Station be a permanent structure with lifts
- The temporary pedestrian bridge at Central Station appears to be overkill. A smaller bridge could simply connect platform 12 and 16/17 with customers then using the existing underground connections.

Response

The potential for impacts to active transport is considered and assessed in Section 8.4 of the Environmental Impact Statement. Responses to the specific issues raised are provided below:

- Construction sites would be arranged to maintain safe access to surrounding properties. This would include maintaining emergency access and exit arrangements to adjacent buildings.
- Transport for NSW is reviewing and further developing construction staging and methodology for Martin Place Station. The revised methodology will be the subject of further pedestrian analysis to ensure that pedestrian movements are maintained at an acceptable level of service throughout construction.
- The temporary pedestrian bridge at Central Station is no longer proposed to be provided. Pedestrian movements during construction at Central Station would be managed by maintaining underground pedestrian connectivity and staging of the construction works. Further details are provided in Section 2.5 of this report.

8.7.9 Public transport impacts

Five submissions raised issues regarding public transport impacts.

Stakeholder identification numbers

1, 50, 135, 213, 270

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the replacement bus services during track possessions around Chatswood. Roads in the area are already congested and adding rail replacement buses will make the problem worse
- Concern regarding the proposed relocation of the bus shelter on 194 Miller Street – information is required on the new location
- Concern regarding conflict with pedestrian, cycle, bus and taxi access to the ferry wharf at McMahons Point
- Concern regarding the relocation of the Henry Lawson Drive bus stop near Blues Point, and the impact this will have on residents
- Concern regarding the removal of platforms 13, 14 and 15 at Central Station.

Response

The potential for impacts to public transport is considered and assessed in Section 8.4 of the Environmental Impact Statement. Responses to the specific issues raised are provided below:

- Where possible, track possessions required for the project would be coordinated with possessions required by Sydney Trains and the Epping to Chatswood Conversion project. Rail replacement buses would be managed in the same manner as during regular Sydney Trains track possession works. During these periods, the additional buses on the network may result in additional traffic congestion and longer travel times for public transport users
- There would be no restrictions on access to the McMahons Point Ferry Wharf
- The bus stop on Henry Lawson Drive would need to be relocated to facilitate construction works. The relocation of the bus stop would be carried out in consultation with bus operators, Roads and Maritime Services and North Sydney Council. Any decision regarding an alternative location would consider the primary users of the bus stop and the location of other nearby bus stops
- Planning for the removal of platforms 13, 14 and 15 at Central Station is being carried out with Sydney Trains and NSW Trains to enable existing rail services to be maintained.

8.7.10 Parking and taxi impacts

Thirty-five submissions raised issues regarding parking and taxi impacts.

Stakeholder identification numbers

50, 66, 91, 95, 110, 112, 135, 140, 141, 166, 173, 178, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 200, 213, 238, 242, 254, 273, 297

Issue raised

In summary, the submissions raised the following issues:

- Suggestion that a resident-only parking scheme be implemented for Nelson Street and Gordon Avenue, Chatswood
- Suggestion for planning and on-going monitoring at Crows Nest to limit impacts on local roads and parking
- Concern regarding loss of parking at Blues Point considering many residents do not have on-site parking. Residents would need to travel further to find parking
- Concern regarding parking loss impacting businesses and tourists on Blues Point Road
- Concern that there has been no assessment of parking impacts for the Sydney Yard Access Bridge construction site
- Concern regarding the loss of parking around Waterloo during construction
- A Construction Traffic Management Plan should be prepared and distributed publicly to make sure community at Waterloo is aware of car parking restrictions associated with construction. The loss of on-street car parking should be considered at the City of Sydney Council's Local Pedestrian Cycling and Traffic Calming Committee with an opportunity for input from the local community
- To minimise excessive disruption to the local community in Waterloo, a logical, staged construction timetable with inter-Government Agency coordination should be prepared to minimise impacts and prevent car parking congestion in the area

Response

The potential removal of existing car parking is considered and assessed in Section 8.4 of the Environmental Impact Statement. The loss of parking in the vicinity of most construction sites would be minor (generally around two to four spaces would be removed). Where feasible and reasonable, and in accordance with mitigation measures T19, alternative parking facilities would be provided where existing parking is removed to facilitate construction activities.

Construction worker parking would be managed through the implementation of mitigation measure T12 which commits to managing construction sites to minimise construction staff parking on surrounding streets. The following measures would be implemented:

- Encouraging staff to use public or active transport (through the use of incentive systems)
- Encouraging ride sharing
- Provision of alternative parking locations and shuttle bus transfers where feasible and reasonable.

Transport for NSW would work with local councils to minimise adverse impacts of construction on parking and other kerbside use in local streets.

Mitigation measure T5 commits to community notification in advance of proposed road and pedestrian network changes. In addition, the communication and consultation strategy outlined in the Construction Environmental Management Framework (Appendix B of this report) commits to notification of works that may affect transport such as road closures, changes to pedestrian routes and changes to bus stops.

The process for the development of Construction Traffic Management Plans is also outlined in the Construction Environmental Management Framework.

8.7.11 Road network performance

Sixty submissions raised issues regarding road network performance.

Stakeholder identification numbers

13, 18, 65, 70, 74, 82, 84, 91, 95, 97, 98, 102, 105, 110, 112, 135, 139, 140, 141, 142, 145, 153, 173, 182,, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 206, 207, 208, 209, 213, 220, 228, 236, 238, 242, 245, 249, 254, 266, 271, 273, 275, 297, 298

Issue raised

General

In summary, the submissions raised the following issues:

- General concern regarding impacts to local residents from construction traffic
- Concern regarding the need to widen roads for the metro line. This need may be addressed instead by blocking off roads, or widening the road and inserting bus lanes
- Concern regarding traffic performance from the overlap in haul routes between the Blues Point, Victoria Cross and Crows Nest sites.

Chatswood dive site – demolition of Nelson Street bridge and alterations to Pacific Highway / Mowbray Road intersection

In summary, the submissions raised the following issues:

- Traffic information for the Chatswood dive site is missing and no solution provided. No survey of traffic appears to have been made of traffic turning off Pacific Highway, left into Nelson Street, in order to travel west on Mowbray Road. There is only a proposed solution which is subject to Roads and Maritime Services action and may have related property acquisition impacts

- Nelson Street Bridge near the Chatswood dive site should not be closed as this will limit entry of residents to their property and increase traffic congestion on the Pacific Highway and in Chatswood. Suggestion that this closure will add 15 to 30 minutes of travel time for local residents
- Suggestions to minimise impacts of the removal of Nelson Street bridge near the Chatswood dive site:
  - Build a new bridge
  - Provide traffic lights at the Nelson Street / Pacific Highway / Moriarty Road intersection and allow all movements
  - Provide 'keep clear' signs on Pacific Highway at Nelson Street
  - Provide a one-way road from Nelson Street to Mowbray Road
  - Provide a left-in / left-out access at the western Ausgrid entrance on Mowbray Road
  - Provide a right-in / left out access at the western Ausgrid entrance on Nelson Street with two-phase traffic lights at Nelson Street / Pacific Highway intersection
  - Provide a left-in / left-out access for light vehicles at Bryson Street
- Objection to the reconfiguration of the Mowbray Road / Pacific Highway intersection at Chatswood
- Request for a dedicated left turn lane from the Pacific Highway to Mowbray Road at Chatswood without traffic control at the beginning of the project.

Chatswood dive site – other traffic impacts

In summary, the submissions raised the following issues:

- Support for proposed site access at Brand Street for the Chatswood dive site
- The intersections of Pacific Highway and Gore Hill Freeway ramps, Pacific Highway and Victoria Avenue (AM period) and Pacific Highway and Fullers Road (AM period) are graded F and no solutions have been offered
- Concern regarding vision obstruction by the abutments of the old bridge at the Chatswood dive site
- Concern regarding traffic congestion near Chatswood including at the intersection of Pacific Highway / Mowbray Road, especially cumulative impacts during shutdown of the Epping to Chatswood Rail Link
- Metro should present a traffic control plan to the Willoughby Traffic Committee
- Metro should provide a traffic control plan for the Chatswood dive site to alleviate local traffic congestion
- The Nelson Street / Pacific Highway intersection should be signalised during construction at Chatswood
- Metro construction vehicles should not enter Nelson Street, Chatswood and an alternative slip lane off the Pacific Highway should be provided
- The intersection of Gordon Avenue and Pacific Highway at Chatswood should be marked with 'Do not block this intersection'
- Request for more information regarding traffic management during the support works to the western abutment of Mowbray Road Bridge near the Chatswood dive site
- Suggestion to facilitate access to the Chatswood dive site via Brand Street and Hampden Road rather than Elizabeth Street.

Crows Nest Station

In summary, the submissions raised the following issues:

- An alternative route is required when Hume Street is closed for residents and businesses on Nicholson Street who currently turn left off the Pacific Highway southbound into Oxley Street, then turn right into Clarke Street and then turn right into Hume Street to cross the highway. The alternative route should be detailed in a traffic management plan and signposted
- Concern regarding significant construction traffic impacts at Crows Nest
- Request that Clarke Lane, Crows Nest, be retained as a one way thoroughfare. Clarke Lane is very narrow and trucks using this lane, particularly as a two way road, will make entering and exiting the building driveway difficult for vehicles and for rubbish removal trucks
- Request that a turning circle is built at the Hume Street end of Clarke Lane, Crows Nest, during construction to make the road two-way
- Concern regarding the blocking of driveways on Clarke Lane, Crows Nest due to 200 trucks per day
- Concern regarding temporary closure of Hume Street, Crows Nest, and whether it will prevent access to Lawson House carparks on Clarke Lane and restricted access to Nicholson Place
- Request for information on traffic control measures to be implemented during the closure period of Hume Street, Crows Nest
- Concern regarding traffic impacts on Kelly's Place child care centre caused by haulage trucks and light vehicles on Clarke Street, Crows Nest
- Suggestion for planning and ongoing monitoring to limit impacts on local roads and parking around Crows Nest Station.

Victoria Cross Station

In summary, the submissions raised the following issues:

- Concern regarding truck/pedestrian conflicts at the end of the school day near Victoria Cross Station
- Concern regarding traffic management around Victoria Cross Station due to existing traffic congestion

Blues Point temporary site

In summary, the submissions raised the following issues:

- Traffic congestion on Blues Point Road due to the use of trucks, especially considering the narrow width of the road, the potential for oversize loads to create traffic congestion, and the inconvenience of a truck every few minutes
- Blocking parked cars and property access on Blues Point Road by queuing trucks
- Traffic impact of idling trucks on Blues Point Road. This has not been addressed in the Environmental Impact Statement.

Martin Place Station

In summary, the submissions raised the following issues:

- Concern regarding impacts of vehicular movements on access and road network performance at Martin Place Station. Particular concern has been expressed about the transportation of spoil.

Central Station

Concerns were raised regarding traffic around Regent Street during construction of the proposed Sydney Yard Access Bridge.

Waterloo Station

In summary, the submissions raised the following issues:

- Concern regarding traffic impacts during construction of Waterloo Station, specifically the intersection of Cope and Raglan streets
- A detailed Construction Traffic Management Plan to be prepared and distributed publicly to the surrounding properties around the Waterloo Station site. Any road closures should be considered at the City of Sydney Council's Local Pedestrian Cycling and Traffic Calming Committee for consideration and determination with an opportunity for input from the local community
- To minimise excessive disruption to the local community, a logical, staged construction timetable with inter-Government Agency coordination is requested to minimise impacts and prevent traffic congestion in the Waterloo area.

Marrickville dive site

In summary, the submissions raised the following issues:

- The haul route for trucks at the Marrickville dive site will have major traffic impacts
- Do not make the entry to the Marrickville dive site in Murray Street – instead use an entry at Sydney Steel Road, Marrickville

Response

General

Changes to roads in the vicinity of the metro stations or other metro infrastructure are generally not proposed. Where changes are required, such as Nelson Street at Chatswood, this is described in Sections 6.9.1 and 7.10.1 of the Environmental Impact Statement and the potential traffic and transport impacts are assessed in Sections 8.4.6 and 9.4.3 of the Environmental Impact Statement.

Haul routes for construction sites have generally been designed to limit the potential to overlap where feasible and reasonable. This issue would be further investigated during detailed construction planning. Where routes do overlap, this would be confined to the arterial road network which is intended to handle the majority of traffic movements. The construction traffic impact assessment shows that the potential impacts on the surrounding road network from construction vehicles would be negligible. In the event there is some overlap of construction vehicles from multiple sites on the arterial road network, this impact is also anticipated to be negligible.

Chatswood dive site – demolition of Nelson Street bridge and alterations to Pacific Highway / Mowbray Road intersection

Nelson Street bridge is required to be demolished due to the Chatswood dive site and the realigned T1 North Shore Line. It is not feasible to replace this bridge due to the grades which would be required to raise the road over the realigned T1 North Shore Line. To cater for the main vehicle movement using Nelson Street (the G-turn from Pacific Highway southbound to Mowbray Road westbound using Nelson and Orchard streets), it was proposed in the Environmental Impact Statement to provide an all vehicle right turn provision at the Pacific Highway / Mowbray Road intersection.

Since development of the Environmental Impact Statement, concerns have been raised by stakeholders (including Roads and Maritime Services) regarding the provision of the right hand turn lanes in isolation from other long term changes required at this intersection. It has also been identified that it would be desirable for all work at the intersection to be carried out at the same time to avoid traffic disruption on multiple occasions.

As a result, Transport for NSW is currently working with Roads and Maritime Services and other stakeholders to carry out a broader review of the traffic and transport needs in the precinct, the implications of the closure of the Nelson Street bridge and to identify a preferred approach to any future upgrade of the Pacific Highway / Mowbray Road intersection. The identification of the proposed solution at the Pacific Highway / Mowbray Road intersection and the carrying out of such work may not be implemented prior to the construction work that would require closure of the Nelson Street bridge. Section 9.2 of this report provides a revised traffic impact assessment for the area around Chatswood in the event that the solution cannot be implemented prior to the demolition of Nelson Street bridge.

Responses to other specific issues raised are provided below:

- Background traffic data was obtained for the areas around Chatswood dive site. This included a combination of data provided by Roads and Maritime Services from the Sydney Coordinated Adaptive Traffic System (SCATS) and surveyed traffic counts
- The role of Nelson Street, and Nelson Street bridge, providing local access to properties is considered in the operational traffic and transport assessment (Section 9.4.3 of the Environmental Impact Statement). Following closure, residents would need to use alternative roads (such as Mowbray Road or Albert Avenue) to cross the rail line and access properties. This is expected to result in marginal increases to travel times.

Chatswood dive site – other traffic impacts

An assessment of potential construction traffic and transport impacts is provided in Section 8.4.6 of the Environmental Impact Statement. Around Chatswood, the assessment identified that construction vehicles would have a negligible impact on the surrounding road network. Responses to specific issues raised are provided below:

- The Pacific Highway / Gore Hill Freeway ramps, Pacific Highway / Victoria Avenue and Pacific Highway / Fullers Road intersections are predicted to operate at a level of service F both with and without the project. The introduction of construction vehicles would not result in a substantial change in performance of these intersections
- In relation to the potential for the removal of the bridge reducing sight lines, all metro works would be carried out to meet the relevant road design specifications
- The potential for cumulative traffic impacts with the Epping to Chatswood Rail Line conversion is considered in Chapter 26 of the Environmental Impact Statement. Transport for NSW would manage this interface to minimise potential road network performance impacts where feasible and reasonable
- The process for developing construction traffic management plans and traffic control plans is provided in the Construction Environmental Management Framework (Appendix B of this report). This would include consultation with the relevant stakeholders
- The potential impacts of trucks using Nelson Street during construction would be effectively managed without the need for new traffic signals or removing this access point from the project

- The design of the project has minimised the works required to Mowbray Road bridge. Specific traffic management requirements would be developed during detailed construction planning as part of traffic management plans and traffic control plans
- Access to carry out the northern surface track works would be required from a number of streets, including Brand Street and Drake Street. As such, there would be a requirement for some vehicles to use Elizabeth Street (anticipated to be around six vehicles per hour). This would not result in impacts to the performance of the surrounding road network.

Crows Nest Station

An assessment of potential construction traffic and transport impacts around Crows Nest is provided in Section 8.4.8 of the Environmental Impact Statement.

The assessment identified that the introduction of construction vehicles would have a negligible impact on the surrounding road network. Responses to specific issues raised are provided below:

- During the period when Hume Street is closed, motorists would be able to use a number of alternative routes to access the western side of the Pacific Highway. For example, this could include left at Albany Street, right at Oxley Street then straight across the Pacific Highway
- A temporary closure of Clarke Lane is proposed near the intersection with Hume Street. During this period, Clarke Lane would be made two-way to facilities continued access to buildings
- During construction, access would be maintained to properties around the site. This would include periods when Clarke Lane and Hume Street are partially closed
- The exact nature of traffic control measures during road closures would be developed as part of traffic management plans and traffic control plans in consultation with the relevant road authority.

Victoria Cross Station

An assessment of potential construction traffic and transport impacts around Victoria Cross is provided in Section 8.4.9 of the Environmental Impact Statement.

The assessment identified that the introduction of construction vehicles would have a negligible impact on the surrounding road network. Construction traffic would be managed to provide a safe pedestrian environment around the sites.

Blues Point temporary site

An assessment of potential construction traffic and transport impacts around Blues Point from construction vehicles along Blues Point Road is provided in Section 8.4.10 of the Environmental Impact Statement. The assessment found that the potential to impact intersection performance would be negligible.

The potential impacts from oversized vehicles to remove the tunnel boring machine components were also considered. This would involve the temporary short-term closure of the road (most likely overnight) and the temporary removal of street furniture along Blues Point Road. Since the development of the Environmental Impact Statement, further investigations have been carried out into the potential to use barges to transport the tunnel boring machine components. Further information is provided in Section 2.2 of this report.

Martin Place Station

An assessment of potential construction traffic and transport impacts around Martin Place is provided in Section 8.4.14 of the Environmental Impact Statement.

In the vicinity of the Martin Place Station, the assessment identified that construction vehicles would have a negligible impact on the surrounding road network. Responses to specific issues raised are provided below:

- The exact details and location of the site exit from the Martin Place Station construction sites would be determined during detailed construction planning. Access to neighbouring properties would be maintained
- There are no proposed access restrictions on Castlereagh Street during construction. In the event that temporary night-time partial road closures are required, these would be managed in consultation with the relevant road authority. In this event, notification would be provided to neighbouring properties and alternative arrangements provided where feasible and reasonable.

Central Station

An assessment of potential construction traffic and transport impacts around Central and Sydney Yard Access Bridge is provided in Section 8.4.16 of the Environmental Impact Statement.

The assessment identified that construction vehicles would have a negligible impact on the surrounding road network.

Waterloo Station

An assessment of potential construction traffic and transport impacts around Waterloo is provided in Section 8.4.17 of the Environmental Impact Statement.

In the vicinity of Waterloo Station, the assessment identified that construction vehicles would have a negligible impact on the surrounding road network. Responses to specific issues raised are provided below:

- The process for developing construction traffic management plans and traffic control plans is provided in the Construction Environmental Management Framework (Appendix B of this report). This would include consultation with the relevant stakeholders. Management plan required by the conditions of approval would be made available on the project website
- The potential cumulative impacts of construction traffic from the project and other projects in the vicinity of Waterloo are considered in Chapter 26 of the Environmental Impact Statement. Transport for NSW would manage and co-ordinate the interface with projects under construction at the same time.

Marrickville dive site

An assessment of potential construction traffic and transport impacts around Marrickville is provided in Section 8.4.18 of the Environmental Impact Statement.

The assessment identified that construction vehicles would have a negligible impact on the surrounding road network. Responses to specific issues raised are provided below:

- Consultation would continue with all relevant stakeholders regarding potential traffic impacts and changed traffic conditions associated with the project
- Access to neighbouring properties would be maintained during construction. This may involve the provision of alternative access arrangements
- The Marrickville dive site is proposed to provide two functions during construction – to support the tunnel boring machine and use as a temporary concrete pre-cast facility. Two access points are proposed for the Marrickville dive site to provide separation of vehicles accessing different parts of the site and manage potential traffic impacts.

8.8 Operational traffic and transport

8.8.1 Assessment method

Fourteen submissions raised issues regarding the assessment method.

Stakeholder identification numbers

10, 31, 32, 33, 106, 115, 116, 117, 123, 124, 144, 147, 177, 250

Issue raised

In summary, the submissions raised the following issues:

- Operational transport impacts including interchanges, opportunities to improve public transport, impacts to pedestrian access in and around stations and connecting streets, capacity of streets, and the provision of infrastructure to support sustainable transport options has not been adequately addressed in the Environmental Impact Statement
- There is not sufficient information on how metro interacts with buses, cycling and pedestrians at each location and the opportunities to improve public transport. The Environmental Impact Statement fails to state whether integration and state of the art technology will be at ground level so that bus users and pedestrians can get travel information
- The Environmental Impact Statement does not adequately model how additional metro stations could reduce traffic associated with the WestConnex project

Response

The project has been designed to provide efficient interchange between Sydney Metro and other forms of transport. The station access hierarchy has been adopted during the development of the design. This hierarchy prioritises walking, cycling and interchange with other public transport modes over kiss-and-ride infrastructure.

Section 9.4 of the Environmental Impact Statement provides information on how each metro station would interact with buses, cycling and pedestrians at each location. The design of each station and the interchange facilities would continue to be developed during detailed design in consultation with key planning agencies, including the Department of Planning and Environment and local councils, to identify opportunities to integrate existing and future land uses within and around the stations.

Changes to traffic volumes and patterns associated with WestConnex New M5 are a matter for assessment as part of that project. There is no requirement for the project to consider the potential for additional stations to reduce the traffic impacts associated with WestConnex. However, as identified in Section 3.4.1 of the Environmental Impact Statement, the Chatswood to Sydenham project is anticipated to reduce the number of car trips which would have otherwise been on the network (by up to 20 million annually in 2026) and would result in a reduction in traffic on the road network.

8.8.2 Strategic traffic and transport impacts

Ten submissions raised issues regarding strategic traffic and transport impacts.

Stakeholder identification numbers

100, 114, 122, 159, 162, 163, 205, 216, 221, 298

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding changes to the frequency of existing heavy rail services to St Peters and Erskineville stations. All of the stations currently on the Bankstown line will be serviced by the Metro, other than Erskineville Station and St Peters Station. The future of train services to those stations has still not been confirmed. Residents have been told that Erskineville Station and St Peters Station will be incorporated into a different existing line, however no further details have been given. Buses are not a viable alternative
- Concern regarding future heavy rail services to St Peters and Erskineville and the rumours of service reduction on the T3 Bankstown Line due to the metro line
- Query as to which heavy rail line will run through Wynyard once the T3 Bankstown Line is removed

Response

After opening of the project, trains on the T3 Bankstown Line would be moved to other lines such as the T2 Inner West and South Line.

Erskineville and St Peters stations would continue to be served by Sydney Trains services. Customer demand levels at these stations would be taken into account when new train timetables are being designed over the coming years.

Similarly, a decision on which train line would use the City Circle (and Wynyard Station) would be made when new train timetables are being designed over the coming years.

Changes to the T3 Bankstown Line are part of the Sydenham to Bankstown project, which is subject to a separate assessment and approval process.

8.8.3 Pedestrian integration

Nineteen submissions raised issues regarding pedestrian integration.

Stakeholder identification numbers

18, 19, 37, 69, 113, 138, 206, 215, 221, 228, 229, 236, 238, 240, 250, 266, 270, 294, 297

Issue raised

General issues

In summary, the submissions raised the following issues:

- The Environmental Impact Statement does not adequately assess impacts on future pedestrian movements and densities
- It is important that the project provides adequate all weather pedestrian access and limits jaywalking
- Suggestion to establish a Local Active Transport Plan at each station to integrate with pedestrian and cycle links. A radius of 15 to 20 minutes' walking or cycling should be used.

Chatswood dive site

In summary, the submissions raised the following issues:

- Support for the extension of Frank Channon Walk from Nelson Street / Mowbray Road near the Chatswood dive site
- Concern regarding maintenance of footpaths in Chatswood
- Suggestion that a single-span footbridge be installed to replace Nelson Street bridge or that a new bridge be built at Gordon Avenue to allow existing utilities to be left in place and to retain pedestrian access. This would save time and money and connect the eastern end of Nelson Street to Frank Channon Walk.

Crows Nest Station

In summary, the submissions raised the following issues:

- Support for pedestrian integration at Crows Nest Station
- Suggestion that an underground pedestrian connection should be provided at Crows Nest Station to the other side of the Pacific Highway near Hume Street. This would avoid lots of metro customers crowding the narrow footpath to cross at the intersection and reduce pedestrian safety risks
- Suggestion for pedestrian integration of Crows Nest Station with Hume Street Park
- Request for new pedestrian crossing on the Pacific Highway at Oxley Street, Crows Nest, with traffic lights
- Support for new pedestrian crossings on the Pacific Highway / Oxley Street, Clarke Street, Hume Street and Oxley Street. Suggestion for further investigation into pedestrian integration at the station in consultation with Roads and Maritime Services and North Sydney Council

Victoria Cross Station

In summary, the submissions raised the following issues:

- Further consideration should be given to a Greenwood Plaza to Victoria Cross Station underground pedestrian link to improve pedestrian safety and relieve pressure at the Pacific Highway / Miller Street intersection and Dennison Street, North Sydney
- Concern regarding pedestrian volumes increasing on the Dennison Street laneway system outside Victoria Cross Station

Blues Point temporary site

In summary, the submissions raised the following issues:

- In collaboration with North Sydney Council, the intersection of Henry Lawson Avenue and Blues Point Road should be improved to provide safe pedestrian crossing at the completion of works.

Martin Place Station

In summary, the submissions raised the following issues:

- Concern regarding the proposed main customer discharge point of Martin Place Station onto Castlereagh Street. Concern regarding safety and inefficiency ('bottle necks') of pedestrians travelling along a narrow foot path and then turning north to reach the pedestrian crossing. Suggestion to extend the pedestrian crossing further south, and or discharge customers onto the expanse of Martin Place

- Following additions are suggested at Martin Place Station:
  - A north-east tunnel from Martin Place Station to Chifley Square for pedestrians crossing Hunter Street
  - Retention of the underground connection from Martin Place to MLC Centre as it forms part of a cross town path.

Pitt Street Station

In summary, the submissions raised the following issues:

- The Environmental Impact Statement does not describe the impacts on people using major bus interchange areas at Park and Druitt streets near Pitt Street Station. Design responses need to manage pedestrian traffic from metro stations and bus interchanges. The Environmental Impact Statement does not demonstrate how interchange between transport networks will occur as claimed. Environmental Impact Statement does not define what "appropriate" footpath widths are and how this will be determined
- Following additions are suggested at Pitt Street Station:
  - An underground connection from Pitt Street Station to Town Hall Station through Galleries Victoria
  - A connection to the Foodbase Food court to provide connection to Museum Station
  - A station entrance and exit in the block between Park, Castlereagh, Bathurst and Pitt streets.

Waterloo Station

In summary, the submissions raised the following issues:

- Consideration should be given to additional pedestrian access points on the southern side of Waterloo Station to enhance connectivity with the residential area in the south of Waterloo.

Response

General issues

The pedestrian modelling approach is outlined in Section 9.2 and Section 4.3 of Technical Paper 1 of the Environmental Impact Statement. The pedestrian modelling provides an assessment of the performance of footpaths around the metro stations from the redistribution of pedestrians by the new stations.

The Chatswood to Sydenham Design Guidelines (Appendix A of this report) will be used to guide the ongoing design of the project. This includes the provision for adequate pedestrian weather protection, safe crossing and ensures effective interchange between different modes of transport.

Chatswood dive site

Once the project is operational, the ongoing maintenance of footpaths would be the responsibility of the relevant road authority.

Section 9.4.3 of the Environmental Impact Statement provides an assessment of impact to pedestrians and cyclists from the removal of Nelson Street bridge. With the proposed extension of Frank Channon Walk to Mowbray Road, the additional travel distance would be around 50 to 100 metres. This is not considered to result in a significant impact to pedestrians and cyclists. As such, the provision of a footbridge to replace the Nelson Street bridge is not considered to be justified.

Crows Nest Station

Transport for NSW would implement the project in an integrated manner and in direct collaboration with key planning agencies, including the Department of Planning and Environment and local councils, to identify opportunities to integrate existing and future land uses within and around the stations.

It is proposed to introduce a signalised pedestrian crossing on the northern side of the Pacific Highway / Oxley Street intersection to facilitate improved pedestrian access from the western side of the Pacific Highway to Crows Nest Station.

Transport for NSW is conducting further work to determine the feasibility of safeguarding a link to the western side of Pacific Highway. There are a number of constraints which are being investigated including:

- Link would be into the paid side of station and would require an extra gateline
- The shallow station depth constrains opportunities for an underground link
- Unknown services underneath Pacific Highway
- Potential conflict with underground car parks
- Customer catchment on the western side of the Pacific Highway is limited by steep grades and easy access to Wollstonecraft Station.

Victoria Cross Station

Victoria Cross Station is not proposed to fulfil a major interchange role with Sydney Trains services at North Sydney Station. This interchange function is provided at other stations along the metro line including Chatswood, Martin Place and Central stations. Notwithstanding, customers wishing to interchange between North Sydney and Victoria Cross stations would be able to use the existing footpath network. As such, there are no plans for an underground connection between the proposed Victoria Cross Station and the existing North Sydney Station.

Section 9.4.5 of the Environmental Impact Statement identifies that pedestrian volumes are predicted to increase on Dennison Street. Transport for NSW is currently working with North Sydney Council to investigate opportunities to improve the pedestrian environment on Dennison Street while maintaining servicing and delivery access the buildings.

Blues Point temporary site

The project would not have any ongoing effect at the Henry Lawson Avenue / Blues Point Road intersection. Any improvements to pedestrian facilities at this intersection are a matter for the relevant road authority.

Martin Place Station

Transport for NSW would implement the project in an integrated manner and in direct collaboration with key planning agencies, including the Department of Planning and Environment and local councils, to identify opportunities to integrate existing and future land uses within and around the stations. This process would include further consideration of improvement to the pedestrian network around Martin Place Station and the interface of the station with Martin Place.

Pitt Street Station

Section 9.4.8 of the Environmental Impact Statement provides information on the interchange arrangements at Pitt Street Station with nearby bus services. In relation to bus stops on Park and Druitt streets, the station would provide efficient interchange potential with customers using existing footpaths to interchange between the two modes.

The two station entries would provide efficient entry and exit points to surrounding land uses. A third station entry is not considered to be warranted. The station design does, however, safeguard a potential future underground connection to the future Town Hall Square.

Waterloo Station

There are no plans for additional station entries at Waterloo Station. The station access on the corner of Cope and Raglan streets is strategically located adjacent to future civic, retail and commercial spaces. It is also within three minutes walk to the Australian Technology Park via Henderson Road to the west. This entry point serves wider urban and civic outcomes and includes surface treatments to facilitate access in all directions.

The single entry aligns with connectivity to transport links. Interchange with the bus network is adjacent to the station entry on Botany Road. Suburban rail interchange is within 10 minutes walk to Redfern Station to the north via Wyndham Street. To the east of the station entry, a shared zone (proposed as part of future urban renewal) on Cope Street would allow for safe and convenient access to the south for pedestrians and cyclists. The single entry also provides an opportunity to activate the surrounding streets and frontage along Botany Road as customers are walking past.

The station has been designed to safeguard future entries to either the east or western side of the station via subways connecting into the concourse level. Future entries are also possible within any adjacent development should they be justified in the future.

Given the ability for customers to move within sheltered public spaces at street level along Cope Street and through a new permeable local street network associated with the future urban renewal, the addition of a second metro entry at Waterloo is not warranted. On balance, an urban design response combined with the ability to safeguard future subway connections is considered adequate.

The details of the Waterloo Station layout and transport integration arrangements are subject to detailed design. Consultation would continue with Land and Housing Corporation, UrbanGrowth NSW and other relevant stakeholders to enable the station arrangements to consider the broader strategic planning for the area and other relevant projects.

8.8.4 Cyclist integration

Seven submissions raised issues regarding cyclist integration.

Stakeholder identification numbers

7, 19, 37, 129, 229, 236, 238

Issue raised

In summary, the submissions raised the following issues:

- Sydney Metro must include provision for bicycle integration. Metro stations need to be connected to and by a separated bike path network with the ability to take bikes on the train
- Encourage as much secure enclosed bicycle parking as can be accommodated with flexibility to expand to cater for increased future demand
- Suggestion to establish a Local Active Transport Plan at each station to integrate with pedestrian and cycle links. A radius of 15 to 20 minutes walking or cycling should be used
- Suggestion that a single-span footbridge be installed to replace Nelson Street bridge or a new bridge be built at Gordon Avenue, Chatswood, to retain cyclist access
- Support for cyclist integration at Crows Nest via Hume, Oxley, Clarke and Nicholson streets

Response

The facilities providing integration with the cycle network are described in Section 9.4 of the Environmental Impact Statement. This would include:

- Cycle parking at all metro stations
- New on road cycle facilities at Crows Nest and Waterloo stations, connecting existing cycle routes to the station entries.

Section 6.2.2 of the Environmental Impact Statement also identifies that the system would be designed to provide the ability to take bicycles on trains.

The Chatswood to Sydenham Design Guidelines (Appendix A of this report) will be used to guide the ongoing design of the project. This includes the provision for convenient, safe, secure bicycle storage facilities and connections to existing cycle ways.

Section 9.4.3 of the Environmental Impact Statement provides an assessment of impact to pedestrians and cyclists from the removal of Nelson Street bridge. With the proposed extension of Frank Channon Walk to Mowbray Road, the additional travel distance would be around 50 to 100 metres. This is not considered to result in a significant impact to pedestrians and cyclists. As such, the provision of a footbridge to replace the Nelson Street bridge is not considered to be justified.

8.8.5 Public transport integration

Nine submissions raised issues regarding public transport integration.

Stakeholder identification numbers

7, 13, 131, 159, 236, 238, 250, 266, 270

Issue raised

In summary, the submissions raised the following issues:

- The chapter on Operational Transport does not on address physical interchanges at each metro entrance or the experience of people transferring between metro and bus or metro and active transport
- Concerns that the new metro will not connect with the existing rail system. The transport system needs to be properly integrated
- Interchanges should be convenient and involve minimum time
- Concern regarding access to buses from bus stops and buses becoming 'bunched up' as a result of Sydney Metro development
- Query regarding the transport connection between Crows Nest Station and St Leonards
- Suggestion to maintain existing bus stops on the Pacific Highway close to Crows Nest Station to facilitate integration
- A zebra crossing should be provided across Hickson Road near Barangaroo Station to access bus services 311, 324 and 325 near the entrance to Cutaway Park and Barangaroo Reserve. Query as to whether bus stop facilities will be relocated
- The existing northern CBD buses hub on Clarence, York and Carrington streets should be retained and connected to Sydney Metro infrastructure.

Response

The project has been designed to provide efficient interchange between each Sydney Metro station and other forms of transport. Section 9.4 of the Environmental Impact Statement provides information regarding the proposed public transport interchange arrangements at each station. The station access hierarchy, adopted during the development of the design, prioritises walking, cycling and interchange with other public transport modes over kiss-and-ride infrastructure.

Responses to specific issues raised are provided below:

- The metro system would provide interchange potential with the existing rail network at strategic points, including Martin Place and Central stations. Further interchange would be provided at Epping, Chatswood, Central and Sydenham stations as part of other stages of Sydney Metro
- Interchange with the bus network is described for each station in Chapter 9 of the Environmental Impact Statement. Section 3.4.1 of the Environmental Impact Statement identifies that the project would deliver improved reliability and reduced travel times for bus customers associated with improved road traffic conditions
- There would be no change to the existing transport network between Crows Nest and St Leonards. It is anticipated that connections would be primarily made by walking using the existing footpath network. The proposed northern station entry at Crows Nest Station would provide efficient pedestrian connectivity to the St Leonards' commercial centre
- As described in Section 9.4.4 of the Environmental Impact Statement, the existing bus stops on the Pacific Highway near Crows Nest Station would be retained to provide for efficient interchange with the station
- The proposed interchange facilities at Barangaroo Station are described in Section 9.4.6 of the Environmental Impact Statement. Subject to further consultation with the Barangaroo Delivery Authority, this would include pedestrian crossings on Hickson Road to facilitate interchange with bus services. It is also proposed to relocate bus stops on Hickson Road closer to the proposed northern station entry
- There are no plans to change the existing bus interchange at Clarence, York and Carrington streets near Wynyard Station. Potential interchange from this bus facility to metro stations would involve pedestrians using the existing footpath network and other pedestrian facilities such as Wynyard Walk through the Sydney CBD.

8.8.6 Road network performance

Thirty-five submissions raised issues regarding road network performance.

Stakeholder identification numbers

3, 15, 37, 44, 54, 55, 80, 82, 90, 110, 139, 142, 145, 170, 173, 175, 198, 199, 201, 206, 207, 208, 209, 211, 212, 228, 236, 238, 241, 249, 250, 271, 273, 274, 297

Issue raised

In summary, the submissions raised the following issues:

- Suggestion to undertake traffic flow analysis for improved service at the Pacific Highway / Mowbray Road intersection

- The provision of the right turn from Pacific Highway to Mowbray Road, Chatswood, appears to be unviable. Without these right turn lanes, there would be a severe impact to traffic congestion on the Pacific Highway that would reverse the improvements in safety made over a number of years by Roads and Maritime Services
- Suggestion to improve access to Chatswood from the Pacific Highway and Mowbray Road due to the permanent closure of Nelson Street
- Proposal for a right turn lane following closure of Nelson Street bridge ignores residents from Chatswood West / Lane Cove travelling to the Pacific Highway from Mowbray Road. Suggestion to provide new traffic lights at Eddy Road with right turn onto Pacific Highway
- The removal of Nelson Street bridge will have considerable impact on Orchard Road and access to and from Nelson Street (eastern side of the rail line) and Gordon Avenue at Chatswood. Suggested solution to construct a road linking Nelson Street and Mowbray Road opposite Hampden Road
- The removal of Nelson Street bridge will have considerable impact on congestion around Chatswood
- Suggestion to construct a new road post construction over the Chatswood dive site in a similar location to the existing private road within the Ausgrid site
- Suggestion to construct a new two way local road parallel to the proposed Frank Channon Walk with a signalised intersection at Mowbray Road. This will enable light vehicles travelling on Nelson Street to access Chatswood East via Mowbray Road rather than the Pacific Highway
- Suggestion for a traffic bridge linking Gordon Street and Orchard Road
- Suggestion for a 'Do not queue across intersection' sign at the intersection of Nelson Street and the Pacific Highway at Chatswood
- Suggestion for a 'hook turn' on Albert Avenue, Chatswood
- A resident parking scheme should be provided on Nelson Street and Gordon Avenue, Chatswood, while maintaining on street parking provision. Suggestion to give out resident parking permits
- Support for kiss-and-ride and taxi bays on Clarke Street, Crows Nest
- Concern regarding traffic impacts from reduced on street parking, kiss-and-ride and taxi bays on Clarke Street, Crows Nest
- Request for the taxi rank and park-and-ride at Crows Nest be moved to another location
- The artists' impression of Crows Nest Station appears to show Hume Street closed to traffic. Residents rely on Hume Street to travel between the shops in Crows Nest to Nicholson Street and the western part of Hume Street. There is no other way into this area
- Concern regarding traffic increases and reduced car parking due to people accessing Waterloo Station

Response

Nelson Street bridge is required to be demolished due to the Chatswood dive site and the realigned T1 North Shore Line. It is not feasible to replace this bridge due to the grades which would be required to raise the road over the realigned T1 North Shore Line. To cater for the main vehicle movement using Nelson Street (the G-turn from Pacific Highway southbound to Mowbray Road westbound using Nelson Street and Orchard Road), it was proposed in the Environmental Impact Statement to provide an all vehicle right turn provision at the Pacific Highway / Mowbray Road intersection.

Since development of the Environmental Impact Statement, concerns have been raised by stakeholders (including Roads and Maritime Services) regarding the provision of the right hand turn lanes in isolation from other required changes at this intersection. It has also been identified that it would be desirable for all work at the intersection to be carried out at the same time to avoid traffic disruption on multiple occasions.

As a result, Transport for NSW is currently working with Roads and Maritime Services and other stakeholders to carry out a broader review of the traffic and transport needs in the precinct, the implications of the closure of the Nelson Street bridge and to identify a preferred approach to any future upgrade of the Pacific Highway / Mowbray Road intersection. The identification of the proposed solution at the Pacific Highway / Mowbray Road intersection and the carrying out of such work may not occur prior to the closure of the Nelson Street bridge. Section 9.2 of this report provides a revised traffic impact assessment for the area around Chatswood in the event that the solution cannot be implemented prior to the demolition of Nelson Street bridge.

Management of parking on local streets, including implementation of resident parking schemes, is a matter for the relevant local council. Transport for NSW would work with local councils to minimise adverse impacts of metro operation on parking and other kerbside use in local streets.

The location of the proposed taxi and kiss-and-ride bays near Crows Nest Station has been determined through the station access hierarchy principles discussed above. The proposed location provides efficient access to the station, while prioritising more sustainable modes of transport such as walking and cycling.

The artists' impressions provided in Section 6.6 of the Environmental Impact Statement are indicative only. There are no plans to close Hume Street to vehicular traffic.

The provision of a station at Waterloo is anticipated to reduce the reliance on car use in this area and provide an overall improvement in traffic congestion and car parking. The provision of kiss-and-ride bays at this station would have negligible impact on the performance of the road network.

8.8.7 Maintenance access

One submission raised issues regarding maintenance access.

Stakeholder identification number

110

Issue raised

The submission suggested that residents be informed about work in relation to the track maintenance access points at Chatswood.

Response

Track maintenance access points at Chatswood would be used by Sydney Trains maintenance workers. Sydney Trains would continue to follow their usual processes in relation to notification to residents regarding the use of maintenance access.

8.8.8 Impacts to the broader rail network

One submission raised issues regarding impacts to the broader rail network.

Stakeholder identification number

15

Issue raised

The submission raised concerns that the rail corridor at the location of the Chatswood dive is of prime importance to Sydney Trains as trains park there every day. Should this provision be removed, this will impact on public safety.

Response

Consultation has and would continue with Sydney Trains to ensure its existing operations can continue safely and efficiently in the vicinity of the Chatswood dive.

8.9 Construction noise and vibration

8.9.1 Assessment method

Six submissions raised issues regarding the assessment method.

Stakeholder identification numbers

12, 161, 173, 220, 241, 273

Issue raised

In summary, the submissions raised the following issues:

- The noise assessment incorrectly identifies 402-420 Pacific Highway Crows Nest as commercial. This is a residential property
- Query as to whether the residential area around Crows Nest Station was assessed to determine acceptable levels of noise and vibration during construction
- Concern regarding the noise assessment and classification of noise sensitive receivers at Lawson House, Crows Nest. Request for additional assessments to be undertaken and request for 'special sensitive' mitigation measures to be applied to Lawson House on account of the sound recording business and other commercial activities undertaken outside standard business hours. Request for additional information on assessments and proposed mitigation measures for forecasted ground-borne noise and its impact on commercial sensitive receivers which are particularly sensitive (recording studios) or operate outside standard business hours
- The Environmental Impact Statement fails to identify that 31-33 McLaren Road, North Sydney, is a residential premise and incorrectly classifies this property as a commercial receiver. This building will be uninhabitable during night works and alternative accommodation would be required
- It is not clear where receivers were placed for the airborne noise assessment around Sydney Yard Access Bridge.

Response

The construction noise and vibration assessment in Section 10.4 of the Environmental Impact Statement and Section 3 of Technical Paper 2 has been carried out in accordance with the Secretary's environmental assessment requirements and the relevant guidelines. Since the development of the Environmental Impact Statement, additional information regarding the nature of some receivers around the site has become available. Section 2.6 of this report provides a clarification of these receiver types and the potential construction noise impacts.

As part of the assessment, noise monitoring was carried out at representative receivers around each of the sites to determine background noise levels. Noise predictions from construction activities were made at the facades of all surrounding buildings.

8.9.2 Airborne noise

Twenty-nine submissions raised issues regarding airborne noise.

Stakeholder identification numbers

44, 50, 54, 55, 58, 61, 74, 80, 82, 90, 91, 94, 141, 142, 173, 198, 199, 207, 208, 209, 212, 213, 215, 241, 242, 245, 249, 273, 293

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding noise during construction and adequacy of mitigation measures for residents on Nelson Street, Gordon Avenue, Orchard Road and Gilham Street, Chatswood
- Request for the following construction noise mitigation at Chatswood:
  - A five metre high noise barrier and landscaping be provided from the top of the cutting on the eastern side of the rail line from Mowbray Road to Nelson Street
  - An acoustic shed over the dive site
  - Double-glazing on west-ward facing windows and glass doors
  - All efforts made to contain noise where there are no acoustic covers, especially vehicle noise
- Concern regarding the level and duration of noise impacts at Crows Nest Station.
- Noise impacts are discussed in the Environmental Impact Statement for Clarke Street but not for Clarke Lane which is closer to the construction site
- Request for a sound proof wall to be built on the western side of Crows Nest construction site prior to excavation commencing
- Concern regarding noise from Blues Point site. Noise barriers will be ineffective due to apartments around the site
- The noise impacts from the extraction of the tunnel boring machines at Blues Point has not been assessed
- Concern that the predominate wind direction during construction hours is towards the residential apartments at Blues Point and will accentuate noise levels
- Request for acoustic attenuation or shed over the excavation site at Blues Point to manage noise impacts
- Request to have construction equipment orientate noise away from residents at Blues Point
- The Environmental Impact Statement states there would be significant exceedances of more than 20 db in first two periods of construction at Central Station.

Response

The assessment of potential construction noise impacts in the Environmental Impact Statement presents a worst-case 15-minute assessment in accordance with the approach required by the *Interim Construction Noise Guideline*. This approach assumes that all construction equipment for a particular construction scenario is operating at the same time and at the closest point on the site to any receiver. In reality, construction equipment would move around the site and would rarely all be in use at the one time. As such, the actual noise levels experienced by individual receivers would vary throughout the construction works.

The Construction Noise and Vibration Strategy (Appendix C of this report) provides the process for carrying out more detailed construction noise and vibration impact statements prior to each construction activity based on further understanding of the construction equipment and construction processes. This process would provide further detail regarding the actual noise levels which would be experienced by individual receivers.

The Construction Noise and Vibration Strategy also provides a list of standard noise mitigation measures which would be implemented at all construction sites for the project. Further, the Strategy provides additional mitigation measures which would be implemented when defined exceedances of the noise management levels are predicted to occur. These mitigation measures would meet the outcomes of the mitigation proposed in submissions.

Construction noise modelling provides predictions at the facades of all properties around the construction site. At Crows Nest this includes the buildings with facades backing onto Clarke Lane (with physical addresses on Clarke Street).

The noise impacts from the extraction of tunnel boring machine components at Blues Point are assessed as part of the broader earthworks scenario.

8.9.3 Ground-borne noise

One submission raised issues regarding ground-borne noise.

Stakeholder identification number

220

Issue raised

In summary, the submission raised concerns regarding impacts of ground-borne noise from tunnel excavations on commercial and residential receivers around Crows Nest Station, including Lawson House. Suggestion to implement appropriate mitigation measures. Request for advanced notice of tunnelling works to enable businesses within Lawson House to schedule work around this period of worst disruption

Response

The potential ground-borne noise impacts are assessed in Section 10.4 of the Environmental Impact Statement.

In relation to tunnelling works, some exceedances of the night-time noise management levels are predicted in certain locations, including around Crows Nest Station. This would only occur when the tunnel boring machines are directly below each receiver and would be likely to occur for a few days for each tunnel boring machine. Notification would be provided to receivers in advance of each tunnel boring machine passing beneath their property.

8.9.4 Vibration

Twenty-three submissions raised issue regarding vibration.

Stakeholder identification numbers

42, 50, 63, 66, 82, 112, 134, 162, 163, 173, 190, 198, 199, 200, 207, 208, 209, 220, 231, 238, 241, 249, 273

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding vibration causing damage to properties around the tunnels
- Concern regarding construction vibration at the Chatswood dive site

- Concern regarding impacts of vibration from tunnelling, blasting and demolition on the Federation-style cottages on the southwest corner of Naremburn Heritage Conservation Area
- Concern regarding construction vibration levels at Crows Nest. Suggestion for mitigation measures to monitor and manage the severity and duration of impacts
- Vibration impacts for Crows Nest Station are predicted in the Environmental Impact Statement for Clarke Street but not for Clarke Lane
- Concern regarding cosmetic damage of Lawson House caused by ground-borne vibrations from construction activities at Crows Nest Station. Request for provision of advanced of impact schedule to Lawson House owners. Request for information regarding the construction vibration management plan and assessment methods for vibration damage of structural elements of Lawson House. Suggestion for a vibration damage assessment and ongoing monitoring
- Concern regarding perceptible vibration and cosmetic damage to buildings around the northern access shaft at Victoria Cross Station
- Concern regarding vibration and property damage from tunnelling and truck movements at Blues Point. The old buildings on Blues Point Road are particularly sensitive to vibration
- Request that residents of the Stamford on Kent and the Stamford Marque not be able to feel vibrations during construction
- Vibration will significantly and adversely affect the amenity of 54 Regent Street, Chippendale.

Response

The assessment of construction vibration in Section 10.4 of the Environmental Impact Statement has adopted cosmetic damage screening levels based on guidance from British Standard *BS 7385 Evaluation and Measurement for Vibration in Buildings*. These screening criteria are set at 50 percent of the level when cosmetic damage would typically start to occur, and are:

- 25 mm/s for reinforced or framed structures
- 7.5 mm/s for unreinforced or light framed structures.

Although heritage items are not assumed to be more susceptible to vibration, a conservative approach has been taken in applying the screening criteria of 7.5 mm/s to all heritage items.

The assessment shows that a number of buildings adjacent to the construction sites are predicted to have vibration levels above these screening criteria. In this case, and in accordance with mitigation measure NV4, a more detailed site specific assessment of the structure would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items this would also take into consideration the heritage value of the structure. For all tunnelling works, the vibration levels are predicted to be below 7.5 mm/s.

Human comfort vibration is assessed using ground-borne noise as a proxy as people would typically hear vibration well before they feel vibration. As such, where the ground-borne noise management levels are exceeded, the human comfort vibration levels may also be exceeded. These exceedances are predicted to occur at all construction sites primarily associated with rock breaking activities. Due to these predicted impacts, blasting has been proposed as a primary excavation technique for stations to minimise these impacts, although some rock breaking would still be required prior to reaching safe blasting depths. The Environmental Impact Statement shows that the use of blasting would substantially reduce the overall duration of ground-borne noise impacts.

Additionally, since the development of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would not be required outside of standard construction hours. This would reduce the potential vibration impacts in the more sensitive night-time period Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report.

The Construction Noise and Vibration Strategy has been updated to provide vibration and noise monitoring requirements for the construction phase of the project. The revised Construction Noise and Vibration Strategy is provided as Appendix C of this report.

8.9.5 Traffic noise

Fifty-seven submissions raised issues regarding traffic noise.

Stakeholder identification numbers

44, 48, 49, 50, 54, 55, 62, 63, 65, 74, 80, 82, 84, 89, 90, 91, 95, 102, 112, 139, 141, 142, 145, 166, 168, 173, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 207, 208, 209, 212, 220, 241, 242, 249, 268, 270, 273, 275

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding traffic noise from spoil removal
- Concern regarding noise from trucks left with engines idling
- The use of exhaust brakes should be banned for construction vehicles, with 24/7 noise and video monitoring to enable policing
- Concern regarding construction traffic noise around Chatswood
- Concern regarding noise from truck movements during construction in Nelson Street and the Ausgrid site. Suggestion that construction vehicles should not be allowed to use Nelson Street, but should access only from Mowbray Road
- Concern regarding traffic noise from trucks at Crows Nest, especially from trucks trying to turn around in narrow Clarke Lane
- Concern regarding potential changes to haul routes on Hume Street (between Clarke Street and Clarke Lane) and associated impacts on Lawson House, Crows Nest
- Noise and vibration traffic concerns at McLaren Street, North Sydney
- Concern regarding road traffic noise and vibration from the Blues Point site
- Request to find an alternative to the haul route at Blues Point due to noise impacts
- Concern regarding construction traffic noise from Barangaroo Station, especially around Towns Place and Dalgety Road
- Concern that the noise impacts from the trucks around Central Station will be unbearable. Night-time truck noise is expected to exceed sleep disturbance screening levels by up to 10 dB during excavation, with no practical options to address this.

Response

A construction traffic noise assessment for each site is included in Section 10.4 of the Environmental Impact Statement. Additional assessment of traffic noise impacts for Cope Street at Waterloo, O'Connell Street construction site at Martin Place, the proposed Gordon Avenue access at Chatswood and the alternative routes associated with the demolition of Nelson Street bridge are provided in Sections 3.4, 3.3, 9.1 and 9.2 of this report.

In the majority of cases, the traffic noise levels would comply with the relevant criteria. As such, no mitigation measures are required in these cases. Where traffic noise is predicted to exceed the relevant criteria, mitigation measure NV2 commits to restricting the use of these access points at night unless compliance can be achieved.

Additionally, mitigation measure T7 commits to driver training to limit the use of compression braking.

8.9.6 Noise impacts during out of hours work

Thirty-six submissions raised issues regarding noise impacts during out of hours work.

Stakeholder identification numbers

18, 66, 82, 98, 105, 112, 139, 141, 142, 145, 173, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 193, 194, 195, 196, 197, 198, 199, 207, 208, 209, 249, 266, 270, 273, 294

Issue raised

In summary, the submissions raised the following issues:

- Suggestion to limit rock breaking to the hours of 7 am to 6 pm to avoid sleep disturbance impacts
- Suggestion to provide sound proof cladding and roofing to limit noise impacts
- Concern regarding construction noise impacts out of hours around Chatswood
- Concern regarding noise from Crows Nest Station at night. The Environmental Impact Statement suggested that noise levels will be 90 dB throughout the night which is above the acceptable level of 30 dB. The acoustic shed will not help as:
  - It will be built after the initial excavation
  - The impact of blasting will not be mitigated by the shed
  - There will be openings at either end of the shed
- Suggestion to limit spoil truck movements to the hours of 7 am to 10 pm to avoid sleep disturbance impacts at Crows Nest
- Suggestion that noise and vibration measurements and monitoring should be taken at Crows Nest prior to and during construction and tunnel boring machine works to ensure residents are not kept up all night
- Concern regarding night time traffic noise during construction at McLaren Street near Victoria Cross Station. The well-being of all residents will be compromised if overnight truck noise goes on for the many years that it appears this project will take to complete. The many schools in the area will have concerns when the students need to take important exams and truck noise disturbs their concentration
- Concern regarding sleep disturbance during the night-time activity at the Blues Point site. A sleep disturbance assessment of trucks on Blues Point Road at night has not been included in the Environmental Impact Statement
- Noise concerns at 54 Regent Street, Chippendale, regarding sleep impacts due to construction noise and traffic noise at Sydney Yard Access Bridge construction site.

Response

Section 10.4 of the Environmental Impact Statement provides an assessment of potential noise impacts at night from tunnelling and station excavation works and associated supporting activities. In some cases, exceedances of the relevant night-time noise management level were predicted to occur.

Since the development of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would not be required outside of standard construction hours. This would reduce the potential noise impacts during out of hours work. Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report.

The Construction Noise and Vibration Strategy (Appendix C of this report) provides the approach for managing noise, including noise from out of hours work. This includes additional mitigation measures which would be implemented when defined exceedances of the noise management levels are predicted to occur.

Responses to potential night-time traffic noise impacts are provided in Section 8.9.5.

8.9.7 General noise and vibration issues

Forty-three submissions raised general noise and vibration issues.

Stakeholder identification numbers

15, 74, 76, 77, 82, 84, 85, 87, 88, 89, 94, 97, 98, 105, 110, 112, 128, 130, 134, 135, 139, 142, 143, 145, 154, 157, 158, 167, 169, 198, 199, 207, 208, 209, 212, 220, 235, 236, 238, 249, 255, 297, 298

Issue raised

General

In summary, the submissions raised the following issues:

- Concern regarding noise and vibration above the tunnels during construction
- Concern regarding noise levels during construction. Shift workers need to be able to sleep during the daytime.

Chatswood dive site

In summary, the submissions raised the following issues:

- Concern regarding noise and vibration impacts around Chatswood from the dive site and surface works
- Concern regarding the maximum permissible noise levels being exceeded at the Chatswood dive site and that the remedy proposed is unlikely to occur
- No remedy is offered to Chatswood residents for noise level exceedances
- Mitigation measures for dealing with construction noise at the Chatswood dive site seem to have clauses to permit breaches on the grounds of 'unavoidable events or work' and 'impractical to mitigate or avoid'
- Objection to the proposed noise management at Chatswood dive site. Suggestion that an acoustic shed and sound barrier be installed
- Concern regarding construction noise and vibration impacting a home business around Chatswood
- Request that 2 Gordon Avenue / 9 Nelson Street, Chatswood, be considered for at-property treatment to mitigate noise. This building has an existing rail noise issue
- Concern regarding noise, vibration and the health and well-being of residents near the Chatswood dive site.

Crows Nest Station

In summary, the submissions raised the following issues:

- Concern regarding construction noise at Crows Nest Station, with levels above 90dB when humans sleep with levels of 30dB
- Objection to the metro line and station at Crows Nest due to construction noise impacts to adjacent residents on Clarke Street. These apartment buildings have bedrooms overlooking the construction site
- Request for a residential building at Crows Nest be insulated to reduce noise and vibration impacts prior to construction. Request for ongoing noise and vibration monitoring during construction
- The Environmental Impact Statement does not adequately assess the impacts of blasting on businesses at Lawson House, Crows Nest (particularly sensitive businesses such as recording studios). Request for blasting schedule and mitigation measures to minimise impacts
- Preference expressed by Lawson House, Crows Nest management for a higher number of days above noise management levels if it means the construction schedule is reduced. Particular concern expressed for noise impacts of blasting
- Request for double glazing of windows of apartments on Clarke Street
- Suggestion for mitigation measures at Crows Nest to monitor and manage the severity and duration of impacts

Blues Point temporary site

In summary, the submissions raised the following issues:

- Preference for blasting to be used at Blues Point over rock hammers.

Barangaroo Station

In summary, the submissions raised the following issues:

- Concern regarding construction noise impacts at Millers Point. Request that all construction should be kept to the Barangaroo Central area where there are no residents

Martin Place Station

In summary, the submissions raised the following issues:

- Request to assess alternative excavation methods, measures to reduce the construction programs and provision of respite periods to reduce impact on surrounding activities at Martin Place Station

Pitt Street Station

In summary, the submissions raised the following issues:

- Concern regarding Pitt Street Station construction noise on Sabbath at the Great Synagogue.

Waterloo Station

In summary, the submissions raised the following issues:

- Concern regarding construction noise and vibration around Waterloo
- High to very high noise attenuation measures must be considered for the eastern metro track at Waterloo to ensure the amenity of future residential accommodation on the Ethnic Communities Centre site is reasonable

Marrickville dive site

The submissions raised concerns regarding construction noise around the Marrickville dive site

Response

The construction noise and vibration assessment has been carried out in accordance with the requirements of the Secretary's environmental assessment requirements and applicable guidelines, particularly the *Interim Construction Noise Guideline*. Details of the methodology of the assessment are provided in Technical Paper 2: Noise and Vibration of the Environmental Impact Statement.

Since the development of the Environmental Impact Statement, additional information regarding the use of some receivers around the site has become available. Section 2.6 of this report provides a clarification of these receiver types and the potential construction noise impacts.

The assessment in Section 10.4 of the Environmental Impact Statement found that there would be exceedances of the applicable airborne noise, ground-borne noise and vibration levels during construction of the project. Responses relating to these potential impacts are provided below.

Airborne and ground-borne noise

The project has inherently included a number of measures to minimise airborne noise impacts. This includes provision for noise barriers around all construction sites and acoustic sheds where ongoing night-time works are proposed. Despite these measures, there are predicted to be exceedances of the airborne noise management levels. In this event, all feasible and reasonable mitigation measures would be implemented. Details on noise and vibration mitigation and management are provided below.

The ground-borne noise assessment found that there would be exceedances of the ground-borne noise management levels, particularly associated with rock breaking for stations and station shaft excavation.

Due to these predicted impacts, blasting has been proposed as a primary excavation technique to minimise these impacts, although some rock breaking would still be required prior to reaching safe blasting depths. The Environmental Impact Statement shows that the use of blasting would substantially reduce the overall duration of ground-borne noise impacts. All blasting for the project would be design to achieve the applicable air blast overpressure and vibration criteria.

Since the development of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would not be required outside of standard construction hours. This would reduce the potential airborne and ground-borne noise impacts in the more sensitive night-time period. Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report.

In relation to potential ground-borne noise from tunnelling works, some exceedances of the night-time noise management levels are predicted in certain locations. This would only occur when the tunnel boring machines are directly below each receiver and would be likely to occur for a few days for each tunnel boring machine.

Vibration

The assessment of construction vibration in Chapter 10 of the Environmental Impact Statement has adopted cosmetic damage screening levels based on guidance from British Standard *BS 7385 Evaluation of Measurement for Vibration in Buildings*. These screening criteria are set at 50 percent of the level when cosmetic damage would typically start to occur, and are:

- 25 mm/s for reinforced or framed structures
- 7.5 mm/s for unreinforced or light framed structures.

Although heritage items are not assumed to be more susceptible to vibration, a conservative approach has been taken in applying the screening criteria of 7.5 mm/s to all heritage items.

The assessment shows that a number of buildings adjacent to the construction sites are predicted to have vibration levels above these screening criteria. In this case, and in accordance with mitigation measure NV4, a more detailed site specific assessment of the structure would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items this would also take into consideration the heritage value of the structure. For all tunnelling works, the vibration levels are predicted to be below 7.5 mm/s.

As described above, since the development of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would not be required outside of standard construction hours. This would reduce the potential vibration impacts in the more sensitive night-time period. Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report.

Potential vibration levels from tunnelling activities would remain below the cosmetic damage screening criterion of 7.5 mm/s in all cases.

Noise and vibration mitigation and management

Proposed noise and vibration mitigation measures are identified in Chapter 10 of the Environmental Impact Statement.

The Construction Noise and Vibration Strategy (Appendix C of this report) provides the process to carrying out more detailed construction noise and vibration impact statements prior to each construction activity based on further understanding of the construction equipment and construction processes. This process would provide further detail regarding the actual noise levels which would be experienced by individual receivers.

The Construction Noise and Vibration Strategy also provides a list of standard noise mitigation measures which would be implemented at all construction sites for the project. Further, the strategy provides additional mitigation measures which would be implemented when defined exceedances of the noise management levels are predicted to occur. These mitigation measures would meet the outcomes of the mitigation proposed in submissions.

It is acknowledged that some receivers are particularly sensitive to noise and vibration at different periods of the day. This would be considered as part of the Construction Noise Impact Statement process (described in the Construction Noise and Vibration Strategy (Appendix C of this report)). As part of this process, consultation would be carried out with these receivers (in accordance with mitigation measures BI1 and SO2 – refer to Chapter 11 of this report) to identify and develop mitigation measures to manage the specific construction impacts to the receiver.

The Construction Noise and Vibration Strategy has been updated to provide vibration and noise monitoring requirements for the construction phase of the project. The revised Construction Noise and Vibration Strategy is provided as Appendix C of this report.

8.10 Operational noise and vibration

8.10.1 Assessment method

Eight submissions raised issues regarding the assessment method.

Stakeholder identification numbers

139, 161, 173, 199, 207, 208, 209, 273

Issue raised

Chatswood dive site

In summary, the submissions raised the following issues:

- Concern that the operational noise performance and criteria is a voluntary guideline, not mandatory.

Crows Nest Station

In summary, the submissions raised the following issues:

- The Environmental Impact Statement noise and vibration assessment predictions are based on a mid-floor multi-storey building. Much of the surrounding residential area at Crows Nest is single storey – query as to whether this was considered and whether this information is available.

Victoria Cross Station

In summary, the submissions raised the following issues:

- Noise objectives for the operation of services plant associated with Victoria Cross Station should be revised to reflect representative noise levels of the area
- Operational noise criteria at Victoria Cross Station would result in plant noise at nearby receivers that is at least 10 dBA higher than acceptable levels

Central Station

In summary, the submissions raised the following issues:

- The noise assessment in the Environmental Impact Statement is inadequate for 54 Regent Street, Chippendale, including the omission of ongoing use of Sydney Yard Access Bridge following construction.

Response

Chatswood dive site

The *Rail Infrastructure Noise Guideline* (EPA, 2013) has been applied to the design and assessment of the project.

This guideline specifies that the noise trigger levels apply both immediately after operations commence and for projected train numbers at an indicative period into the future to represent the expected typical maximum level of train use. To support the noise modelling predictions, estimated train numbers were assessed for the at-opening and 10-years after opening scenarios. If the guidelines are exceeded, there is a requirement to consider feasible and reasonable mitigation measures.

Crows Nest Station

The behaviour of vibration as it passes through a building is complex. Depending on various factors such as construction type and material of the building, this can include a reduction in vibration or an increase in vibration levels. The noise and vibration assessment has considered the potential for the reduction in vibration levels through a building as well as the potential for propagation of vibration through a building. At this stage, the assessment has been carried out on a conservative basis using the maximum mid floor vibration levels.

Additional noise and vibration modelling would be carried out during detailed design to refine the findings of the assessment and to enable the appropriate mitigation measures to be applied.

Victoria Cross Station

The noise objectives for the services plant at Victoria Cross has been determined through background noise monitoring and then deriving the project specific noise criteria from the *Industrial Noise Policy* (EPA, 2000).

Since the development of the Environmental Impact Statement, additional information regarding the type of receivers around the site has become available. Section 2.6 of this report provides a clarification of these receiver types and the potential operational noise impacts.

Central Station

Following construction, the use of Sydney Yard Access Bridge would be for infrequent maintenance requirements for Sydney Trains and Sydney Metro. Due to the infrequent use of this bridge, potential noise impacts would be negligible.

8.10.2 Ground-borne noise and vibration

Twenty-seven submissions raised issues regarding ground-borne noise and vibration.

Stakeholder identification numbers

49, 57, 59, 60, 62, 64, 68, 73, 74, 82, 84, 97, 98, 99, 105, 142, 162, 163, 173, 198, 199, 207, 208, 209, 236, 249, 273

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding operational ground-borne noise and vibration in the vicinity of metro tunnels and potential for disturbance, health impacts and structural damage
- High-attenuation track should be provided to reduce noise
- Concern regarding operational vibration at the Chatswood dive site, particularly at 1-3 Gordon Avenue, Chatswood. Suggestion to install dampers under metro tracks and north shore tracks between Albert Avenue and the Ausgrid dive site to reduce vibration impacts
- Request for track attenuation in the vicinity of Crows Nest Station to mitigate ground-borne noise and vibration
- Concern regarding the depth of Crows Nest Station and operational noise and vibration impacts
- Objection to the proposed route of the tunnels through McMahons Point and Blues Point due to operational ground-borne noise and vibration impacts
- Request to use the best available noise abatement measures to minimise ground-borne noise near Towns Place, Millers Point

Response

Ground-borne noise and vibration impacts from operational rail lines in tunnels are generally mitigated by a resilient rubber layer between the rail and the tunnel foundation. This can take the form of resilient rail fasteners, booted sleepers, floating slab track or a combination of measures.

Initial ground-borne noise and vibration modelling was carried out to determine the indicative track form along the tunnel alignment to meet the design objectives (from the *Rail Infrastructure Noise Guideline*) at receivers above the tunnels. This modelling determined that the following three track forms would be required:

- Standard attenuation track – incorporating a hard resilient baseplates. This track form would be used for around 93 per cent of the tunnels. This is the standard specification for Sydney Metro and would be used in areas with low sensitivity to ground-borne noise and vibration, or at locations where there is sufficient tunnel depth to the receivers
- High attenuation track – incorporating medium resilient baseplates. This track form would be used for around seven per cent of the tunnels, in sensitive areas where the standard attenuation track is not sufficient to meet the design objectives
- Very high attenuation track – incorporating soft resilient baseplates. This track form would be required for less than one per cent of the tunnels, in very sensitive areas where the depth of the tunnel is particularly shallow.

The indicative track form for the current design of the tunnels, trains and operations is shown in Section 11.4.1 of the Environmental Impact Statement. The proposed track form provides one option to meet the ground-borne noise and vibration objectives. As identified in Section 6.3.1 of the Environmental Impact Statement, the tunnel alignment is indicative at this stage, and has been used for the purposes of the environmental impact assessment including all specialist investigations. During detailed design, the alignment may change (horizontally and / or vertically). Any changes to the alignment would be reviewed for consistency with the assessment contained in this Environmental Impact Statement including relevant mitigation measures, performance outcomes and any future conditions of approval. The final track form would be confirmed as part of detailed design.

Since the development of the Environmental Impact Statement, additional information regarding the use of some receivers around the site has become available. Section 2.6 of this report provides a clarification of these receiver types and the potential operational noise impacts.

8.10.3 Airborne noise

Twenty-one submissions raised issues regarding airborne noise.

Stakeholder identification numbers

44, 54, 55, 80, 90, 94, 110, 135, 142, 154, 158, 173, 198, 199, 207, 208, 209, 212, 236, 241, 273

Issue raised

In summary, the submissions raised the following issues:

- Request dampers be used where metro tracks are on concrete slab for the surface works
- Concern regarding noise during operation for residents on Nelson Street and Gordon Avenue, Chatswood, considering metro tracks will be on concrete slabs between Albert Avenue and the Ausgrid site, there will be two additional tracks between Albert Avenue and the Ausgrid site and existing tracks will be moved west by three metres at Gordon Avenue and Nelson Street. Suggestion to use dampers instead of concrete slabs under tracks

- Relocation of T1 North Shore Line and construction at Chatswood dive site and removal of vegetation will increase residential noise levels
- Request for the following operational airborne noise mitigation measures at Chatswood:
  - Noise barriers around the metro and T1 North Shore lines along the dive site and tunnel entrance and over the T1 North Shore Line bridge
  - Best practice quiet rail wheels and rail lines
  - Dampers instead of concrete slab for the T1 North Shore and metro lines instead of increasing the height of the noise barrier
  - Landscaping to reduce operational noise
- Request for double glazing, treatment and / or soundproofing of windows of impacted properties at Chatswood
- Request that the noise walls at Chatswood not be increased as they create an echoing effect and reduce sunlight and cooling breezes
- Concern regarding long-term use noise impacts of the Sydney Yard Access Bridge.

Response

The project has been designed with the aim of achieving the noise and vibration objectives from the *Rail Infrastructure Noise Guideline*.

To mitigate potential airborne noise impacts at the northern end of the project, the design has incorporated the following measures:

- An increase in the height (to four metres) of the noise barrier between Chapman Avenue and Nelson Street on the eastern side of the rail line
- An increase in the height (to four metres) of the noise barrier between the Frank Channon Walk pedestrian underpass and Albert Avenue on the western side the rail line
- An increase in the height (to four metres) of the noise barrier between Nelson Street and Gordon Avenue on the western side the rail line
- A two metre high noise barrier to the south of Mowbray Road on the western side of the rail line
- Rail dampers and deck absorption within the Chatswood dive structure.

The exact height and extent of the noise barriers in these locations would be further refined during detailed design.

The results of the noise assessment indicate that there remains a predicted exceedance of the noise trigger levels at one residential receiver building (at 1-3 Gordon Avenue, Chatswood) on the western side of the rail line. This receiver is a multi-storey apartment building with several dwellings. The upper floors of this receiver would have an unobstructed view of the rail tracks over the noise barrier, even with the proposed increase in barrier height. To break the line of sight at the triggered receivers on the upper floor of this building, a noise barrier in excess of six metres high would be required. Noise barriers of this height are unlikely to be considered reasonable and may not be feasible, particularly since the barrier would need to be located in close proximity to the building facade. Based on the outcomes of noise modelling during detailed design, this property would be considered for at property treatment.

Following construction, the use of Sydney Yard Access Bridge would be used for infrequent maintenance requirements for Sydney Trains and Sydney Metro. Due to the infrequent use of this bridge, potential noise impacts would be negligible.

8.10.4 Noise from stations and ancillary facilities

Five submissions raised issues regarding noise from stations and ancillary facilities.

Stakeholder identification numbers

82, 84, 130, 228, 249

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding noise issues associated with operations of the Artarmon substation
- Concern regarding increased noise from pedestrians and commuter traffic accessing Crows Nest Station
- There has been no assessment of the noise impact of ancillary equipment (substations and ventilation systems) at Waterloo.

Response

The approach to assessment of noise from station and ancillary infrastructure is to calculate the maximum acceptable sound power level at each location based on the location of the proposed facility and the location of the nearest receivers. These maximum acceptable sound power levels would be used to guide the detailed design to ensure compliance with the applicable criteria from the *Industrial Noise Policy* (EPA, 2000).

The nearest receiver type and relevant external noise criteria for each station and ancillary services facility are presented in Section 11.4.3 of the Environmental Impact Statement. Based on experience with existing projects such as Epping to Chatswood Rail Line, it is expected that these levels can be achieved through the use of appropriate noise attenuation measures such as equipment selection, positioning of plant and ventilation discharges, in-duct attenuators, and acoustic enclosures.

Potential noise impacts from customers and vehicles accessing Crows Nest Station are anticipated to be negligible when compared to existing background noise levels.

8.10.5 General noise and vibration issues

Thirty-six submissions raised general noise and vibration issues.

Stakeholder identification numbers

43, 46, 47, 51, 53, 76, 77, 81, 82, 84, 85, 87, 88, 89, 93, 98, 105, 134, 139, 140, 143, 145, 151, 204, 236, 248, 249, 255, 261, 262, 263, 264, 265, 267, 269, 297

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding noise and vibration impacts to residents (including shift workers) and businesses in the vicinity of metro tunnels
- Concern regarding operational noise and vibration impacts around Chatswood from the dive site and surface works
- Concerns that the existing excessive noise levels at Chatswood provide an excuse for not providing mitigation. The statement that a noise barrier is not practical is unacceptable. Concerns that the at-property treatment may not be provided or will be provided after operations commence

- Concern regarding compliance with industrial noise standards at Chatswood dive site during operations
- Objection to and concern regarding the metro line and station at Crows Nest due to operational noise impacts to adjacent residents on Clarke Street. Request for track attenuation and window glazing in the vicinity of Crows Nest Station
- Concern regarding operational noise and vibration impacts around Dalgety Road and Towns Place, Millers Point. Request for track attenuation
- Suggestion that noise and vibration from the tunnels will be significantly worse than the Environmental Impact Statement suggests due to existence of underground car park, tunnel depth will be much closer to ground level, and absence of noise attenuation between the harbour and Barangaroo Station. The operational noise and vibration has not been properly attenuated
- Concern regarding noise from train operations around Waterloo where the tunnels are only 25 metres deep. Suggestion that the track through the Waterloo area should be very high attenuation track
- High to very high noise attenuation measures must be considered for the eastern metro track to preserve the amenity of any future residential accommodation on the Ethnic Communities Council site.

Response

The project has been designed with the aim of achieving the noise and vibration objectives from the *Rail Infrastructure Noise Guideline*. Further, the assessment has been carried out to meet the requirements of the Secretary's environmental assessment requirements and in accordance with the *Rail Infrastructure Noise Guideline*.

Noise and vibration impacts from operational rail lines in tunnels are generally mitigated by a resilient rubber layer between the rail and the tunnel foundation. This may take the form of resilient rail fasteners, booted sleepers, floating slab track or a combination of measures.

Initial ground-borne noise and vibration modelling determined that the following three track forms would be required:

- Standard attenuation track
- High attenuation track
- Very high attenuation track.

The indicative track form for the current design of the tunnels, trains and operations (which has been determined to meet the noise and vibration trigger levels from the *Rail Infrastructure Noise Guideline*) is shown in Section 11.4.1 of the Environmental Impact Statement.

As identified in Section 6.3.1 of the Environmental Impact Statement, the tunnel alignment is indicative at this stage, and has been used for the purposes of the environmental impact assessment including all specialist investigations. During detailed design the alignment may change (horizontally and / or vertically). Any changes to the alignment would be reviewed for consistency with the assessment contained in this Environmental Impact Statement including relevant mitigation measures, performance outcomes and any future conditions of approval. The final track form would be confirmed as part of detailed design.

For the northern surface works, the results indicate that noise levels at residential receivers without the project are generally already close to, or exceeding, the overall noise criteria levels. Mitigation measures proposed within the design of the project for the northern surface works includes:

- An increase in the height (to four metres) of the noise barrier between Chapman Avenue and Nelson Street on the eastern side of the rail line
- An increase in the height (to four metres) of the noise barrier between the Frank Channon Walk pedestrian underpass and Albert Avenue on the western side the rail line
- An increase in the height (to four metres) of the noise barrier between Nelson Street and Gordon Avenue on the western side the rail line
- A two metre high noise barrier to the south of Mowbray Road on the western side of the rail line
- Rail dampers and deck absorption within the Chatswood dive structure.

The outcomes of the assessment indicate that there remains a predicted exceedance of the noise trigger levels and increase in train passby vibration levels at one residential receiver building (at 1-3 Gordon Avenue, Chatswood) on the western side of the rail line. This residential receiver is a multi-storey apartment building with several dwellings. The upper floors of this receiver would have an unobstructed view of the rail tracks over the noise barrier, even with the proposed increase in barrier height. To break line of sight at the triggered receivers on the upper floor of this building would require a noise barrier in excess of six metres high. Noise barriers of this height are unlikely to be considered reasonable and may not be feasible, particularly since the barrier would need to be located in close proximity to the building facade. Based on the outcomes of noise modelling during detailed design, this property would be considered for at property treatment.

8.11 Land use and property

8.11.1 Property acquisition

Eleven submissions raised issues regarding property acquisition.

Stakeholder identification numbers

119, 140, 162, 163, 173, 198, 207, 208, 209, 273, 298

Issue raised

In summary, the submissions raised the following issues:

- Request that 1-3 Gordon Avenue, Chatswood, be acquired due to impacts of the construction and operation of the project
- Request that 54 Regent Street, Chippendale, be acquired or leased for the duration of construction
- Concern regarding the acquisition and demolition of buildings for Waterloo Station. Comment that not all buildings are required for station construction and the loss of the buildings will degrade the character of the area
- Concern that houses on Lawrence Street and Belmont Street in Alexandria will be compulsory acquired with the tunnel depth at 45 metres
- Concern regarding property buy outs in Lord Street, Newtown
- Concern regarding the methods used to determine compensation for properties compulsorily acquired.

Response

Transport for NSW will only acquire properties necessary to facilitate construction or operation of the project. The Environmental Impact Statement has shown that the potential impacts of the project can be managed to within acceptable levels at nearby receivers.

The property acquisition requirements for the project are summarised in Section 12.4.1 of the Environmental Impact Statement. The owners of all properties subject to acquisition have been contacted by the Sydney Metro project team.

All property acquisition would be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. This Act sets out the steps to be followed including how compensation is calculated. Every effort would be made to acquire the affected properties through negotiated purchase. This requires appropriate compensation to be paid including associated legal costs, valuation fees, relocation and removal expenses, and mortgage costs.

8.11.2 Substratum acquisition

One submission raised issues regarding substratum acquisition.

Stakeholder identification number

143

Issue raised

The submission raised concerns regarding substratum acquisition for the tunnels and the restriction of the future development of land

Response

It would be necessary to acquire stratum below the surface of properties for the construction of the project. This subsurface stratum would be a stratum acquisition envelope around the tunnel, including any tunnel anchors required. The project alignment is generally shallowest at stations and at tunnel portals (at stations tunnel depths are typically greater than 20 metres). Between stations tunnel depth increases to typically between 25 and greater than 40 metres.

The introduction of the subsurface stratum, and the tunnel itself, has the potential to limit development above the alignment. Based on proposed tunnel depths there would be a minor impact with respect to limiting future development potential above project infrastructure. Development applications within the project corridor would be referred to Transport for NSW for concurrence and to ensure that project infrastructure is not impacted by proposed developments.

8.11.3 Direct impacts on land use

One submission raised issues regarding direct impacts on land use.

Stakeholder identification number

228

Issue raised

The submission raised concern regarding the location of the Artarmon substation. This site is currently leased by the Department of Education with an option to extend to 2020.

Response

The potential for overlap in the use of the site with the school is acknowledged. In response to the issues raised by Council and local residents surrounding the site at Barton Road / Butchers Lane, Artarmon, Transport for NSW has commenced investigations into an alternative site for the Artarmon substation within the Artarmon Industrial Area. Confirmation of an alternative site would be dependent on meeting criteria for siting. These criteria include:

- being directly located above the track running tunnels
- be accessible by a public road
- be located such that compliance with relevant NSW noise policy guidance may be achieved.

It is anticipated the site location and property requirements would be identified following determination of the project and a supplementary environmental review / assessment would be carried out and, if necessary, the appropriate approvals obtained.

Confirmation of a suitable alternative site would result in the requirement for the land at Barton Road / Butchers Lane being removed from the project.

8.11.4 Land use integration

One submission raised issues regarding land use integration.

Stakeholder identification numbers

238

Issue raised

In summary, the submission suggested consultation with North Sydney Council with regards to land use planning around Crows Nest Station

Response

Crows Nest Station

A metro station at Crows Nest would support State and local strategic priorities and planning controls by providing an incentive for investment along the Pacific Highway. This would enhance urban design and amenity, and improve connectivity in Crows Nest.

Transport for NSW would implement the Chatswood to Sydenham project in an integrated manner in direct collaboration with key planning agencies, including the Department of Planning and Environment and local councils, to identify opportunities to integrate existing and future land uses within and around the stations.

8.11.5 Future development opportunities

Sixteen submissions raised issues regarding future development opportunities.

Stakeholder identification numbers

13, 122, 126, 127, 131, 149, 171, 179, 236, 240, 246, 250, 252, 266, 270, 297

Issue raised

In summary, the submissions raised the following issues:

- Concern that developers will be the big winners from the metro and that metro is an excuse for overdevelopment
- Concern regarding provision of open space proportional to density of future development

- Concern regarding over station development at the Chatswood dive site. Suggestion to limit over station development to low rise
- Request that high rise towers are not built in Crows Nest and that development around the Crows Nest Station needs to retain the character of Crows Nest and differentiate this area from North Sydney and St Leonards.
- Over station development at Crows Nest should be coordinated to occur as soon as possible so that the areas are not left derelict
- Query as to the plans to increase the density of buildings on the Lane Cove side of St Leonards
- Concern regarding future above station development at Victoria Cross. Question as to whether North Sydney Council will be involved in the development process
- The Environmental Impact Statement should provide information on the building which would be built above Victoria Cross Station, how these buildings could mitigate the loss of the social and aesthetic amenity of the area, and how they would visually impact on the neighbouring heritage items (MLC Centre and Rag and Famish Hotel)
- Concern regarding the metro construction and operation leading to overdevelopment of Waterloo and Sydenham
- The Over Station Development will enable substantial uplift of the development density in and around Waterloo

Response

The need for the project, detailed in Chapter 3 of the Environmental Impact Statement, is clearly established based on public transport capacity requirements for Sydney. Section 3.4.1 of the Environmental Impact Statement identifies the additional rail capacity which would be provided by the introduction of Sydney Metro. This section identifies that Sydney Metro, together with signalling and infrastructure upgrades across the existing network, would increase the capacity of the rail network through the Sydney CBD from about 120 services per hour during peak periods today, to up to 200 services per hour beyond 2024, including capacity for up to 60 metro trains per hour during peak periods (or 30 trains per hour in each direction). This would equate to an increase of up to 60 per cent capacity across the network.

Along with the transport benefits (associated with rail network capacity, resilience and congestion) and road network improvements, Sydney Metro would also provide city building opportunities in relation to a higher intensity of land uses around new and converted stations.

Over station development will be subject to a separate approval processes. This process would consider the potential impacts of the over station development.

8.11.6 Property values

Eight submissions raised issues regarding property values.

Stakeholder identification numbers

82, 100, 135, 142, 162, 163, 212, 249

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding impact on property values

- The removal of the Nelson Street bridge was never noted in searches for properties in Chatswood purchased over the last few years. Suggestion that the values of properties will be reduced by the removal of the Nelson Street bridge and the ability of residents to sell their properties reduced
- Concern regarding impact on property values and the ability to rent or sell apartments in Crows Nest
- Concern regarding property value loss in Lord Street, Newtown

Response

Property values are based a number of complex factors including demand at a certain point in time, general location, accessibility, traffic and traffic noise on the street and proximity to transport infrastructure. Properties located above the rail tunnels are not anticipated to experience a reduction in value as a result of the project. A decline in property values above the tunnels has not been evident along the Epping to Chatswood Rail Line or other underground rail lines in Sydney. Based on experience around other rail stations within Sydney and elsewhere, the proximity to a rail station would be anticipated to have a positive impact on property prices over the long term.

8.11.7 Property condition surveys

Fourteen submissions raised issues regarding property condition surveys.

Stakeholder identification numbers

42, 50, 94, 152, 153, 162, 163, 190, 200, 231, 236, 254, 297, 298

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding structural impacts on old houses, heritage items and infrastructure during tunnelling. Request for property condition surveys pre and post-construction and compensation if any damage occurs
- Improvements to roads and bridges would alleviate concerns of being left with damaged road infrastructure following construction
- Concern regarding property damage at Chatswood and that it will not be fixed by Sydney Metro
- Concern regarding damage to the Chatswood Bowling Club and Croquet fields
- Suggestion to undertake pre-construction and post-construction condition reports on the Federation-style cottages on the southwest corner of Naremburn Heritage Conservation Area
- Condition surveys of properties along Blues Point should be carried out by a specialist heritage engineer prior to the start of construction
- Request that the Stamford on Kent and the Stamford Marque be assessed prior to construction and then afterwards to ensure any damage is made good. Presumption that the NSW Government will cover any consequential damage to the building
- Request for a dilapidation report for Ethic Communities Council site before and after construction. Any rectification works and / or compensation are to be paid by Sydney Metro/NSW Government
- Request for structural assessment of houses on Lord Street, Newtown, and at residential properties in Newtown more generally, at the start of operation and at six and 12 months after the start of operation. Query that if there is damage to houses whether there is a mitigation plan that will fix any issues with houses and infrastructure
- The bridge over the railway line included in the Marrickville haul route is old and needs work. Roads in the local area are pot-holed and subsiding during to the existing traffic volumes.

Response

Mitigation measure GWG2 (refer to Chapter 11) and the Construction Environmental Management Framework (Appendix B of this report) provide the process for carrying out condition surveys. These would be offered to the owners of buildings and structures in the vicinity of the tunnel and excavations prior to the commencement of excavation at each site. This process would also apply to all local public roads proposed to be used by construction heavy vehicles. In the unlikely event that building damage does occur as a result of the project, this would be rectified by the project at no cost to the building owner.

8.11.8 Restrictions on future development

Two submissions raised issues regarding restrictions on future development.

Stakeholder identification numbers

143, 297

Issue raised

In summary, the submissions raised the following issues:

- Any construction works at Waterloo should consider the potential impacts on residential dwellings on the Ethnic Communities Centre site and adjoining sites where shop top housing and other residential accommodation is permitted under the planning framework
- Further information is requested regarding any restrictions on future basement excavation on the Ethnic Communities Centre site due to the proximity to rail tunnels and associated metro infrastructure
- Concern regarding impacts of underground tunnelling on the development potential of Green Square

Response

The project would require a substratum acquisition envelope around the tunnel, including any tunnel anchors required. The introduction of the subsurface stratum, and the tunnel itself, has the potential to limit development above the alignment. The project alignment is generally shallowest at stations and at tunnel portals (at stations tunnel depths are typically greater than 20 metres). Between stations tunnel depth increases to typically between 25 and greater than 40 metres. Based on proposed tunnel depths there would be a minor impact with respect to limiting future development potential above project infrastructure.

Development applications within the project corridor would be referred to Transport for NSW for concurrence and to ensure that project infrastructure is not impacted by proposed developments.

8.11.9 Requests for compensation

Nine submissions raised issued regarding requests for compensation.

Stakeholder identification numbers

50, 62, 82, 84, 110, 142, 173, 249, 273

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding structural issues to buildings and question as to who will pay for repairs
- There has been no effort to compensate residents near the Crows Nest Station site
- Request for double glazing of windows around Crows Nest

- Request for Sydney Metro to pay for regular cleaning of residential windows and exterior of buildings, and repair damage from construction 'as new' at Crows Nest
- Query as to whether any damage to properties in the vicinity of the Blues Point site will be repaired immediately and as a priority
- Request for compensation for 54 Regent Street, Chippendale, owners and tenants.

Response

The Environmental Impact Statement has shown that the potential impacts of the project can be managed, with the implementation of feasible and reasonable mitigation measures, to within acceptable levels at nearby receivers.

In the unlikely event that damage to any adjacent buildings or structure is caused by construction activities associated with the project, this would be rectified at no cost to the owner.

8.12 Business impacts

8.12.1 Direct acquisition

Three submissions raised issues regarding direct acquisition.

Stakeholder identification numbers

130, 140, 259

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the demolition of the existing shops within the proposed metro station areas
- Concern regarding the acquisition, loss or relocation of businesses at Waterloo.

Response

As part of the design process, construction footprints were aligned as closely as possible with the operational footprint to minimise the need for property acquisition. However, property acquisition affecting businesses would still be required at metro stations and dive sites, including an estimated 18 properties at Waterloo (resulting in acquisition or relocation of occupying businesses, or other negotiated arrangements).

All property acquisition would be managed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Transport for NSW has made direct contact with directly affected businesses and has provided details of the proposed property acquisition process. Every effort would be made to acquire the affected properties through negotiated purchase.

While subject to a separate assessment and approval process, it is expected that once operational, metro stations would provide new retail, commercial and mixed use opportunities.

8.12.2 Servicing and delivery access during construction

Two submissions raised issues regarding servicing and delivery access during construction.

Stakeholder identification numbers

130, 297

Issue raised

The submissions raised concerns about business servicing and delivery access on Botany Road, Raglan Street and Buckland Street, and in general around Waterloo.

Response

The Environmental Impact Statement commits to maintain access to existing properties and buildings in consultation with property owners (refer to mitigation measure T8). Specific consultation would occur to identify and develop measures to manage the specific construction impacts for individual businesses, including access and servicing (refer to mitigation measure BI1).

8.12.3 Customer access during construction

Seven submissions raised issues regarding customer access during construction.

Stakeholder identification numbers

130, 141, 153, 190, 200, 242, 245

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding customer access to businesses on Blues Point Road during construction due to loss of parking, increased traffic and the presence of trucks
- Concern regarding reduction in customer access and passing trade for businesses around Waterloo
- Marrickville Metro shopping centre will lose customers during construction of the Marrickville dive site.

Response

The potential impacts to businesses in the vicinity of the sites are assessed in Section 13.4 of the Environmental Impact Statement. Further details regarding potential traffic related impacts to businesses are provided in Section 8.4 of the Environmental Impact Statement.

The Blues Point temporary site would be used intermittently – firstly for site establishment and excavation of the shaft, and then on occasions for the retrieval of the cutter heads from the tunnel boring machines. Site establishment and shaft excavation works would occur over a period of about 12 months and then the site would remain inactive until retrieval is required. Each retrieval would take about four weeks.

The peak heavy vehicle movements at Blues Point would be six heavy vehicles per hour during the shaft excavation phase (and four heavy vehicles per hour during the AM peak period (7 am to 10 am)). The peak for light vehicles would be 10 vehicles per hour. These construction traffic volumes would not affect amenity for and access to businesses located in the northern section of Blues Point Road.

Around four on street car parking spaces on Blues Point Road near the temporary site would be removed during the site establishment and shaft excavation stage. During each tunnel boring machine retrieval, all on street car parking spaces (around 23 spaces in total) on the eastern side of Blues Point Road adjacent to the site would also need to be removed. This loss of parking would be for a period of around four weeks and occur on four occasions. It is recognised that this temporary loss of parking would impact the ability for some visitors to access this area, but is less likely to affect businesses which are located on the northern section of Blues Point Road. Alternative on-street parking (around eight spaces) is available on the opposite side of Blues Point Road and about 50 metres further north.

Options to retain some car parking at the end of Blues Point Road, including a disabled parking space, would be investigated during detailed design. It may also be feasible to remove the tunnel boring machines via barge using the wharf at the end of Blues Point Road and this would likely reduce the need to remove parking. Further details of this opportunity are provided in Section 2.2 of this report.

Section 13.4.1 of the Environmental Impact Statement acknowledges the potential for moderately negative impacts on businesses during construction of Pitt Street Station, Waterloo Station and Marrickville dive site in terms of services / delivery access, customer access / passing trade, changed consumer behaviour and impacts on amenity (noise, vibration and dust). Further consultation would be carried out with business owners with the aim of developing measures to manage the specific construction impacts (including access and servicing) for individual businesses and to ensure visibility to customers is maintained (refer to mitigation measures BI1 to BI3).

8.12.4 Amenity issues during construction

Eleven submissions raised issues regarding amenity issues during construction.

Stakeholder identification numbers

48, 50, 61, 66, 74, 112, 198, 199, 207, 208, 209

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding impacts to residences and a home business at 1-3 Gordon Street, Chatswood
- Loss of amenity during construction works at the Chatswood dive site will force a home business to relocate at great personal expense
- Concern regarding amenity impacts to cafes and businesses on Blues Point Road due to the presence of the worksite and trucks. This has not been adequately assessed in the Environmental Impact Statement and mitigation plans have not been adequately developed

Response

The potential impacts to businesses in the vicinity of the sites are assessed in Section 13.4.1 of the Environmental Impact Statement. Further details regarding potential noise related impacts to businesses are provided in Section 10.4 of the Environmental Impact Statement.

For the Chatswood dive site, Section 10.4.1 of the Environmental Impact Statement identifies exceedences of construction noise management levels (for airborne and ground-borne noise). These exceedences are a direct result of the relative close proximity of receivers to the construction activities and the absence of any appreciable shielding between sites and receivers. Mitigation measures provided in the Environmental Impact Statement and the Construction Noise and Vibration Strategy (Appendix C of this report) would be implemented to address these impacts.

The Blues Point temporary site is located within Blues Point reserve and some distance from the businesses on the northern section of Blues Point Road. This separation would minimise potential amenity impacts for these businesses as would the implementation of measures to address noise, air quality and visual impacts at the site through a range of measures, including the installation of hoarding and site fencing.

Section 8.4.10 of the Environmental Impact Statement notes that at Blues Point peak heavy vehicle movements would be six heavy vehicles per hour during the shaft excavation phase (and four heavy vehicles per hour during the AM peak period (7 am to 10 am)). The peak for light vehicles would be 10 vehicles per hour. These construction traffic volumes are not expected to significantly affect amenity for businesses located in the northern section of Blues Point Road.

Further consultation with the aim of developing measures to manage the specific construction impacts (including access and servicing) would be carried out with individual businesses and to ensure visibility to customers is maintained (refer to mitigation measures BI1 to BI3). Measures to address noise / vibration and air quality impacts during construction are detailed in Sections 10.5 and 22.6 of the Environmental Impact Statement respectively.

Section 13.4.1 of the Environmental Impact Statement acknowledges that for businesses near Martin Place and Pitt Street stations there is some potential for changed consumer behaviour to persist following completion of construction. There would however also be important benefits including improved access for customers and staff.

8.12.5 Customer access during operation

One submission raised issues regarding customer access during operation.

Stakeholder identification number

1

Issue raised

The submission raised concern about the removal of the Nelson Street bridge near the Chatswood dive site, as it will impact access to businesses on the Pacific Highway between Gordon Avenue and Nelson Street.

Response

As described in Section 6.9.1 of the Environmental Impact Statement, the project would require the permanent demolition of the Nelson Street bridge over the T1 North Shore Rail Line. This would affect convenience of access to the Dulux premises on the corner of Nelson Street and the Pacific Highway, which has its access directly from Nelson Street. With the proposed Nelson Street bridge closure, access to this business would be achieved as follows:

- From the north – left-turn into Nelson Street from the Pacific Highway (as is currently the case)
- From the east – access via Albert Street and the Pacific Highway
- From the south – right-turn at Mowbray Road, left-turn at Orchard Road then via Albert Avenue and the Pacific Highway
- From the west – cross the Pacific Highway at Mowbray Road, right-turn at Orchard Road then via Albert Avenue and the Pacific Highway.

While these alternative routes would involve some minor additional travel time, it is not expected that this would significantly affect a business of this type, which is a destination for customers who are seeking a specific product or service (in contrast to a passing trade business).

The other businesses on the eastern side of the Pacific Highway between Gordon Avenue and Nelson Street are currently accessed either directly from the Pacific Highway or from Gordon Avenue. The project would not affect these access arrangements.

8.12.6 Compensation to businesses

Seven submissions raised issues regarding compensation to businesses.

Stakeholder identification numbers

50, 139, 145, 198, 207, 208, 209

Issue raised

In summary, the submissions raised the following issues:

- Request for compensation for a business operating from home near the Chatswood dive site due to noise and vibration impacts during construction
- Request for temporary or permanent relocation of a home business at 1-3 Gordon Street, Chatswood, due to noise impacts
- Request for compensation for businesses along Blues Point Road

Response

Section 13.4.1 of the Environmental Impact Statement acknowledges the potential for impacts on businesses during construction and commits to carrying out further consultation with the aim of developing measures to manage the specific construction impacts for individual businesses. A business impact risk register would also be developed to identify, rate and manage the specific construction impacts for individual businesses (refer to mitigation measures BI1 and BI2). Additionally, mitigation measures relating to noise and vibration (in Section 10.5 of the Environmental Impact Statement) would assist in managing potential impacts to businesses. Potential business impacts can be effectively managed through the implementation of these mitigation measures.

8.13 Non-Aboriginal heritage

8.13.1 Assessment method

One submission raised issues regarding the assessment method.

Stakeholder identification number

127

Issue raised

The submission suggested that Tower Square should be addressed in the heritage assessment for Victoria Cross Station. The report should include places of potential heritage value not just listed items.

Response

Assessing heritage impacts based on listed items is a standard approach to environmental impact assessment. The local listings (such as those listed under the *North Sydney Local Environmental Plan 2013*) are compiled by councils as part of a systematic evaluation of heritage values across a local government area. They represent a sound basis on which heritage impacts can be assessed. The heritage assessment in the Environmental Impact Statement has been carried out in accordance with the relevant Secretary's environmental assessment requirements.

8.13.2 Demolition of heritage items

Seven submissions raised issues regarding the demolition of heritage items.

Stakeholder identification numbers

13, 127, 159, 164, 215, 217, 259

Issue raised

In summary, the submissions raised the following issues:

- Suggestion to relocate heritage buildings rather than demolish them
- Concern regarding the demolition of local heritage items. Archival recording is a poor substitute for the preservation of heritage items
- The following shop fronts (facades) should be preserved around Crows Nest Station: 501 (Proud Furniture), 465 (Oz Design), 465A, 459-467 – 469A – 471 – 473 – 475
- It is unclear if options to place Victoria Cross Station on the opposite side of Miller Street were explored in order to avoid demolition of heritage items
- Support for the retention of the heritage listed shop at 187 Miller Street, North Sydney, and the sculpture outside 189 Miller Street
- The heritage bus shelter art work at Blues Point should be reinstated in collaboration with North Sydney Council at the completion of the project
- Concern about whether former car ferry docks at Blues Point will be maintained
- Objection to the demolition of 7 Elizabeth Street for Martin Place Station due to its design by prominent architect Emil Sodersten and interior design by Marion Hall Best
- Objection to the construction methodology for Central Station, specifically the removal of platforms 13-15 and the historic canopies. It is unacceptable to impact rare heritage items for a temporary footbridge structure
- Protection for built heritage values at Central Station is required
- Loss of historic buildings along Regent Street, Chippendale, is unnecessary.

Response

The potential to avoid direct impact to heritage items was considered as part of the station locations options assessment, and during the refinements of station design. In some locations, avoidance of heritage items was not a feasible solution to provide optimum station planning (including customer experience outcomes) and constructible configurations (minimising risk and safety issues).

Mitigation measure NAH1 commits to archival recording of all heritage items to be demolished in accordance with the NSW Heritage Office's *How to Prepare Archival Records of Heritage Items* (1998), and *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006).

Responses to specific issues raised are provided below:

- The shop fronts around Crows Nest Station, the sculpture at 189 Miller Street, North Sydney and 56 to 64 Regent Street, Chippendale are not listed heritage items and, as such their removal is not considered in terms of heritage impacts
- The sculpture outside 189 Miller Street, North Sydney would be removed by North Sydney Council prior to construction activities at the site. North Sydney Council will take responsibility for works relating to its relocation, including any notification or negotiations required relating to moral rights
- The bus shelter at Blues Point would be temporarily removed. Opportunities to salvage this shelter and reinstate it at the completion of construction would be investigated in consultation with North Sydney Council
- There would be no impact on the former car ferry wharf at Blues Point
- The retention of 7 Elizabeth Street would have resulted in increased risk and safety issues and a more complex construction methodology, and a significantly compromised station design outcome for customer experience. The reduced excavation area required by the retention of this building would also result in restricted below ground station areas and therefore reduced pedestrian circulation areas in the paid and unpaid concourse creating potential congestion issues. Notification would be carried out as required by moral rights legislation.

  Emil Sodersten is considered to be one of Australia's most influential architects (Emil Sodersten) from the 1930s and numerous building designed by Sodersten remain in Sydney. Sodersten's most highly regarding commercial office building are the CML Building at 60-66 Hunter Street and Bryant House at 80-82 Pitt Street. In relation to residential buildings, Sodersten's most important building is considered to be Birtley Towers, Elizabeth Bay. Although 7 Elizabeth Street is considered to be significant as an important work, it is not considered to be at the forefront of Sodersten's work, and its relatively modest scale has been overwhelmed by more recent and lesser quality adjacent development.

  It is understood that Marion Hall Best's input to 7 Elizabeth Street was limited to the decoration of the apartment interiors. It cannot be confirmed whether any evidence remains of Best's original decorative scheme, however it is considered unlikely. Any surviving fragments, if present, would not substantially contribute to the significance of the building.
- Transport for NSW is working with the Heritage Council of NSW and other relevant stakeholders in relation to the design outcomes for Central Station. In addition, the Sydney Metro Design Review Panel would include a heritage architect to provide independent review throughout detailed design. Further construction planning has identified that the temporary station footbridge at Central Station would not represent the optimum outcome. As such, it is now proposed to manage pedestrian movements at Central Station during construction through the staged retention of underground connections. This would reduce potential heritage impact at Central Station, particularly associated with impacts to platform canopies. Further details are provided in Section 9.4 of this report.

8.13.3 Indirect impacts to heritage items

Twenty-six submissions raised issues regarding indirect impacts to heritage items.

Stakeholder identification numbers

37, 94, 127, 164, 173, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 193, 194, 195, 196, 197, 206, 228, 236, 238, 250, 273

Issue raised

In summary, the submissions raised the following issues:

- Suggestion to protect and enhance the Mowbray Road heritage precinct including Mowbray House School, Chatswood South Uniting Church, the Cemetery, Chatswood Reservoirs 1 and 2, and 2 Orchard Road
- Concern raised regarding impacts of truck movements and spoil haulage on the 10 metre curtilage of Mowbray House and heritage palm tree garden
- This historical significance of the area around Chatswood dive site is important with some of the earliest uses of gas (including Mowbray House). The significance to historical pre railway Chatswood is enormous
- Mowbray House should be retained as a public access building due to its historical cultural and political significance
- Request for heritage urban design treatment for the Mowbray House and garden precinct post completion
- Concern regarding other heritage properties on the northern side of Mowbray Road, Chatswood, and four on the southern side in a 430 metre strip between Bowen Street and Orchard Road / Elizabeth Street. Suggestion to undertake dilapidation reports on heritage items and residential buildings pre and post construction to assess construction impacts and share these reports with Willoughby / Lower North Shore Council and the Willoughby District Historical Society
- Concern regarding impacts on heritage listed buildings around Crows Nest Station (particularly 28-34 Clarke Street / St Leonards Centre). Mitigation measures to prevent structural or amenity impacts should be implemented
- The heritage chapter does not assess the relationship of Crows Nest Station or the services buildings to the scale of the heritage buildings on the Pacific Highway. The form of any future building above the station needs to consider the visual impact and relationship to these heritage buildings which contribute to the village character of Crows Nest
- Given the sensitive interfaces and the Victoria Cross precinct generally (being surrounded by heritage items), a far more substantive level of design detail is required to properly assess the impacts of the proposed works
- Objection to the Sydney Yard Access Bridge which would impact views to Mortuary Station. The footprint on the Sydney Yard Access Bridge is excessive and too close to Mortuary Station heritage item. Request to consider other potential access locations such as site near existing driveway between 26 Lee Street and bus depot or existing maintenance access driveway from Chalmers Street adjacent to the Central Station south eastern entry. Access to Sydney Yard should be by tunnel rather than an elevated bridge
- Concern regarding the adverse impact on the heritage context of 54 Regent Street.

Response

Section 14.5 of the Environmental Impact Statement provides an assessment of the potential indirect impacts to non-Aboriginal heritage items. These indirect impacts are mainly associated with views and vistas, or the potential for impacts from vibration causing construction activities.

In relation to vibration, a conservative cosmetic damage screening criterion of 7.5 mm/s has been applied to all heritage items. Where levels are predicted to be above this screening criterion, a more detailed assessment of the structure would be carried out to ensure vibration levels remain below a specific cosmetic damage level for that structure. This would consider the heritage values of the item.

Responses to specific issues raised are provided below:

- Mowbray House would be retained and protected within the Chatswood dive site, although there would be some impacts to non-original outbuildings. The future use of this item would be determined in consultation with Willoughby Council
- Existing condition surveys would be offered to the owners of all properties with the potential to be affected by construction works. The process for condition surveys is provided in the Construction Environmental Management Framework (Appendix B of this report)
- Mitigation measure NAH8 identifies that appropriate heritage interpretation would be incorporated into the design for the project in accordance with the NSW Heritage Manual, the NSW Heritage Office's *Interpreting Heritage Places and Items: Guidelines* (August 2005), and the NSW Heritage Council's *Heritage Interpretation Policy*. Consideration of heritage values is also required by the Design Guidelines for the project (Appendix A of this report)
- The potential heritage impacts to Mortuary Station from the Sydney Yard Access Bridge are considered in the heritage assessment in the Environmental Impact Statement.

Since development of the Environmental Impact Statement, further work has been carried out regarding the design principles for the Sydney Yard Access Bridge including consideration of the visual impacts of the bridge to Mortuary Station. These updated design principles are provided in Section 2.5 of this report. Further, Transport for NSW is working with the Heritage Council of NSW and other relevant stakeholders in relation to the design outcomes for Central Station (including the design of the Sydney Yard Access Bridge). The Sydney Metro Design Review Panel would include a heritage architect to provide independent review throughout detailed design.

Options for access to Sydney Yard are considered in Section 4.8.2 of the Environmental Impact Statement. In summary, a tunnel solution was not feasible as the horizontal geometry and vertical grades could not be achieved, it would have resulted additional disruption to the rail network, it would have constrained future infrastructure provision at Central Station, and it would have resulted in substantial impacts to infrastructure around Central Station (such as Prince Alfred Park or the bus layover).

8.13.4 Impacts to heritage conservation areas

One submission raised issues regarding impacts to heritage conservation areas.

Stakeholder identification number

134

Issue raised

The submission raised concerns regarding vibration causing damage to properties in heritage conservation areas around the tunnels.

Response

The assessment of vibration impacts to buildings has considered the cosmetic damage values from British Standard BS7385 and then applied a 50 per cent reduction as a screening criterion.

As identified in the Environmental Impact Statement, heritage buildings or conservation areas have not been assumed to be more susceptible to vibration. Notwithstanding, the screening criterion applied to all heritage items has been set at a lower value of 7.5 mm/s (typically applied to light framed, unreinforced buildings) rather than the higher 25 mm/s value (typically applied to reinforced or framed buildings).

Section 10.4.13 of the Environmental Impact Statement provides a vibration assessment of properties above the tunnel alignment. Ground-borne vibration levels from main tunnelling works are predicted to be lower than the 7.5 mm/s cosmetic damage screening criteria at all locations.

Mitigation measure NV3 ensures that where vibration levels (from other construction activities) are predicted to exceed the screening criteria, a more detailed assessment of the structure and attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure. For heritage items, the more detailed assessment would specifically consider the heritage values of the structure.

8.13.5 Potential archaeological items

Six submissions raised issues regarding potential archaeological items.

Stakeholder identification numbers

50, 130, 166, 200, 213, 254

Issue raised

In summary, the submissions raised the following issues:

- A full historic research and analysis should be a condition of any approval as should a full historical archaeological assessment prior to any intervention being considered at Blues Point Reserve where the tunnel boring machine retrieval site has been proposed
- Concern regarding the high likelihood of archaeological deposits in the Waterloo area which would be of significance. In particular this relates to the proposed tunnel between Marrickville dive site and Waterloo Station runs beneath Sheas Creek, a now concrete canal which forms the north-eastern extent of Alexandra Canal.

Response

Section 14.5 of the Environmental Impact Statement identifies the potential for archaeological items to be present at a number of sites including the Blues Point temporary site and Waterloo Station. Mitigation measure NAH2 identifies that an archaeological research design would be prepared for these sites. This has subsequently been prepared and is provided as Appendix H to this report.

The archaeological research design identified that:

- There is moderate potential for State significant archaeology to be present in one location on the Blues Point temporary site, low potential for State significant archaeology in two other locations, and a moderate to high potential for local significant archaeology at various location on the site
- There is low to moderate potential for local significant archaeology to be present at the Waterloo Station site.

The archaeological research design also sets out the proposed archaeological management for construction works at these sites.

8.14 Aboriginal heritage

8.14.1 Potential archaeological items

Two submissions raised issues regarding potential archaeological items.

Stakeholder identification numbers

50, 200

Issue raised

The submissions suggest that the potential heritage significance of Blues Point Reserve is exceptionally high due potentially earlier Cammerragal occupation. A more thorough investigation should be undertaken into the significance of Blues Point Reserve in accordance with the NSW Heritage Council's guidelines. A full historic research and analysis should be a condition of any approval as should a full historical archaeological assessment prior to any intervention being considered at Blues Point Reserve.

Response

As stated in Section 15.3.4 of the Environmental Impact Statement, there is a moderate or greater potential for previously unrecorded items of Aboriginal heritage significance to be present in sub-surface contexts in the northwest corner of the Blues Point temporary site where there is evidence of natural landform. As a result, mitigation measure AH2 commits to the preparation of an Aboriginal cultural heritage assessment report. This has subsequently been prepared and is provided as Appendix I to this report. The Aboriginal cultural heritage assessment report identified that the northwest corner of the site has a moderate potential for Aboriginal archaeology. The report also sets out the excavation methodology for this site considering the potential for archaeology.

The overall guiding principle for cultural heritage management for the project would be to conserve Aboriginal sites in situ, where possible. In situations where the conservation of an Aboriginal heritage site is not practical, mitigation measures would be developed (in consultation with the Metropolitan Local Aboriginal Land Council) and implemented to reduce the project's Aboriginal heritage impact. These measures would include:

- Consultation with the Metropolitan Local Aboriginal Land Council in accordance with the NSW Office of Environment and Heritage's *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation 2005* (Department of Environment and Conservation, 2005a)
- Archaeological test excavation and salvage (when required).

Archaeological test excavation (and salvage when required) would be carried out where intact natural soil profiles with the potential to contain significant archaeological deposits are encountered at the Blues Point temporary site.

8.15 Landscape character and visual amenity

8.15.1 Construction visual impacts

Eleven submissions raised issues regarding constriction visual impacts.

Stakeholder identification numbers

50, 66, 94, 97, 112, 178, 198, 200, 207, 208, 238

Issue raised

Chatswood dive site

In summary, the submissions raised the following issues:

- Concern regarding visual impacts from the works around Chatswood
- The Environmental Impact Statement assessment of visual impacts being minor at 1-3 Gordon Avenue, Chatswood is not acceptable.

Crows Nest Station

In summary, the submissions raised the following issues:

- Concern regarding impacts on visual amenity (particularly from the perspective of 22-26 Clarke Street) caused by construction activities at Crows Nest Station. Suggestion for mitigation measures to monitor and manage the severity and duration impacts
- Concern regarding privacy of residents around Crows Nest.

Blues Point temporary site

In summary, the submissions raised the following issues:

- Concern regarding general visual impacts at Blues Point
- Concern regarding views associated with the Blues Point site including the curtilage of the world heritage listed Opera House and views from Dawes Point, Walsh Bay and Barangaroo
- The Environmental Impact Statement should rate the views to the Opera House from Blues Point as of national importance, not regional importance.

Response

Chatswood dive site

The potential visual impacts around the Chatswood dive site are assessed in Section 16.4.1 of the Environmental Impact Statement. The assessment was carried out in accordance with the Secretary's environmental assessment requirements.

The daytime visual impact assessment considered visual amenity as experienced by the users of the site and surrounds. The assessment included consideration of views from residential areas, offices and streets. To identify the potential impacts, the assessment involved identifying the existing visual conditions, views that are representative of these conditions, the sensitivity of the views, and the magnitude of change expected as a result of the project (Table 16-7 of the Environmental Impact Statement shows the relationship between these factors). An overall assessment was then made of the level of impact expected.

During construction at the Chatswood dive site there would be:

- Minor and moderate adverse visual impacts on viewpoints from Nelson Street, Gilham Street, Mowbray Road and residential properties to the east of the existing rail corridor. These impacts would primarily be due to the scale and extent of the proposed work, including removal of vegetation along the rail corridor (between Nelson Street and Mowbray Road) and construction activities at the Chatswood dive site (for example, spoil removal and tunnel support works)
- Minor adverse visual impacts on viewpoints from elevated residences to the west of the Frank Channon Walk. This impact would be due to the removal of vegetation within the rail corridor, which would open up views to both existing rail infrastructure and metro infrastructure under construction. The minor impact in this location is derived from a combination of a considerable reduction in visual amenity, associated with a viewpoint of a *neighbourhood* level of visual sensitivity.

Where feasible and reasonable, the elements within construction sites would be located to minimise visual impacts, for example materials and machinery would be stored behind fencing. Visual mitigation would be implemented as soon as feasible and reasonable after the commencement of construction, and remain for the duration of the construction period. The design and maintenance of construction site hoardings would aim to minimise impacts on visual amenity and landscape character, including the prompt removal of graffiti. Public art opportunities would be considered. The selection of materials and colours for acoustic sheds would aim to minimise their visual prominence.

Crows Nest Station

During construction, there would be minor and moderate visual impacts at Crows Nest due to the extent of demolition and the scale of the proposed acoustic enclosures and construction sites. The range of impact levels at this location reflects the scale and proximity of the works to the viewing location. Generally, impacts would be more substantial in the vicinity of Hume Street where the construction site works would be more complex and have a larger footprint.

Where feasible and reasonable, the elements within construction sites would be located to minimise visual impacts, for example materials and machinery would be stored behind fencing. Visual mitigation would be implemented as soon as feasible and reasonable after the commencement of construction, and remain for the duration of the construction period. The design and maintenance of construction site hoardings would aim to minimise impact on visual amenity and landscape character, including the prompt removal of graffiti. Public art opportunities would be considered. The selection of materials and colours for acoustic sheds would aim to minimise their visual prominence.

Blues Point temporary site

During construction, there would be:

- Moderate to high adverse visual impacts on viewpoints from Blues Point and McMahons Point. These impacts would be due to the obstruction of views to the open water of the harbour and the incongruous character of the construction work with these views
- A moderate adverse visual impact on viewpoints from the Harbour Bridge and St Ives stairs due to the disruption of the green foreshore edge, which is currently visible from across the harbour
- Negligible visual impacts from the Sydney Opera House and forecourt. Although the project site would be clearly visible from these locations, the distance and ability of the surrounding urban environment to absorb visual impacts would result in no perceived change in the amenity of views. Similarly, negligible visual impacts would be experienced from Barangaroo Reserve, where distance and intervening elements would limit the visibility of the site.

Where feasible and reasonable, the elements within construction sites would be located to minimise visual impacts (for example, materials and machinery would be stored behind fencing). Visual mitigation would be implemented as soon as feasible and reasonable after the commencement of construction, and remain for the duration of the construction period. The design and maintenance of construction site hoardings would aim to minimise impact on visual amenity and landscape character, including the prompt removal of graffiti. Public art opportunities would be considered. The selection of materials and colours for acoustic sheds would aim to minimise their visual prominence.

Tunnel boring machine retrieval works at the Blues Point temporary site would be timed to avoid key harbour viewing events and benching would be used where feasible and reasonable to minimise visual amenity impacts.

Defining views of the harbour (which include views of the Opera House) from Blues Point as regional is consistent with the allocation of visual sensitivity throughout the visual impact assessment in the Environmental Impact Statement. An important factor in determining visual sensitivity is how heavily a viewpoint is experienced. In this context, views from the Opera House are experienced by far more people than those from Blues Point. While views from Blues Point are unquestionably important (regionally sensitive), they do not have the same level of importance as the national sensitive views from the Opera House.

8.15.2 Operation visual impacts

Twenty-eight submissions raised issues regarding operational visual impacts.

Stakeholder identification numbers

44, 54, 55, 80, 90, 110, 135, 173, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 193, 194, 195, 196, 197, 206, 212, 228, 241, 273

Issue raised

In summary, the submissions raised the following issues:

Chatswood dive site

In summary, the submissions raised the following issues:

- Concern regarding visual impacts around the Chatswood dive site as trains will be visible above the noise wall
- There will be visual amenity impacts to residents west of Frank Channon Walk due to removal of vegetation within the rail corridor, noise barriers, overshadowing, and the rail bridge
- Concern regarding loss of sunlight and views as a result of installations of noise barriers at Chatswood. Suggestion to consult with affected residents in choice of material and barrier height
- Suggestion that the rail bridge should not be built over Nelson Street and Nelson Street bridge should not be permanently closed
- Both metro tracks at Chatswood should be located together from Albert Avenue rather than in between the two T1 North Shore Line tracks
- Suggestion that an artist's impression showing a cross-section of the two major structures at Chatswood dive site within the rail corridor showing the dive structure and the rail bridge be developed
- Suggestion that the development of the Ausgrid site near Chatswood should exclude high rise

- Suggestion for extra tree plantings at the south and north of Nelson Street and east of Nelson Street bridge before construction starts
- Suggestion that vines growing on the noise barriers along Frank Channon Walk should be retained and the height of the current barriers should be retained.

Central Station

In summary, the submissions raised the following issues:

- Concern regarding visual impacts from Sydney Yard Access Bridge at 54 Regent Street.

Response

Chatswood dive site

During the operation at the Chatswood dive site, there would be minor to moderate adverse daytime visual impacts on viewpoints from the following locations:

- Residential properties to the west of the Frank Channon Walk
- Residential properties and streets between Nelson Street and Mowbray Road
- Residential properties and streets between Mowbray Road and Hawkins Street.

These impacts would be due to the proposed removal of vegetation from within the rail corridor and scale of metro infrastructure, which would result in unfiltered views of the rail corridor, noise barriers and dive structure. There would also be minor adverse landscape impacts on the Frank Channon Walk during operations due to the proposed removal of trees, the scale of the adjacent retaining structure and noise barriers, and associated overshadowing.

Mitigation measures (LV12 and LV13) have committed that, where feasible and reasonable, vegetation would be provided to screen and visually integrate sites with the surrounding area. In addition appropriate landscape treatments for Frank Channon Walk are to be identified and implemented.

Sydney Metro would consult with Willoughby Council to identify in opportunities to mitigate the impacts to Frank Channon Walk, Gordon and Nelson Avenue, through landscape and public domain treatments for areas affected by construction.

Noise barriers would be transparent where they are augmenting existing transparent noise barriers.

The Nelson Street bridge is required to be demolished to enable the construction of the metro dive structure and the realignment of the T1 North Shore Line.

The future development of the residual land at Chatswood dive site would be subject to a separate planning approval process.

Central Station

The visual impact of the Sydney Yard Access Bridge is considered and assessed in Section 16.4.10 of the Environmental Impact Statement. Moderate adverse visual impacts are anticipated to be experienced at Regent Street where the Sydney Yard Access Bridge would remain and continue to be used for access to the Yard.

Since exhibition of the Environmental Impact Statement, more detailed design principles for the Sydney Yard Access Bridge have been developed with a focus on minimising the visual and heritage impacts associated with the bridge, These refined design principles are provided in Section 2.5 of this report and are also included in the updated Chatswood to Sydenham Design Guidelines (Appendix A of this report).

8.15.3 Construction and operation landscape character impacts

Nine submissions raised issues regarding construction and operational landscape character impacts.

Stakeholder identification numbers

15, 50, 94, 110, 127, 137, 215, 236, 250

Issue raised

Chatswood dive site

In summary, the submissions raised the following issues:

- Suggestion for landscape master planning and a maintenance program post-construction at Chatswood dive site
- Request for a landscape plan for Nelson Street and the rail corridor to Chatswood Station
- Concern regarding the potential removal of vines on Frank Channon Walk wall adjacent to the rail corridor. This is great for the environment and also provide a barrier against graffiti
- Concern regarding tree removal on Nelson Street, Chatswood. Suggestion for a 2 for 1 tree replacement program.

Crows Nest Station

In summary, the submissions raised the following issues:

- The Crows Nest Station design does not keep with the appearance of Crows Nest. The Environmental Impact Statement does not address the change to pedestrian areas or footpath spaces and the removal of small scale retail.

Victoria Cross Station

In summary, the submissions raised the following issues:

- Objection to the demolition of the Jewellers Shop and Tower Square for Victoria Cross Station. These buildings make an important contribution to the social and visual character of the Miller Street area
- All trees on Miller Street and Berry Street, North Sydney should be retained and included in the rebuilt streetscape.

Blues Point temporary site

In summary, the submissions raised the following issues:

- Concern regarding the considerable landscape impact to Blues Point, including harbour viewing events and unique photo opportunities of the Opera House and Harbour Bridge

Martin Place Station

In summary, the submissions raised the following issues:

- Concern regarding the size and design of Martin Place Station as it appears to take up a lot of open space in Martin Place. The building does not appear to be in keeping with the architecture of other buildings in Martin Place.

Response

The potential landscape character impacts are assessed in Section 16.4 of the Environmental Impact Statement. Responses to specific issues raised at each relevant site are provided below.

Chatswood dive site

The assessment at Chatswood includes the potential landscape impact associated with the removal of vegetation and changes to Frank Channon Walk.

Mitigation measures (LV12 and LV13) have committed that, where feasible and reasonable, vegetation would be provided to screen and visually integrate sites with the surrounding area. In addition appropriate landscape treatments for Frank Channon Walk are to be identified and implemented.

Sydney Metro would consult with Willoughby Council to identify in opportunities to mitigate the impacts to Frank Channon Walk, Gordon and Nelson Avenue, through landscape and public domain treatments for areas affected by construction.

In addition, mitigation measure LV5 commits identifying opportunities for the retention and protection of existing trees during detailed construction planning.

Crows Nest Station

The location and form of Crows Nest Station has been specifically developed to be in keeping with the existing character of Crows Nest. Of particular importance is the location of the station outside the main village centre. This is discussed in the Chatswood to Sydenham Design Guidelines, which were included as Appendix B to the Environmental Impact Statement. An updated version of the Design Guidelines (Appendix A of this report) provides more context to the station design at Crows Nest and its relationship to the surrounding urban character.

During operation, there would be minor beneficial landscape impacts on these areas due to the improved accessibility of public transport and the provision of additional pedestrian crossings, which would improve overall accessibility around the entire precinct. In addition, there would be a negligible visual impact on surrounding viewpoints. In addition, the proposed station entry and streetscape upgrades would likely improve the overall quality of views from the corner of Hume and Clarke streets.

Victoria Cross Station

The project provides a major opportunity to improve the overall quality of the area. Further information is provided in the updated Chatswood to Sydenham Design Guidelines (Appendix A of this report).

During construction there would be a minor adverse landscape impact on Berry and Miller streets. This impact would be primarily due to direct impacts on pedestrian movement and the removal of mature street trees at these locations.

While the contribution of the jewellers shop and Tower Square to the character of Miller Street is acknowledged, there are substantial opportunities for improved landscape outcomes provided through the design of an integrated station precinct. Beneficial landscape impacts are identified in the Environmental Impact Statement through the uncluttering of views to the site, and the introduction of a broad open plaza, street trees, and a prominent, architectural station entry and plaza. Following construction, and where feasible and reasonable, vegetation would be provided to screen and visually integrate sites with the surrounding area.

Blues Point temporary site

During construction, there would be a high adverse landscape impact on Blues Point Reserve. This impact would be a consequence of the direct loss of harbour foreshore open space. It is noted, however, that pedestrian access would be maintained around the foreshore edge, and existing mature trees would be retained.

Where feasible and reasonable, the elements within construction sites would be located to minimise visual impacts (for example, materials and machinery would be stored behind fencing). Visual mitigation would be implemented as soon as feasible and reasonable after the commencement of construction, and remain for the duration of the construction period. The design and maintenance of construction site hoardings would aim to minimise impact on visual amenity and landscape character, including the prompt removal of graffiti. Public art opportunities would be considered. The selection of materials and colours for acoustic sheds would aim to minimise their visual prominence.

In addition, tunnel boring machine retrieval works at the Blues Point temporary site would be timed to avoid key harbour viewing events., and Benching would be used where feasible and reasonable to minimise visual amenity impacts.

During operation, there would be negligible landscape impacts as the reserve would be reinstated after construction.

Martin Place Station

The architectural form of the building associated with the southern Martin Place entry will be identified as part of the approvals process for over station development. The southern station entry would be built to the existing property line and not resume any part of Martin Place. It is acknowledged however that the existing building at this site is set back from Martin Place with some open plaza space on the Martin Place and Castlereagh Street frontages.

During operation, there would be a minor beneficial landscape impact on Hunter, Castlereagh and Elizabeth streets, as well as a high beneficial landscape impact on Martin Place due to the integration of the station and plaza, and improvements to legibility and accessibility. There would also be high beneficial impacts on views in the vicinity of Martin Place, as the design outcome would improve views in this area.

8.16 Groundwater and geology

8.16.1 Ground movement and settlement

Thirteen submissions raised issues regarding ground movement and settlement.

Stakeholder identification numbers

50, 82, 84, 98, 105, 114, 130, 140, 142, 162, 163, 249, 298

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the impact of blasting on the stability of the buildings across Clarke Lane, Crows Nest
- Concern that excavation at Blues Point will exacerbate subsidence issues at Blues Point Tower
- Concern that tunnelling will impact foundations of buildings in Waterloo and that not enough information has been provided

- Concern regarding ground movement near Waterloo Station
- Concern regarding potential tunnel collapse and subsidence around Newtown
- Concern regarding damage to residential properties in Lord Street, Newtown especially those close to the dive site. Specific concerns raised include:
  - Houses are over 100 years old
  - Soil is reactive clay with substantial existing movement during dry and wet weather
  - Tunnels will be in an aquifer with a high water table. Disturbance during construction may create subsidence problems
  - Water and sewer pipes are over 100 years old. Investigations are needed on this infrastructure
  - There have been no geotechnical investigations
  - Request for more detail on contingency funds to repair any damage.

Response

Section 10.4 of the Environmental Impact Statement considers the potential impacts of project construction associated with blasting and ground-borne vibration. Section 17.4.2 considers the potential for ground movement (or settlement) related to construction.

The use of blasting is proposed at most excavation locations (including at Crows Nest) because it is expected to reduce the overall duration of excavation, and the associated impacts of rock hammering. Upper limits for vibration and overpressure from blasting were adopted for the project in line with other recent project approvals to target the protection of building structures from cosmetic damage. An additional conservative criterion for heritage buildings was also adopted to screen potential vibration impacts from blasting at heritage buildings. All of the blasting scenarios considered in the Environmental Impact Statement were designed (based on preliminary information) to comply with these criteria.

Consistent with the guidance from British Standard *BS 7385 Evaluation an Measurement for Vibration in Buildings*, conservative vibration damage screening levels were adopted for reinforced or framed structures and unreinforced or light framed structures. Chapter 10 of the Environmental Impact Statement identifies that during main tunnelling works ground-borne vibration would be lower than the threshold at which cosmetic damage may occur at all locations. However, exceedences of the screening criteria are expected as a result of excavation for some buildings and structures at Crows Nest Station, Victoria Cross Station, Barangaroo Station, Martin Place Station, Pitt Street Station and Central Station. A more detailed assessment of potentially affected structures and attended vibration monitoring would therefore be carried out at these locations to ensure vibration levels remain below appropriate limits for those structures (refer to mitigation measure NV3).

Ground movement typically results from either the release or redistribution of stress in rock formations during tunnelling and excavation, or from ground consolidation following the drawdown of groundwater (during construction and / or operation). While the specific risk to buildings and structures due to ground movement depends on geotechnical conditions, distance from construction activities and building characteristics, preliminary ground movement contours indicate that for most of the project alignment there would be a negligible ground movement risk, with superficial damage to buildings unlikely. Some buildings and structures close to station and dive sites excavations may be at risk of superficial damage and therefore may require future building strain and structural assessment to address settlement related risks.

Mitigation measure GWG1 commits to the development of a detailed geotechnical model that would allow more specific assessment of the potential for damage to structures, services, basements and other sub-surface elements through settlement or strain. Where building damage risk is rated as moderate or higher (as per adopted risk based criteria), a structural assessment of the affected buildings and structures would be carried out and specific measures implemented to address the risk of damage. Pre-excavation condition surveys of buildings and structures in the vicinity of the tunnel and excavations are also proposed (refer to mitigation measure GWG2).

Geotechnical investigations have occurred along the project alignment to inform the design development process and further investigations would be conducted as required during detailed design.

8.16.2 Groundwater inflow

Three submissions raised issues regarding groundwater inflow.

Stakeholder identification numbers

130, 162, 163

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding groundwater impacts and impacts at Waterloo
- Concern regarding the lack of survey of the Lord Street, Newtown area for suitability for a train line and possibility of interference with underground water.

Response

Potential groundwater impacts are considered in Sections 17.4.1, 17.4.3 and 17.4.4 of the Environmental Impact Statement.

During construction, the assessment estimates the maximum dewatering (after initial works) would be 2.86 litres per second for Waterloo Station. This maximum inflow rate, should it occur, would not be expected to result in changes to groundwater levels at the nearest groundwater extraction site. Further, actual inflows during operation would be much lower than this estimated maximum because Waterloo Station would be tanked. This means it would be designed to inhibit the inflow of groundwater, typically using concrete lining and waterproofing membrane.

The geological long-section included in Appendix F of the Environmental Impact Statement shows that a number of geotechnical investigations were conducted near Lord Street at Newtown and that beneath Lord Street the tunnels would be located within Ashfield Shale. As the tunnels would be tanked to inhibit groundwater inflows, groundwater drawdown at this location is expected to be limited. Additionally, the permeability of shale is generally low, with the majority of groundwater flow transmitted through joints and fractures rather than via the porous nature of the material.

Section 17.4.1 of the Environmental Impact Statement sets target changes to groundwater levels which vary depending on geology and the presence of buildings. These targets would be reviewed following the development of a detailed geotechnical model for the project and a groundwater monitoring program would be implemented if significant exceedances of target changes to groundwater levels are predicted at surrounding land uses and nearby water supply works. Any groundwater monitoring program would aim to confirm no adverse impacts on groundwater levels or to identify impacts so they can be appropriately managed (refer to mitigation measure GWG1).

8.17 Soils, contamination and water quality

8.17.1 Soil erosion

One submission raised issues regarding soil erosion.

Stakeholder identification number

130

Issue raised

The submissions raised concerns regarding erosion from the Waterloo Station site.

Response

Potential soil erosion and sedimentation impacts of the project are considered in Section 18.4.2 of the Environmental Impact Statement.

Construction of the project would temporarily expose the natural ground surface and sub-surface at the Waterloo Station site through the removal of overlying structures (such as buildings and footpaths) and excavation of the construction footprint for the station, structures and foundations. The exposure of these disturbed areas to water runoff and wind could increase soil erosion potential.

Given the relatively small areas of surface disturbance anticipated during construction and the flat topography at the Waterloo Station site, it is expected that soil erosion would be adequately managed by implementing measures in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2* (Department of Environment and Climate Change, 2008a).

8.17.2 Acid sulfate soils

One submission raised issues regarding acid sulfate soils.

Stakeholder identification number

130

Issue raised

The submission raised concerns regarding disturbance of acid sulfate soils at Waterloo Station.

Response

The likelihood of the project exposing potential acid sulfate soil is considered in Section 18.4.2 of the Environmental Impact Statement.

The Office of Environment and Heritage acid sulfate soil rock maps do not identify the Waterloo Station site as having a probability of acid sulfate soils. The site is also classified as Class 5 on the acid sulfate soils map included in *Sydney Local Environmental Plan 2012*, which is the lowest risk category. It is, however, still possible that construction at the Waterloo Station site could expose alluvial soils with acid sulfate soil potential.

Further geotechnical testing of underlying sub-soil and rock stratum would be undertaken to determine the composition of rock and soil types likely to be present within excavation areas. If acid sulfate soils are encountered, they would be effectively managed in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee, 1998). The manual includes procedures for the investigation, handling, treatment and management of such soils (refer to mitigation measure SCW2).

8.17.3 Contamination

Two submissions raised issues regarding contamination.

Stakeholder identification numbers

112, 130

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the risk to workers, residents and visitors from contamination at Blues Point from previous industrial activities
- Concern regarding disturbance of contamination at Waterloo Station.

Response

The potential for the project to disturb contaminated areas is considered in Section 18.4.2 of the Environmental Impact Statement and Section 3 of Technical Paper 8: Phase 1 Contamination Investigation.

The Blues Point temporary site has a moderate contamination risk with a history of commercial / industrial use including potential ship yard activities undertaken on and / or adjacent to the site which could have resulted in contaminated soils, water and vapour.

The historical and current commercial and industrial use of the Waterloo Station site (including present day activities such as dry cleaners, automotive use and a sub-station) represents a moderate risk and is a potential source of contamination associated with the chemicals used in the dry cleaning process (ie chlorinated hydrocarbons, and volatile organic compounds), the automotive industry (hydrocarbons), substation (hydrocarbons and PCB) and miscellaneous chemicals associated with historical commercial / industrial operations.

Updated desktop contamination assessments would be carried out for the Chatswood dive site, Blues Point temporary site, Barangaroo Station, Central Station and Waterloo Station. If necessary to determine the remediation requirements and identify risks to site workers, visitors, the general public and surrounding environments, detailed contamination assessments, including collection and analysis of soil and groundwater samples would be carried out (refer to mitigation measure SCW1).

8.17.4 Marine water quality

One submission raised issues regarding marine water quality.

Stakeholder identification number

159

Issue raised

The submissions requested protection for estuarine environments of Sydney Harbour.

Response

The Environmental Impact Statement commits to mitigation measures including the use of silt curtains, a water quality monitoring program to inform responses to any potential impacts and procedures to avoid the spread of marine pests (refer to mitigation measures SCW5, SCW6 and B4). With the implementation of suitable mitigation measures, impacts on Sydney Harbour environments would be managed.

8.18 Social impacts and community infrastructure

8.18.1 Community cohesion

One submission raised issues regarding community cohesion.

Stakeholder identification number

250

Issue raised

The submission raised concerns that if large scale buildings are built over the stations, Crows Nest village will be broken up and the community will be less cohesive.

Response

Over station development would be subject to a separate planning approval process.

8.18.2 Community health and safety

Seven submissions raised issues regarding community health and safety.

Stakeholder identification numbers

8, 130, 153, 154, 158, 167, 268

Issue raised

In summary, the submissions raised the following issues:

- Health and safety of local residents is the number one priority
- The health and wellbeing of people in the neighbouring properties at the Chatswood dive site is worth significant consideration
- Concern regarding the impact of construction dust on health at the Chatswood dive site
- Concern regarding the location of the Artarmon substation near a school and potential impacts to children's health. Suggestion to move the substation to the Artarmon Industrial Area
- Request to find an alternative to the haul route at Blues Point due to impacts on health of elderly people
- Concern regarding the health impacts of the substation at Waterloo Station. There has been no community consultation on this issue.

Response

Section 19.4.3 of the Environmental Impact Statement provides consideration of the potential health and safety impacts to the surrounding community from construction and operation of the project.

Responses to specific issues raised are provided below:

- The potential impacts associated with the generation of dust are assessed in Section 22.4.1 of the Environmental Impact Statement. These impacts are anticipated to be minor and would be managed through the implementation of standard mitigation measures provided in Section 22.6 of the Environmental Impact Statement
- Transport for NSW is continuing to investigate sites for the Artarmon substation within the Artarmon Industrial Area. This location would represent better land use compatibility and remove the potential for overlap with the use of the site by the school

- In relation to potential health impacts from substations, the Environmental Impact Statement commits to meeting the exposure standards of the *Draft Radiation Standard – Exposure Limits for Magnetic Fields* (Draft Radiation Standard) (Australian Radiation Protection and Nuclear Safety Agency, 2006)
- Details of community consultation are provided in Chapter 4 of this report. Prior to exhibition of the Environmental Impact Statement, this included specific consultation following the announcement of Waterloo Station in February 2016. Consultation during exhibition of the Environmental Impact Statement included six community information sessions and two information stalls. Place Managers were also available to contact via the community information line and the project email address.

8.18.3 Impacts to community infrastructure

Fifteen submissions raised issues regarding impacts to community infrastructure.

Stakeholder identification numbers

18, 37, 74, 91, 112, 166, 190, 200, 213, 215, 240, 242, 250, 254, 301

Issue raised

In summary, the submissions raised the following issues:

- Suggestion that if a road link between Nelson Street and Mowbray Road was provided as part of the Chatswood dive site, the area between the road and the metro could become open space and incorporate Frank Channon Walk. If the Ausgrid site is totally dedicated to high rise development it would exacerbate a need for open space in the immediate area. In the event the link from Nelson Street to Mowbray Road is not provided, this area should still be retained as open space after construction
- Residual land at the dive site should be used as 'green / recreational' spaces
- The loss of the Crows Nest post office is not included in the business impacts chapter. Private mailboxes at this post office are vital to businesses in Crows Nest and would have a significant impact. It is important that there is a permanent post office at Crows Nest during and following construction
- Objection to the use of Blues Point Reserve due to impacts on public open space and community infrastructure
- Concern regarding permanent impacts to Blues Point Reserve
- Blues Point Reserve should be reinstated in collaboration with North Sydney Council at the completion of the project

Response

Responses to the specific issues raised are provided below:

- The use of the residual land at the Chatswood dive site would be subject to a separate planning approval process
- The replacement of the Australia Post in Crows Nest is a matter for Australia Post Corporation. Alternative postal facilities are available nearby at St Leonards
- The site at Blues Point Reserve is a temporary facility. This site would be reinstated as soon as possible after the completion of activities at the site in consultation with North Sydney Council.

8.19 Biodiversity

8.19.1 Vegetation clearing

Three submissions raised issues regarding vegetation clearing.

Stakeholder identification numbers

15, 130, 270

Issue raised

In summary, the submissions raised the following issues:

- The construction of Chatswood dive site will remove an old and large tree inside the rail corridor near the Nelson Street bridge
- Concern regarding tree removal in Miller Street, North Sydney, due to shade provision and pollution reduction
- Concern regarding the clearing of native fig trees at Waterloo which provide habitat for Rainbow Lorikeet and Sulphur-crested Cockatoo.

Response

The biodiversity assessment in Chapter 20 of the Environmental Impact Statement conservatively assumed that all vegetation within the construction footprint would be cleared. Mitigation measure LV5 identifies that vegetation would be retained where feasible and reasonable.

All vegetation identified within the study area is mapped as Urban – Exotic / Native in Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area (Department of Environment, Climate Change and Water, 2009a) and field assessment has confirmed that most vegetation is planted or exotic regrowth.

There is minimal native vegetation in the area to be impacted. Native vegetation is limited to planted trees and shrubs and occasional scattered regeneration of common native plant species within previously disturbed areas.

The clearing of planted trees and landscaped vegetation could impact foraging habitat and shelter for fauna species. However, impacts would be to a very small amount of vegetation and would therefore be minor and generally restricted to common fauna species that inhabit urban environments.

8.19.2 Impacts to threatened species

One submission raised issues regarding impacts to threatened species.

Stakeholder identification number

130

Issue raised

The submission raised concerns regarding impacts to bat roosting at Waterloo Station.

Response

As identified in Section 20.4 of the Environmental Impact Statement, the removal of buildings at the Waterloo Station site has the potential to impact roosting and nesting fauna including microbat habitat. During targeted surveys carried out as part of the assessment, no microbats were observed at this site. The assessment concluded that there would be a moderate likelihood of microbats occurring at the Waterloo Station site.

Potential bat roosting locations at the Waterloo Station site would be checked by a qualified ecologist or wildlife handler prior to demolition. The local WIRES group and / or a veterinarian would be contacted if any fauna are injured on site or require capture and / or relocation.

8.20 Flooding and hydrology

8.20.1 Construction stage flooding, hydrology and drainage infrastructure

One submission raised issues regarding construction stage flooding, hydrology and drainage infrastructure.

Stakeholder identification numbers

297

Issue raised

In summary, the submission requested the flooding implications for Waterloo be addressed in the short term and longer term via a detailed flood impact assessment undertaken prior to finalising the detailed design of the Waterloo Station.

Response

As identified in Section 21.4.2 of the Environmental Impact Statement, the Waterloo Station site would be at risk of flooding during construction. Construction of the project also has the potential to alter local flood behaviour due to the obstruction of overland flow paths, loss of floodplain storage (for example, due to stockpiling construction materials and spoil) and the alteration to stormwater drainage infrastructure. Detailed construction planning would consider flood risk at the Waterloo Station construction site. This would include identification of measures to avoid, where reasonable and feasible, construction phase flooding impacts on the community and on other property and infrastructure.

8.20.2 Operational flooding, hydrology and drainage infrastructure

Two submissions raised issues regarding operational stage flooding, hydrology and drainage infrastructure.

Stakeholder identification numbers

134, 297

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding increased local flooding from the project around the metro rail tunnels
- Concern regarding flooding impacts during the operation of Waterloo Station.

Response

To avoid inundation, the tunnel dive structures would be designed at or above the Probable Maximum Flood level for mainstream flooding. Drainage at the dive structures would be designed to manage flows for the 100-year average recurrence interval event.

As identified in the Environmental Impact Statement, the Waterloo Station site would be at risk of flooding during operation. To avoid flooding impacts on project infrastructure, station entries and aboveground rail system facilities would be located (where feasible and reasonable) above the Probable Maximum Flood level and at least 0.5 metres above the 100-year average recurrence interval flood level. Where it is not feasible and reasonable to meet these design criteria, the design would consider the need for sumps and pumps to manage any potential inflows into project infrastructure.

The aboveground station infrastructure would be located within the footprint of existing development and would have a negligible impact on the existing surface hydrology. The runoff volumes and flow rates would be similar to the existing conditions and there would be no impact to the capacity of the existing downstream stormwater infrastructure. All surface water from aboveground facilities and tunnel dive structures would also be collected by new drainage infrastructure and connected to existing stormwater systems.

Mitigation measure FH9 (refer to Chapter 11 of this report) has been revised to identify that the design of the project would, where feasible and reasonable, not worsen existing flooding characteristics up to and including the 100 year average recurrence interval event in the vicinity of the project.

8.21 Air quality

8.21.1 Construction dust emissions

Thirty-seven submissions raised issues regarding construction dust emissions.

Stakeholder identification numbers

49, 58, 61, 63, 74, 91, 95, 112, 128, 130, 154, 158, 166, 167, 173, 182, 183, 184, 185, 186, 187, 188, 189, 191, 192, 193, 194, 195, 196, 197, 200, 215, 220, 238, 242, 245, 273

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding dust from spoil removal
- Concern regarding air pollution and air quality impacts from the Chatswood dive site during construction. Request for high dust barriers to mitigate impacts
- Objection to the proposed air quality management at Chatswood dive site
- Concern regarding dust impacts caused by construction activities at Crows Nest Station. Suggestion for mitigation measures to monitor and manage the severity and duration of impacts
- Concern regarding impacts of dust from demolition, construction and heavy vehicle movements on Hume Street, Crows Nest, and how dust will effect ground and first floor businesses of Lawson House
- Concern regarding dust impact on Kelly's Place child care centre caused by haulage trucks and light vehicles on Clarke Street, Crows Nest
- Concern regarding dust emissions from the Blues Point site and reduced quality of life, especially due to winds from the harbour blowing towards residences
- Concern regarding dust from trucks on Blues Point Road
- Suggestion to contain dust by erecting an acoustic shed at the Blue Point temporary site
- The suggested 'hoardings' at Blues Point will be of minimal value in attenuating the dust because the site is surrounded by apartment towers
- Dust and amenity impacts from Sydney Yard Access Bridge construction likely at properties on Regent Street, Chippendale
- Concern regarding construction dust emissions and general construction pollution around Waterloo
- Concern regarding construction pollution around the Marrickville dive site.

Response

Section 22.4 of the Environmental Impact Statement provides an assessment of potential air quality impacts of the project. Dust emissions from the project would be readily manageable to appropriate standards through standard mitigation measures (as identified in Section 22.6 of the Environmental Impact Statement).

It is acknowledged that some receivers are particularly sensitive dust emissions. Specific consultation (as per mitigation measure SO2) would be carried out with sensitive community receivers potentially impacted during construction. This consultation would aim to identify and develop specific measures to manage construction impacts for individual sensitive community receivers.

8.21.2 Construction exhaust emissions

Twenty-eight submissions raised construction exhaust emissions.

Stakeholder identification numbers

65, 74, 91, 95, 112, 141, 166, 173, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 242, 245, 273, 275

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding exhaust emissions from trucks on Blues Point Road and exhaust emissions from the Blues Point site, particularly the impact on this inner city residential area
- Request for machinery vents and exhausts to be faced away from residential buildings at Blues Point
- Concern regarding fumes from Sydney Yard Access Bridge during construction.

Response

Exhaust emissions during construction would generally be restricted to minor localised emissions of carbon monoxide, oxides of nitrogen, sulfur dioxide and volatile organic compounds, due to the combustion of fuel in construction plant, machinery and equipment and emissions from plant and equipment.

These pollutants would not significantly affect local air quality at the nearest sensitive receivers and would be adequately managed during construction with standard mitigation measures as outlined in Section 22.6 of the Environmental Impact Statement.

8.21.3 Operational impacts

Six submissions raised issues regarding operational impacts.

Stakeholder identification numbers

134, 139, 142, 145, 158, 182

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding degradation to air quality around exhaust stacks from the tunnels
- Request for air pollution control at the Chatswood dive site
- Concern regarding increased pollution around Chatswood due to the removal of Nelson Street bridge
- Relocation of T1 North Shore Line and construction at Chatswood dive site and removal of vegetation will increase air pollution
- Concern regarding air quality impacts in Crows Nest and an increase in dust and grime on the outside of buildings
- Concern regarding fumes and dust from Sydney Yard Access Bridge during operation

Response

Section 22.5 of the Environmental Impact Statement provides a detailed assessment of potential air quality impacts of the project. This assessment identifies that emissions vented through the fresh air ventilation system would be in very low concentrations.

During operation, the Sydney Yard Access Bridge would be used for maintenance access requirements for Sydney Trains and Sydney Metro. Access would be infrequent, with traffic volumes less than on a local residential street.

8.22 Hazard and risk

8.22.1 Dangerous goods and hazardous substances

Three submissions raised issues regarding dangerous goods and hazardous substances.

Stakeholder identification numbers

82, 142, 249

Issue raised

The submissions raised concerns regarding the storage of dangerous goods at Crows Nest Station

Response

Typically, low volumes of potentially hazardous materials would be stored on site. The likely materials and storage volumes at each site are provided in Section 23.3.1 of the Environmental Impact Statement. Storage of dangerous goods would be located to meet State environmental policy requirements – namely *State Environmental Planning Policy No. 33- Hazardous and Offensive Development*.

8.23 Waste management

8.23.1 Spoil generation and management

Sixteen submissions raised issues regarding spoil generation and management.

Stakeholder identification numbers

43, 46, 47, 76, 77, 81, 85, 87, 88, 93, 151, 204, 261, 263, 264, 267

Issue raised

In summary, the submissions raised the following issues:

- The indicative timing of construction (and removal) at Barangaroo Station is on a 24/7 basis, which is superfluous and unreasonable
- The spoil from Barangaroo Station should be removed from the area directly to its final destination, and this should not occur at night
- The temporary spoil stockpile on Hickson Road for Barangaroo Station is unnecessary and will result in double handling. Spoil should be removed directly to its final destination
- The Environmental Impact Statement indicated that spoil from Barangaroo may be removed from the area by barge. If that was to happen, it must only do so from the harbour side of the central Barangaroo site. To do so from any other local harbour location would involve double handling, unwarranted and unreasonable noise and increase the number of truck movements in the area

Response

Tunnelling and underground excavations and supporting activities are proposed to be carried out up to 24 hours per day and seven days per week. The proposed hours aim to provide a balance between minimising the intensity and duration impacts on the community and construction efficiency.

Since the preparation of the Environmental Impact Statement, construction planning has identified that rock breaking for cut-and-cover stations and station shafts (except for Central Station) would no longer be required outside of standard construction hours. Support station excavation activities would still occur up to 24 hours per day and seven days per week. Further information is provided in Section 9.6 of this report.

The spoil generated at Barangaroo Station, including from tunnelling activities, would be stored at the site and removed as efficiently as possible. Double handling is an additional cost to the contractor and would be avoided where feasible and reasonable.

Section 8.2.3 of the Environmental Impact Statement identifies alternative spoil transport options, including the potential use of barges at Barangaroo. Further investigations regarding the potential for use of barges at Barangaroo have been carried out (refer to Section 3.2 of this report).

8.23.2 Other construction waste

One submission raised issues regarding other construction waste.

Stakeholder identification number

220

Issue raised

The submission raised concerns regarding emissions of asbestos from demolition activities (particularly the Post Office) at Crows Nest Station and requested information on mitigation measure designed to reduce risk to owners and tenants of nearby properties.

Response

Mitigation measure HR3 identifies that a hazardous material survey would be completed for those buildings and structures suspected of containing hazardous materials (particularly asbestos) prior to their demolition. If asbestos is encountered, it would be handled and managed in accordance with relevant legislation, codes of practice and Australian standards.

8.24 Sustainability

8.24.1 Environment and sustainability policy and strategy

One submission raised issues regarding environment and sustainability policy and strategy.

Stakeholder identification number

153

Issue raised

The submission suggested that staff and contractors for the project should be sourced from NSW.

Response

Transport for NSW would implement a Workforce Development and Industry Participation Strategy for the Sydney Metro project.

The project offers the potential to increase workforce capability and capacity, mitigate skills shortages and gaps that would reduce cost, improve productivity and provide local sustainable employment. Sydney Metro's skills legacy would improve the competitiveness of industry, provide individual career pathways and provide major socio-economic benefits to individuals and communities.

Sustainability objectives and supporting targets and initiatives identified for the project (provided in Section 25.3 of the Environmental Impact Statement) include: workforce development and community benefit, the provision of employment opportunities for local people and the creation of opportunities for local business involvement during construction and operation.

8.24.2 Construction resource use

Two submissions raised issues regarding construction resource use.

Stakeholder identification numbers

5, 153

Issue raised

The submissions suggested that rail materials and goods for the project should be provided from Australian suppliers.

Response

Sustainability objectives and supporting targets and initiatives have been identified for the project and are provided in Section 25.3 of the Environmental Impact Statement. This includes local sourcing of high impact material such as steel and concrete used in the project. In some cases, such as for uncommon resources, to provide the optimum product outcome and to ensure value for money some resources may need to be supplied from suppliers outside Australia.

8.24.3 Construction greenhouse gas emissions

One submission raised issues regarding construction greenhouse gas emissions.

Stakeholder identification number

112

Issue raised

The submission raised concerns regarding the greenhouse gas implication of trucks to and from the Blues Point site.

Response

Section 25.6 of the Environmental Impact Statement provides an assessment of the potential greenhouse gas emissions from the project. Overall, emissions from the construction of the project are anticipated to be relatively minor. In the long term, the project would provide a net benefit in greenhouse gas emissions associated with the anticipated shift from road to rail.

Additionally, sustainability objectives and supporting targets and initiatives for the project (provided in Section 25.3 of the Environmental Impact Statement) include the reduction of emissions through design requirements and construction practices, use of biodiesel and ethanol fuel, and the implementation of green travel plans. The project has also committed to offsetting 25 per cent of the greenhouse gas emissions associated with construction.

8.25 Cumulative impacts

8.25.1 Cumulative impacts with other projects

Five submissions raised issues regarding cumulative impacts with other projects.

Stakeholder identification numbers

16, 94, 153, 160, 205

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding the impact of multiple major transport projects around Chatswood
- The Environmental Impact Statement should model the relationship between metro and the WestConnex traffic impacts
- Development of large projects like WestConnex and Central to Eveleigh need to be planned together, with consultation of the local community considered

Response

Section 26.3 of the Environmental Impact Statement identifies the potential for cumulative impacts with a range of other projects during the construction of Sydney Metro City & Southwest Chatswood to Sydenham. This included consideration of WestConnex and the Central to Eveleigh Transformation and Transport Program.

Transport for NSW would manage and co-ordinate the interface with projects under construction at the same time to minimise the potential cumulative impacts. Co-ordination and consultation with relevant stakeholders would include:

- Provision of regular updates to the detailed construction program, construction sites and haul routes
- Identification of key potential conflict points with other construction projects
- Developing mitigation strategies in order to manage conflicts. Depending on the nature of the conflict, this could involve:
  - Adjustments to the Sydney Metro construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of other construction projects
  - Co-ordination of traffic management arrangements between projects.

8.26 Environmental management framework

8.26.1 Construction environmental management framework

One submission raised issues regarding the construction environmental management framework.

Stakeholder identification numbers

155

Issue raised

In summary, the submission requested that staff at the Chatswood dive site and Artarmon site be briefed on the residential nature of the local area and behave accordingly.

Response

The Construction Environmental Management Framework (Appendix B of this report) provides information on the training, awareness and competence requirements for Principal Contractors on Sydney Metro.

As a minimum this would include site induction, regular toolbox talks and topic specific environmental training, including informing workers of the environment surrounding the construction sites and appropriate measures to minimise impacts to nearby residential areas.

8.26.2 Construction noise and vibration strategy

Four submissions raised issues regarding the construction noise and vibration strategy.

Stakeholder identification numbers

50, 66, 74, 112

Issue raised

In summary, the submissions raised the following issues:

- Concern regarding clarity on the management of noise impacts from Victoria Cross Station apart from offering relocation for residents. Much of the strategy is aimed at assessment, prediction, notification and monitoring alone will do nothing to reduce noise and vibration impacts.
- Concern regarding the need for Blues Point residents to vacate their properties when tunnelling is occurring in the vicinity
- In the event Blues Point residents need to vacate their homes, question as to whether equivalent accommodation, removalist and lost employment costs will be provided
- Mitigation for night time noise at Blues Point must include temporary alternative accommodation for all residents to close proximity and should a minimum 4-star quality hotel and include parking

Response

The Construction Noise and Vibration Strategy (Appendix C of this report) provides the overall noise and vibration management approach during construction of the project.

This includes the process specific Construction Noise and Vibration Impact Statements based on a more detailed understanding of the construction methods, plant and equipment. This would also include the identification of specific mitigation measures. Depending on the nature of the works, the Construction Noise and Vibration Impact Statements may be activity specific or location specific.

The Construction Noise and Vibration Strategy also identifies standard noise and vibration mitigation measures which would be implemented at all construction sites. Additional mitigation measures are also identified and would be implemented for certain works based on defined levels of noise exceedance.

Based on the anticipated ground-borne noise levels from tunnelling in the vicinity of Blues Point (refer Section 10.4.13 of the Environmental Impact Statement), it is unlikely that residents would be required to vacate their properties. In the event this is required, it is anticipated this would be a few days only for each tunnel boring machine. The project team would work with affected residents to find suitable alternative accommodation in the event it is required

8.27 Endorsement of other submissions

One submission provided an endorsement of another submission.

Stakeholder identification number

255

Issue raised

The submission supports the submission by the Owners Corporation of the residential complex at Towns Place, Millers Point.

Response

The support for the submission is noted.

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