Part D

Conclusion

Part D Conclusion

17. Synthesis of the Submissions and Preferred Infrastructure Report

This Submissions and Preferred Infrastructure Report has been prepared to support Transport for NSW's application for approval of the preferred project as critical State significant infrastructure, in accordance with the requirements of Division 5.2 (formerly Part 5.1) of the EP&A Act.

This chapter provides a synthesis of the findings of the Submissions and Preferred Infrastructure Report. As per Chapter 28 of the Environmental Impact Statement (Synthesis of the Environmental Impact Statement) it addresses the Secretary's environmental assessment requirements where relevant to the preferred project.

17.1 Response to issues raised

17.1.1 Key issues raised

During the exhibition period, submissions were invited from the community and other stakeholders. A total of 563 submissions were received from 549 submitters (14 submitters provided two submissions), 550 of which were from members of the community and 13 from government agencies (including local councils) and key stakeholders.

Of the key issues raised in the community submissions, the top three most frequently raised issues raised (comprising over half the issues raised) were:

- project need and justification, including issues regarding project need and development considerations
- construction traffic, transport and access, including issues regarding the impacts during rail possessions and the temporary transport arrangements, construction traffic and parking impacts
- project description – design features, including issues regarding the characteristics of metro trains and facilities, and station designs.

Key issues raised by government agencies and key stakeholders included:

- local impacts and integration with local government land use planning
- impacts to local character, amenity and accessibility
- hydrology, flooding and water quality
- active transport and station design
- active transport corridor
- impacts to non-Aboriginal heritage.

17.1.2 Response

In response to the issues raised by the community and key stakeholders Transport for NSW has revisited the exhibited project and has developed a design solution to retain existing station entrances, heritage buildings and concourses while providing accessible stations. This has enabled the development of a preferred project that not only addresses a number of the issues raised in submissions, but also significantly minimises potential impacts while delivering a world class metro.

Part B of this Submissions and Preferred Infrastructure Report provides responses to each issue raised by the community, government agencies and key stakeholders, based on the preferred project. The responses provided highlight where the issues raised are no longer relevant for the preferred project.

Part C of this Submissions and Preferred Infrastructure Report describes the preferred project and considers the potential impacts of constructing the preferred project, where these have changed from those assessed for the exhibited project in the Environmental Impact Statement.

17.2 Summary description of the preferred project

The preferred project involves upgrading 10 existing stations west of Sydenham (Marrickville to Bankstown inclusive), and a 13 kilometre section of the T3 Bankstown Line, between west of Sydenham Station and west of Bankstown Station, to improve accessibility for customers and to meet the standards required for metro operations. The preferred project would enable Sydney Metro to operate beyond Sydenham, to Bankstown.

A summary of the key features of the preferred project is provided below and a full description of the preferred project is provided in Appendix B.

17.2.1 Location

The preferred project is located mainly within the existing rail corridor, from about 800 metres west of Sydenham Station in Marrickville, to about one kilometre west of Bankstown Station in Bankstown.

The location of the preferred project is shown in Figure 2.1.

17.2.2 Works to upgrade access at stations

The preferred project includes upgrading the 10 stations from Marrickville to Bankstown as required. The works at each station generally include:

- works to platforms including re-levelling and the provision of emergency access ramps
- new lifts to access the station and station platforms, where required
- refurbishment/repurposing of station buildings on platforms or at station entrances
- renewing/revitalising station interiors and exteriors
- provision of additional station facilities as required.

Works to integrate with other modes of transport and improve travel paths would also be undertaken in some areas adjoining the stations. This would include the provision of accessible parking, cyclist facilities, and kiss and ride facilities at locations where these currently do not exist.

17.2.3 Works to convert stations and the rail line to Sydney Metro operations

Station works

In addition to the station upgrades, works to meet the standards required for metro services would include:

- installation of platform screen doors and fixed or mechanical gap fillers on platforms
- provision of operational facilities, such as station services buildings.

Track and rail system facility works

Upgrading the track and rail systems to enable operation of metro services would include:

- track works where required along the rail corridor
- new or replacement turn back facilities and track crossovers
- installing Sydney Metro rail systems and adjusting existing Sydney Trains rail systems
- overhead wiring adjustments.

Other works

Other works proposed to support Sydney Metro operations would include:

- upgrading existing bridges and underpasses across the rail corridor
- installation of security measures, including fencing, where required
- installation of noise barriers where required
- augmenting the existing power supply, including new traction substations and provision of new feeder cables
- utility and rail system protection and relocation works.

Temporary works during construction

During construction, the preferred project would involve:

- provision of temporary facilities to support construction, including construction compounds and work sites
- implementation of alternative transport arrangements for rail customers during possession periods and/or station closures, guided by the Temporary Transport Strategy.

Further information on the design features of the preferred project is provided in the preferred project description in Appendix B.

17.2.4 Construction

Construction of the preferred project would commence once all necessary approvals are obtained (anticipated to be in 2018/2019). Upgraded stations would be progressively delivered from 2019 until 2022, with the main station upgrade works estimated to take about one year for each station. Works to upgrade other infrastructure would also occur during this period to improve the reliability of services.

The T3 Bankstown Line and freight tracks operated by ARTC (between Marrickville and west of Campsie) would remain operational for the majority of the construction period. However, to ensure the station and infrastructure upgrade works are completed as efficiently and safely as possible, and to accommodate works that cannot be undertaken when trains are operating, it would be necessary to undertake some work during rail possession periods, when trains are not operating. It is anticipated that these rail possession periods would comprise the routine weekend maintenance possessions scheduled by Sydney Trains (and ARTC), some additional weekend possessions and a longer possession period during the Christmas holiday periods when patronage is reduced. Individual stations may also be closed for up to two months.

A final, longer possession of about three to six months would also be required. This would involve full closure of the line to enable it to be converted to metro operations. This final possession period is to enable works that can only be completed once Sydney Trains services are not operating. It would include works such as the installation of new signalling, communication systems, and platform screen doors.

During each possession period and station closure, a temporary transport management plan would be implemented to provide alternative transport arrangements and ensure that customers can continue to reach their destinations.

Further information on how the preferred project would be constructed is provided in the preferred project description in Appendix B.

17.2.5 Operation

The preferred project would connect with the Chatswood to Sydenham project within the existing rail corridor, about 800 metres to the west of Sydenham Station.

The preferred project would operate in conjunction with Sydney Metro Northwest and the Sydney Metro City & Southwest Chatswood to Sydenham project, which is proposed to extend from Chatswood Station to Sydenham Station.

Sydney Metro Northwest will be operational between Tallawong and Chatswood stations by 2019. Sydney Metro City & Southwest would be fully operational by 2024, with the opportunity of operation commencing in two phases. Initially, Sydney Metro Northwest services would be extended by the City & Southwest project, and would operate from Chatswood Station to Sydenham Station. Some months later, metro operations would extend from Sydenham Station to Bankstown Station, with both phases planned to be completed before the end of 2024. The opportunity for phased opening of the project would enable metro trains to operate from Tallawong Station to Sydenham Station prior to the final conversion of the T3 Bankstown Line to metro operations.

Once the preferred project is operational, Sydney Trains services would no longer operate between Sydenham and Bankstown stations. Metro trains would run between Sydenham and Bankstown stations in each direction, at least every four minutes in peak periods, with at least 15 trains per hour. Customers would be able to interchange with Sydney Trains services at Sydenham and Bankstown stations. Sydney Trains services to Liverpool and Lidcombe stations from Bankstown Station would also not be affected.

Further information on how the preferred project would operate is provided in the preferred project description in Appendix B.

17.3 Uncertainties of preferred project and approach to design refinements

17.3.1 Uncertainties

Given the complexity of delivering the preferred project, the design presented in this Submissions and Preferred Infrastructure Report is indicative. The design serves to:

- confirm that the proposed performance and technical requirements can be achieved
- validates the feasibility and methodology of the required construction
- identifies key risks/constraints and environmental assessment issues.

There remain some uncertainties relating to technical requirements and how the preferred project would be constructed. These would be resolved as the design progresses. A summary of the uncertainties that have the potential to impact on the environment, and how these would be resolved, is provided in Table 17.1.

Table 17.1 Project uncertainties

Category of impact	Key uncertainty	How uncertainties will be resolved
Transport, traffic and access	Final possession strategy	The duration of the final possession would be as short as practicable to bring Sydney Metro trains into service. The duration of this possession would be refined in consultation with relevant stakeholders, and the community would be informed of any proposed changes once they are confirmed.
	Temporary transport arrangements - rail replacement services during construction, including: • final service provision and arrangements • services west of Bankstown • infrastructure required • rail network changes for Circle Line stations and other network changes	Transport for NSW will work to ensure disruptions to customers are minimised. In accordance with the Temporary Transport Strategy, temporary transport management plans will be implemented during possessions to cater for displaced train passengers between Sydenham and Bankstown, and stations west of Bankstown where services are impacted. Development of the plans have commenced and will continue during detailed design. Further information is provided in Appendix G of the Environmental Impact Statement (Temporary Transport Strategy).
Noise	Final noise mitigation requirements	Further noise modelling will be undertaken during detailed design to confirm the receivers that are eligible for mitigation. Feasible and reasonable mitigation measures will be considered for each of the receivers during detailed design.
Across a number of potential impact areas	Compounds and work sites – location, layout and facilities	The final location and layout of compounds and work sites will be confirmed based on the detailed design and final construction methodology, taking into account the criteria and requirements provided in Section 2.8 of the preferred project description provided in Appendix B.
	Utilities – impacts to utilities to be defined in detail	Utility investigations are ongoing and will be completed during detailed design, to validate current assessments, and confirm relocation/protection requirements. To minimise potential impacts to utilities and the community, utilities would be managed in accordance with the Utilities Management Framework, provided in Appendix H.

17.3.2 Design refinements

The design of the preferred project as described in this Submissions and Preferred Infrastructure Report would be subject to ongoing refinements during the detailed design phase. Refinements may be made to:

- avoid services that present significant construction difficulties in terms of logistics, time and/or cost
- reduce the construction timeframe
- avoid areas of environmental sensitivity identified following approval
- reduce impacts on the community
- improve operation without increasing potential environmental impacts.

Such refinements may include, for example:

- minor changes to the location of compounds, work sites, and construction site accesses
- minor changes to the location of key infrastructure, refinement or reorientation of site boundaries
- minor changes to the features of key project components
- utility relocations outside the existing project area
- additional infrastructure to support the implementation of the Temporary Transport Strategy.

For design refinements, a screening assessment would be undertaken to consider whether the refinement would:

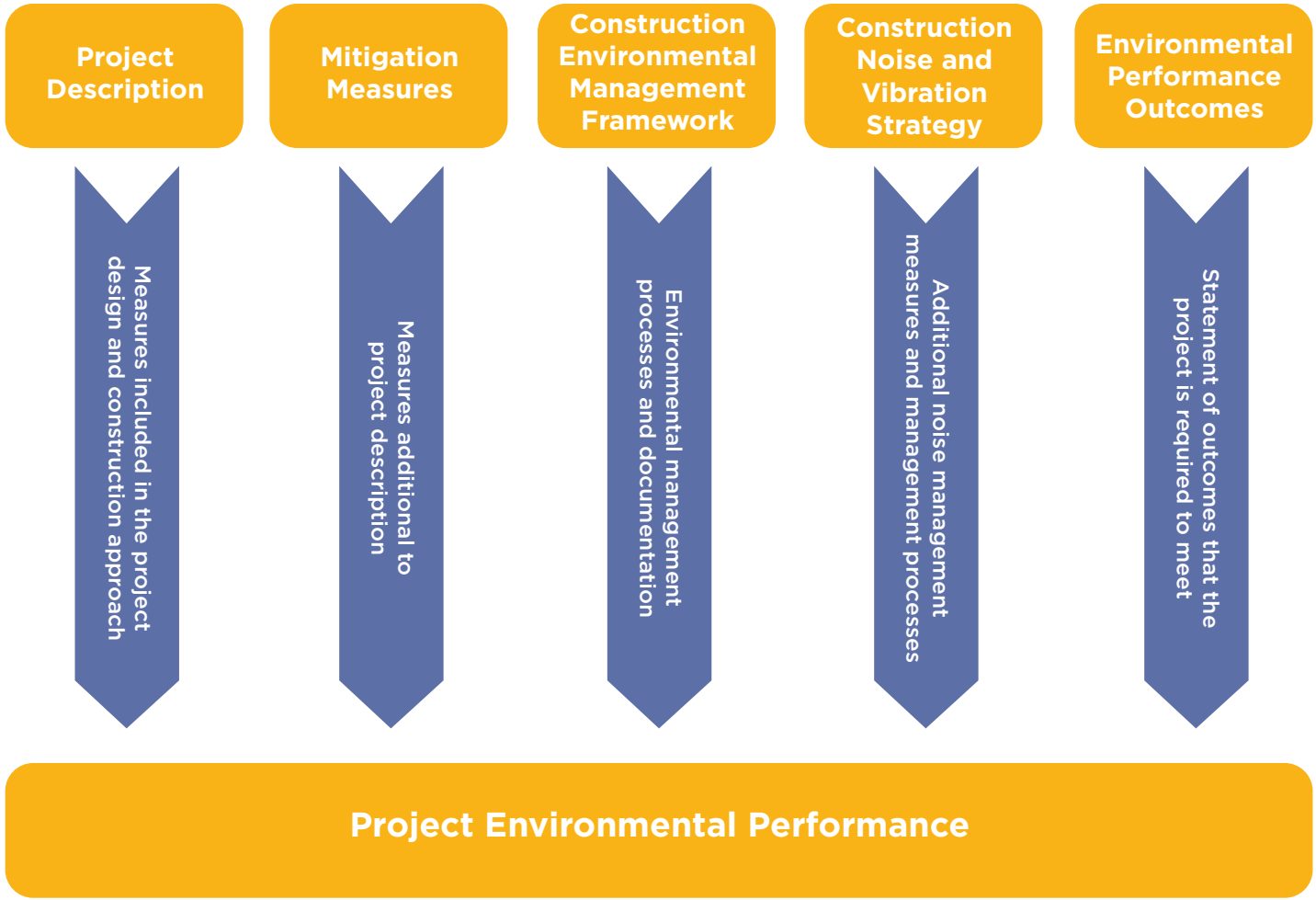
- result in a condition of approval not being met
- be consistent with the objectives and operation of the project as described in the Environmental Impact Statement and this Submissions and Preferred Infrastructure Report
- result in a significant change to the approved project
- result in potential environmental or social impacts of a greater scale or impact on previously unaffected receivers than those considered by the Environmental Impact Statement and this Submissions and Preferred Infrastructure Report.

17.4 Approach to environmental management

17.4.1 Environmental management during construction

The approach to environmental management during construction is shown in Figure 17.1 and involves:

- Project design – measures incorporated in the design and construction planning to avoid and minimise impacts.
- Mitigation measures – identified as an outcome of the environment impact assessment provided in the Environmental Impact Statement and Chapters 12 to 15 of this report. A revised, consolidated list of mitigation measures is provided in Chapter 16 of this report.
- Environmental performance outcomes – future construction planning would be considered against the environmental performance outcomes provided in Section 17.6 of this report.
- Implementation of the following project specific construction environmental management frameworks/strategies (described below):
  - Construction Environmental Management Framework
  - Construction Noise and Vibration Strategy
  - Temporary Transport Strategy
  - Utilities Management Framework.



sydney METRO | city & southwest

Approach to environmental mitigation and management during construction

FIGURE 17.1

Construction Environmental Management Framework

The Construction Environmental Management Framework, provided in Appendix D of the Environmental Impact Statement, details the approach to environmental management and monitoring during construction. The framework is a linking document between the planning approval documentation and the construction environmental management documentation (including the Construction Environmental Management Plan), which would be developed by the construction contractors.

The framework describes the environmental, stakeholder, and community management systems and processes that would be applied during construction. Specifically, it identifies the requirements in relation to the Construction Environmental Management Plan, sub-plans, and other supporting documentation for each specific environmental aspect.

Construction Noise and Vibration Strategy

The Construction Noise and Vibration Strategy, provided in Appendix E of the Environmental Impact Statement, defines how construction noise and vibration will be managed for the Sydney Metro City & Southwest project as a whole. The strategy provides guidance for managing construction noise and vibration impacts in accordance with the *Interim Construction Noise Guideline,* to provide a consistent approach to management and mitigation across all Sydney Metro projects.

The strategy identifies the requirements and methodology to develop construction noise impact statements. These would be prepared prior to specific construction activities, based on a more detailed understanding of construction methods, including the size and type of construction equipment.

Temporary Transport Strategy

A Temporary Transport Strategy has been prepared to provide a guide to managing alternative public transport arrangements during construction, to minimise impacts to customers during station closures and possession periods. The strategy identifies:

- objectives for customers and bus services
- customer markets to be served by temporary transport plans
- the process for developing temporary transport plans to guide alternative transport arrangements, including stakeholder and community consultation
- options to maintain public transport connections to and from all affected rail stations
- management of impacts associated with temporary transport options to be provided in temporary transport plans
- temporary transport facilities and measures required to support the implementation of temporary transport plans, ensuring provision of accessible services
- performance outcomes for temporary transport plans.

Guided by the strategy, temporary transport plans would be developed to manage the movement of customers, who would usually use the T3 Bankstown Line, during station closures and possessions. The plans would focus on what needs to happen during closures and possession periods to provide customers with alternative means of travel by public transport.

The Temporary Transport Strategy was provided in Appendix G of the Environmental Impact Statement.

Utilities Management Framework

The Utilities Management Framework has been updated from the Utilities Management Framework provided in the Environmental Impact Statement and is provided in Appendix H to this report. It describes the approach to avoiding and/or minimising impacts associated with the relocation and/or adjustment of public utilities affected by the project and provides a consistent approach to the assessment and management of public utilities relocation/adjustment across all project activities.

17.4.2 Environmental management during operation

The approach to environmental management during operation involves:

- Project design – measures inherent in the design to avoid and minimise impacts.
- Mitigation measures – identified as an outcome of the environment impact assessment described in Chapters 10 to 27 of the Environmental Impact Statement and Chapters 12 to 15 of this report. A revised, consolidated list of mitigation measures is provided in Chapter 16 of this report.
- Environmental performance outcomes – future design development and design changes would be considered against the environmental performance outcomes provided in Section 17.6.
- Operational environmental management – the approach to environmental management during operation would be defined in the Operational Environmental Management Plan (described below).

Operational Environmental Management Plan

Environmental performance during operation would be managed by the implementation of an Operational Environmental Management Plan. The plan would describe how the mitigation measures and performance outcomes would be implemented and achieved during operation, and would specify the environmental management practices and procedures to be followed during operation. The plan would be prepared in consultation with relevant agencies and in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004). The plan would include, but not be limited to, the following:

- a description of activities to be undertaken during operation
- statutory and other obligations, including approvals, consultations and agreements required from authorities and other stakeholders
- overall environmental policies, guidelines and principles to be applied to operation
- a description of the roles and responsibilities, including relevant training and induction to ensure that employees are aware of their environmental and compliance obligations
- an environmental risk analysis to identify the key environmental performance issues associated with the operation phase
- details of how environmental performance would be managed and monitored
- a register of heritage assets that would be managed and protected.

17.4.3 Revised mitigation measures

A compilation of the measures proposed to mitigate and manage potential impacts of the preferred project is provided in Chapter 16 of this report. These measures were developed based on the recommended measures in the Environmental Impact Statement and updated as required to take into account issues raised in submissions and the findings of the assessments undertaken for the preferred project.

The mitigation measures compiled in Chapter 16, together with the approach to environmental management described above, provide Transport for NSW's commitments for the preferred project. If the preferred project is approved, the conditions of approval, which would include reference to the revised mitigation measures, would guide subsequent phases of the preferred project. The preferred project would be undertaken in accordance with the conditions of approval and the revised list of mitigation measures.

The mitigation measures are broadly grouped according to the environmental aspect they are dealing with (e.g. traffic, transport and access; or noise and vibration, etc.) and differentiated by an identifier number (e.g. TC1, or TO3, etc.) according to the main stage of implementation required (e.g. construction or operation). However, it is noted that the implementation of some measures may occur across a number of stages.

17.5 Compilation of residual impacts

Based on community and stakeholder feedback received during the public exhibition period for the Environmental Impact Statement, Transport for NSW has revised the exhibited project to significantly minimise potential impacts, particularly in respect of construction (including construction noise and traffic), heritage and vegetation impacts.

By reusing existing infrastructure (where possible), Transport for NSW has revised:

- the activities required to construct the preferred project, reducing construction noise and traffic impacts
- the amount of vegetation that needs to be removed
- the amount of land required to upgrade the Sydenham to Bankstown line to a metro line.

A comparison of the preferred project to the exhibited project is provided in Chapters 9 and 10 of this report.

Chapters 12 to 15 of this report provide screening assessments which consider changes to the potential construction and operational impacts for the preferred project, when compared with the exhibited project. Where the impacts of the preferred project significantly differ from those assessed in the Environmental Impact Statement, Chapters 12 to 15 also include assessments of these potential impacts.

Key residual construction and operational impacts of the preferred project are summarised in Table 17.2 and Table 17.3, respectively. Further information on these impacts is provided in Chapters 12 to 15 of this report.

Table 17.2 Residual construction impacts

Issue	Residual construction impacts
Traffic, transport and access	• Increase in vehicle movements on the local and regional road network due to construction traffic, resulting in increased congestion and delays. • Local traffic disruptions and short-term access restrictions for road users during station and bridge upgrades. • Access restrictions for pedestrians and cyclists within and surrounding the stations during station works. • A number of on and off-street (including commuter) parking spaces would be unavailable to the general public during construction at each station, with the main potential impacts at Hurlstone Park, Belmore, Lakemba, Punchbowl, and Bankstown stations. • Additional temporary impacts to on and off-street parking are also predicted during possession periods, with the main potential for impacts during these periods at Dulwich Hill, Canterbury, Campsie, Belmore, Lakemba, and Punchbowl stations. • The establishment of temporary bus layovers and bus stops near stations for the operation of rail replacement buses would impact some on-street and off-street parking spaces, with the main potential impacts at Campsie, Lakemba, Wiley Park, and Bankstown stations. As a result of the operation of rail replacement buses, some impacts to parking may also be experienced at other stations, including Sydenham, Birrong, Sefton, and Lidcombe stations. • Implementation of rail replacement buses during possessions, guided by the Temporary Transport Strategy, would add to road traffic and congestion, and change the amenity of public transport trips, with corresponding changes to travel times and mode choice. • Impacts to rail customers, as a result of changes to rail timetables on the T3 Bankstown Line and on the connecting lines during possession periods.
Noise and vibration	• Construction noise levels were predicted to exceed the relevant criteria at most sites for a majority of construction scenarios modelled, with a number of exceedances at residential receivers being greater than 20 decibels above the relevant criteria during the day and night. These predictions identify noise levels at the most exposed receiver, which may not be reached, or only infrequently reached, during the construction period. • There is also the potential for sleep disturbance impacts during the night. • Construction traffic movements, including both heavy vehicles and rail replacement buses, may result in road traffic noise levels above the relevant criteria.
Non-Aboriginal heritage	• Moderate direct impacts and moderate visual impacts to all stations, three of which are listed on the State Heritage Register (the Marrickville, Canterbury and Belmore railway station groups). • Potential for impacts to significant archaeological remains at Marrickville, Canterbury, Lakemba, and Belmore stations.
Aboriginal heritage	• Construction may disturb a potential Aboriginal archaeological deposit of moderate significance and low to moderate potential for intact archaeological deposits (S2B PAD 02), located adjacent to Punchbowl Station.
Land use and property	• Some areas of land would need to be temporarily leased or occupied to locate some of the proposed compounds and work sites. • During construction, the use of land within the project area would change from its existing use (mainly transport) to use as a partial and temporary construction site.

Issue	Residual construction impacts
Socio-economics	• Changes in existing access arrangements and connectivity across and within the station areas. • Possessions and/or station closures, and the associated alternative public transport arrangements, have the potential to impact the community, including as a result of travel time delays, and a reduced likelihood to use public transport. • Impacts on the amenity of the local community, including as a result of an increase in noise levels, traffic movements and congestion, dust, and changes in visual outlook. • Impacts on community infrastructure located near the project area, mainly as a result of changes to amenity and access arrangements.
Business	• Cessation of one existing commercial lease at Wiley Park Station. • Station and track closures would have the potential to affect businesses, mainly those located close to the stations that have a higher reliance on passing trade, particularly during longer duration possessions. • Temporary changes to the road network could result in inefficiencies, potentially reducing revenue and providing a disincentive for visiting some local centres near stations. • Changes to parking arrangements and the temporary removal of some existing parking spaces has the potential to affect deliveries and convenience for business employees and customers, particularly for areas where parking is already in short supply, businesses close to stations, and/or retail or service-oriented businesses that require quick and efficient access for customers. • Impacts on amenity for businesses, including as a result of an increase in noise levels, traffic movements and congestion, dust, and changes in visual outlook.
Landscape character and visual impact	• Visual impacts during construction as a result of the presence of construction works, plant, and disturbance. • Loss of mature street trees providing screening and amenity, particularly in the vicinity of stations.
Hydrology, flooding and water quality	• Potential for inundation of construction areas during flood events in areas where flooding is currently problematic (such as high flood risk areas at Marrickville Station, Canterbury, and Campsie). • Changes in surface water flows as a result of construction activities. • Impacts on downstream water quality if management measures are not implemented, monitored, and maintained.
Biodiversity	• Construction would require removal of vegetation located along the rail corridor in the project area, with the exception of native plant community types that requires offset if removed and identified areas of the threatened species Downy Wattle. This would involve removal of about 16.3 hectares of vegetation, the majority of which comprises exotic plants (about 9 hectares) or planted, often non-indigenous, native species on fill material (about 7.3 hectares). • Removing vegetation in the rail corridor would also impact some nesting and foraging habitat, including about 7.9 hectares of foraging habitat for the threatened Grey-headed Flying-fox, Eastern Bentwing Bat, and other threatened fauna species with known or potential habitat in the study area.

Table 17.3 Residual operation impacts

Issue	Residual operation impacts
Traffic, transport and access	• Kerbside parking arrangements around some station areas would be reconfigured to support access to the stations. This would include reallocation of kerbside space, mainly to provide/upgrade accessible parking, and areas for kiss and ride, and taxis. This reallocation would result in a loss of some on-street parking spaces in the immediate vicinity of stations.
Noise and vibration	• Noise levels at a number of residential receivers adjacent to the rail corridor have the potential to exceed the *Rail Infrastructure Noise Guideline* criteria, and are therefore eligible for further consideration of noise mitigation (i.e. noise barriers).
Business	• Loss of parking described above may impact the availability of parking for some customers of local businesses in the vicinity of stations.
Landscape character and visual amenity	• Introduction of new structures in the visual landscape, including upgraded stations.

17.6 Performance outcomes

17.6.1 Project consistency

NSW strategic planning and policy

The State Significant Infrastructure Application Report discusses a number of NSW strategic transport policy documents and demonstrates the consistency of the project with those documents.

The preferred project is consistent with those strategic planning and policy documents.

NSW strategic transport infrastructure policy

The State Significant Infrastructure Application Report discusses a number of NSW strategic planning and policy documents and demonstrates the consistency of the project with those documents.

The preferred project is consistent with those strategic transport policy documents.

Project objectives and aims

The following primary and secondary objectives, together with project aims, were specified for the project in Section 1.2.4 (Project objectives and aims) of the Environmental Impact Statement.

Primary objectives were stated as being to:

- improve the quality of the transport experience
- provide a system that is able to satisfy long-term demand
- improve the resilience of the transport network.

Secondary objectives were stated as being to:

- grow public transport patronage and mode share
- support the productivity of the Global Economic Corridor
- serve and stimulate urban development
- improve the efficiency and cost effectiveness of the public transport system
- implement a feasible solution recognising impacts, constraints and delivery risks.

Project aims were stated as being to:

- grow deliver accessible, modern, secure and integrated transport infrastructure
- contribute to the accessibility and connectivity of existing and future communities.

The preferred project is consistent with these aims and objectives.

Project benefits

A number of project benefits were identified in the State Significant Infrastructure Application Report and the Environmental Impact Statement that would be delivered by the project. These included:

- transport benefits
- city building benefits
- customer benefits.

The preferred project is consistent with the delivery of these benefits.

Key project elements

A number of key project elements were identified for the exhibited project in Section 1.2.1 (The project) of the Environmental Impact Statement. These included upgrading stations along the corridor from Marrickville to Bankstown, to allow better access for more people and provide a better, more convenient, and safer experience for public transport customers, by delivering:

- stations that are accessible to people with a disability or limited mobility, the elderly, people with prams, and people travelling with luggage
- upgraded station buildings and facilities for all transport modes that meet the needs of a growing population
- interchanges that support an integrated transport network and allow seamless transfers between different modes for all customers.

The key project elements of the preferred project are consistent with these key elements identified for the exhibited project.

17.6.2 Environmental and social performance

The Secretary's environmental assessment requirements identified a number of desired performance outcomes for the exhibited project. These outcomes outline the broader objectives to be achieved during design, construction, and operation.

These outcomes have been reviewed based on the design clarifications, additional assessment, submissions received and the preferred project. The consolidated preferred project environmental performance outcomes are listed in Table 17.4. The first and second columns provide the key issue and desired performance outcome from the Secretary's environmental assessment requirements, and the third column provides the project specific environmental performance objectives to achieve the desired outcome.

Future design development and any design changes would be considered against these environmental performance outcomes.

Table 17.4 Compilation of preferred project environmental performance

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Preferred project specific environmental performance outcomes
5. Biodiversity	The project design considers all feasible measures to avoid and minimise impacts on terrestrial and aquatic biodiversity. Supplementary measures are assured which are equivalent to residual impacts of project construction and operation.	The preferred project is designed to minimise impacts on biodiversity and avoid impacts to biodiversity that requires offsets. Where practical, the design minimises the need to clear vegetation. Potential impacts on biodiversity are managed in accordance with relevant legislation, including the EP&A Act, TSC Act, EPBC Act, and the *Biosecurity Act 2015*. The biodiversity outcome is consistent with the *Framework for Biodiversity Assessment* (OEH, 2014a).
6. Flooding and hydrology	The project minimises adverse impacts on existing flooding characteristics. Construction and operation of the project avoids or minimises the risk of, and adverse impacts from, infrastructure flooding, flooding hazards, or dam failure. Long term impacts on surface water and groundwater hydrology (including drawdown, flow rates and volumes) are minimised. The environmental values of nearby, connected and affected water sources, groundwater and dependent ecological systems including estuarine and marine water (if applicable) are maintained (where values are achieved) or improved and maintained (where values are not achieved). Sustainable use of water resources.	Construction is undertaken in a manner that minimises the potential for adverse flooding impacts, through staging of works and the implementation of mitigation measures. Construction compounds and work sites are laid out such that flows are not significantly impeded. The preferred project maintains existing flood levels within and adjacent to the rail corridor. The preferred project avoids long term impacts to surface water. Opportunities to reuse water resources are considered during the design process. The use of water during construction is minimised.
7. Heritage	The design, construction and operation of the project facilitates, to the greatest extent possible, the long term protection, conservation and management of the heritage significance of items of environmental heritage and Aboriginal objects and places. The design, construction and operation of the project avoids or minimises impacts, to the greatest extent possible, on the heritage significance of environmental heritage and Aboriginal objects and places.	The design is sympathetic to the historic significance of existing stations, and where practicable, avoids and minimises impacts to heritage. The preferred project retains, and where possible, repurposes all heritage elements. The design and mitigation strategies are reviewed by the Sydney Metro Design Review Panel. Impacts on heritage are managed in accordance with relevant legislation, including the EP&A Act, the *Heritage Act 1977*, and relevant guidelines. Potential impacts are managed by the mitigation measures.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Preferred project specific environmental performance outcomes
8. Noise and vibration – amenity	Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on acoustic amenity. Increases in noise emissions and vibration affecting nearby properties and other sensitive receivers during operation of the project are effectively managed to protect the amenity and well-being of the community.	The preferred project minimises impacts to the local community by: • controlling noise and vibration at the source • controlling noise and vibration on the source to receiver transmission path • controlling noise and vibration at the receiver • implementing practical and reasonable measures to minimise the noise and vibration impacts of construction activities on local sensitive receivers.
9. Noise and vibration – structural	Construction noise and vibration (including airborne noise, ground-borne noise and blasting) are effectively managed to minimise adverse impacts on the structural integrity of buildings, items including Aboriginal places and environmental heritage, and nearby road infrastructure. Increases in noise emissions and vibration affecting environmental heritage as defined in the Heritage Act 1977 during operation of the project are effectively managed.	The preferred project minimises impacts to structures by: • controlling vibration at the source • controlling vibration on the source to receiver transmission path • implementing practical and reasonable measures to minimise vibration impacts of construction activities on structures.
10. Socio-economic, land use and property	The project minimises adverse social and economic impacts and capitalises on opportunities potentially available to affected communities. The project minimises impacts to property and business and achieves appropriate integration with adjoining land uses, including maintenance of appropriate access to properties and community facilities, and minimisation of displacement of existing land use activities, dwellings and infrastructure.	The preferred project minimises impacts to the local community, community infrastructure, and businesses. Impacts to existing land use and properties are minimised. Access to private properties is maintained. The project is appropriately integrated with local and regional land use planning strategies, including the revised draft of the *Sydenham to Bankstown Urban Renewal Corridor Strategy*. During operation, the preferred project would improve access to local facilities, services and destinations, supporting opportunities for community interaction.
11. Soils	The environmental values of land, including soils, subsoils and landforms, are protected. Risks arising from the disturbance and excavation of land and disposal of soil are minimised, including disturbance to acid sulfate soils and site contamination.	Site-specific soil characteristics are taken into consideration during detailed design and construction. Contamination is managed in accordance with relevant regulatory requirements. Soil waste is assessed, classified, managed and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014).
12. Sustainability	The project reduces the NSW Government's operating costs and ensures the effective and efficient use of resources. Conservation of natural resources is maximised.	Sustainability considerations are integrated throughout design, construction, and operation. The preferred project would be carried out in accordance with the Sydney Metro City & Southwest Sustainability Strategy.

Key issue (as listed in the SEARs)	SEARs desired performance outcomes	Preferred project specific environmental performance outcomes
13. Traffic, transport and access	Network connectivity, safety and efficiency of the transport system in the vicinity of the project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.	The preferred project would reduce station crowding, increase rail network reach and use, improve network resilience, and improve travel times within the global economic corridor. Impacts to traffic and transport are minimised. Motorist, pedestrian and cyclist safety will be maintained. Safe access to properties is maintained. The preferred project is integrated with existing and future local and regional transport infrastructure and planning strategies. Metro customers would be provided with a safe and secure service.
14. Place making and urban design	The project capitalises on opportunities to improve place, character and quality of the surrounding build and natural environment (including adjoining public spaces). The project contributes to the accessibility and connectivity of communities.	The preferred project is designed to have regard to the surrounding landscape and visual environment and to minimise the potential for visual impacts. The preferred project is designed to have regard to community needs/outcomes to allow Metro trains to operate. The preferred project is visually integrated with its surroundings. The design does not preclude (and in some instances safeguards) future planning for the revised draft of the *Sydenham to Bankstown Urban Renewal Corridor Strategy*. Vegetation providing screening of the rail corridor is retained where practicable.
15. Water - quality	The project is designed, constructed and operated to protect the NSW Water Quality Objectives where they are currently being achieved, and contribute towards achievement of the Water Quality Objectives over time where they are currently not being achieved, including downstream of the project to the extent of the project impact including estuarine and marine waters (if applicable).	Impacts to water quality during construction and operation are minimised. Erosion and sediment controls during construction are implemented 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, 2008). The preferred project would protect or contribute to achieving the Water Quality Objectives, during construction and operation. Construction water quality discharge would comply with the requirements of an environment protection licence issued to the project.
16. Utilities	The project is designed, constructed and operated to minimise impacts to utilities and provision of such to the public.	Impacts to utilities during construction are minimised. The design takes into account the input of utility providers and owners.

17.7 Preferred project justification

17.7.1 Preferred project need

The preferred project forms a key part of Sydney Metro, which is Australia's largest public transport project. A new standalone railway, this 21st century network will deliver 31 metro stations and 66 kilometres of new metro rail for Australia's biggest city – revolutionising the way Sydney travels.

Sydney is experiencing sustained population and economic growth. The need for the preferred project, as part of Sydney Metro as a whole, is driven by the challenges being experienced in responding to this growth, including the existing and future capacity of Sydney's transport system.

The rail network is heavily congested, with customers on most rail lines often experiencing significant crowding on trains and station platforms during the morning and evening peaks.

Sydney's current suburban system can reliably carry 24,000 people an hour per line. As population and employment continue to grow, rail is forecast to experience the highest growth in travel demand, with about an additional 100,000 trips expected on Sydney's rail network during the morning peak by 2036. This will place additional pressure on the rail network.

It is forecast that without further investment, Sydney's rail network will reach capacity in the Sydney CBD and on critical suburban rail lines by the mid to late 2020s. Sydney Metro (including the preferred project) will have a long-term target capacity of about 40,000 customers per hour in each direction, similar to other metro systems worldwide. Sydney Metro, together with signalling and infrastructure upgrades across the existing Sydney rail network, will increase the capacity of train services entering the Sydney CBD – from about 120 an hour today to up to 200 services beyond 2024. This is an increase of up to 60 per cent capacity across the network to meet demand.

Over the next 15 years, NSW will require infrastructure to support 40 per cent more train trips, 30 per cent more car trips and 31 per cent more households. Sydney Metro, including the project, is identified as a key infrastructure project as part of the NSW Government's infrastructure investment program.

Sydney Metro will transform Sydney, cutting travel times, reducing congestion and delivering economic and social benefits for generations to come. It will boost economic activity by more than $5 billion a year, supporting major jobs and business growth along its route with better connectivity and land development opportunities, and greatly improving business logistics, especially for knowledge-based businesses.

The T3 Bankstown Line effectively slows down the Sydney Trains network because of the way it merges with other railway lines closer to the city, including the T2 Inner West & Leppington Line, and the T8 Airport & South Line. With at least 15 trains an hour in the peak when services start in 2024, the conversion of the T3 Bankstown Line to metro operations would address one of Sydney's biggest rail bottlenecks, delivering benefits across Sydney's rail network. These benefits would further increase when the number of trains increases to 20 per hour as part of the ultimate operations.

Parts of the T3 Bankstown Line are over 120 years old with existing infrastructure in varying conditions. A key challenge for this line is customer accessibility, with five of the stations not having lifts. In addition, a number of these stations have larger than desirable gaps between the platforms and trains, which makes access difficult for some customers, particularly the disabled, elderly, and those travelling with young children, prams or luggage.

17.7.2 Summary of preferred project benefits

The preferred project would have the following benefits:

- all stations would be fully accessible, with lifts and level access between trains and platforms
- faster, more frequent and direct access to key employment centres providing more job opportunities
- better access to education, with fast, more frequent and direct connections
- no timetable required – customers can just turn up and go
- new and direct access to major CBD stations, including Martin Place, Pitt Street and Barangaroo, and Victoria Cross at North Sydney
- increased train frequency in AM and PM peak services – a train at least every four minutes
- improved interchange with light rail, pedestrian and cycling networks, and provision of taxi, kiss and ride and bike parking facilities at key stations
- fast, safe and reliable services – a new generation of 21st century metro trains.

17.7.3 Consequence of not proceeding

The preferred project is a section of Sydney Metro as a whole, and one of two components of Sydney Metro City & Southwest. Without the preferred project, the benefits of Sydney Metro City & Southwest would not be fully realised. The bottleneck created by the T3 Bankstown Line would remain. There would not be sufficient rail capacity to provide for Sydney's growth, as summarised in Section 17.7.1.

17.7.4 Environmental considerations

Environmental investigations were undertaken during preparation of the Environmental Impact Statement to assess the potential impacts of the exhibited project. These included specialist assessments of traffic and transport, noise and vibration; heritage; hydrology, flooding and water quality; landscape and visual amenity; biodiversity; socio-economics; and business impacts. The Environmental Impact Statement documented the potential environmental impacts, considering both potential positive and negative impacts, and identified mitigation measures to protect the environment where required.

To address a number of issues raised in submissions during the public exhibition period, the exhibited project was revised to further reduce potential impacts. By retaining and reusing existing infrastructure, where possible, Transport for NSW has developed a design solution that would significantly minimise impacts during construction, as well as reducing impacts to heritage items and vegetation.

This Submissions and Preferred Infrastructure Report describes the key features of the preferred project, and provides the results of additional investigations undertaken to assess the impacts of the preferred project where these differ from those assessed in the Environmental Impact Statement for the exhibited project. These included specialist assessments of traffic, transport and access, non-Aboriginal heritage, landscape and visual and noise and vibration.

The screening assessments and additional assessment summaries provided in Chapters 12 to 15 of this report demonstrate that the preferred project would result in an overall reduction in impacts when compared with the exhibited project.

The list of mitigation measures presented in Chapter 28 (Synthesis of the Environmental Impact Statement) of the Environmental Impact Statement has been updated with consideration given to the preferred project, the findings of the assessments undertaken for the preferred project and the submissions received. Some new measures have been added, and the wording of existing measures has been adjusted. Table 16.1 shows the changes that have occurred to the mitigation measures since the Environmental Impact Statement was exhibited.

As described in in Section 17.4 of this report, the preferred project would incorporate environmental management and design features to ensure that potential impacts are managed and mitigated as far as practicable.

17.7.5 Ecologically sustainable development

The EP&A Act adopts the definition of ecologically sustainable development contained in the *Protection of the Environment Administration Act 1991*. An assessment of the preferred project against the principles of ecologically sustainable development as per clause 7(4) of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* is provided below.

Precautionary principle

The assessment of the potential impacts of the preferred project is considered to be consistent with the precautionary principle. The assessments undertaken (provided in the Environmental Impact Statement and in this report) are consistent with accepted scientific and assessment methodologies, and have taken into account relevant statutory and agency requirements. The assessments have applied a conservative approach with regard to construction and operational arrangements, and the modelling used.

The exhibited project has been revised to avoid impacts where possible. A number of safeguards have been proposed to further minimise potential impacts. These safeguards would be implemented during construction and operation. No safeguards have been postponed as a result of lack of scientific certainty.

Principle of inter-generational equity

Once operational, the preferred project (in conjunction with other Sydney Metro projects) would benefit future generations. The preferred project would provide long-term benefits by strengthening connections and access across Sydney, through the provision of a more efficient means of public transport. These benefits would be most felt by future generations as the population along the project area increases.

In addition to the broader Sydney transport operational benefits, the ‘door-to-door’ experience provided by Sydney Metro would also result in long-term health benefits with the creation of safer and more appealing conditions for pedestrians, cyclists, and other transit users. The would make modes of transport like walking and cycling more desirable, which would result in increased health of future generations.

Conservation of biological diversity and ecological integrity

The majority of the project area is located within an existing transport corridor, with minimal habitat value. The few areas of Downy Wattle (*Acacia pubescens)* located between Punchbowl and Bankstown stations have been excluded from the project area.

A biodiversity assessment, undertaken in accordance with the *Framework for Biodiversity Assessment* to identify potential adverse impacts on biodiversity, found that the main potential impact on biodiversity would occur as a result of clearing of vegetation. The assessment concluded that the project would not significantly impact any listed ecological community or species.

Transport for NSW has developed a design solution for the preferred project that has enabled the retention of native plant community types within the project area, thereby further reducing impacts to biodiversity.

Improved valuation and pricing of environmental resources

Economic appraisal draws on a number of established methodologies that provide for the valuation of externalities, including environmental externalities, and their inclusion in the appraisal process. Environmental parameters that can be valued include air pollution, greenhouse gas emissions, noise pollution and water run-off. Valuations typically adopt broad average values.

The assessments provided in the Environmental Impact Statement and in this report have identified the environmental and other consequences of the preferred project, and identified mitigation measures to manage these potential impacts. If the preferred project proceeds, construction and operation would be undertaken in accordance with relevant legislation, the conditions of approval, and the identified environmental management plans and mitigation measures.

The design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the design has been developed with an environmental objective in mind.

These requirements would result in an economic cost to the proponent, increasing the capital and operating costs of the preferred project. This signifies that the protection of environmental resources has been given appropriate valuation.

17.8 Conclusion

The preferred project involves upgrading 10 existing stations west of Sydenham (Marrickville to Bankstown inclusive), and a 13 kilometre long section of the Sydney Trains T3 Bankstown Line, between west of Sydenham Station and west of Bankstown Station, to improve accessibility for customers and meet the standards required for metro operations. The project is needed to support the development of Sydney Metro, in line with the objectives of the *Future Transport Strategy 2056*.

Transport for NSW has revised the exhibited project to address issues raised during the public exhibition period and significantly minimise potential impacts, especially in respect of heritage, vegetation, construction noise and traffic impacts, while delivering a world class metro.

The preferred project is consistent with applicable NSW strategic planning and policy, and strategic transport infrastructure policy, and is also consistent with the project objectives and aims, project benefits and the project elements identified in the State Significant Infrastructure Application Report and the Environmental Impact Statement for the exhibited project.

The detailed design would be developed with the objective of further minimising potential impacts on the local and regional environment and community. The design and construction methodology would continue to be developed with this overriding objective in mind, taking into account the input of stakeholders and the local community.

To manage the potential impacts identified by the Environmental Impact Statement and this Submissions and Preferred Infrastructure Report, Table 16.1 lists a range of management and mitigation measures that would be implemented during construction and operation. The preferred project's environmental performance would be managed in accordance with the approach described in Section 17.4. This includes implementing the Construction Environmental Management Framework, Construction Environmental Management Plan, Construction Noise and Vibration Strategy, Temporary Transport Strategy, Utilities Management Framework, and the Operational Environmental Management Plan. These plans would also ensure compliance with relevant legislation and any conditions of approval.

With the implementation of the proposed management and mitigation measures, potential environmental impacts of the preferred project are considered manageable.

18. Reference list, definitions and abbreviations

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18.2 Abbreviations

Abbreviation	Definition
AEP	annual exceedance probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal heritage impact permit
ANZECC	Australian and New Zealand Environment and Conservation Council
ARTC	Australian Rail Track Corporation
AS	Australian Standard
BS	British Standard
CBD	central business district
CEMP	construction environmental management plan
dB	Decibel (A-weighted)
DDA	*Disability Discrimination Act 1992*
DEC	NSW Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DIPNR	NSW Department of Infrastructure, Planning and Natural Resources
DPI	Department of Primary Industries
DSAPT	*Disability Standards for Accessible Public Transport 2002*
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESD	*ecologically sustainable development*
FM Act	*Fisheries Management Act 1994*
ICNG	*Interim Construction Noise Guideline*
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
km	kilometres
km/hr	kilometres per hour
LEP	local environmental plan
LGA	local government area
m	metres
m/s	metres per second
m^3	cubic metre
mg	milligram
NCA	noise catchment areas
NEPC	National Environment Protection Council
NPW Act	*National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	Office of Environment and Heritage
PAD	potential archaeological deposit

Abbreviation	Definition
PMF	probable maximum flood
POEO Act	*Protection of the Environment Operations Act 1974*
RAP	remediation action plan
RBL	rating background level
RING	*Rail Infrastructure Noise Guideline*
RNP	*Road Noise Policy 2011*
Roads and Maritime	Roads and Maritime Services
SEPP	State environmental planning policy
State and Regional Development SEPP	*State Environmental Planning Policy (State and Regional Development) 2011*
Waste Regulation	*Protection of the Environment Operations (Waste) Regulation 2014*
TSC Act	*Threatened Species Conservation Act 1995*
WARR Act	*Waste Avoidance and Resource Recovery Act 2007*

18.3 Definitions

Term	Definition
100-year flood	A 100-year flood is the flood that will occur or be exceeded on average once every 100 years. It has a one per cent probability of occurring in any given year. The same principle applies to other flooding events, such as the 10-year, 20-year and 50-year floods.
Aboriginal site	A place where physical remains or modification of the natural environment indicate past and 'traditional' activities by Aboriginal people. Site types include artefact scatters, isolated artefacts, burials, shell middens, scarred trees, quarries, and contact sites. Includes sites listed on the AHIMS. Also known as Aboriginal objects.
Accessibility	A public transport customer's ability to reach their destination unhindered and as independently as possible. Includes compliance with relevant disability standards such as the *Disability Discrimination Act 1992* and the *Disability Standards for Accessible Public Transport 2002*. Also refers to a measure of the ability or ease of customers to travel between various origins and destinations.
Annual exceedance probability	The annual exceedance probability (AEP) is a measure of the frequency of a rainfall event. It is the probability that a given rainfall total, accumulated over a given duration, will be exceeded in any one year. A one per cent AEP event is a rainfall event with a one per cent chance of being exceeded in magnitude in any year.
Archaeological potential	The likelihood of unregistered surface and/or subsurface archaeological materials to be present at a location.
Australian height datum	A common reference surface level used in Australia which is approximately equivalent to the height above mean sea level.
Average delay	Duration, in seconds, of the average vehicle waiting time at an intersection.
Average recurrence interval	The long-term average number of years between the occurrence of a flood larger than the selected event.
Ballast	Crushed rock, stone etc used to provide a foundation for a railway track. Ballast usually provides the bed on which railway sleepers are laid, transmits the load from train movements, and restrains the track from movement.
Biobank site	A site to which a biobanking agreement applies.
Biobanking agreement	Landowners enter into a biobanking agreement with the Minister for the Environment to establish a biobank site. A biobanking agreement is a conservation covenant that is attached to the land title. It specifies the management actions to be undertaken on biobank sites to improve biodiversity values and allow biodiversity credits to be created.
Biodiversity credits	In accordance with the *Framework for Biodiversity Assessment* (OEH, 2014a), biodiversity credits, which consist of ecosystem credits and species credits, represent the impacts on threatened species as a result of a proposal. A decision support tool produced by OEH is used to determine the number of biodiversity credits required to offset the impacts of a development.
Biodiversity offsets	Biodiversity offsets are measures that benefit biodiversity by compensating for the adverse impacts elsewhere of an action, such as clearing for development. Biodiversity offsets work by protecting and managing biodiversity values in one area in exchange for impacts on biodiversity values in another.
Biodiversity offset strategy	The section of a Biodiversity Assessment Report prepared in accordance with the *Framework for Biodiversity Assessment,* which presents the approach to the delivery of biodiversity offsets for a project, including the quantum of offsets required, options to deliver these offsets, an estimate of the costs involved, and the additional steps required to finalise their delivery.
Biodiversity values	The composition, structure and function of ecosystems, including native species, populations and ecological communities, and their habitats.
Catchment	The area drained by a stream or body of water, or the area of land from which water is collected.
Chatswood to Sydenham project	One of the two components of the Sydney Metro City & Southwest project, the other being the Sydenham to Bankstown upgrade.

Term	Definition
Classified road	A road that meets the definition of a classified road and is listed as such under the *Roads Act 1993* – includes main roads, highways, freeways etc.
Community	A physical or cultural grouping of stakeholders with common interests created by shared proximity or use.
Concourse	The paved open area at a station – can be located either behind or in front of ticket barriers.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or construction site offices and worker facilities.
Crossover	Points and tracks enabling trains to switch from one line to another.
Cutting	Excavation from the surface down, so that the new surface level sits below the adjacent ground level.
Degree of saturation	The ratio between traffic volumes and capacity of an intersection used to measure how close to capacity an intersection is operating. Degree of saturation is a direct measure of the congestion level at the intersection. As it approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur with a degree of saturation between 0.8-0.9 or below.
Discharge	The quantity of water per unit of time flowing in a stream, for example cubic meters per second or megalitres per day.
Ecologically sustainable development	Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Emission	A substance discharged into the air.
Embankment	A structure to allow rail lines (or other infrastructure) to be located above the natural ground surface.
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
Flood	The inundation of normally dry land by water which escapes from, is released from, is unable to enter, or overflows from the normal confines of a natural body of water or watercourse, such as rivers, creeks or lakes, or any altered or modified body of water, including dams, canals, reservoirs and stormwater channels.
Flood liable land	Land which is within the extent of the probable maximum flood and therefore prone to flooding.
Floodplain	The area of land subject to inundation by floods up to and including the probable maximum flood.
Flora and fauna	Plants and animals
Formation	Refer to track formation
Groundwater	All waters occurring below the land surface. The upper surface of the soils saturated by groundwater in any particular area is called the water table.
Habitat tree	A tree that is recognised as being of value as a shelter, roosting, and/or nesting resource for fauna species. Includes hollow-bearing trees, stags (standing dead trees), and trees with nests or other signs of fauna occupancy.
Heritage listed	An item, building or place included on statutory heritage lists maintained by local, State and/or the Australian Government.
Interchange	A location where customers transfer from one mode of transport to another or between two services of the same mode. Also includes a place where customers join or leave the public transport system on foot, by bicycle, motorcycle, or car.
Kiss and ride	An area allocated for cars to pull out of the active traffic lane and drop passengers off at a station.
$L_{A90(period)}$	The sound pressure level exceeded for 90 per cent of the measurement period.
$L_{Aeq(1\ hour)}$	The busiest one hour 'equivalent continuous noise level', representing the typical L_{Aeq} noise level from all the proposal noise events during the busiest one hour of the assessment period.
$L_{Aeq(15\ hour)}$	The daytime 'equivalent continuous noise level', representing the cumulative effects of all the proposal noise events occurring in the daytime period from 7am to 10pm.

Term	Definition
$L_{Aeq(24\ hour)}$	The 'equivalent continuous noise level', sometimes also described as the 'energy-averaged noise level', representing the cumulative effects of all the proposal noise events occurring in one day.
$L_{Aeq(9\ hour)}$	The night-time 'equivalent continuous noise level', representing the cumulative effects of all the proposal noise events occurring in the night-time period from 10pm to 7am.
$L_{Aeq(time)}$	Typically used to describe ambient (background) noise levels.
L_{Amax}	The maximum sound level recorded during the measurement period.
Landform	A specific feature of the landscape or the general shape of the land.
Landscape	All aspects of a tract of land, including landform, vegetation, buildings, villages, towns, cities, and infrastructure.
Landscape character	The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.
Level of service	Defined by Austroads as a measure for ranking operating road and intersection conditions, based on factors such as speed, travel time, freedom to manoeuvre, interruptions, comfort, and convenience.
Local road	Road used mainly to access properties located along the road.
Platform screen doors	Screens the platform from an approaching train. The doors open after the train doors have opened to let passengers move between the train and platform, and close before the train doors have been closed, to improve safety and efficiency.
Possession	A period of time during which a rail line is shut down to trains, to permit work to be carried out on or near the line.
Potential archaeological deposit	An area where sub-surface stone artefacts and/or other cultural materials are likely to occur.
Power supply feeder	Electricity distribution line
Probable maximum flood	The largest flood that could conceivably occur (a worst-case flood event). It is typically estimated from probable maximum precipitation coupled with the worst flood-producing catchment conditions. The probable maximum flood extent defines the floodplain and incorporates all flood‑prone land.
Project	The construction and operation of the Bankstown to Sydenham upgrade component of Sydney Metro City & Southwest.
Project area	The area that would be directly affected by construction works (also known as the construction footprint). It includes the location of project infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas/compounds sites etc, that would be used to construct that infrastructure.
Rail alignment	The exact positioning of the track, accurately defined both horizontally and vertically, along which the rail vehicles operate.
Rail corridor	The corridor within which the rail tracks and associated infrastructure are located.
Rating background level	The underlying level of noise present in an area once transient and short-term noise events are filtered out.
Runoff	The amount of rainfall which ends up as streamflow, also known as rainfall excess.
Sediment	Material of varying sizes that has been, or is being moved from its site of origin by the action of wind, water or gravity.
Surface water	Water that is derived from precipitation or pumped from underground and may be stored in dams, rivers, creeks and drainage lines.
Section 170 register	Under Section 170 of the *Heritage Act 1977*, all state government agencies must keep and administer a database of heritage assets called a Section 170 Heritage and Conservation Register.
Sensitive receivers	Land uses which are sensitive to potential noise, air, and visual impacts, such as residential dwellings, schools and hospitals.

Term	Definition
Sensitivity	The sensitivity of a landscape character area or view and its capacity to absorb change. In the case of visual impact this also relates to the type of viewer and number of viewers.
Spoil	Material generated by construction
Station area	A subset of the project area. It includes the station and the area around the station where works are proposed as part of the project – mainly to provide facilities/space for customers to transfer between other forms of transport (such as bus stops, taxi parking bays, kiss and ride bays, cycle parking/storage).
Study area	The study area is defined as the wider area including and surrounding the project area, with the potential to be directly or indirectly affected by the project (for example, by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according the nature and requirements of each impact assessment technical paper.
Sydenham to Bankstown upgrade	The Sydenham to Bankstown upgrade forms the project for the purposes of the Environmental Impact Statement and this report. It is one of the two components of the Sydney Metro City & Southwest project, the other being the Chatswood to Sydenham project.
Sydney Metro	Sydney Metro is a new standalone automated rapid transit rail network under construction in Sydney. The Sydney Metro network consists of Sydney Metro Northwest (under construction) and Sydney Metro City & Southwest, which together would provide 66 kilometres of metro rail line and 31 metro railway stations. Early planning for Sydney Metro West is currently underway.
Sydney Metro City & Southwest	Part of the Sydney Metro network proposed between Chatswood and Bankstown, comprising two core components - the Chatswood to Sydenham project and the Sydenham to Bankstown upgrade.
Sydney Trains	The agency responsible for the provision of suburban passenger train services in/around Sydney.
Tree	A long lived woody perennial plant growing to greater than (or usually greater than) three metres in height, with one or relatively few main stems or trunks.
Topography	Representation of the features and configuration of land surfaces.
Track	The structure consisting of the rails, fasteners, sleepers, and ballast, which sits on the track formation.
Track formation	The earthworks/material on which the ballast, sleepers, and tracks are laid.
Trackside intruder detection system	A system where information is fed to the control centre whenever a large object moves from the platform to the tracks.
Traction substation	An electrical substation that converts electric power from the form provided by the electricity provider to an appropriate voltage, current type and frequency, which can be used to supply the rail network with power.
View	The visual experience from the viewer's perspective.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual impact	The impacts on the views from residences, workplaces, and public places. This can be positive (i.e. benefit or an improvement) or negative (i.e. adverse or a detraction).
Waste	Waste is defined by the EPA as any matter (whether liquid, solid, gaseous or radioactive) that is discharged, emitted, or deposited in the environment in such volume, constituency, or manner as to cause an alteration to the environment.
Waste management hierarchy	The waste management hierarchy is a set of priorities for the efficient use of resources, which underpins the objectives of the *Waste Avoidance and Resource Recovery Act 2001*. The waste management hierarchy progresses from avoidance (most preferred), to re-use/recycling, to disposal (least preferred).
Watercourse	Refers to waterways, such as rivers, streams and creeks
Water quality	Chemical, physical and biological characteristics of water, including the degree (or lack) of contamination.

SYDENHAM TO BANKSTOWN

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