12. Station upgrades environmental screening and assessment

This section summarises the potential environmental impacts relating to the operation of the upgraded stations and precincts. This screening assessment considers changes to potential operational impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of the preferred project in relation to the station upgrades.

12.1 Environmental impact screening

This screening assessment considers changes to potential operational impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of the preferred project in relation to the station upgrades. Chapter 9 identifies the key differences between the operational station features of the preferred project compared to those of the exhibited project.

Table 12.1 indicates where the need for additional environmental assessment of the preferred project has been identified and where the assessment of the exhibited project in the Environmental Impact Statement remains applicable in relation to the preferred project station upgrades. The additional environmental assessment is provided in Section 12.2.1 to 12.2.3 of this report.

Table 12.1 Station upgrades environmental screening

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Traffic, transport and access	A number of the potential impacts from station upgrades identified in the Environmental Impact Statement would differ for the preferred project. The station upgrades involve the retention of the existing station entrances and existing supporting infrastructure where possible, including kerbside facilities, accessible parking and bike parking. This has resulted in changes to the impacts to active transport, public transport, road network and kerbside facility integration when compared to the assessment provided in the Environmental Impact Statement. Due to the revised construction methodology, the preferred project has reduced impacts on parking compared to the exhibited project. A revised traffic, transport and access assessment is summarised in Section 12.2.1 and detailed in Appendix D.	Yes
Noise and vibration	The potential impacts during operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. Operational noise from the upgraded stations would relate to mechanical services and public address systems, which would continue to comply with the applicable noise criteria.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Non-Aboriginal heritage	All 10 railway stations in the project area are heritage listed. Three stations (Marrickville, Canterbury and Belmore stations) are listed on the State Heritage Register and the others are subject to listings in local environmental plans and/or a State agency Section 170 heritage register. Potential impacts during operation of the preferred project station upgrades would differ from those of the exhibited project that were described in the Environmental Impact Statement. The reduction in heritage impacts from the exhibited project is principally due to retention of all heritage buildings and the re-levelling of existing platforms. Overall, stations would be subject to moderate heritage impacts, which is a reduction from major impacts of the exhibited project. A revised assessment is summarised in Section 12.2.2 and detailed in Appendix F.	Yes
Aboriginal heritage	The potential impacts during operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. No listed Aboriginal sites are located within the exhibited project footprint. As the preferred project footprint sits within the exhibited project footprint, no additional potential impacts during operation of the preferred project are anticipated. Minor changes to mitigation measures have been made in line with the revised scope of works for the preferred project. These are presented in Section 16.1 of this report.	No
Land use and property	The preferred project would occupy a reduced area to that of the exhibited project that was described in the Environmental Impact Statement. The preferred project would not require the acquisition of private properties and by retaining the existing station entrances, the preferred project would not result in a change of land use within the station area or in the immediate vicinity of the existing station entrances. Potential impacts of the preferred project station upgrades on land use and property would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Socio-economic impacts	The potential socio-economic impacts and benefits during operation of the preferred project station upgrades would be consistent with those of the exhibited project that are described in the Environmental Impact Statement, although they are reduced in scale. The preferred project would continue to provide improved access, connectivity and amenity at the stations. Benefits from enhancements in the area surrounding the stations as a result of the focus on place making and the promotion of active transport in the design development process would be reduced. Works would still be undertaken in the areas around the stations to better integrate with other modes of transport and improve accessibility, however the works have been revised to reflect the retention of the existing station entrances and facilities where possible. In particular, the additional new station entrances, the new station plazas at Belmore and forecourts at Lakemba and Punchbowl, as part of the exhibited project, would not be undertaken as part of the preferred project. This would reduce the potential social and economic benefits of the exhibited project that were outlined in the Environmental Impact Statement. The preferred project would not constrain or preclude this station infrastructure from being provided at a later date and integrated with future development plans around the stations and rail corridor. In a number of locations, the preferred project station design incorporates safeguarding of this future infrastructure. Potential impacts of the preferred project relating to access improvements that form part of the preferred project within the station areas would not differ substantially from those of the exhibited project that was described in the Environmental Impact Statement.	No
Business impacts	The potential benefits and impacts of the preferred project station upgrades on regional and local businesses would be reduced from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would still provide benefits to local businesses from renewed, fully accessible stations along the corridor which may facilitate increased retail investment in local business precincts, due to improved customer access and an enlarged customer base. The preferred project would however not provide any additional potential retail opportunities at stations. The retention of the existing station entrances would not change the existing accessibility and connectivity to existing businesses along the corridor. In addition, the preferred project would have a reduced impact on car parking surrounding the station precincts compared to the exhibited project. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Landscape character and visual amenity	Potential impacts to landscape character and visual amenity during operation of the preferred project station upgrades would differ from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would retain existing station entrances, heritage buildings and concourses and involve the installation of new lift and stair structures. The preferred project would also retain an increased number of existing trees within the station precincts. The overall maximum number of trees potentially affected within station precincts would decrease from 893 for the exhibited project, as shown in the Environmental Impact Statement, to 503 for the preferred project. During operation, the minor landscape character benefits identified in the exhibited project at Marrickville, Hurlstone Park, Campsie, Belmore, Lakemba and Wiley Park would reduce to negligible and the moderate benefits identified for Canterbury and Punchbowl would reduce to minor benefits. The visual impacts would largely remain as negligible as the existing heritage station entry buildings would be retained. Overall there would be fewer views adversely impacted, and the identified beneficial impacts on views in the exhibited project would be negated, as the preferred project offers few changes to the existing views to the stations. A revised landscape character and visual amenity assessment is summarised in Section 12.2.3 and detailed in Appendix G.	Yes
Soils and contamination	Potential soil and contamination impacts related to operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The potential for contamination as a result of the operation and maintenance of the stations would continue to be low. The assessment of potential impacts provided for the exhibited project in the Environmental Impact Statement in relation to operation of station upgrades therefore remains applicable to the preferred project.	No
Hydrology, flooding and water quality	The preferred project would involve the retention of and maintenance of existing drainage infrastructure. There would be limited new works at stations that would change flood patterns or surface water flows. Hydrology, flooding and water quality aspects are discussed further in Section 14.1 in regards to proposed drainage works.	No
Biodiversity	Potential impacts in relation to biodiversity from operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The trees to be removed within station precincts do not have biodiversity value and therefore the reduction in impacts to this vegetation is not discussed here. However, the landscape character and visual amenity benefits of retaining more trees within the station precincts is discussed in that relevant section. The assessment of potential operational biodiversity impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Air quality	Potential impacts in relation to operational air quality from the preferred project station upgrades would not differ substantially from those of the exhibited project that are described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Sustainability and climate change	The majority of the sustainability initiatives and targets proposed in the Environmental Impact Statement of the exhibited project (subject to detailed design), would be retained for the operation of the preferred project. Some initiatives and targets are no longer relevant or appropriate. This is principally due to the proposed internal refurbishment/repurposing of station buildings and the revised scope of station precincts. Given the retention of existing station entrance locations and infrastructure, the following initiatives and targets are no longer relevant to the preferred project: • 15 per cent above minimum Building Code of Australia requirements • rainwater harvesting at stations • stations to minimise distance for interchange • creation of enhanced and additional public plazas. In addition, the following initiatives and targets would be considered only where feasible for the preferred project: • water sensitive urban design measures • inclusion of renewable energy sources • assessing and mitigating climate change risks. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Hazards, risks and safety	Potential hazards, risks and safety in relation to operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that are described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Cumulative impacts	Potential cumulative impacts during operation of the preferred project station upgrades would not differ substantially from those of the exhibited project that are described in the Environmental Impact Statement. The assessment of potential cumulative operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

12.2 Detailed impact assessment

12.2.1 Traffic, transport and access

Overview

The Environmental Impact Statement presented an operational traffic assessment (Technical Paper 1 (Traffic, transport and access assessment)) for the exhibited project. This assessment has been updated for the preferred project and is provided in full in Appendix D of this report and a summary of the main findings is provided below.

Methodology

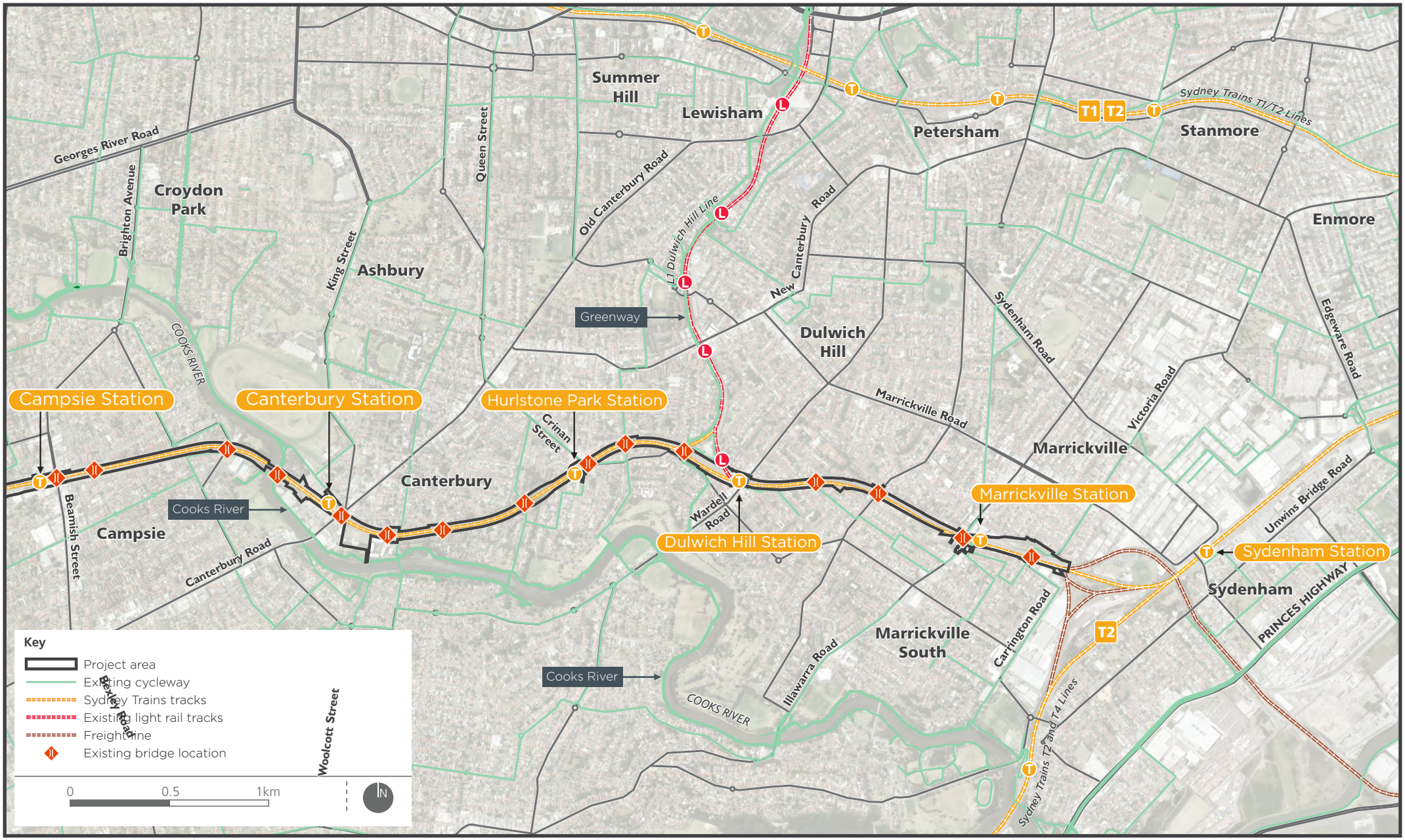
The assessment methodology utilised is consistent with the exhibited project that is described in Section 11.1 (Assessment approach) and Technical Paper 1 (Traffic, transport and access assessment) of the Environmental Impact Statement.

The preferred project involves the retention of the existing station entrances and existing supporting infrastructure where possible, including kerbside facilities, accessible parking and bike parking. An assessment of changes to pedestrian, cycling, public transport, road network and kerbside facility integration is provided for each station. Impacts to parking are discussed at the end of Section 12.2.1.

There have been no changes to the Bankstown Station design from the exhibited project, and as such it is not discussed below.

In considering the additional infrastructure to be provided as part of the preferred project, it should be noted that Transport for NSW is developing a Walking and Cycling Strategy for the preferred project. This strategy would further identify specific measures that would encourage walking and cycling as a means to access the metro stations. Transport for NSW would work with the Department of Planning and Environment, local councils, local community groups, bicycle user groups, relevant NSW government departments, agencies and utility providers to identify the best active transport routes in each suburb. Active transport routes may include pedestrian footpath upgrades, separated cycleway, shared footpath and designated pedestrian and cyclist road crossings. The implementation of further walking and cycling facilities, as informed by the Walking and Cycling Strategy, would be considered as part of the detailed design.

Figure 12.1 shows the study area and the associated road network and transport facilities.



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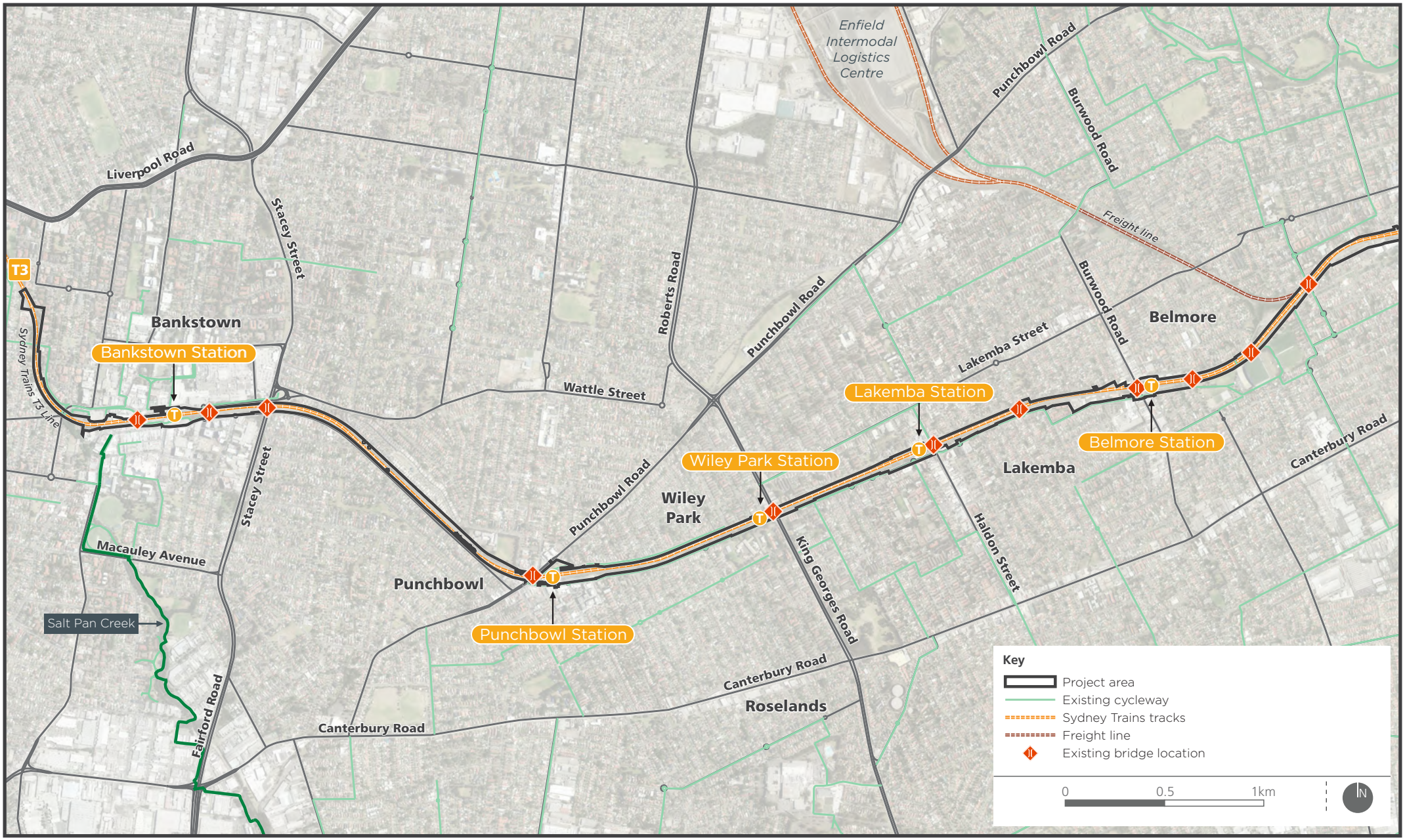
Road network and transport facilities - map 1

FIGURE 12.1



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Road network and transport facilities - map 2

FIGURE 12.1

Operational impact assessment summary of findings

Marrickville Station

Existing infrastructure would be retained at Marrickville Station.

The footpaths in the vicinity of the station have sufficient capacity to accommodate the predicted patronage growth. However, the existing grade of Station Street means that the access from accessible parking near the station is not fully accessible to the station entrance. Opportunities for the inclusion of an accessible vehicular drop off point at the station entrance would be investigated as part of the detailed design.

Dulwich Hill Station

Existing infrastructure would be retained at Dulwich Hill Station and infrastructure to improve pedestrian, cycling and public transport integration would be provided.

The preferred project involves the upgrade of existing pedestrian pathways surrounding the station, including from Ewart Lane to Wardell Road and from Keith Lane to Bedford Crescent which provides a positive impact on pedestrian accessibility at the station.

The preferred project improves interchange to light rail, through providing a direct connection from the metro platform to the light rail stop, improving the accessibility to both transport modes.

Additional bike parking would also be provided to the south of the existing station entrance, catering to the future bike parking demand.

Hurlstone Park Station

Existing infrastructure would be retained at Hurlstone Park Station and infrastructure to improve pedestrian, cycling and kerbside facility integration would be provided.

An accessible parking space would be provided on Duntroon Street which is closer to the southern station entrance than existing accessible parking, improving the accessibility of the station.

Additional bike parking would be provided at its existing location adjacent to the station entrance increasing the availability of bike parking in close proximity to the station entrance.

Canterbury Station

Existing infrastructure would be retained at Canterbury Station.

Infrastructure to improve cycling, public transport and kerbside integration would be provided.

New kerbside facilities would be provided north-west along Broughton Street, including kiss and ride spaces and a taxi space.

The existing bus shelter on Broughton Street would be refurbished, alongside the station entrance, improving the accessibility of the bus shelter from the station.

As presented in Table 12.2 the relocated kerbside facilities would result in a loss of six untimed, on-street parking spaces in Broughton Street. This would be a small proportion of the existing on-street parking which comprises 597 unrestricted on-street parking spaces and 107 unrestricted off-street parking spaces, located in the vicinity of the station. It is recognised that alternative parking may be located further from the customer's preferred destination which would be a minor negative impact.

The preferred project involves the provision of additional bike parking at the existing location on Canterbury Road, adjacent to the retained station entrance, as well as a new bike parking area on Broughton Street, providing a positive impact on bike access at the station.

Campsie Station

The preferred project would retain existing infrastructure at Campsie Station.

Infrastructure to improve pedestrian accessibility and cycling integration would be provided. This includes an accessible parking space on South Parade, as well as additional bike parking on North Parade improving accessibility and connectively.

Belmore Station

Existing infrastructure would be retained at Belmore Station.

Infrastructure to improve cycling and kerbside integration would be provided. This includes the provision of kerbside facilities in Tobruk Avenue and bike parking south of the station.

Lakemba Station

Existing infrastructure would be retained at Lakemba Station and infrastructure to improve cycling and kerbside facility integration would be provided.

New bike parking would be provided on the southern side of Railway Parade. New kiss and ride kerbside facilities would be provided on Railway Parade (west of new station entrance) and new taxi kerbside facilities would be provided on The Boulevarde (east of the new station entrance).

Opportunities for the inclusion of an accessible vehicular drop off point at the station entrance on Railway Parade would be investigated as part of the detailed design.

Wiley Park Station

Existing infrastructure would be retained at Wiley Park Station including bus stops, and the existing entrance upgraded. The preferred project would upgrade the existing pedestrian pathways surrounding the station, including an upgrade of the laneway to Stanlea Parade.

The revised bike parking locations provide easier access to the retained station entrance which would be a minor positive impact.

The proposed kerbside facilities on The Boulevarde have been re-arranged to provide the accessible parking spaces closer to the station entrance, improving accessibility.

Punchbowl Station

Existing infrastructure would be retained at Punchbowl Station and infrastructure to improve pedestrian, cycling and kerbside facility integration would be provided.

A new pedestrian crossing would be provided on Punchbowl Road north-east of Bruest Place and the existing pedestrian underpass below Punchbowl Road would be retained and upgraded. The additional pedestrian crossing would improve access to the existing bus stops.

New bike parking would be provided at the northern and southern station entrances directly adjacent the station entrances.

Kerbside facilities would be provided on The Boulevarde adjacent to the southern station entrance.

Parking Impacts

The preferred project has reduced impacts on parking compared to the exhibited project. The changes are summarised in Table 12.2 and outlined in detail in Appendix D.

Table 12.2 Parking spaces affected by the preferred project

Station	Number on-street parking spaces impacted by kerbside facilities		Number of removed commuter parking spaces	
	Exhibited project	Preferred project	Exhibited project	Preferred project
Marrickville	2	0	0	0
Dulwich Hill	10	3	25[1]	0
Hurlstone Park	5	6	0	0
Canterbury	2	6	0	0
Campsie	20	0	15[1]	0
Belmore	5	5	7[2]	0
Lakemba	7	7	16[2]	0
Wiley Park	10	10	0	0
Punchbowl	20	5	23[1]	0
Bankstown	0	0	10	10
TOTAL	**81**	**42**	**96**	**10**

Note 1: The Environmental Impact Statement identified the net loss or gain of commuter parking at these locations, taking into account where existing parking areas would be reconfigured or extended to provide offset commuter parking spaces. This table presents the impacts of the exhibited project without the provision of reconfigured parking areas at these locations to offset this impact.

Note 2: The commuter parking spaces lost at Belmore and Lakemba were incorrectly not identified in the exhibited Environmental Impact Statement. The seven commuter spaces to be removed at Belmore were to accommodate the northern station entrance and plaza as part of the exhibited project. The 16 commuter spaces to be removed at Lakemba were to provide for the active transport corridor and associated reconfiguration of the car park on The Boulevarde as part of the exhibited project. This omission was not clarified in Section 2.4 of this report as the impacts are no longer relevant to the preferred project.

The preferred project aims to achieve a no net loss of dedicated commuter parking spaces on NSW Government owned land between Marrickville and Bankstown stations. The proposed loss of 10 commuter parking spaces would be offset by the provision of new commuter parking spaces at stations along the alignment.

Revised mitigation measures

Changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.

12.2.2 Non-Aboriginal heritage

Overview

Potential impacts during operation of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment). The non-Aboriginal heritage impact assessment has been updated for the preferred project and is provided in full in Appendix F and a summary of the main findings is provided below.

Methodology

The operational assessment of non-Aboriginal heritage items within the preferred project area considered direct and visual impacts. The methodology, details and significance of the heritage features for the assessment of the preferred project remain as outlined for the exhibited project as described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment).

The updated assessment considers changes to nine stations resulting from the preferred project. There are no changes proposed at Bankstown Station compared to the exhibited project. Therefore, the heritage impact assessment for Bankstown Station provided in the Environmental Impact Statement remains relevant.

Figure 12.2 shows the location of the heritage listed items and areas discussed.

Operational impact assessment summary of findings

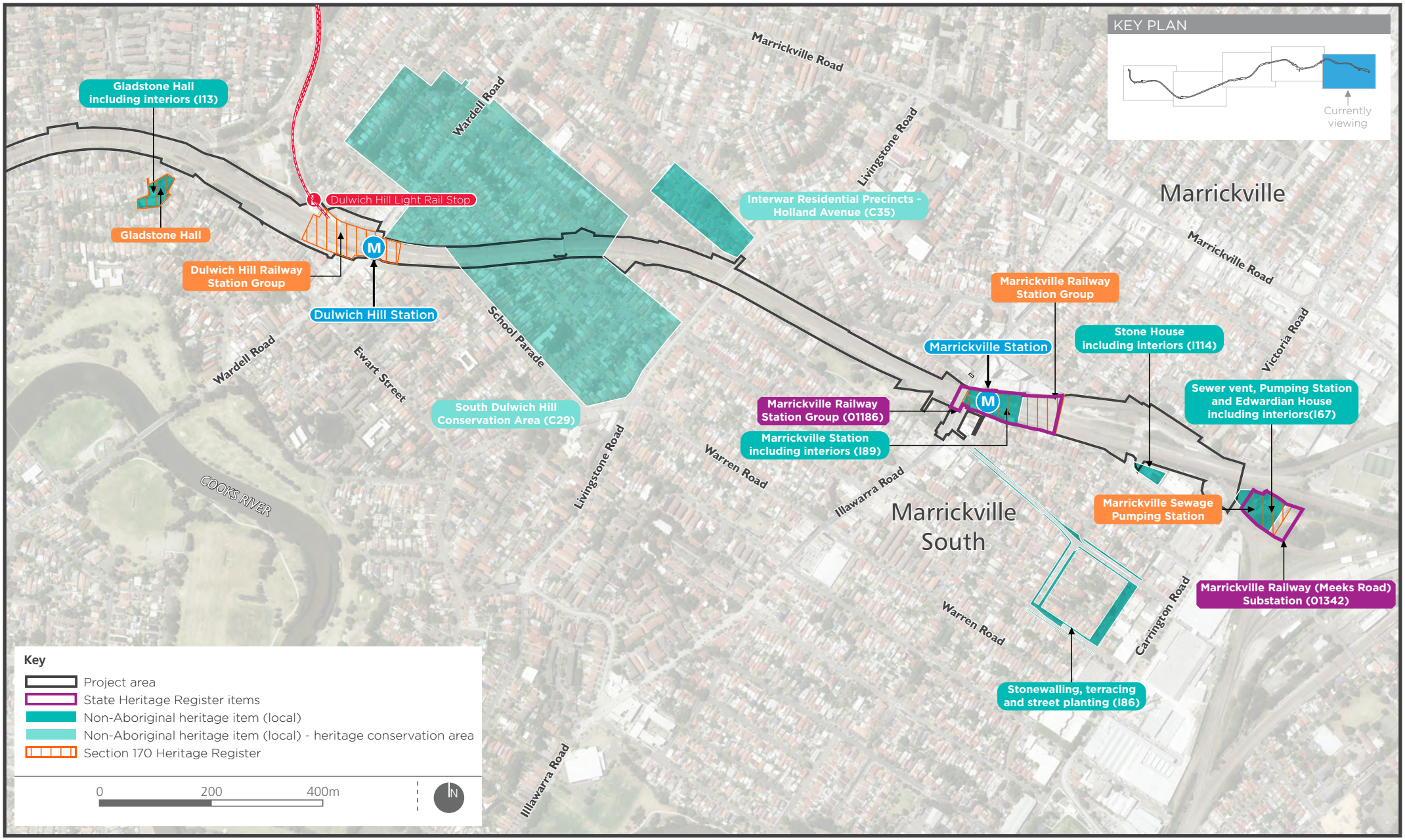
Potential impacts during operation of the preferred project would differ from that of the exhibited project as described in the Environmental Impact Statement. This would principally be due to the proposed internal refurbishment/repurposing of retained listed station buildings for the preferred project.

Among the nine heritage railway stations reassessed for the preferred project, there would not be major direct or visual impacts to any stations. There would be moderate direct impacts and moderate visual impacts to the nine stations, three of which are listed on the State Heritage Register: Marrickville, Canterbury and Belmore. The retention and reuse of the heritage buildings would maintain the function of the building as relevant to the listing. All State Heritage Register stations would continue to meet the threshold for State significance under more than one significance assessment criteria. All locally heritage listed stations would continue to meet the threshold to maintain their local listing.

Overall, all the nine stations would be subject to moderate direct and visual impacts which is a reduction from major impacts for the exhibited project. This reduction in heritage impacts from the exhibited project is principally due to retention of all heritage buildings, the re-levelling of platforms rather than reconstruction and retention of the existing location of heritage platforms.

For the preferred project, existing station buildings would be retained and re-purposed for new uses to facilitate the operation of the Metro line. Although some impacts to original fabric would be required, it is expected that all station buildings would retain their assessed significance as elements of the listed stations. The re-purposing of building would result in a few localised increases in impacts to particular heritage elements due to the preferred project. This would be at Marrickville, Dulwich Hill, Hurlstone Park, Canterbury, Campsie, Belmore and Lakemba Railway Station Groups.

Below is a summary of the direct and visual impacts assessed for the operation of the preferred project for each station area, apart from Bankstown which remains consistent with the exhibited project. A comparison is provided with the impact summary for the exhibited project as described in the Environmental Impact Statement. Further detail is provided in Appendix F.



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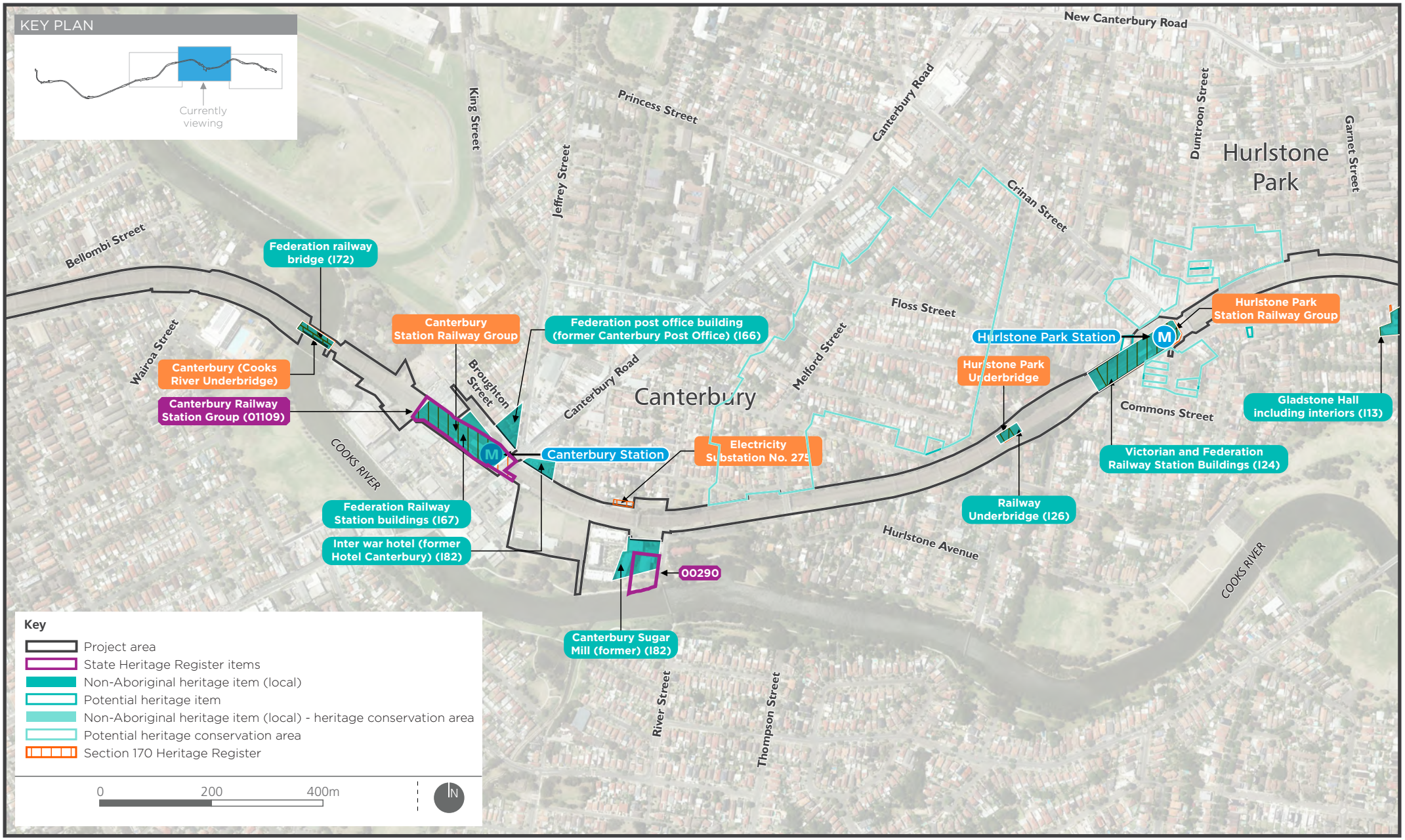
Heritage listed items and areas - map 1

FIGURE 12.2



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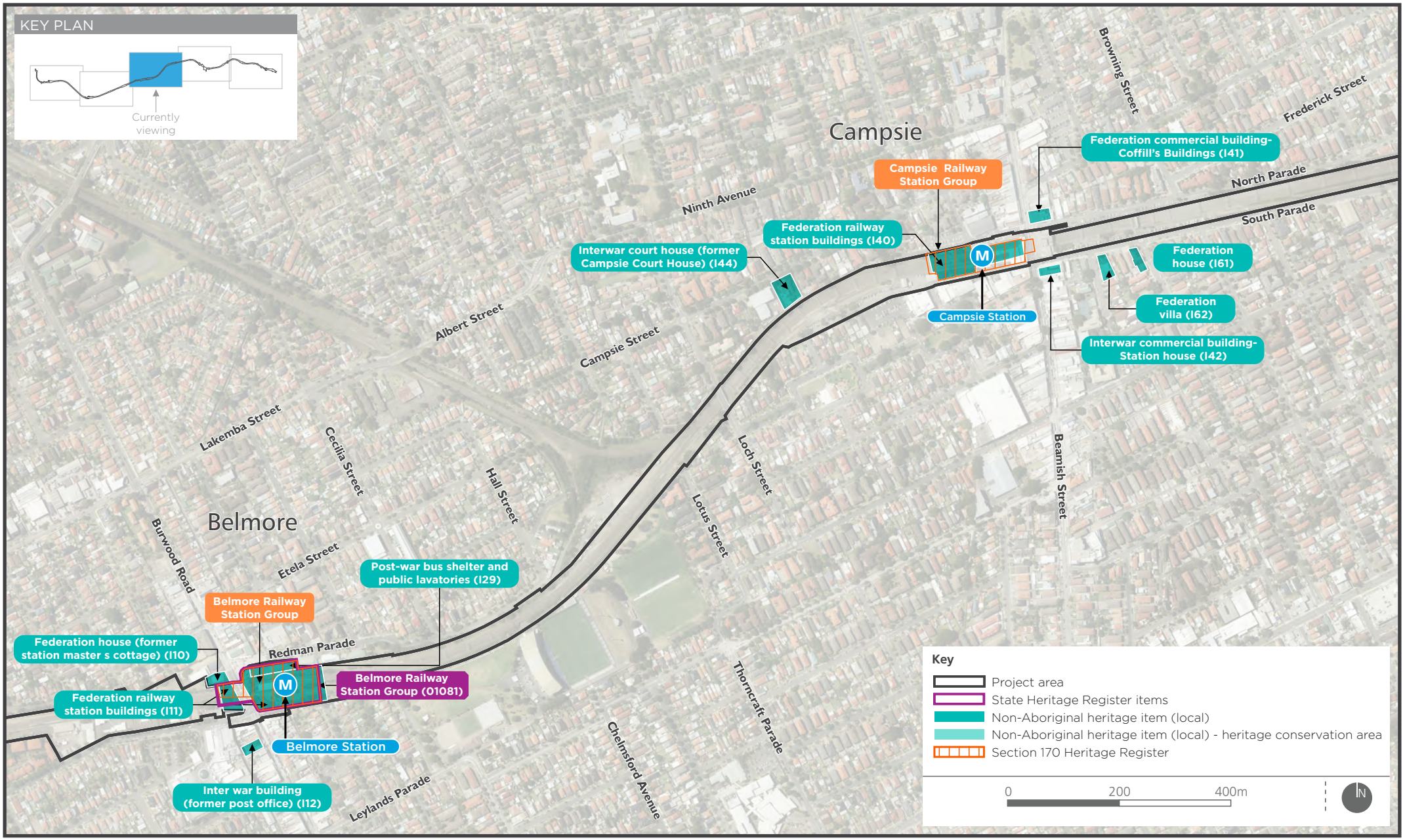
Heritage listed items and areas - map 2

FIGURE 12.2



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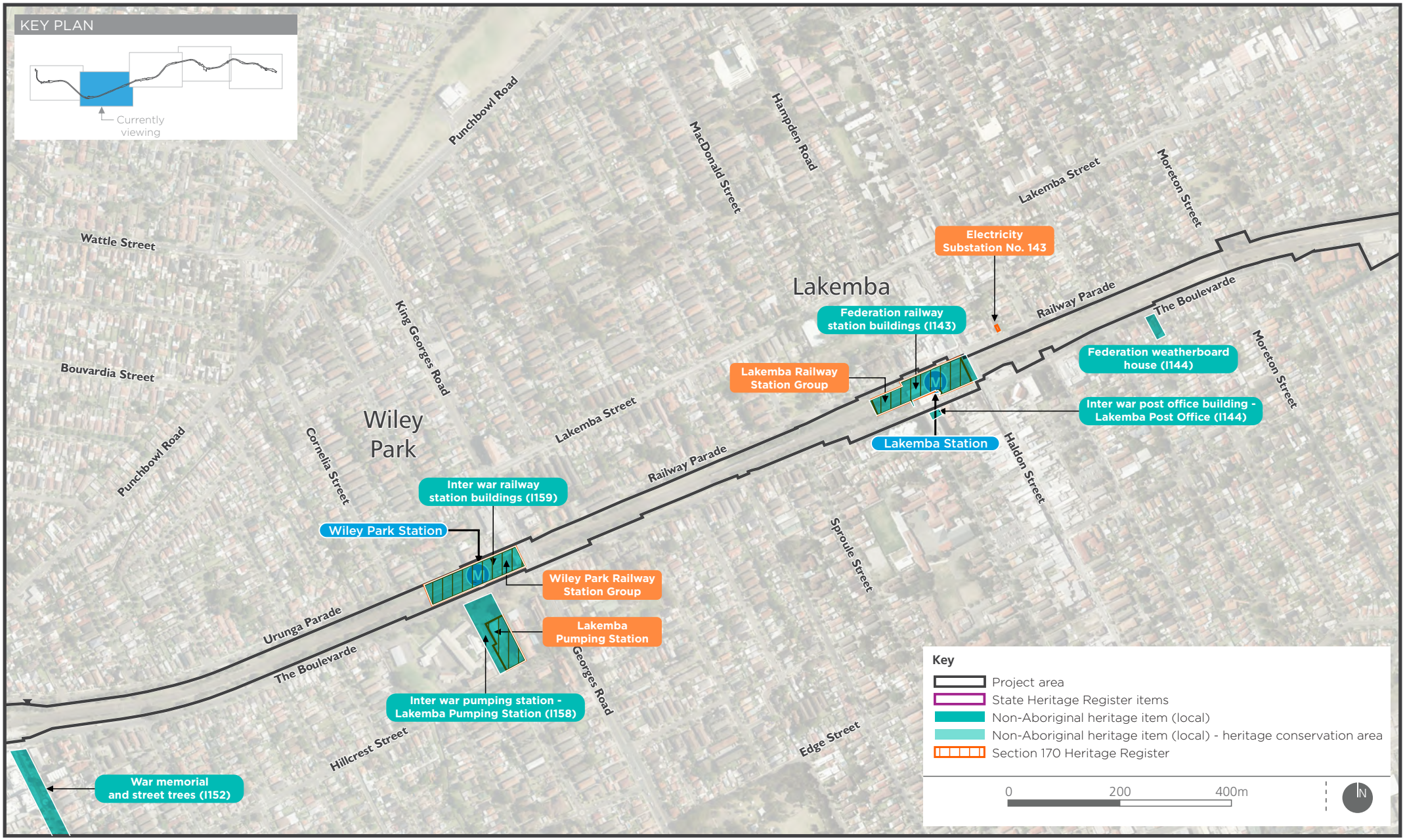
Heritage listed items and areas - map 3

FIGURE 12.2



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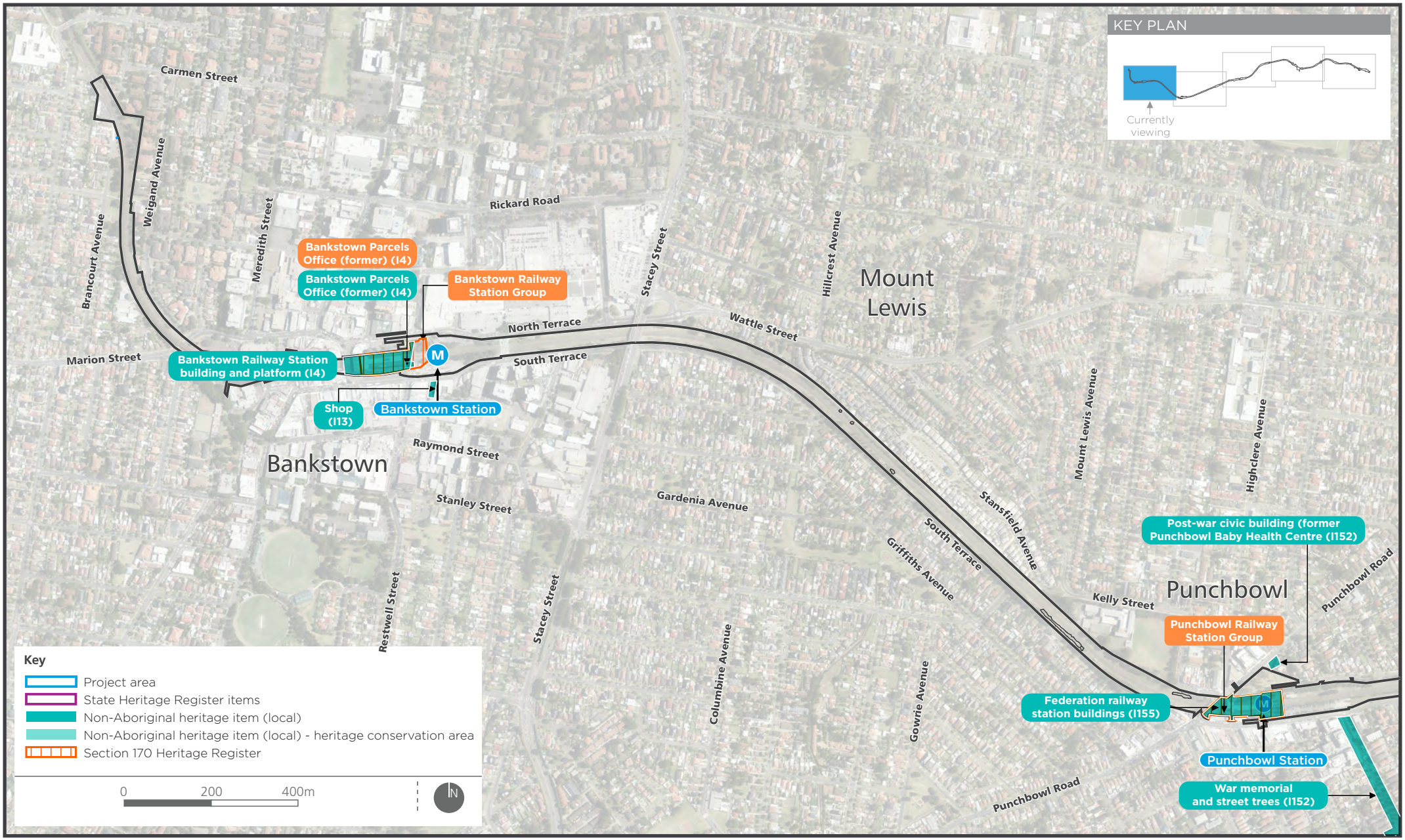
Heritage listed items and areas - map 4

FIGURE 12.2



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Heritage listed items and areas - map 5

FIGURE 12.2

Marrickville Station

Table 12.3 summarises the assessment of direct heritage impacts around Marrickville Station. This shows that no major impacts are anticipated for the preferred project on any heritage items within the Marrickville Railway Station Group, as existing platforms are being retained and re-levelled. The preferred project would also retain the existing Overbridge – Illawarra Road, reducing impacts from major to minor.

The Platform 1 and Platform 2 buildings may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Marrickville Railway Station Group. This is a reduction in impact from the assessment of the exhibited project, which assessed direct impacts as major.

Table 12.3 Assessment of direct impacts around Marrickville station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Marrickville Railway Station Group			
Platform 1	Exceptional	Major	Moderate
Platform 1 building	Exceptional	Minor	Moderate
Platform 2	Exceptional	Major	Moderate
Platform 2 building	High	Minor	Moderate
Overbridge- Illawarra Road	Brick parapets including curbs, piers and panels- Exceptional Structure below the deck level- Moderate	Major	Minor
Platform 2 booking office	Exceptional	Neutral	Neutral
Pedestrian steps: northern set	Little	Neutral	Neutral
Pedestrian steps: southern set	Little	Neutral	Neutral
Other heritage items			
Sewage Pumping Station 271	Exceptional	Neutral	Neutral
Stone house, including interiors	-	Neutral	Neutral

Table 12.4 provides an overview of the predicted visual impact to heritage items around Marrickville Station. This demonstrates that visual impacts to Marrickville Railway Station Group remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project while impacts to other heritage items have been reduced.

Table 12.4 Assessment of visual impacts around Marrickville Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Marrickville Railway Station Group	Moderate	Moderate
Sewage Pumping Station 271	Negligible	Neutral
Stone house, including interiors	Negligible	Neutral
Stonewalling, terracing and street planting	Negligible	Neutral

Dulwich Hill Station

Table 12.5 summarises the assessment of direct heritage impacts around Dulwich Hill Station. This shows that no major impacts are anticipated for the preferred project on any heritage items within the Dulwich Hill Station Group. This would be due to the retention and re-levelling of existing platforms and the retention of the overhead booking office.

The Platform 1/2 building may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structure which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Dulwich Hill Railway Station Group. This is a reduction in impact from the assessment of the exhibited project, which assessed direct impacts as major.

Table 12.5 Assessment of direct impacts around Dulwich Hill Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Dulwich Hill Railway Station Group			
Platforms 1/2	High	Major	Moderate
Platform 1/2 building	High	Minor	Moderate
Overhead booking office	High	Major	Moderate
Stairs	Moderate	Major	Neutral
Wardell Road overbridge	Moderate	Minor	Minor

Table 12.6 provides an overview of the predicted visual impact to heritage items around Dulwich Hill Station. This shows that visual impacts to Dulwich Hill Station Group are reduced from a major to moderate impact while impacts to other heritage items have also reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.6 Assessment of visual impacts around Dulwich Hill Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Dulwich Hill Railway Station Group	Major	Moderate
South Dulwich Hill Heritage Conservation Area	Negligible	Negligible
Inter-War Heritage Conservation Area Group	Negligible	Neutral
Gladstone Hall, including interiors	Neutral	Neutral

Hurlstone Park Station

Table 12.7 summarises the assessment of direct heritage impacts around Hurlstone Park Station. This shows that the impacts for the preferred project on heritage items within the Hurlstone Park Railway Station Group have been reduced or remain consistent with the exhibited project. Impacts to existing have been reduced as existing platforms are retained and re-levelled and the Platform 1 building would also be retained.

The Platform 2 building may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Hurlstone Park Railway Station Group. This is a reduction in impact from the assessment of the exhibited project, which assessed direct impacts as major.

Table 12.7 Assessment of direct impacts around Hurlstone Park Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Hurlstone Park Railway Station Group			
Platform 1	High	Major	Moderate
Platform 2	High	Major	Moderate
Platform building, platform 1	High	Major	Moderate
Platform building, platform 2	High	Minor	Moderate
Footbridge	High (stairs) Moderate (footbridge) Little (deck)	Major	Major
Brick abutments	High	Minor	Negligible
Overhead booking office	Little	Neutral	Neutral
Landscape /natural features	High	Neutral positive	Neutral positive
Other heritage features			
Hurlstone Park Railway Underbridge	-	Negligible	Negligible
Hurlstone Park Heritage Assessment Study – Heritage items	-	Minor	Minor

Table 12.8 provides an overview of the predicted visual impact to heritage items around Hurlstone Park Station. This shows that visual impacts to Hurlstone Park Railway Group are reduced from a major to moderate impact while impacts to other heritage items remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.8 Assessment of visual impacts around Hurlstone Park Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Hurlstone Park Railway Station Group	Major	Moderate
Hurlstone Park Railway Underbridge	Negligible	Negligible

Canterbury Station

Table 12.9 summarises the assessment of direct heritage impacts around Canterbury Station. This shows that no major impacts are anticipated for the preferred project on any heritage items within the Canterbury Railway Station Group and impacts to heritage listed bridges have also been reduced. Impacts to platforms have been reduced as they are being retained and re-levelled.

The Platform 1 and Platform 2 buildings may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms. Impacts to other heritage features have also been reduced from that predicted in the Environmental Impact Statement for the exhibited project.

The design provides for a potential future station entrance on Charles Street, to enable access to Platform 2. The future station entrance is to be safeguarded subject to detail design. No heritage items would be removed in regard to the future proofing. When considering overall impacts, it is assessed that the preferred project would result in a moderate direct impact on Canterbury Railway Station Group. This is consistent with the assessment of the exhibited project.

Table 12.9 Assessment of direct impacts around Canterbury Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Canterbury Railway Station Group			
Platform 1	High	Major	Moderate
Platform building, platform 1	Exceptional	Minor	Moderate
Platform 2	High	Major	Moderate
Platform building, platform 2	High	Minor	Moderate
Signal box	High	Neutral	Neutral
Footbridge	Moderate	Moderate	Neutral
Overbridge	High	Moderate	Minor
Overhead booking office and concourse	Little	Neutral	Neutral
Canopies	Little	Neutral	Neutral
Other heritage features			
Canterbury (Cooks River) Underbridge	-	Moderate	Neutral
Canterbury (Cooks River/ Charles St) Underbridge – Main Line	-	Moderate	Minor

Table 12.10 provides an overview of the predicted visual impact to heritage items around Canterbury Station. This shows that visual impacts have reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.10 Assessment of visual impacts around Canterbury Railway Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Canterbury Railway Station Group	Moderate	Moderate
Canterbury (Cooks River) Underbridge	Minor	Negligible
Canterbury (Cooks River/Charles St) Underbridge – Main Line	Minor	Minor
Old Sugarmill	Negligible	Negligible
Inter-War Hotel (former Hotel Canterbury)	Neutral	Neutral
Federation Post Office Building (former Canterbury Post Office)	Neutral	Neutral
Electricity Substation no. 275	Negligible	Negligible

Campsie Station

Table 12.11 summarises the assessment of direct heritage impacts around Campsie Station. This shows that no major impacts are anticipated for the preferred project on any heritage items within the Campsie Railway Station Group. The majority of impacts have been reduced from that predicted in the Environmental Impact Statement for the exhibited project. Impacts to platforms have been reduced as they are being retained and re-levelled.

The Platform 1 and Platform 2 buildings may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Campsie Railway Station Group. This is consistent with the assessment of the exhibited project.

Table 12.11 Assessment of direct impacts around Campsie Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Campsie Railway Station Group			
Platform 1	High	Major	Moderate
Platform 2	High	Major	Moderate
Platform building, platform 1	High	Minor	Moderate
Platform building, platform 2	High	Minor	Moderate
Concourse including overhead booking office and Parcels Office	Little (Concourse) Moderate (booking office and Parcels Office)	Moderate	Minor
Overbridge	High	Minor	Minor
Footbridge	Little	Neutral	Neutral
Platform 3	Moderate	Moderate	Neutral
Platform canopies, platforms 1-3	Little	Neutral	Neutral
Landscape/ natural features	High	Moderate	Neutral

Table 12.12 provides an overview of the predicted visual impact to heritage items around Campsie Station. This shows that visual impacts have reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.12 Assessment of visual impacts around Campsie Railway Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Campsie Railway Station Group	Moderate	Moderate
Federation commercial building–Coffill's Buildings	Negligible	Negligible
Inter-War Commercial Building–Station House	Negligible	Neutral
Inter-War Court House (former) Campsie Court House	Neutral	Neutral
War Memorial Clock Tower	Neutral	Neutral
Federation house	Negligible	Negligible
Federation villa	Negligible	Negligible

Belmore Station

Table 12.13 summarises the assessment of direct heritage impacts around Belmore Station. This shows that the majority of impacts are predicted to be consistent with that predicted in the Environmental Impact Statement for the exhibited project. Impacts to platforms have been reduced as they are being retained and re-levelled.

The platform building may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Belmore Railway Station Group. This is consistent with the assessment of the exhibited project.

Table 12.13 Assessment of direct impacts around Belmore Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Belmore Railway Station Group			
Platform 1/2	High	Major	Moderate
Platform building	Exceptional	Minor	Moderate
Overhead booking office and concourse	High	Minor	Moderate
Overbridge	Little	Negligible	Negligible
Platform canopies	Little	Neutral	Neutral
Other heritage features			
Post-war bus shelter and public lavatories	-	Neutral	Neutral

Table 12.14 provides an overview of the predicted visual impact to heritage items around Belmore Station. This shows that visual impacts remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.14 Assessment of visual impacts around Belmore Railway Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Belmore Railway Station Group	Moderate	Moderate
Post-war bus shelter and public lavatories	Minor	Minor
Federation House (former station master's cottage)	Negligible	Negligible

Lakemba Station

Table 12.15 summarises the assessment of direct heritage impacts around Lakemba Station. This shows that the majority of impacts are predicted to be reduced or consistent with that predicted in the Environmental Impact Statement for the exhibited project. Impacts to platforms have been reduced as they are being retained and re-levelled.

The Platform 1/2 building may have an increase in impacts from minor to moderate as a result of internal re-purposing of the structures which may result in removal of significant fabric. This impact would avoid the need to construct additional buildings on the station platforms.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Lakemba Railway Station Group. This is consistent with the assessment of the exhibited project.

Table 12.15 Assessment of direct impacts around Lakemba Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Lakemba Railway Station Group			
Platform 1/2	High	Major	Moderate
Platform building, platform 1/2	High	Minor	Moderate
Footbridge and stairs	Moderate	Minor	Neutral
War Memorial	High	Neutral	Neutral
Overhead booking office /concourse	Little/Intrusive	Neutral	Neutral
Canopies	Intrusive	Minor positive	Neutral

Table 12.16 provides an overview of the predicted visual impact to heritage items around Lakemba Station. This shows that visual impacts remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.16 Assessment of visual impacts around Lakemba Railway Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Lakemba Railway Station Group	Moderate	Moderate
Federation weatherboard house	Neutral	Neutral
Inter-War post office building - Lakemba Post Office	Negligible	Negligible
Electricity Substation no. 143	Neutral	Neutral

Wiley Park Station

Table 12.17 summarises the assessment of direct heritage impacts around Wiley Park Station. This shows that all impacts are predicted to reduce or be consistent with that predicted in the Environmental Impact Statement for the exhibited project. The impact to platforms buildings has reduced from major to moderate due to the retention and reuse of the heritage buildings. Impacts to platforms have been reduced as they are being retained and re-levelled. The preferred project will also retain the footbridge and landscape/natural features, reducing impacts to these features.

Wiley Park Railway Station Group would now continue to meet the threshold for local significance. Impacts as a result of the exhibited project would have resulted in the heritage item no longer meeting the threshold for local significance and would likely have been delisted.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Wiley Park Railway Station Group. This is a reduction in impact from the assessment of the exhibited project, which assessed direct impacts as major.

Table 12.17 Assessment of direct impacts around Wiley Park Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Wiley Park Railway Station Group			
Platform 1	High	Major	Moderate
Platform 2	High	Major	Moderate
Platform building, platform 1	High	Major	Moderate
Platform building, platform 2	High	Major	Moderate
Overhead booking office	High	Major	Moderate
Retail at entrance	Little	n/a	Neutral
Footbridge	Moderate	Major	Moderate
Access ramp canopies (Modern)	Little	Neutral	Neutral
Landscape/ natural features	Moderate	Moderate	Neutral

Table 12.18 provides an overview of the predicted visual impact to heritage items around Wiley Park Station. This shows that visual impacts have reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.18 Assessment of visual impacts around Wiley Park Railway Station

Heritage item	Exhibited project impact summary	Preferred project impact summary
Wiley Park Railway Station Group	Major	Moderate
Inter-War water pumping station– Lakemba Pumping Station (WP0003)	Negligible	Negligible

Punchbowl Station

Table 12.19 summarises the assessment of direct heritage impacts around Punchbowl Station. This shows that the majority of impacts are predicted to reduce or be consistent with that predicted in the Environmental Impact Statement for the exhibited project. The reduced impact to the overhead booking office, platform buildings and footbridge from major to moderate/minor is due to the retention and reuse of the heritage items and maintaining the function of the building as relevant to the listing. Impacts to platforms have been reduced as they are being retained and re-levelled.

The retention of existing canopies of the overhead booking office would result in a slight increase in impact.

Punchbowl Railway Station Group would now continue to meet the threshold for local significance. Impacts as a result of the exhibited project would have resulted in the heritage item no longer meeting the threshold for local significance and would likely have been delisted.

When considering overall direct impacts, it is assessed that the preferred project would result in a moderate direct impact on Punchbowl Railway Station Group overall. This is a reduction in impact from the assessment of the exhibited project, which assessed direct impacts as major.

Table 12.19 Assessment of direct impacts around Punchbowl Railway Station

Heritage item	Significance	Exhibited project impact summary	Preferred project impact summary
Punchbowl Railway Station Group			
Platform 1/2	High	Major	Moderate
Overhead booking office	High	Major	Moderate
Footbridge	Moderate	Major	Moderate
Toilet block, platform 1/2	Moderate	Major	Moderate
Platform building, platform 1/2	Moderate	Major	Moderate
Canopies and extensions to overhead booking office	Little	Neutral	Negligible

Table 12.20 provides an overview of the predicted visual impact to heritage items around Punchbowl Station. This shows that visual impacts have reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project.

Table 12.20 Assessment of visual impacts around Punchbowl Railway Station

Heritage item	Significance	Exhibited project impact summary
Punchbowl Railway Station Group	Major	Moderate
War Memorial and street trees	Negligible	Negligible
Post-war Civic Building (former Punchbowl Baby Health Centre)	Negligible	Negligible

12.2.3 Landscape character and visual amenity

Overview

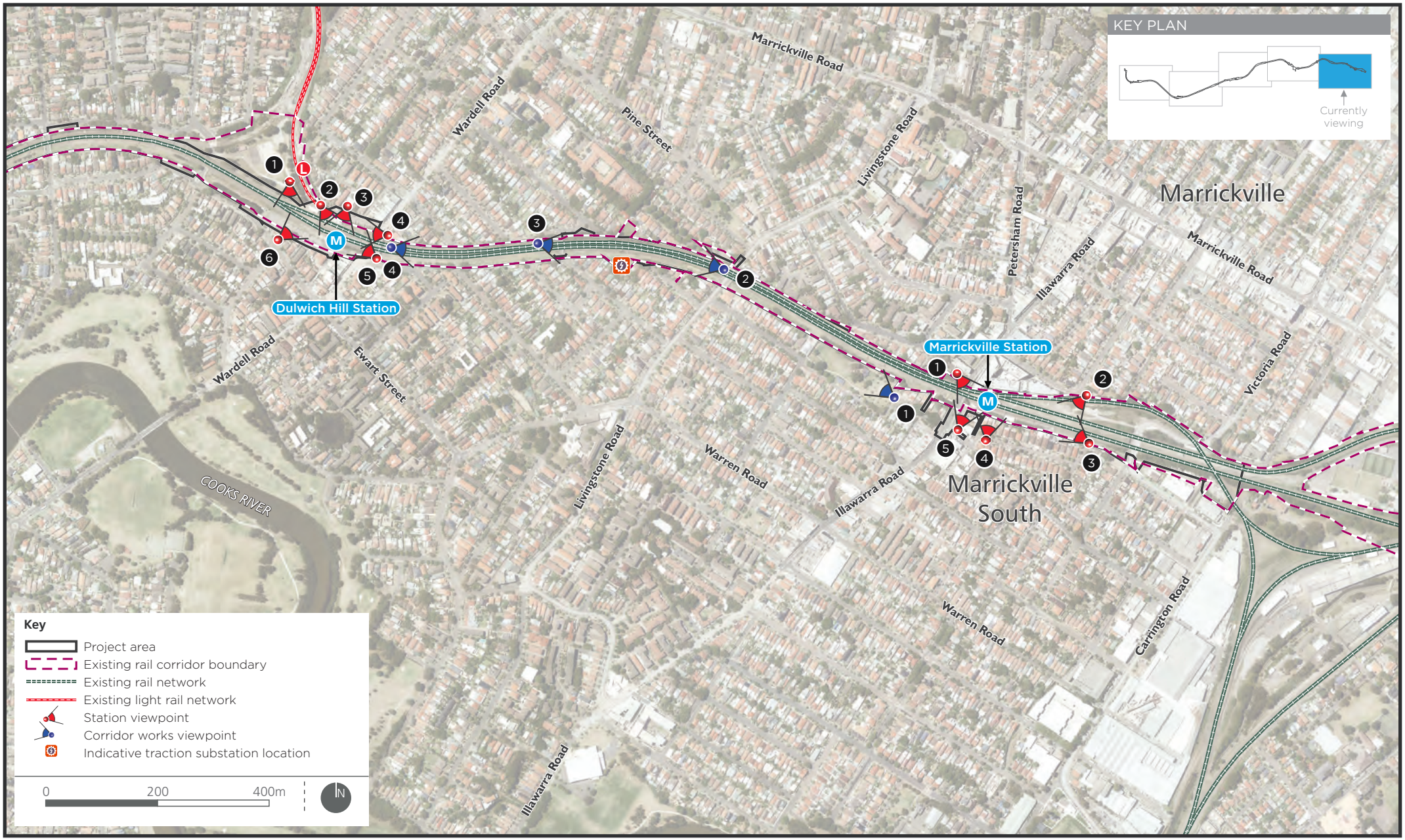
Potential impacts during operation of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment). The landscape and visual impact assessment has been updated for the preferred project and is provided in full in Appendix G. A summary of the main findings is provided below.

Methodology

The assessment methodology, and sensitivity ratings of landscape and viewpoint locations for the visual impact assessment for the preferred project remain as outlined for the exhibited project that is described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment). The assessment provided in Appendix G compares the landscape and visual impacts identified in the Environmental Impact Statement and the changes in impacts resulting from the preferred project. This includes an operational assessment of the landscape impact, daytime visual impact and night time visual impact for each station.

This includes the re-assessment of impacts to landscape character and to station viewpoints previously assessed in the Environmental Impact Statement, which require reconsideration in light of the changes incorporated into the preferred project. One additional station viewpoint, the view from the lane south of Canterbury Station, has been included for the preferred project. Figure 12.3 shows the locations of the viewpoints.

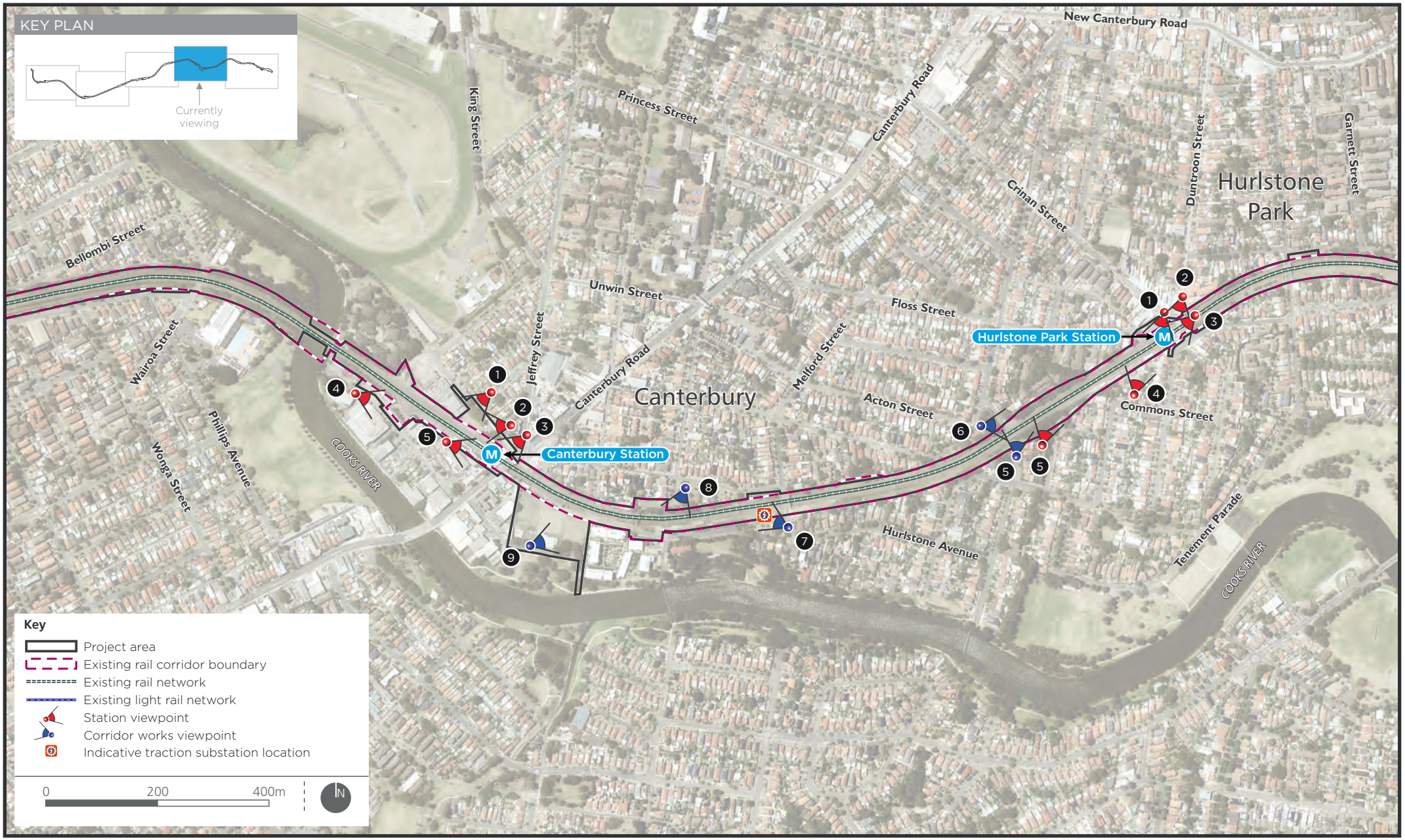
There are no changes proposed at Bankstown Station compared to the exhibited project. Therefore, the landscape character and visual impact assessment for Bankstown Station provided in the Environmental Impact Statement remains relevant.



sydney METRO | city & southwest

Representative viewpoints - map 1

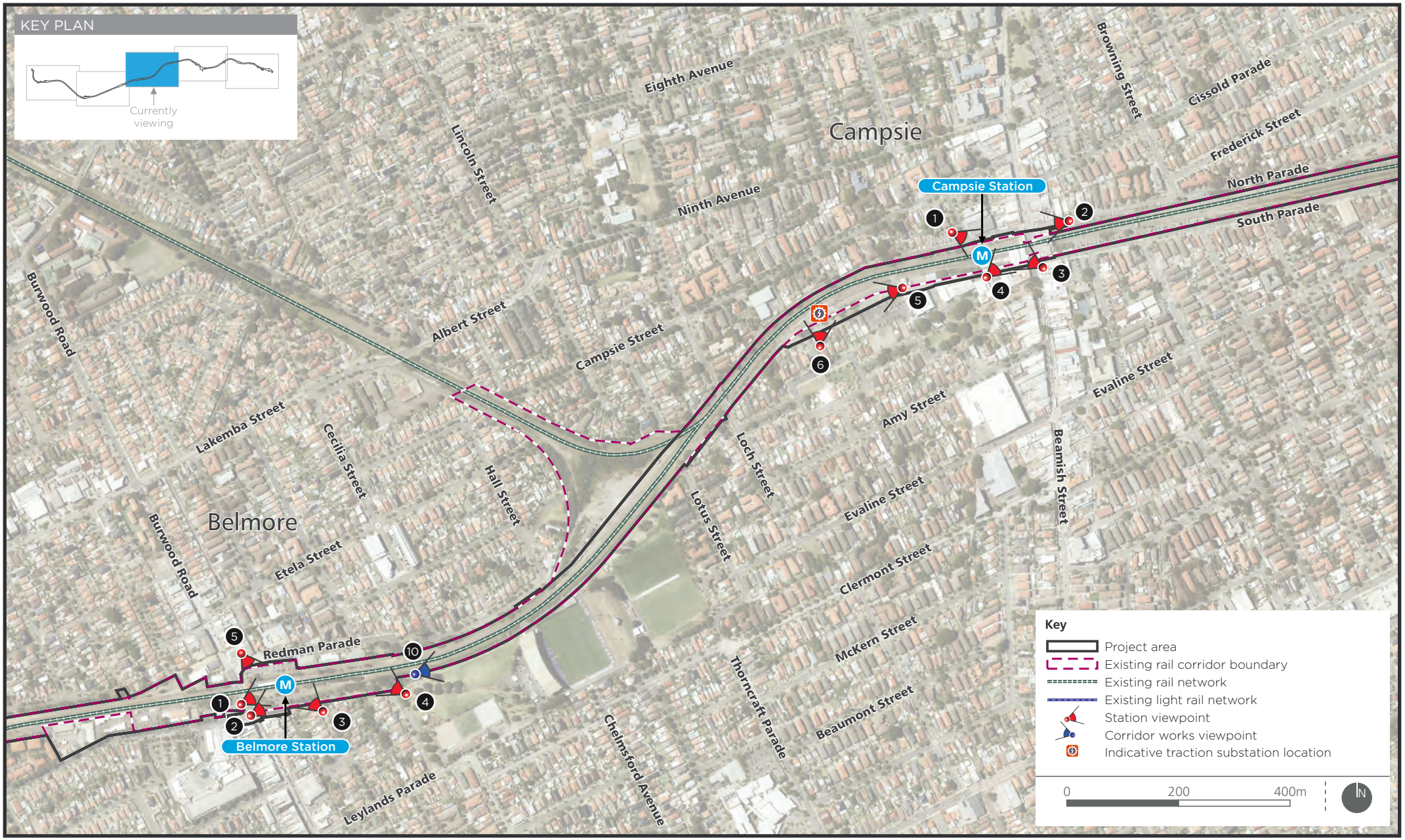
FIGURE 12.3



sydney METRO | city & southwest

Representative viewpoints - map 2

FIGURE 12.3



sydney METRO | city & southwest

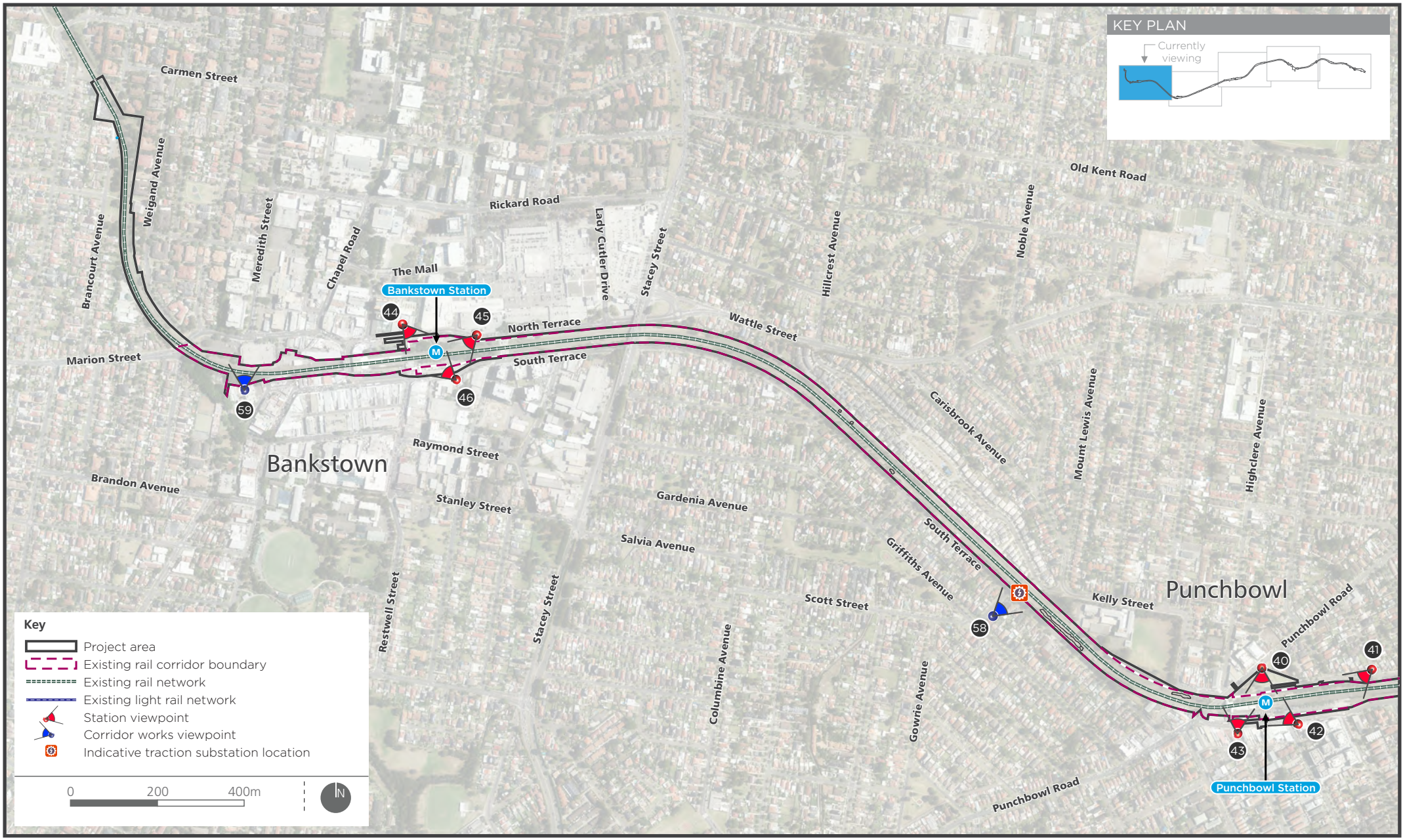
Representative viewpoints - map 3

FIGURE 12.3

sydney METRO | city & southwest

Representative viewpoints - map 4

FIGURE 12.3



Representative viewpoints - map 5

FIGURE 12.3

Operational impact assessment summary of findings

The beneficial operational landscape impacts identified in the Environmental Impact Statement for the exhibited project have all been reduced or remain consistent for the preferred project. This is due to the reduced degree of intervention at the stations and across the precincts. Whilst the legibility and accessibility of the stations would be improved with the new lifts, stairs, and improved interchange facilities where required, the connectivity benefits proposed for the exhibited project would not be fully realised.

Table 12.21 summarises the predicted changes to local landscape character for each station precinct during operation of the preferred project, in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail is provided in Appendix G.

Table 12.21 Operational landscape character impacts

Location	Sensitivity rating	Exhibited project	Preferred project[1]
Marrickville Station precinct	Local	Minor beneficial	**Negligible**
Dulwich Hill Station precinct	Local	Minor beneficial	Minor beneficial
Hurlstone Park Station precinct	Local	Minor beneficial	**Negligible**
Canterbury Station precinct	Local	Moderate beneficial	**Minor beneficial**
Campsie Station precinct	Local	Minor beneficial	**Negligible**
Belmore Station precinct	Local	Minor beneficial	**Negligible**
Lakemba Station precinct	Local	Minor beneficial	**Negligible**
Wiley Park Station precinct	Local	Minor beneficial	**Negligible**
Punchbowl Station precinct	Local	Moderate beneficial	**Minor beneficial**

Note 1: **Bold** text represents a change in impact.

During operation, daytime visual impact at the majority of assessed viewpoints for the preferred project would remain consistent or result in a reduced adverse impact compared to the exhibited project. The majority of daytime visual impacts are assessed as negligible for the preferred project as there would be limited or no perceived change in the amenity of views or the proposed infrastructure would be more readily absorbed into the view.

Some improvements to the character and visual prominence of the station entry envisaged in the Environmental Impact Statement for the exhibited project would be reduced for the preferred project. This has resulted in a reduction in beneficial impacts to viewpoints at the following locations:

- Dulwich Hill Station, View west from corner of Wardell Road and Dudley Street
- Campsie Station, View southwest from Beamish Street
- Belmore Station, View northeast from Tobruk Avenue
- Lakemba Station, View southwest along The Boulevarde
- Wiley Park Station, View northwest across King Georges Road
- Punchbowl Station, View south from Warren Reserve
- Punchbowl Station, View west along The Boulevarde at Matthew Street.

Table 12.22 summarises the predicted daytime visual amenity impacts during operation of the preferred project in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail is provided in Appendix G.

Table 12.22 Operational daytime visual amenity impacts

	Viewpoint	Sensitivity rating	Exhibited project	Preferred project[1]
	Marrickville Station			
1	View south-east from Illawarra Road	Local	Negligible	Negligible
2	View south-west from O'Hara Street playground	Neighbourhood	Negligible	Negligible
3	View north from Riverdale Avenue	Neighbourhood	Negligible	Negligible
4	View north from Schwebel Street	Neighbourhood	Negligible	Negligible
5	View north from Station Street	Neighbourhood	Negligible	Negligible
	Dulwich Hill Station			
1	View south from Jack Shanahan Reserve	Local	Negligible	Negligible
2	View southeast from Dulwich Hill light rail stop	Local	Negligible	Negligible
3	View south from Bedford Crescent to Dulwich Hill light rail stop entrance	Local	Minor adverse	Minor adverse
4	View west to Dulwich Hill Station from Wardell Road bridge	Local	Minor adverse	**Negligible**
5	View west from corner of Wardell Road and Dudley Street	Local	Minor beneficial	**Negligible**
6	View southeast from Ewart Lane	Neighbourhood	Negligible	Negligible
	Hurlstone Park			
1	View southwest from the Floss Street commuter carpark	Local	Negligible	Negligible
2	View southwest across Floss Street	Local	Negligible	Negligible
3	View southwest from the Duntroon Street bridge	Local	Moderate adverse	**Negligible**
4	View north from Commons Street	Neighbourhood	Minor adverse	**Negligible**
5	View from Railway Street	Neighbourhood	Minor adverse	Minor adverse
	Canterbury Station			
1	View southwest from Robert Street	Neighbourhood	Negligible	Negligible
2	View northwest from Broughton Street	Local	Negligible	Negligible
3	View southwest form corner of Broughton Street and Canterbury Road	Local	Negligible	Negligible
4	View northeast from Charles Street	Neighbourhood	Negligible	Negligible
5	View from the lane south of Canterbury Station	Local	N/A	Negligible

	Viewpoint	Sensitivity rating	Exhibited project	Preferred project[1]
	Campsie Station			
1	View southeast from corner of Wilfred Avenue and London Street	Neighbourhood	Negligible	Negligible
2	View west along North Parade	Neighbourhood	Negligible	Negligible
3	View southwest from Beamish Street	Local	Minor beneficial	**Negligible**
4	Northeast from Lilian Lane	Neighbourhood	Negligible	Negligible
5	View west from Lilian Street	Neighbourhood	Negligible	Negligible
6	View east from Lilian Street	Neighbourhood	Negligible	Negligible
	Belmore Station			
1	View east from Burwood Road overbridge	Local	Minor adverse	**Negligible**
2	View northeast from Tobruk Avenue	Local	Minor beneficial	**Negligible**
3	View northwest from shared path linking to the Terry Lamb Reserve	Neighbourhood	Minor adverse	**Negligible**
4	View west from the Terry Lamb Reserve	Neighbourhood	Minor adverse	Minor adverse
5	View southwest from Redman Parade	Local	Negligible	Negligible
	Lakemba Station			
1	View northeast from Railway Parade	Local	Minor adverse	Minor adverse
2	View southwest along The Boulevarde	Local	Minor beneficial	**Negligible**
3	View southwest from The Boulevarde commuter car park	Neighbourhood	Negligible	Negligible
4	View southeast from Jubilee Reserve	Neighbourhood	Negligible	Negligible
	Wiley Park Station			
1	View southwest from Wiley Lane at King Georges Road	Local	Minor adverse	**Negligible**
2	View northwest across King Georges Road	Local	Minor beneficial	**Negligible**
3	View northwest along The Boulevarde	Neighbourhood	Negligible	Negligible
4	View northeast from The Boulevarde	Neighbourhood	Negligible	Negligible
	Punchbowl Station			
1	View south from Warren Reserve	Local	Minor beneficial	**Negligible**
2	View east along Urunga Parade	Neighbourhood	Minor adverse	**Negligible**
3	View west along The Boulevarde at Matthew Street	Local	Moderate beneficial	**Negligible**
4	View north from The Boulevarde	Local	Negligible	Negligible

Note 1:**Bold** text represents a change in impact.

During operation of the preferred project, night-time visual impact at the majority of assessed viewpoints would be reduced to negligible from minor adverse or would remain consistent with the impacts identified in the Environmental Impact Statement.

The majority of night-time visual impacts are assessed as negligible as the preferred project would have a consistent character to the existing station and would be more readily absorbed into the view. By not extending the platforms, the potential night time visual impact on adjacent residential areas around the rail corridor would be reduced.

Table 12.23 summarises the predicted night-time visual amenity impacts during operation of the preferred project in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail is provided in Appendix G.

Table 12.23 Operational night-time visual amenity impacts

Location	Sensitivity rating	Exhibited project	Preferred project
Marrickville Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Dulwich Hill Station precinct	E3: Medium district brightness	Minor adverse	Minor adverse
Hurlstone Park Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Canterbury Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Campsie Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Belmore Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Lakemba Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Wiley Park Station precinct	E3: Medium brightness district	Minor adverse	**Negligible**
Punchbowl Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Bankstown Station precinct	E4: High district brightness	Negligible	Negligible

Note 1:**Bold** text represents a change in impact.

Revised mitigation measures

Changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.

13. Track and rail systems facility upgrades environmental screening and assessment

This section summarises the potential environmental impacts relating to the operation of track and rail systems facilities. This screening assessment considers changes to potential operational impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of the preferred project in relation to the track and rail systems facility upgrades.

13.1 Environmental impact screening

This screening assessment considers changes to potential operational impacts of the exhibited project assessed in the Environmental Impact Statement, as a result of the preferred project in relation to the track and rail system facility upgrades. Chapter 9 identifies the key differences between the operational features of the preferred project compared to those of the exhibited project.

Table 13.1 indicates where the need for additional environmental assessment of the preferred project has been identified and where the assessment of the exhibited project in the Environmental Impact Statement remains applicable in relation to the preferred project track and rail system facility upgrades. The additional environmental assessment is provided in Section 13.2.1 and Section 13.2.2 of this report.

Table 13.1 Track and rail systems facility upgrades environmental screening

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Traffic, transport and access	The potential impacts during operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would continue the deliver the train service and frequency identified in the Environmental Impact Statement for the exhibited project.	No
Noise and vibration	Potential impacts during operation of the preferred project track and rail systems would differ from those of the exhibited project that were described in the Environmental Impact Statement. This is principally due to the retention of the existing track alignment along the corridor and the new crossover proposed for the preferred project on the eastern side of Campsie Station. The proposed crossover has the potential to trigger the requirement for consideration of noise mitigation options at some sensitive receivers in the vicinity of the crossover. This would be considered in greater detail during the detailed design stage of the preferred project, when the rail track design is finalised. A revised noise and vibration assessment is summarised in Section 13.2.1 and detailed in Appendix E.	Yes

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Non-Aboriginal heritage	Impacts as a result of the preferred project in relation to track and rail system facilities would be reduced from that assessed in the Environmental Impact Statement for the exhibited project. This is due to the preferred project including minimal works to the track and rail systems. As the preferred corridor footprint sits within the exhibited corridor footprint, no additional potential impacts resulting from the track and rail system facilities are anticipated. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Aboriginal heritage	Potential impacts during operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. No listed or potential Aboriginal sites were located within the footprint of the exhibited project and no impacts on listed or potential Aboriginal heritage sites were predicted in the Environmental Impact Statement during operation. As the preferred project footprint sits within the exhibited project footprint, no additional potential impacts during operation of the preferred project are anticipated. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Land use and property	The potential impacts during operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement remains applicable to the preferred project.	No
Socio-economic impacts	Socio-economic impacts and benefits relating to the operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts and benefits of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Business impacts	Business impacts and benefits relating to the operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts and benefits of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Landscape character and visual amenity	Potential impacts during operation of the preferred project track and rail systems would differ from those of the exhibited project that were described in the Environmental Impact Statement. Works within the rail corridor would be minimal as the preferred project involves retention of existing track and associated overhead wiring structures and retention of existing embankments. The retention of existing track enables more vegetation to be retained. The preferred project would therefore reduce impacts to viewpoints from new infrastructure compared to the exhibited project. A revised landscape character and visual amenity assessment is summarised in Section 13.2.2 and detailed in Appendix G.	Yes

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Soils and contamination	The potential impacts to soils and contamination in relation to the operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential impacts of the exhibited project that was provided in the Environmental Impact Statement in relation to operation of track and rail systems therefore remains applicable.	No
Hydrology, flooding and water quality	The preferred project would involve the retention of and maintenance of existing rail corridor drainage infrastructure. New works associated with the track and rail systems that have potential to change flood patterns or surface water flows would be minor. Hydrology, flooding and water quality aspects are further discussed in Section 14.1 in regards to proposed drainage works.	No
Biodiversity	Potential impacts in relation to biodiversity from the operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would not result in the removal of native plant community types requiring biodiversity offsets. This is a reduction in impact to that of the exhibited project as described in the Environmental Impact Statement. Transport for NSW would take necessary steps during operation, to locate and protect threatened species and habitats where they occur inside the Sydenham to Bankstown rail corridor. Suitable protection measures would include fencing, signage and other measures where this would not impede the safe maintenance and operation of trains and related infrastructure (see mitigation measure B10 in Section 16.1 of this report). It is also anticipated that large areas of the planted native vegetation and exotic scrub and forest within the rail corridor would not require removal due to the revised scope of the corridor works, however, this is subject to the detailed design of the proposed works, including fencing and the communications services route. The need for and replacement of vegetation removed within the rail corridor would be undertaken in accordance with the tree management strategy. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Air quality	Potential impacts in relation to operational air quality from the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Sustainability and climate change	The sustainability initiatives and targets proposed in the Environmental Impact Statement of the exhibited project (subject to detailed design), which relate to the track and rail systems , would be retained for the operation of the preferred project.	No
Hazards, risks and safety	Potential hazards, risks and safety in relation to operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Cumulative impacts	Potential cumulative impacts during operation of the preferred project track and rail systems would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

13.2 Detailed impact assessment

13.2.1 Noise and vibration

Overview

The Environmental Impact Statement and the accompanying Noise and Vibration Technical Paper (Technical Paper 2 (Noise and Vibration Assessment)) provided an operational noise and vibration assessment for the exhibited project. This assessment has been updated for the preferred project and is provided in full in Appendix E and a summary of the main findings is provided below.

Methodology

The operational noise and vibration assessment has been revised to consider the following features of the track design for the preferred project in comparison to the exhibited project:

- existing Sydney Trains tracks would be used wherever possible and significant track modification would only be required around Bankstown Station
- the revised track design would not include significant realignment in the vicinity of stations
- the turnback facility at Campsie has been removed from scope
- one new crossover on the eastern side of Campsie Station
- the rail junction and turnback to the west of Bankstown Station for Sydney Trains services has been reconfigured.

Operational impact assessment summary of findings

The design modifications described above are not anticipated to increase the operational rail airborne noise levels compared to the predictions presented in the Environmental Impact Statement Technical Paper 2 (Noise and Vibration Assessment), for the exhibited project, with the exception of the new crossover on the eastern side of Campsie Station. The retention of the existing track alignment for the preferred project would avoid the potential operational noise and vibration impacts identified for the exhibited project in the areas where new track was to be located closer to receivers. Therefore, with the exception of the new crossover, the predicted airborne noise impacts and recommended potentially feasible and reasonable noise mitigation presented in Section 16.1 are considered applicable to the revised design and may be slightly conservative in some regions.

The rail turnouts at each end of the new rail crossover on the eastern side of Campsie Station would likely increase the operational rail noise level in a region of the study area that is already predicted to be sensitive to rail noise level increases. The proposed crossover in this area has the potential to trigger the requirement for consideration of noise mitigation options at some sensitive receivers in the vicinity of the crossover.

The design modifications described above are not anticipated to increase the operational ground-borne noise and vibration levels compared to the predictions presented in the Environmental Impact Statement for the exhibited project.

A detailed review of the operational rail noise impacts and the recommended reasonable and feasible noise mitigation is provided in Section 16.1. These would be considered in greater detail during the detailed design stage of the preferred project, when the rail track design is finalised.

Revised mitigation measures

Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.

13.2.2 Landscape character and visual amenity

Overview

Potential impacts during operation of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment).The assessment has been updated for the preferred project and is provided in full in Appendix G and a summary of the main findings relating to the track and rail system is provided below.

The revised assessment includes the re-assessment of impacts to landscape character and all the viewpoints previously assessed in the Environmental Impact Statement.

Methodology

The assessment methodology, and sensitivity ratings of landscape and viewpoint locations for the visual impact assessment for the preferred project remain as outlined for the exhibited project that is described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment). The assessment provided in Appendix G compares the landscape and visual impacts identified in the Environmental Impact Statement and the changes in impacts resulting from the preferred project. This includes the re-assessment of landscapes and station viewpoints previously assessed in the Environmental Impact Statement, which require reconsideration in light of the changes incorporated into the preferred project. This includes an operational assessment of the landscape impact, daytime visual impact and night time visual impact for the rail corridor.

Operational impact assessment summary of findings

The beneficial operational landscape impacts of the preferred project have been reduced or remain consistent with the impacts identified in the Environmental Impact Statement for the exhibited project. During operation, there would be a minor adverse landscape impact experienced along all sections of the rail corridor, between Marrickville Station and Bankstown Station. This is primarily due to the proposed tree removal along the corridor together with the addition of rail corridor infrastructure, including minor modifications to existing overhead lines and support structures, telecommunication masts, and other operational infrastructure, reinforcing the corridor as a physical and visual barrier within the landscape. The retention of the existing track alignment would allow for more vegetation to be retained. The preferred project would result in an improvement on the impacts identified for the exhibited project.

During operation, daytime visual impacts of the preferred project would reduce when compared to the exhibited project in areas where trees have been retained and where there are no new retaining walls or embankments..

During operation of the preferred project, night-time visual impact relating to the track and rail systems would remain consistent with the exhibited project as described in the Environmental Impact Statement.

14. Other infrastructure elements environmental screening and assessment

This section summarises the potential environmental impacts relating to the operation of other elements of the preferred project. This screening assessment considers changes to potential operational impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of the preferred project in relation to other infrastructure inside and outside of the rail corridor.

14.1 Environmental impact screening

This screening assessment considers changes to potential operational impacts of the exhibited project that are assessed in the Environmental Impact Statement, as a result of the preferred project. Chapter 9 identifies the key differences between the operational features of the preferred project compared to those of the exhibited project. This section considers the project elements inside and outside of the rail corridor and includes the following:

- drainage
- active transport corridor and further corridor development
- bridge upgrades
- property requirement outside the rail corridor.

Proposed security fencing, noise barriers and substations for the preferred project have not changed from the exhibited project described in the Environmental Impact Statement and are not discussed in this section.

Table 14.1 indicates where the need for additional environmental assessment of the preferred project has been identified and where the assessment of the exhibited project in the Environmental Impact Statement remains applicable in relation to other infrastructure elements. The additional environmental assessment is provided in Section 14.2.1 of this report.

Table 14.1 Other infrastructure elements environmental screening

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Traffic, transport and access	The potential impacts during operation of the other infrastructure elements as part of the preferred project would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would maintain the existing level of cross-corridor access and has safeguarded/future-proofed additional crossings for future consideration. As discussed in Section 9.4.1, provision of an active transport corridor is no longer viable within the rail corridor as part of the preferred project. The preferred project would include development of a Walking and Cycling Strategy to encourage active transport to the station precincts as described in Chapter 9 of this report. This may result in the delivery of improvements along identified active transport routes to the stations. The preferred project does not preclude the Department of Planning and Environment and local councils delivering an active transport corridor between Sydenham and Bankstown outside of the rail corridor.	No
Noise and vibration	The potential impacts during operation of the other infrastructure elements as part of the preferred project would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The location and design of noise barriers adjacent to the project would be confirmed during detailed design with the aim of not exceeding trigger levels from the *Rail Infrastructure Noise Guidelines* (EPA, 2013). Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Non-Aboriginal heritage	Potential impacts during operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement, except in regards to bridge works. The potential heritage impacts from the installation of throw screens and vehicle protection measures on heritage listed bridges (Hurlstone Park Railway Underbridge, Canterbury (Cooks River) Underbridge, Canterbury (Cooks River/Charles St) Underbridge – Main Line) are minor. A revised assessment is summarised in Section 14.2.1 and detailed in Appendix F.	Yes
Aboriginal heritage	Potential impacts during operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. No listed Aboriginal sites are located within the footprint of the exhibited project. As the preferred project footprint sits within the footprint of the exhibited project, no additional potential impacts during operation of the preferred project are anticipated. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Land use and property	The preferred project would occupy a reduced area to that of the exhibited project that was described in the Environmental Impact Statement. Acquisition of private property would not be required for the preferred project. The preferred project would require access to land which is currently subject to one existing commercial lease at Wiley Park Station, on land owned by the NSW Government (RailCorp), resulting in a change in land use. This is a reduction on the 37 leases required for the exhibited project that was assessed in the Environmental Impact Statement. Potential impacts of the preferred project on land use and property would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Socio-economic impacts	The preferred project has been revised from the exhibited project that was assessed in the Environmental Impact Statement,. The preferred project would maintain the existing level of cross-corridor access and has safeguarded/future-proofed additional crossings for future consideration. As discussed in Section 9.4.1 provision of an active transport corridor is no longer viable within the rail corridor as part of the preferred project. This would reduce health, social interaction and wellbeing opportunities compared to the exhibited project but would not preclude measures to provide these opportunities in the future. The preferred project would include development of a Walking and Cycling Strategy, in consultation with stakeholders as described in Chapter 9 of this report. Implementation of the Strategy would improve local connectively from the existing environment and encourage active transport to the stations improving community infrastructure. The preferred project does not preclude the Department of Planning and Environment and local councils delivering an active transport corridor between Sydenham and Bankstown outside of the rail corridor. Potential socio-economic benefits and impacts of the preferred project would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Business impacts	Benefits from an active transport corridor identified in the Environmental Impact Statement for the exhibited project would not be delivered as part of the preferred project as this infrastructure can no longer be provided within the rail corridor. The preferred project would include development of a Walking and Cycling Strategy to encourage active transport to the station precincts which would provide similar benefits to local businesses outlined for the exhibited project in the Environmental Impact Statement from improved customer access and an enlarged customer base. The preferred project would not preclude the provision of an active transport corridor outside the rail corridor by others. Potential impacts of the preferred project on businesses would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Landscape character and visual amenity	Potential impacts to landscape character during operation of the preferred project relating to other infrastructure elements would not differ substantially from those described in the Environmental Impact Statement for the exhibited project. During operation, daytime visual impacts of the preferred project would reduce when compared to the exhibited project in areas where trees have been retained, there are no new retaining walls and where no larger bridge and underpass structures are proposed. The visual impact would not change where the impact is derived from the substations, noise barriers, and security and segregation fencing as this scope is as per the exhibited project. During operation, night-time visual impacts of the preferred project relating to other infrastructure elements would remain consistent with the exhibited project. The assessment of potential impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable in regards to these elements.	No
Soils and contamination	Potential soil and contamination impacts during operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Hydrology, flooding and water quality	The hydrology, flooding and water quality assessment that was completed for the Environmental Impact Statement considered the existing flooding and hydrology environment, taking into account relevant Council-adopted flood models or latest flood data available from Councils. The existing hydrological regime for surface and groundwater resources remain applicable to the preferred project and have been considered during design development. As the preferred project is retaining existing infrastructure where possible and minimising the extent of corridor works, the exhibited project scope relating to drainage would not be delivered, including the proposed: • new track drainage • modifications to cross drainage • new detention basins. In order to minimise impacts, the preferred project would be operated within the existing hydrological environment. The preferred project would involve the retention of and maintenance of existing drainage infrastructure. The preferred project would not therefore result in a worsening of existing flooding or flood hazard within or surrounding the rail corridor. The change in impervious areas resulting from the preferred project station upgrades would be small compared with the level of urbanisation that already exists in the catchment as a whole. The overall impervious area of the preferred project also covers a reduced area from that of the exhibited project that is assessed in the Environmental Impact Statement. As the proposed use of the railway corridor would be similar to the existing, a change in potential contamination from pollutants entering watercourses is expected to be small. Operational water discharges would be managed in accordance with the water quality management requirements specified in the environment protection licence. The mitigation measures that were proposed for the exhibited project, which are no longer relevant for the preferred project have been refined. Revised mitigation measure are presented in Section 16.1.	No
Biodiversity	Potential impacts in relation to biodiversity from operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. It is also anticipated that large areas of the planted native vegetation and exotic scrub and forest within the rail corridor would not require removal due to the revised scope of the corridor works. This is subject to the detailed design of the proposed works however, including fencing and noise barrier design. The need for and replacement of vegetation removed within the rail corridor would be undertaken in accordance with the tree management strategy. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

Environmental aspect	Comparison of potential operational impacts of preferred project against the exhibited project	Further detailed assessment required?
Air quality	Potential operational air quality impacts from the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Sustainability and climate change	The majority of the sustainability initiatives and targets outlined in the Environmental Impact Statement of the exhibited project, would be retained for the operation of the preferred project relating to other infrastructure elements. Due to the revised scope around active transport facilities and drainage design for the preferred project, the following initiatives and targets would be considered only where relevant and feasible: • water sensitive urban design measures • inclusion of renewable energy sources • assessing and mitigating climate change risks. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Hazards, risks and safety	Potential hazards, risks and safety during operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project. An additional mitigation measure (HRS2) is identified for the preferred project to ensure that substation electric and magnetic fields would remain within the limits set by appropriate guidelines (refer to Chapter 16 of this report for mitigation measures and performance outcomes).	No
Cumulative impacts	Potential cumulative impacts during operation of the preferred project relating to other infrastructure elements would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential cumulative operational impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

14.2 Detailed impact assessment

14.2.1 Non-Aboriginal heritage

Overview

Potential impacts during operation of other infrastructure elements of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment). The non-Aboriginal heritage impact assessment has been updated for the preferred project and is provided in full in Appendix F and a summary of the main findings is provided below.

Methodology

The operational assessment of heritage items within the preferred project area considered direct and visual impacts. The methodology, details and significance of the heritage features for the assessment of the preferred project remain as outlined for the exhibited project as described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment).

The updated assessment considers changes to other infrastructure elements resulting from the preferred project (refer to Section 9.4 of this report for a description of works).

Figure 12.2 shows the location of the heritage listed items and areas discussed.

Operational impact assessment summary of findings

Potential heritage impacts resulting from the preferred project would principally relate to the installation of throw screens and vehicle protection measures on heritage listed bridges. The heritage listed bridges are as follows:

- Overbridge – Illawarra Road (part of Marrickville Railway Station Group)
- Hurlstone Park Railway Underbridge,
- Canterbury (Cooks River) Underbridge,
- Canterbury (Cooks River/Charles St) Underbridge – Main Line.

A summary of the potential impacts to these heritage items during operation of the preferred project are provide in Table 14.2. This shows that impacts from the preferred project bridge works have been reduced or remain consistent with the impacts identified for the exhibited project. The retention of the Illawarra Road overbridge has reduced potential major and moderate impacts to minor. All impacts to heritage listed bridges as a result of the preferred project are minor or less.

Table 14.2 Summary of impacts for other infrastructure elements

Item	Exhibited project direct impact	Exhibited project visual impact	Preferred project direct impact	Preferred project visual impact
Illawarra Road Overbridge	Major	Moderate	Minor	Minor
Hurlstone Park Railway Underbridge	Negligible	Negligible	Negligible	Negligible
Canterbury (Cooks River) Underbridge	Moderate	Minor	Neutral	Negligible
Canterbury (Cooks River/Charles St) Underbridge – Main Line	Moderate	Minor	Minor	Minor

Revised mitigation measures

Changes to mitigation measures have been made in line with the revised scope of works for the preferred project. These are presented in Section 16.1.

15. Construction environmental screening and assessment

This section summarises the potential environmental impacts relating to the construction of the preferred project. This screening assessment considers changes to potential construction impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of changes to the construction methodology of the preferred project.

15.1 Environmental impact screening

This screening assessment considers changes to potential construction impacts assessed in the Environmental Impact Statement for the exhibited project, as a result of changes to the construction methodology of the preferred project. Overall, construction methodology of the preferred project will minimise construction impacts. Chapter 10 identifies the key differences between the construction methodology for the preferred project compared to that of the exhibited project.

Table 15.1 indicates where the need for additional environmental assessment of the preferred project has been identified and where the assessment of the exhibited project in the Environmental Impact Statement remains applicable in relation to construction. The additional environmental assessment is provided in Sections 15.2.1 to 15.2.4 of this report.

Table 15.1 Construction works environmental screening

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
Traffic, transport and access	Potential impacts during construction of the preferred project would differ from those of the exhibited project that were described in the Environmental Impact Statement. This is due to the reduction in possession periods required to construct the preferred project as well as a possession regime that minimises impacts to customers, particularly during the peak periods. In addition, long-term, full bridge closures and associated major diversions are no longer required to undertake the bridge works for the preferred project. A revised traffic, transport and access assessment is summarised in Section 15.2.1 and detailed in Appendix D.	Yes
Noise and vibration	Potential impacts during construction of the preferred project would differ from those of the exhibited project that were described in the Environmental Impact Statement. This is due to the reduction in scope of the construction activities for the preferred project and the removal of the need to use some high noise generating plant such as hydraulic rock breakers. Overall, a reduction in noise impacts to receivers is predicted. This would result in similar reductions in the requirements for additional mitigation measures. A revised assessment is summarised in Section 15.2.2 and detailed in Appendix E.	Yes
Non-Aboriginal heritage	Potential impacts during construction of the preferred project would differ from those of the exhibited project that were described in the Environmental Impact Statement. This would principally relate to changes to vibration impacts from construction works affecting existing heritage items. Overall, a reduction in impacts to heritage items or potential impacts to areas of archaeological potential is predicted as a result of the preferred project.	Yes

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
	A revised assessment is summarised in Section 15.2.3 and detailed in Appendix F.	
Aboriginal heritage	The construction area and extent of proposed excavation for the preferred project would be reduced, resulting in less disturbance and subsequently less potential to impact Aboriginal heritage. The potential to impact areas of potential archaeological deposits (S2B PAD02) at Punchbowl Station would remain. Archaeological test excavation (and salvage if required) may be carried out at S2B PAD02 at Punchbowl Station. Excavations (if required) would be conducted in accordance with the methodology outlined in the Aboriginal cultural heritage assessment report (refer to Appendix J). Minor changes to mitigation measures have been made in line with the revised scope of works for the preferred project. These are presented in Section 16.1 of this report. Potential impacts of the preferred project on Aboriginal heritage would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement.	No
Land use and property	The preferred project would occupy a reduced area to that of the exhibited project that was described in the Environmental Impact Statement. The preferred project would not require the acquisition of private properties, although temporary leases for land occupied for construction compounds and other work sites during construction would still be required. Two work sites and one compound would no longer be required since drainage works and widening of Station Street at Marrickville are not proposed. Therefore, the land use impacts of the exhibited project that was described in the Environmental Impact Statement, as they relate to those sites, would not occur with the preferred project. Therefore the preferred project would enable existing land uses to continue as follows: • Station Street, Marrickville – existing use is retail • McNeilly Park – existing use is open space • Livingstone Road bridge – existing use is a roadway. The proposed change to the traction supply cable route would mean that there would be no impacts on Hughes Park, as the cable is proposed to be located within the Westfield Street road reserve. Construction would temporarily impact on land use in Westfield Street, however these impacts would be similar to those outlined in the Environmental Impact Statement for other roadways. The adjustment of the alignment to Westfield Street would also include a section along the existing access to the Ausgrid substation. Due to the infrequent use of this access and the availability of an alternate access to the substation, impacts on the use of this land during construction would be minimal. Temporary land take and the short term presence of construction equipment, plant, vehicles, and fenced work sites would be reduced. Minor changes to mitigation measures have been made in line with the revised scope of works for the preferred project. These are presented in Section 16.1 of this report. Potential impacts of the preferred project on land use and property would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
Socio-economic impacts	The preferred project would reduce impacts to community infrastructure located near the preferred project area. This is mainly due to a decrease in impacts to amenity, access arrangements, traffic congestion, noise, vibration and dust, and changes to parking availability. McNeilly Park (worksite W2 for the exhibited project) would not be required for the preferred project ensuring the park would remain available to the community in its present form. Impacts that were predicted in the Environmental Impact Statement for the exhibited project, in relation to amenity, health and social cohesion would be reduced with the preferred project. The proposed change to the traction supply cable route would mean that there would be no impacts on Hughes Park, as the cable is proposed to be located within the Westfield Street road reserve. The proposed changes would have the potential to expose additional receivers to potential amenity impacts during construction. However, these impacts would be consistent with the amenity impacts assessed in the Environmental Impact Statement for the exhibited project, and no additional impacts are predicted. The number of, and the duration of, closures of the rail line during possession periods would be reduced with the preferred project. This would reduce the levels of disruption to the community associated with the exhibited project that were assessed in the Environmental Impact Statement. A retail site on Station Street, Marrickville (Compound site C2 for the exhibited project) would not be required for the preferred project. This would therefore minimise local economic impacts that were predicted in the Environmental Impact Statement. Minor changes to mitigation measures have been made in line with the revised scope of works for the preferred project. These are presented in Section 16.1 of this report. Potential economic benefits from construction of the preferred project would not differ substantially from the impacts predicted in the Environmental Impact Statement for the exhibited project. The assessment of potential construction impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Business impacts	The duration of closures of the rail line during possession periods for the preferred project would be reduced from those of the exhibited project that were described in the Environmental Impact Statement. The preferred project would therefore reduce the levels and duration of disruption and impacts to businesses dependent on passing trade generated by rail customers. Transport for NSW would look to keep existing retail businesses within the station entrances open where possible. The preferred project would require less land acquisition and lease cessation than required for the exhibited project. This would result in fewer business closures and less disruption to local businesses. Potential benefits to local businesses from construction workers requiring food and beverage supplies and other goods and services would also decrease as a result of a reduced duration of construction activity. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
Landscape character and visual amenity	Potential impacts to landscape character and visual amenity during construction of the preferred project would differ from those of the exhibited project that were described in the Environmental Impact Statement. Overall a reduction in impacts are predicted due to the reduction in construction activities for the preferred project in order to minimise construction impacts. The potential landscape character impacts of the preferred project during construction would be reduced from the moderate adverse to minor adverse at Hurlstone Park, Canterbury, Campsie, Belmore, Lakemba and Punchbowl Stations. This is due to the revised construction methodology. Predicted impacts would remain consistent with the exhibited project at other stations. Similarly, the visual impacts during construction would be reduced as station buildings and more trees within the station precincts would be retained. The overall maximum number of trees potentially affected within station precincts would decrease from 893 for the exhibited project, as shown in the Environmental Impact Statement, to 503 for the preferred project. A revised landscape character and visual amenity assessment is summarised in Section 15.2.4 and detailed in Appendix G.	Yes
Soils and contamination	Potential soil and contamination impacts related to construction of the preferred project would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The extent and depth of excavations required for the preferred project would be greatly reduced to comprise site levelling and the installation of new communication services routes. The preferred project would not require upgrades to existing embankments and cuttings, and there would therefore be a reduction in impact to soils, ground conditions and the potential for disturbing contaminated land. Potential soil and contamination impacts of the preferred project would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement. As the footprint of the preferred project sits within the footprint of the exhibited project, the assessment of potential construction impacts of the exhibited project provided in the Environmental Impact Statement, remains applicable to the preferred project. Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
Hydrology, flooding and water quality	The hydrology, flooding and water quality impacts of the preferred project during construction are generally the same as those of the exhibited project that were assessed in the Environmental Impact Statement with the following exceptions: • The construction works area for the preferred project would be reduced and two worksites (McNeilly Park Marrickville (W2) and Livingstone Road bridge (W3)) and one construction compound Station Street, Marrickville (C2) would not be required. • The extent and depth of excavation required for the preferred project would be greatly reduced from that of the exhibited project to comprise site levelling and the installation of new communication services routes. Therefore, the potential to impact groundwater flows or water quality would be reduced. As dewatering of excavations would also likely not be required the potential for water quality impacts due to increased sediment loads from discharge of water from dewatering would also be removed. • Construction of the preferred project would not involve works in and around watercourses therefore the potential for disturbance of beds and banks, potentially leading to localised erosion and sediment transport downstream, would be removed. These changes to the scope of works would reduce potential impacts during construction of the preferred project that were predicted for the exhibited project in the Environmental Impact Statement. The potential construction impacts of the preferred project on hydrology, flooding and water quality would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement. Changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	No
Biodiversity	The reduction in construction works for the preferred project to minimise construction impacts would lead to a decrease in the amount of vegetation removal that was identified for the exhibited project in the Environmental Impact Statement. A list of the trees and vegetation which may need to be removed for the preferred project is provided in Table 10.1 of Section 10.2. This identifies that the preferred project would enable the retention of one hectare of native plant community types, which was identified for removal for the exhibited project in the Environmental Impact Statement. It is also anticipated that large areas of the planted native vegetation and exotic scrub and forest within the rail corridor would not require removal due to the revised scope of the corridor works, however, this is subject to the detailed design of the proposed works, including fencing and the communications services route. The need for and replacement of vegetation removed within the rail corridor would be undertaken in accordance with the tree management strategy, consistent with that described for the exhibited project in the Environmental Impact Statement.	No

Environmental aspect	Comparison of potential construction impacts of preferred project against the exhibited project	Further detailed assessment required?
	Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.	
Air quality	Construction dust and emissions from construction equipment would be decreased for the preferred project when compared to the exhibited project. The footprint of the preferred project sits within and is smaller than the footprint of the exhibited project, which would result in a decrease in potential air quality impacts to residential, commercial and recreational receivers at these locations. This includes two worksites - McNeilly Park, Marrickville (W2) and Livingstone Road bridge (W3) and one compound site (C2) Station Street, Marrickville, which would not be used for the preferred project. Potential impacts of the preferred project on air quality, would therefore be reduced from those of the exhibited project that were described in the Environmental Impact Statement.	No
Sustainability and climate change	The sustainability initiatives and targets proposed in the Environmental Impact Statement for the exhibited project, which relate to construction of the preferred project would be retained.	No
Hazards, risks and safety	Potential hazards, risks and safety in relation to construction of the preferred project would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement. The assessment of potential construction impacts of the exhibited project that was provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No
Cumulative impacts	Potential cumulative impacts during construction of the preferred project would not differ substantially from those of the exhibited project that were described in the Environmental Impact Statement although the construction impacts from the preferred project would be reduced. The assessment of potential construction impacts of the exhibited project that were provided in the Environmental Impact Statement therefore remains applicable to the preferred project.	No

15.2 Detailed impact assessment

15.2.1 Traffic, transport and access

Overview

The Environmental Impact Statement presented a construction traffic assessment (Technical Paper 1 (Traffic, transport and access assessment)) for the exhibited project. This assessment has been updated for the preferred project and is provided in full in Appendix D and a summary of the main findings is provided below.

Methodology

The assessment has been revisited to include consideration of the change in possession periods proposed for construction of the preferred project. The change in the proposed possession periods required for the preferred project, compared to the exhibited project as described in the Environmental Impact Statement are discussed in Section 10.3. The assessment methodology is described in full in Appendix D.

The principal changes in comparison to the exhibited project are as follows:

- Compared to the exhibited project, the preferred project does not include:
  - Possessions of the T3 Bankstown Line of up to six weeks during the Christmas school holiday period each year between 2019 and 2024, and two-week school holiday possessions in July each year
  - Extensive bridge works resulting in long-term full bridge closures and road diversions.
- Compared to the exhibited project, the preferred project includes:
  - Possessions of the T3 Bankstown Line of up to two weeks (either in full or part) during the Christmas school holiday periods
  - Up to an additional eight weekend possessions each year
  - Occasional night-time weekday possessions
  - Temporary closure of stations for up to two months. It is noted that the Environmental Impact Statement stated that temporary closure of individual stations would be considered during detailed construction planning and could occur overnight when stations are not in use or between possessions for a period of up to several weeks
  - Minor bridge works which can occur without the need for long-term full bridge closures (short term lane restrictions only).

Both the exhibited project and preferred project requires the final, longer possession of about three to six months to enable the rail line to be converted to metro operations.

During possession periods and/or station closures, the implementation of alternative transport arrangements for rail customers, guided by the Temporary Transport Strategy, would be required. The Environmental Impact Statement presented the Temporary Transport Strategy. This Strategy contained a potential service network for the replacement buses, referred to as the refined baseline Temporary Transport Plan (TTP), and this has been used for this assessment.

To demonstrate the potential impact of the preferred project additional assessment was undertaken. This included:

- Additional intersection modelling to demonstrate the potential impact during the Christmas possession periods. The results for key intersections around each station area are provided for two scenarios for the degree of saturation (DoS) and level of service (LoS), as follows:
  - new assessment for the preferred project: 2023 future conditions Christmas period with construction traffic
  - new assessment for the preferred project: 2023 future conditions Christmas Period with construction traffic and with the refined baseline TTP.
- Qualitative discussion of the impacts of the additional weekend possessions, night-time weekday possessions, station closures and bridge works. The discussion of bridge works includes a discussion on the potential impacts to pedestrians and cyclists.

The following assessment presented in the Environmental Impact Statement has not changed, and remains relevant to the preferred project:

- The final possession period assessment of potential impacts

- Impacts to pedestrians, cyclists, public transport, kerbside facilities and parking (including loading zones) due to construction haulage, construction compounds and worksites
- Impacts as a result of alternative transport arrangements during possession periods
- Impacts to road user safety and special event management.

In addition, some minor changes to haulage routes, as presented in Section 10.4, have been considered within the revised intersection modelling.

Figure 12.1 shows the study area and the associated road network and transport facilities.

Construction traffic, transport and impact assessment

Intersection performance

Overview

This section presents an overview of road intersection performance during the Christmas possession periods. For the detailed results, including modelling tables for each intersection, refer to Appendix D.

To present a worst case assessment, the modelling has assumed that there has been no reduction in the volume of construction vehicles or the number of buses required for refined baseline TTP scenario for the preferred project when compared to the exhibited project. The key change for the preferred project relates to the reduction in background traffic volumes during the two week possession period during the Christmas school holidays.

To determine the reduction in background traffic volumes Christmas school holidays, data from previous years were analysed. The analysis concluded that Christmas school holiday, citybound traffic was 36 per cent and nine per cent lower during the AM and PM periods respectively when compared to a typical weekday (i.e. during non-holiday periods). The outbound traffic was 29 per cent and 8 per cent lower during the AM and PM periods respectively. This proportional reduction was then applied to all intersections modelled across the project area.

The following indicators were used to assess intersection performance:

- Level of service (LoS) – a measure of the overall performance of the intersection. This includes the average delay likely to be experienced by a vehicle waiting at an intersection (the criteria used are listed in Table 15.2).
- Degree of saturation (DoS) – the ratio between traffic volumes and capacity of the intersection, which indicates how close to capacity an intersection is operating (with a number below 1.0 typically targeted).

Table 15.2 Level of service criteria

Level of service	Average delay (seconds)	Traffic signals and roundabouts
A	Less than 14	Good operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity, incidents will cause excessive delays at signals
F	>70	Signals exceed capacity, roundabouts require other control mode

For the intersections modelled, the majority of results identify a LoS ‘C’ or better. This result would be considered satisfactory for intersection performance during peak periods.

There are some intersections where the results identify a LoS D to F for the preferred project. However, this performance is reduced when compared to the impacts of the exhibited project and is generally consistent with or improved when compared to the performance of a future typical weekday during peak periods. This arises as a result of the Christmas possession periods occurring during a period of the year when the traffic flows are well below the typical levels, even with the addition of the construction and refined baseline TTP vehicles.

Therefore, the revised possession periods for the preferred project would result in a significant reduction in the construction traffic impacts when compared to the possessions assessed for the exhibited project.

Where required, mitigation measures have been identified. Further, the temporary transport management plans, in line with the Temporary Transport Strategy, would seek to identify measures to minimise delays during possession periods.

Sydenham

Three intersections were modelled in the area surrounding Sydenham Station. These intersections were chosen for modelling based on the routes of the refined baseline TTP. Although no construction haulage route are identified at this location as part of the preferred project, refined baseline TTP buses would operate to this station and may affect these intersections.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersection as a result of the preferred project:

- Gleeson Avenue / Unwins Bridge Road: the predicted level of service is expected to reduce from LoS C to B during the AM and PM periods.

Compared to the exhibited project, there would no change to the level of service at the following intersections:

- Gleeson Avenue / Burrows Road
- Gleeson Avenue / Railway Parade.

Marrickville

Five intersections were modelled in the area surrounding Marrickville Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Marrickville Road / Illawarra Road: the predicted level of service is expected to reduce from LoS C to B during the AM period
- Marrickville Road / Victoria Road: the predicted level of service is expected to reduce from LoS F to C during the AM period and from LoS F to D during the PM period. A LoS D during the PM period is still an improvement from the expected LoS E during a future typical weekday without construction vehicles and TTP buses.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Illawarra Road / Warren Road
- Petersham Road / Illawarra Road
- Marrickville Station overbridge.

The performance of the Marrickville Road / Illawarra Road intersection during the PM peak is expected to deteriorate from a LoS B to C for the preferred project, however given the intersection would perform satisfactorily at LoS C no significant impact is anticipated.

Dulwich Hill

Six intersections were modelled in the areas surrounding Dulwich Hill Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Wardell Road/Ewart Street: the predicted level of service is expected to reduce from LoS F to LoS C during the AM peak and LoS F to LoS E during PM peak period
- Wardell Road/Dudley Street: the predicted level of service is expected to reduce from LoS F to LoS A during the AM peak and LoS F to LoS E during PM peak period
- Ewart Street/Bayley Street: the predicted level of service is expected to reduce from LoS B to LoS A during both the AM and PM peak period
- New Canterbury Road/Terrace Road: the predicted level of service is expected to reduce from LoS B to LoS A during the PM peak period
- Wardell Road/Marrickville Road: the predicted level of service is expected to reduce from LoS F to LoS B during the AM peak and LoS E to LoS C during PM peak period.

Compared to the exhibited project, there would be no change to the level of service at the New Canterbury Road/Marrickville Road intersection.

Hurlstone Park

Four intersections were modelled in the area surrounding Hurlstone Park Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Canterbury Road/Crinan Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period
- Canterbury Road/New Canterbury Road: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Crinan Street/Floss Street - south of railway
- Floss Street/Crinan Street/Duntroon Street.

Canterbury

Four intersections were modelled in the area surrounding Canterbury Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Canterbury Road/Wonga Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period

- Canterbury Road/Close Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak and LoS D to LoS B during PM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Canterbury Road/Charles Street. It is understood that there is a proposal to signalise this intersection. Whilst details of this proposal were not available at the time of assessment, the addition of signals would allow traffic on the Charles Street arm to egress with much less delay.
- Canterbury Road/Jeffrey Road.

Campsie

Seven intersections were modelled in the area surrounding Campsie Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Beamish Street/Ninth Avenue: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period
- Beamish Street/Clissold Parade: the predicted level of service is expected to reduce from LoS C to LoS A during the AM peak and LoS F to LoS E during PM peak period
- Beamish Street/South Parade: the predicted level of service is expected to reduce from LoS C to LoS B during the AM peak and LoS F to LoS C during PM peak period
- Beamish Street/North Parade: the predicted level of service is expected to reduce from LoS F to LoS D during the PM peak period
- Beamish Street/Amy Street: the predicted level of service is expected to reduce from LoS B to LoS A during the PM peak period
- Ninth Avenue/Loch Street: the predicted level of service is expected to reduce from LoS E to LoS A during the AM peak and LoS C to LoS A during PM peak period

Compared to the exhibited project, there would be no change to the level of service at the Canterbury Road/Beamish Street intersection.

Belmore

Four intersections were modelled in the area surrounding Belmore Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Burwood Road/Bridge Road: the predicted level of service is expected to reduce from LoS F to LoS D during the AM peak period
- Burwood Road/Redman Parade: the predicted level of service is expected to reduce from LoS F to LoS C during the AM peak period
- Burwood Road/Lakemba Street: the predicted level of service is expected to reduce from LoS F to LoS A during the AM peak and LoS F to LoS B during PM peak period.

Compared to the exhibited project, there would be no change to the level of service at the Canterbury Road/Burwood Road intersection.

Lakemba

Six intersections were modelled in the area surrounding Lakemba Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Haldon Street/Railway Parade: the predicted level of service is expected to reduce from LoS F to LoS B during the AM peak and LoS F to LoS A during PM peak period
- Lakemba Street/Haldon Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Lakemba Street/Wangee Road
- The Boulevarde/Haldon Street
- Pedestrian crossing on The Boulevarde
- Canterbury Road/Haldon Street.

Wiley Park

Two intersections were modelled in the area surrounding Wiley Park Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- King George Road/Lakemba Street: the predicted level of service is expected to reduce from LoS C to LoS B during the AM peak and LoS D to LoS C during PM peak period
- King Georges Road/The Boulevarde: the predicted level of service is expected to reduce from LoS E to LoS C during the AM peak period.

Punchbowl

Four intersections were modelled in the area surrounding Punchbowl Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Punchbowl Road/South Terrace: the predicted level of service is expected to reduce from LoS F to LoS C during the AM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Punchbowl Road/The Boulevarde
- Punchbowl Road/Rossmore Avenue
- The Boulevarde/Arthur Street.

Bankstown

Ten intersections were modelled in the area surrounding Bankstown Station, based on the routes of construction haulage traffic and refined baseline TTP.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Restwell Street/Raymond Street: the predicted level of service is expected to reduce from LoS C to LoS B during the PM peak period
- Meredith Street/Marion Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period
- Stacey Street/Wattle Street: the predicted level of service is expected to reduce from LoS C to LoS B during the AM peak period
- North Terrace/Wattle Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak and LoS F to LoS C during PM peak period
- Stanley Street/Stacey Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period
- The Appian Way/North Terrace: the predicted level of service is expected to reduce from LoS C to LoS B during the AM peak period
- Marion Street/Greenwood Avenue: the predicted level of service is expected to reduce from LoS C to LoS B during the AM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- South Terrace/Restwell Street
- South Terrace/West Terrace
- Marion Street/Oxford Avenue.

Regents Park

One intersection, the Auburn Road / Amy Street roundabout, was modelled in the area surrounding Regents Park Station. Although no construction haulage routes are identified at this location as part of the preferred project, TTP buses would operate to this station and may affect these intersections. The predicted level of service is expected to reduce at this intersection from LoS B to LoS A during the AM peak period and remain at LoS A during the PM peak.

Lidcombe

Four intersections were modelled in the area surrounding Lidcombe Station. Although no construction haulage route are identified at this location as part of the preferred project, TTP buses would operate to this station and may affect these intersections.

Compared to the exhibited project, there would be an improvement to the level of service at the following intersections as a result of the preferred project:

- Vaughan Street / Joseph Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak period
- Olympic Drive / Church Street: the predicted level of service is expected to reduce from LoS B to LoS A during the AM peak and LoS D to LoS B during PM peak period.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Joseph Street / Georges Ave
- Olympic Drive / Joseph Street.

Birrong

One intersection, Auburn Road / Moller Avenue, was modelled in the area surrounding Birrong Station. Although no construction haulage routes are identified at this location as part of the preferred project, TTP buses would operate to this station and may affect these intersections. The predicted level of service is expected to reduce at this intersection from LoS D to LoS B during the AM peak period and LoS C to LoS B during the AM during the PM peak.

Yagoona

Two intersections were modelled in the area surrounding Yagoona Station. Although no construction haulage routes are identified at this location as part of the preferred project, TTP buses would operate to this station and may affect these intersections.

Compared to the exhibited project, there would be no change to the level of service at the following intersections:

- Chapel Rd / Hume Highway
- Church Rd / Hume Highway.

Weekend possessions

During the weekend possessions, replacement buses would replicate the rail possessions that currently occur on up to four weekends a year for routine maintenance by Sydney Trains. The frequency of these buses during this time is up to 28 buses per hour. The impact of the preferred project during these additional weekend possessions has been assumed to be consistent with the impacts of these standard weekend possessions.

The operation of the rail replacement bus services currently occurs without significant disruption. However, as detailed in the Temporary Transport Strategy, monitoring would be undertaken of the temporary transport arrangements during these additional weekend possessions and the outcome of that monitoring would be utilised to refine the approach to these possessions during the preferred project.

Night-time weekday possessions

During the night-time weekday possessions, replacement buses would be provided to transport customers that use the late evening train services. The transport effects would be minimal to negligible and constrained to the routes of the replacement buses. These routes are assumed to be the same as for the refined baseline TTP, but require a significantly reduced frequency of services.

Station closures

Since the exhibition of the Environmental Impact Statement, further construction planning has been undertaken to confirm the need and duration for individual station closures. The construction of the preferred project would require the closure of stations for up to two months to complete station works. Up to three stations may be closed at any one time. During the station closures, the T3 Bankstown line trains would still operate, however passengers would be unable to board or alight at the closed stations. For the purposes of the assessment, it has been assumed that the station works would be completed at two neighbouring stations (e.g. Dulwich Hill and Marrickville stations) at a time and would require temporary transport buses for passengers to get to adjacent operating stations (e.g. Sydenham and Hurlstone Park stations).

For the purpose of a worst case assessment, impacts of temporary transport buses to get passengers to adjacent stations has been interpolated as being between the future typical weekday scenario plus construction vehicles and the refined baseline TTP scenario plus construction traffic. The actual impact of the temporary transport buses during these closures is likely to be much less than this, as only the patronage for the closed station would need to be accounted for. The numbers of rail customers needing to utilise these buses is also likely to be less, as people may make their own way to adjacent stations.

A qualitative assessment of the potential impact of station closures has been undertaken in Appendix D. Likely impacts include:

- delays in some intersections resulting from temporary transport buses, which would need to mitigated and managed in line with the Temporary Transport Strategy
- some commuters who usually drive to a closed station would look to park at the adjacent station. This may result in others having to park further away from their usual station.

The assessment presented in Appendix D has shown that the potential impact of the stations closures on the road network and parking availability would generally be negligible, however, in some cases some mitigation would need to be considered as part of the development of temporary transport management plans, outlined in the Temporary Transport Strategy.

Bridge works

Bridge works for the preferred project have been refined (refer to Section 9.4). The works can be undertaken without the need to close bridges, however, some lane restrictions may be required. This has resulted in a significant reduction in the impacts of the preferred project when compared to the exhibited project.

Where short term lane restrictions for the protection of the construction workforce would be required, these works could be carried out over night or at weekends and traffic management would be in place to facilitate safe movement of traffic without diversion (i.e. two way traffic controlled by stop/go boards).

During these works, is it likely that there would need to be footpath closures to ensure the safety of pedestrians and cyclists. The duration of these closures would be minimised to reduce the impacts.

Where a bridge has footpaths on both sides, only one throw screen would be constructed at a time. This would enable diversions of pedestrians and cyclists to the opposite side of the bridge. Where footpaths are narrow, construction management during this period would be implemented to ensure the safety of pedestrians and cyclists.

The following bridges only have footpaths on one side of the road:

- Albermarle Street Overbridge
- Stacey Street Overbridge.

Further, Duke Street Footbridge and Church Street / Hutton Street Footbridge cater only for pedestrian movements and would therefore require full closures to allow bridge works to proceed. As such, the pedestrian diversion routes identified in the Environmental Impact Statement remain relevant to the preferred project.

Traction supply cable route

Alignment of the power supply cable near Hughes Park would be revised for the preferred project from the route described for the exhibited project in the Environmental Impact Statement. Construction of the proposed new section of the route would affect Westfield Street, which is a local street providing access to Hughes Park, and secondary access to Ausgrid's Canterbury substation. The section of street along which the cable is proposed is not fronted by residential dwellings. Construction is likely to involve trenching within the road reserve. Given the width of the road reserve in this section, it is unlikely that full road closures would be required. An alternative access to Ausgrid's substation is available from McGrath Street.

Potential impacts would be managed by installing temporary traffic management measures, defined by the construction traffic management plan as outlined in Section 16.1.

Revised mitigation measures

Changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report. Mitigation has been updated to exclude measures, such as bridge or intersection works, which are no longer included in the preferred project.

15.2.2 Noise and vibration

Overview

The Environmental Impact Statement presented a construction noise and vibration assessment (Technical Paper 2 (Noise and Vibration Assessment)) for the exhibited project. This assessment has been updated for the preferred project and is provided in full in Appendix E and a summary of the main findings is provided below.

Methodology

The construction noise and vibration assessment uses the same methodology and assumptions as used in the Environmental Impact Statement Technical Paper 2 – Noise and Vibration Assessment (SLR 2017) for the exhibited project. The assessment has been revised to consider the key changes to the construction methodology for the preferred project in comparison to the exhibited project including:

- worksites and construction compounds removed from noise catchment area NCA01 (Marrickville) and NCA02 (Dulwich Hill)
- bridge replacement works no longer required in noise catchment area NCA01 (Marrickville) and NCA02 (Dulwich Hill)
- proposed works to bridges across all noise catchment areas are restricted to the bridges themselves
- significant earthworks no longer required in all noise catchment areas
- drainage works no longer required in all noise catchment areas
- track works no longer required in all noise catchment areas except NCA06 (Campsie) and NCA11-13 (Bankstown).

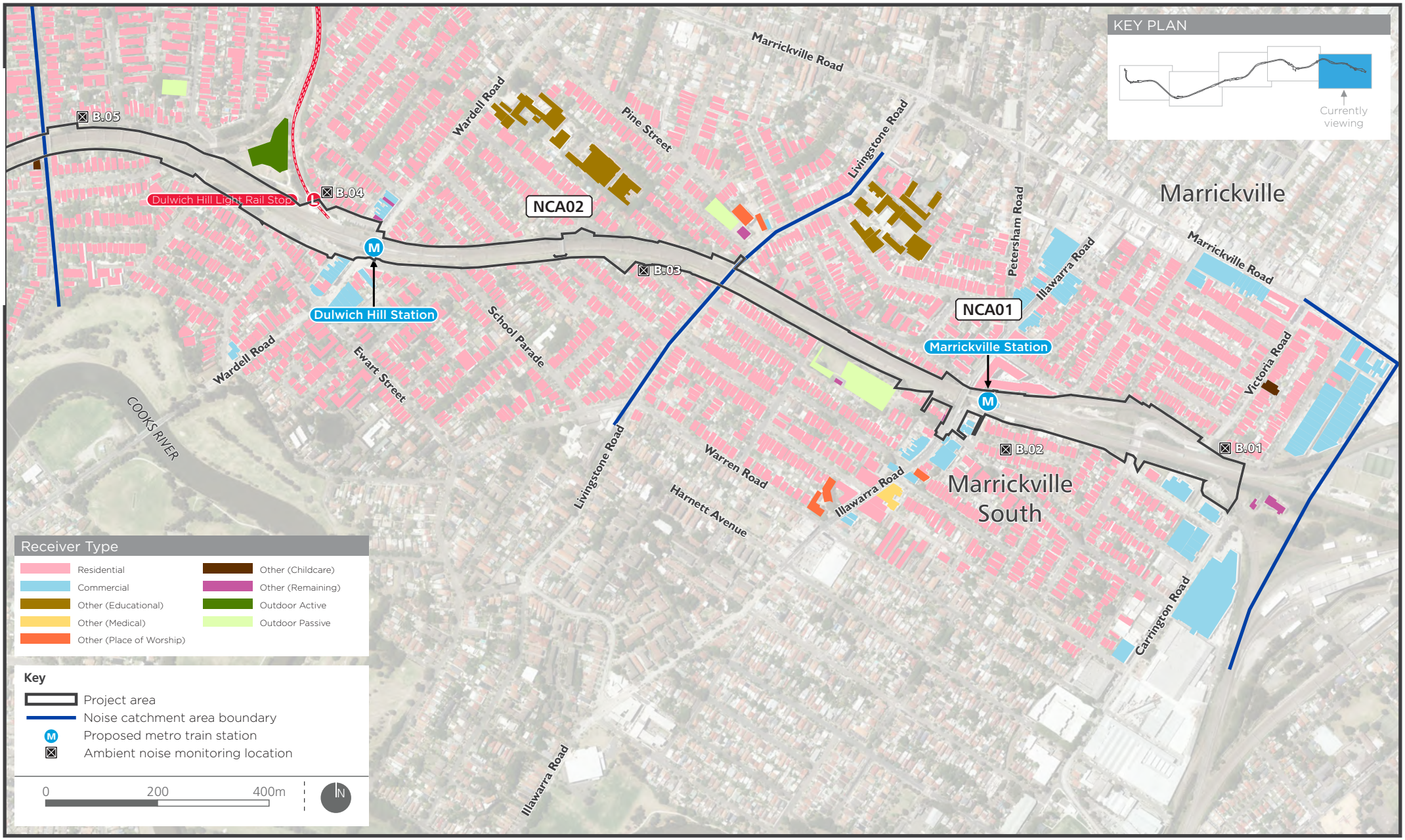
Table 15.3 summarises the major changes that have reduced noise impacts.

Table 15.3 Major changes to construction of the preferred project that reduce noise impacts

ID	Changes to the scope of work relating to the preferred project
1	Rockbreakers were proposed for the exhibited project in several construction scenarios and locations with the project footprint. Rockbreakers are typically the cause of the highest noise levels and impacts. The preferred project has resulted in rockbreakers no longer being required.
2	In the exhibited project, the majority of the stations were proposed to be demolished and rebuilt. The preferred project comprises alterations to the platform height only and other minor upgrade works.
3	The exhibited project proposed track re-alignment works at most stations and other locations along the rail corridor. The requirement for track works has been substantially reduced for the preferred project. Track works are now only required at isolated locations, for example at Bankstown station and at locations where cross-over works are proposed (i.e. Campsie).
4	Bridge works would comprise provision of throw screens and protection measures. Previously, some bridges were being replaced or required more intensive strengthening works.
5	The noise modelling for bridges and station works previously assumed that works would occur at the bridge or station and at the associated construction compounds. The current noise modelling has been refined to only have the major noise generating scenarios at the location of the bridges or station platforms, with site establishment works at the compounds.

Figure 15.1 identifies the NCAs, sensitive receivers and noise monitoring locations. This figure presents the updated work areas and excludes the three work areas that are no longer part of the preferred project namely:

- Station Street, Marrickville (formerly compound site C2 for the exhibited project)
- McNeilly Park (formerly work site W2 for the exhibited project)
- Livingstone Road bridge (formerly work site W3 for the exhibited project).



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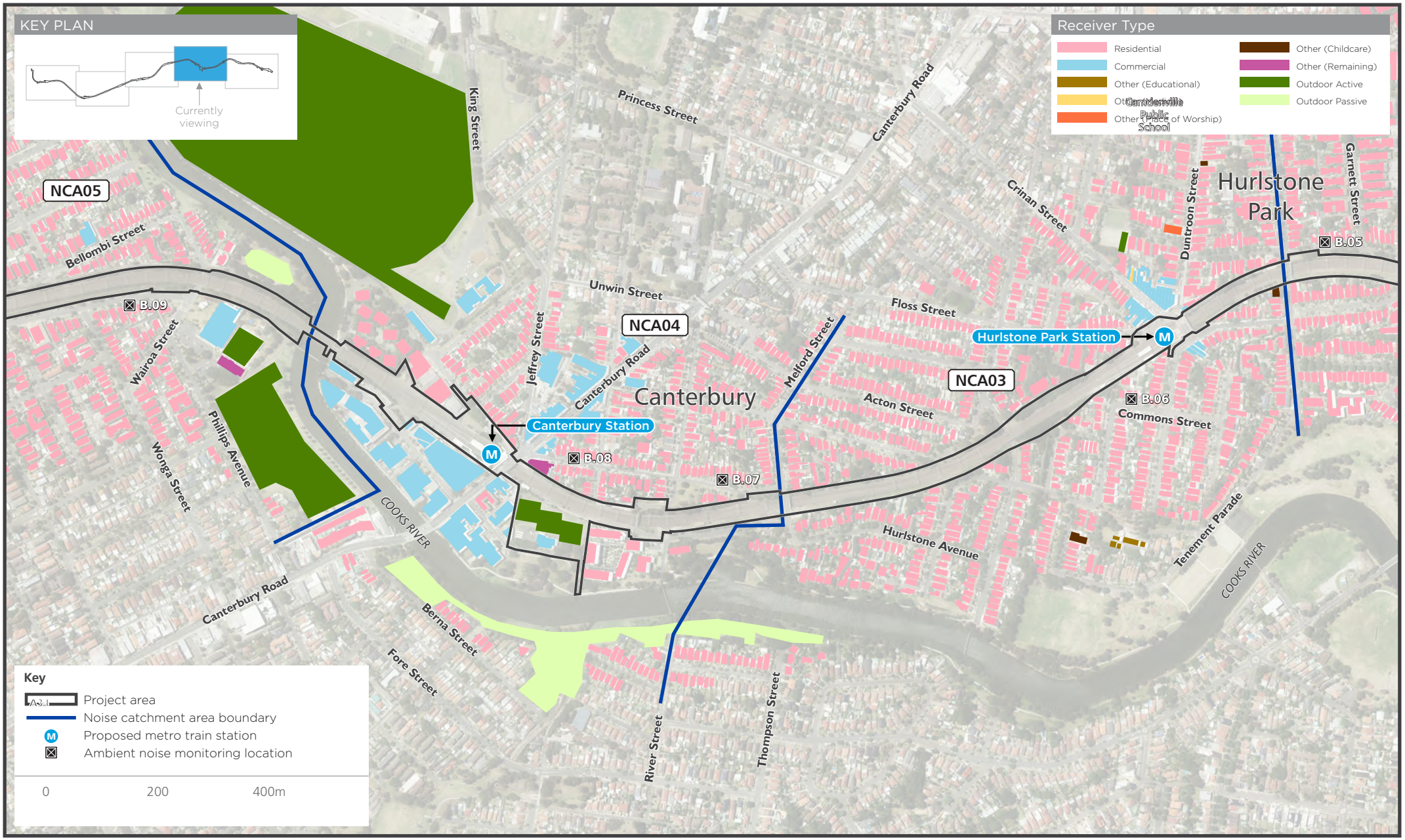
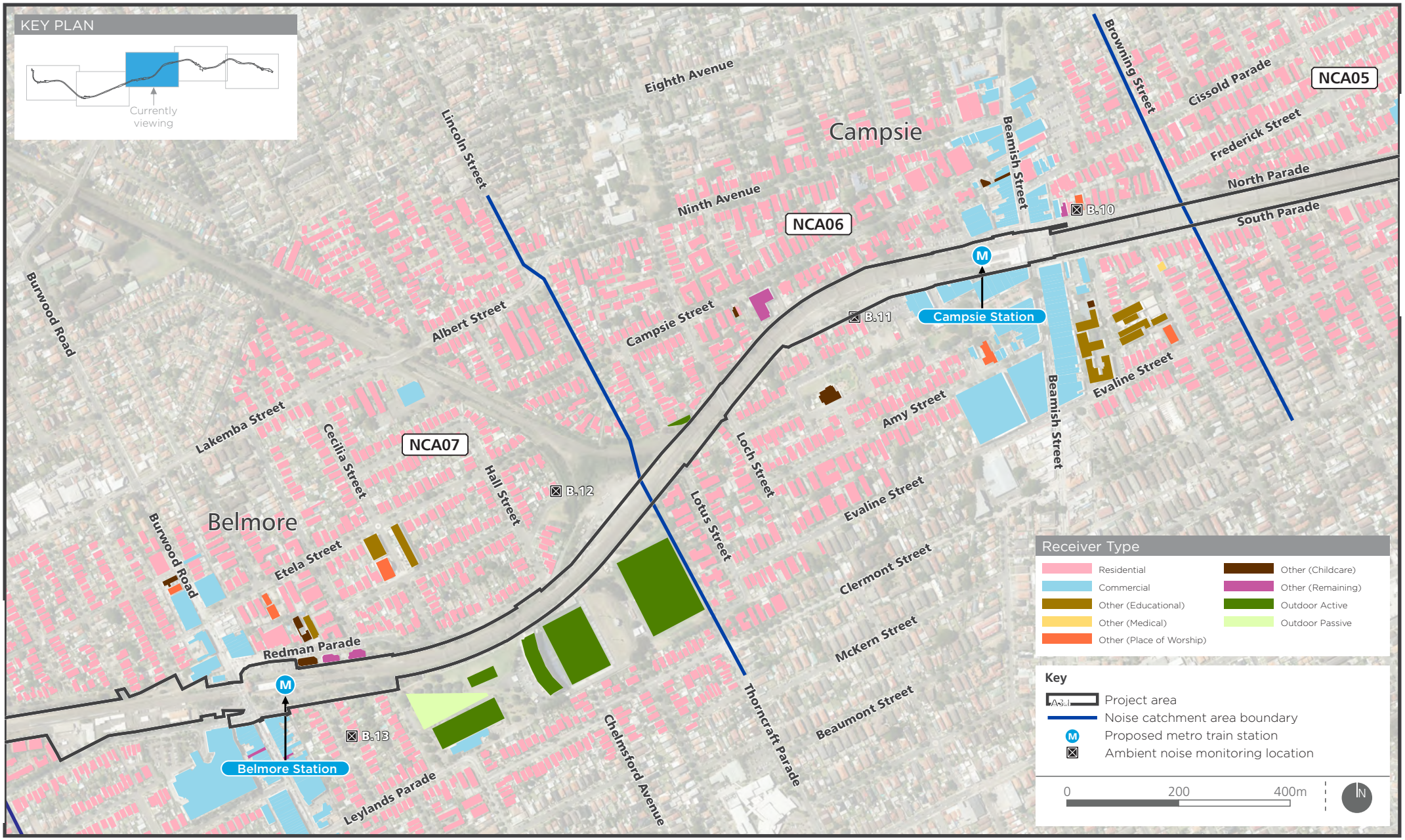
Noise catchment areas, sensitive receivers and ambient noise monitoring locations - map 1

FIGURE 15.1



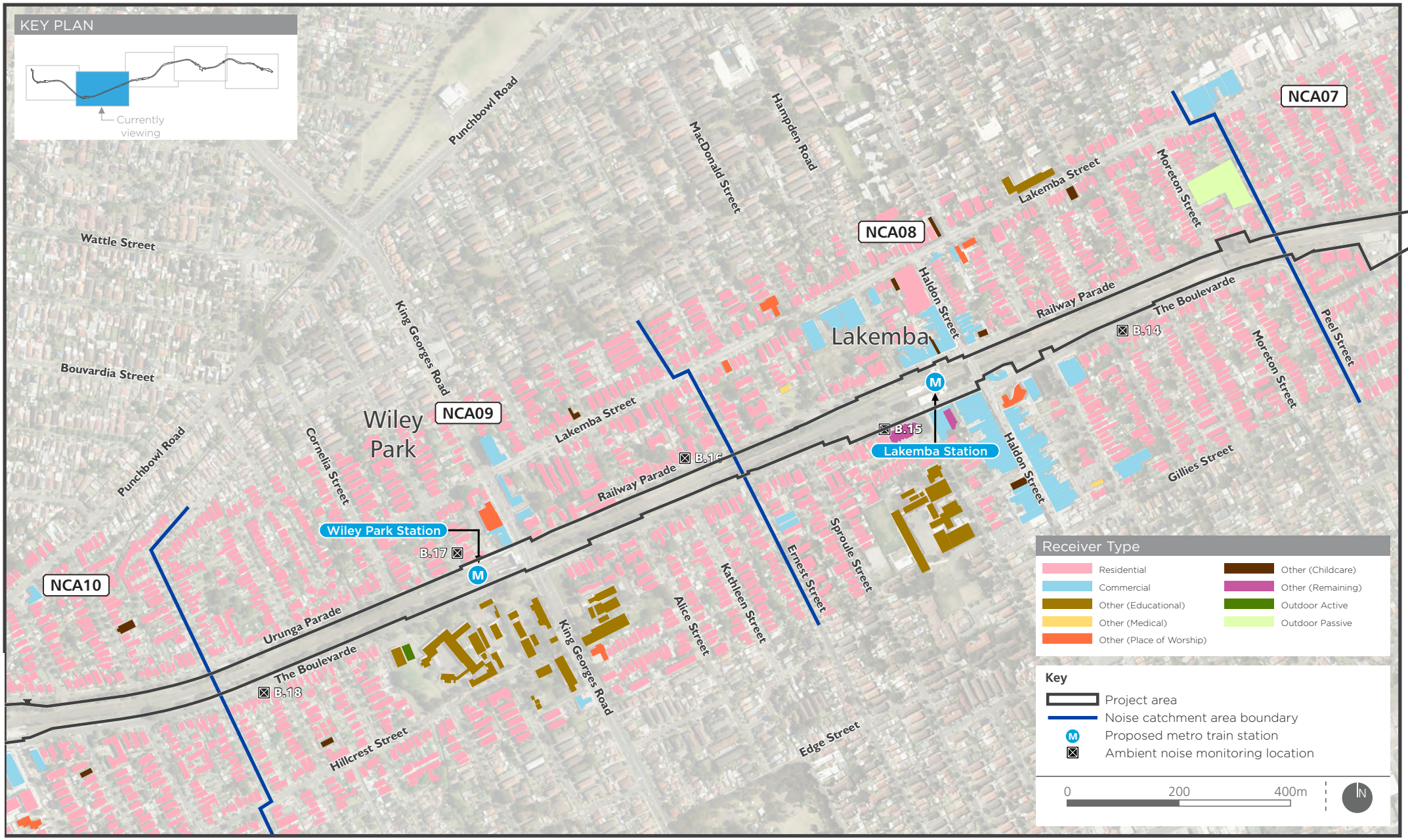
Noise catchment areas, sensitive receivers and ambient noise monitoring locations - map 2

FIGURE 15.1



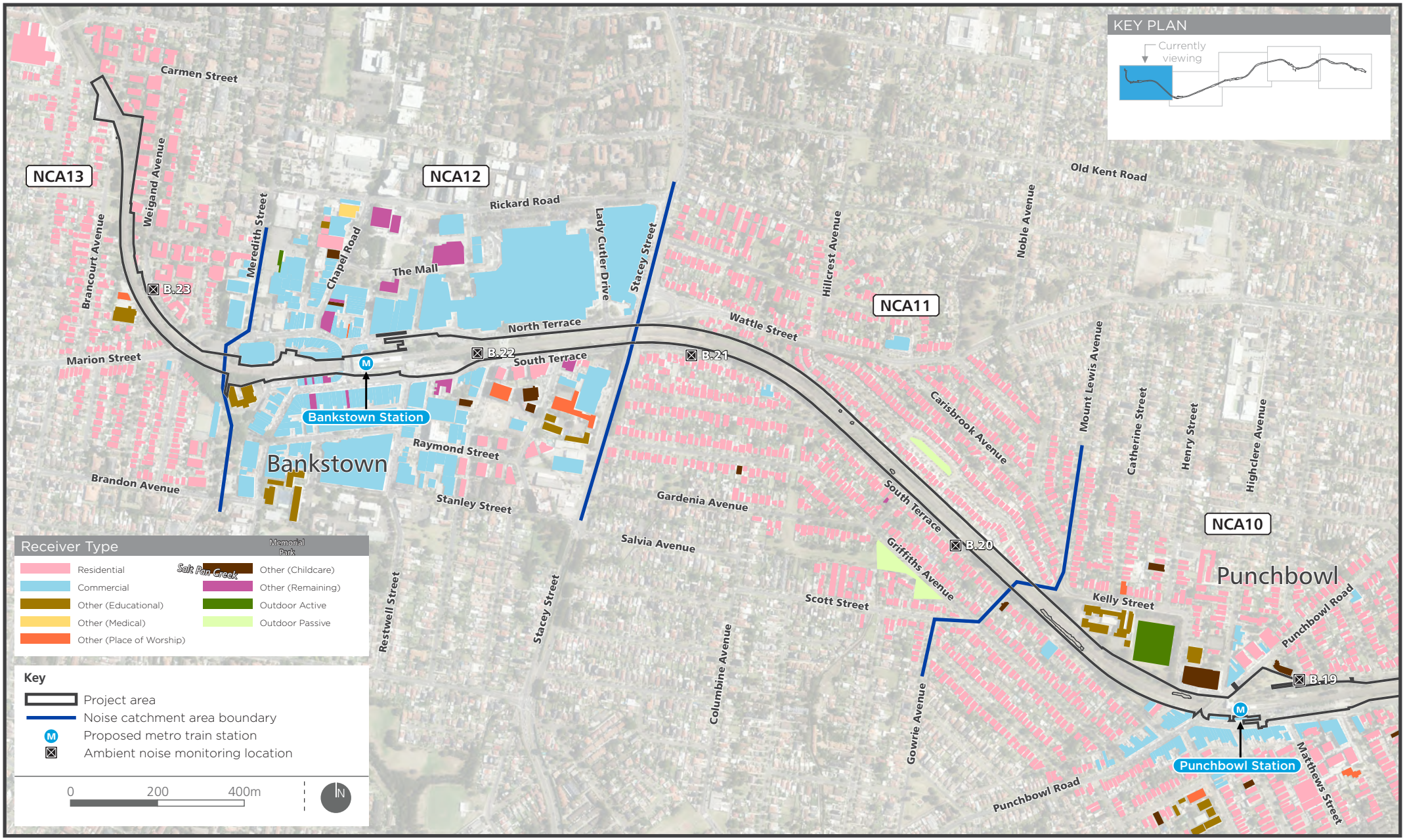
Noise catchment areas, sensitive receivers and ambient noise monitoring locations - map 3

FIGURE 15.1



Noise catchment areas, sensitive receivers and ambient noise monitoring locations - map 4

FIGURE 15.1



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Noise catchment areas, sensitive receivers and ambient noise monitoring locations - map 5

FIGURE 15.1

Construction noise impact assessment

The predicted noise levels (without additional mitigation) in each of the NCAs for the various work activities are presented in Appendix E. A review of the predicted noise levels from the preferred project indicates the following key points:

- Rockbreaking involves highly noise intensive equipment. Rockbreaking has been entirely removed from the construction methodology of the preferred project. This item was previously driving many of the worst-case impacts for the exhibited project.
- Diamond saws would only be needed during excavation of the existing top concrete layer of station platforms and the potential noise impacts from the use of this highly noise intrusive item have been controlled by restricting these works to daytime periods. In the exhibited project, the majority of the stations were proposed to be demolished and rebuilt. The preferred project would comprise alterations to the platform height only and other minor upgrade works.
- Ballast tamping, as part of track works, is the most noise intensive item of equipment that is potentially required during the night-time. Track works for the preferred project are only required in a small number of locations as opposed to at the majority of stations for the exhibited project. This has substantially reduced the number of receivers impacted. Ballast tamping is expected to last for a relatively short period during the daytime, as the works progress quickly. It is also noted that this activity would generally be expected to be completed during the daytime, with night-time works only required to make the track safe prior to re-opening, if needed.
- Night-time impacts are predicted during some scenarios when work is located close to adjacent receivers or when noise generating items are in use such as excavators, concrete pumps/trucks, cranes, etc. Table 15.4 lists the locations predicted to be impacted.
- The highest noise levels are generally predicted during works which require noise intensive plant items, such as a diamond saw and/or ballast tamper. Work activities that do not include high noise generating items of plant generally result in considerably lower impacts for the preferred project than was identified for the exhibited project.
- Whilst all NCAs are predicted to be subject to impacts, the highest impacts are generally seen in NCA01 (Marrickville), NCA02 (Dulwich Hill), NCA03 (Hurlstone Park), NCA04 (Canterbury), NCA06 (Campsie) and NCA11 (Bankstown), due to the close proximity of residential receivers to the worksites in these catchments.

The number of receivers in each NCA that are predicted to be subject to noise impacts greater than 25 dBA above the noise management levels (NML) (i.e. corresponds to the greater than 30 dBA 'Highly Intrusive' category) for the preferred project are shown in Table 15.4. A comparison is provided between the assessment completed for the exhibited project and the preferred project.

Ballast tamping may be required during all construction periods and impacts during the night-time have been provided in Table 15.5. Scenarios both with and without the ballast tamper have been provided to illustrate the effect that this item of equipment has on the predicted impacts.

Table 15.4 Number of receivers predicted to be subject to greater than 25 dba above NML noise levels for the exhibited and preferred project

NCA	Receiver type															HNA[2]		
	Residential					Commercial					Other sensitive							
	Standard Day	Day OOH[1]	Evening	Night-time (with BT[3])	Night-time (without BT[3])	Standard Day	Day OOH	Evening	Night-time (with BT[3])	Night-time (without BT[3])	Standard Day	Day OOH[1]	Evening	Night-time (with BT[3])	Night-time (without BT[3])	Night-time (with BT[3])	Night-time (without BT[3])	Sleep Disturbance [4]
Exhibited project (Environmental Impact Statement)																		
NCA01	64	139	139	152	99	-	-	-	-	-	-	-	-	-	-	20	8	306
NCA02	147	224	223	191	164	-	-	-	-	-	-	-	-	-	-	31	23	307
NCA03	76	138	138	140	94	-	-	-	-	-	1	1	-	-	-	34	9	237
NCA04	21	42	42	38	32	-	-	-	-	-	-	-	-	-	-	6	5	54
NCA05	50	56	56	73	65	-	-	-	-	-	-	-	-	-	-	1	-	95
NCA06	13	45	66	101	65	-	-	-	-	-	-	-	-	-	-	25	9	184
NCA07	33	45	45	79	50	-	-	-	-	-	3	3	2	1	-	12	1	183
NCA08	-	7	7	19	1	-	-	-	-	-	2	2	-	-	-	4	-	52
NCA09	6	34	34	46	40	-	-	-	-	-	-	-	-	-	-	16	5	89
NCA10	-	7	7	15	-	-	-	-	-	-	3	3	1	-	-	7	-	50
NCA11	1	26	26	43	29	-	-	-	-	-	-	-	-	-	-	19	1	85
Preferred project																		
NCA01	24	60	59	78	78	-	-	-	-	-	-	-	-	-	-	10	10	87
NCA02	12	48	34	125	125	-	-	-	-	-	-	-	-	-	-	5	5	123
NCA03	18	53	46	83	83	-	-	-	-	-	1	-	-	-	-	3	3	83
NCA04	2	13	12	26	26	-	-	-	-	-	-	-	-	-	-	1	1	25
NCA05	4	20	20	70	62	-	-	-	-	-	-	-	-	-	-	1	-	93
NCA06	1	4	22	63	47	-	-	-	-	-	-	-	-	-	-	14	1	119
NCA07	-	1	1	33	33	-	-	-	-	-	1	1	-	-	-	-	-	41
NCA08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
NCA09	-	2	-	20	20	-	-	-	-	-	-	-	-	-	-	-	-	22
NCA10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NCA11	-	2	2	41	16	-	-	-	-	-	-	-	-	-	-	19	-	80

Note 1: OOH = Out of hours. During the daytime, this refers to the period on Saturday between 7am – 8am, and 1pm – 10pm.

Note 2: Highly Noise Affected, based on Interim Construction Noise Guideline (ICNG) (i.e. predicted LAeq(15minute) noise at residential receiver is 75 dBA or greater).

Note 3: BT: Ballast Tamper

Note 4: Sleep Disturbance (>20 dB Impacts)

Table 15.4 shows that potential impacts for the preferred project are generally lower than stated in the Environmental Impact Statement of the exhibited project, for the majority of NCAs. Similar reductions are seen in impacts to receivers across the daytime, evening and night-time periods.

This decrease is due to the number of worksites being reduced and less noise intensive equipment being used to construct the preferred project (i.e. rockbreakers) are no longer proposed. The requirement for track works has also been reduced to a small number of isolated locations, whereas previously it was proposed at most stations. Further reductions are also apparent at station sites where the bridge works has been revised and only platform modification works are proposed for the preferred project, as opposed to previously being demolished and re-built for the exhibited project. The extent of earthworks has also been reduced along the rail corridor for the preferred project.

The reduction in the required works and need for highly noise intensive equipment during out of hours periods has also reduced the potential sleep disturbance impacts. Significant reductions are seen in all NCAs. Most areas are predicted to see a decrease in the number of receivers impacted in the region of 50 to 70 per cent.

The noise levels predicted are representative of the realistic worst case impacts where works are at their closest and are intended to give an overview of the likely realistic worst case noise levels from the construction works for the preferred project. For most construction activities, it is expected that the construction noise levels would frequently be lower than predicted at the most-exposed receiver. Construction noise contour figures for the preferred project, showing the worst-case noise predictions for all scenarios are presented in Appendix E.

Construction road traffic noise However, as the number of possessions and the typical duration of possessions would be less for the preferred project when compared to the exhibited project, the frequency and duration of the potential construction traffic noise impacts would be expected to be reduced for the preferred project.

Construction vibration impact assessment

The construction vibration assessment presented in Environmental Impact Statement of the exhibited project assumed that the most vibration intensive piece of construction equipment required for the construction of the project would be a rockbreaker. As rockbreakers are unlikely to be required to construct the preferred project, the most vibration intensive piece of construction equipment is now a ballast tamper. The ballast tamper was previously assessed as part of the exhibited project, however the locations it would be required for the preferred project have been significantly reduced.

The vibration levels generated by a ballast tamper are significantly lower than those generated by a rockbreaker and the ballast tamper would only be used on the rail tracks in a small number of locations of the preferred project. The removal of rockbreakers from the preferred project has significantly reduced the potential vibration impacts at the nearest receivers. All other items of equipment required by the preferred project are generally not considered vibration intensive.

When considering the potential vibration impacts of the preferred project, it is also noted that ballast tampers are routinely used for Sydney Trains rail maintenance works across the project area without significant impact to nearby sensitive receivers and structures.

Construction works associated with platform alterations would be required to be completed in the vicinity of several heritage structures at stations. These works however would not require the use of vibration intensive equipment and the potential vibration impacts from items such as concrete saws and excavators are expected to be minimal.

Based on this, the construction equipment associated with the preferred project would result in lower vibrations levels than predicted in the Environmental Impact Statement of the exhibited project. It is not anticipated that the preferred project would generate higher structural damage or human comfort impacts than typical Sydney Trains rail track maintenance works.

Traction supply cable route

Alignment of the power supply cable near Hughes Park would be revised for the preferred project from the route described for the exhibited project in the Environmental Impact Statement. Construction is likely to involve trenching within the road reserve.

The final section of the cable would be located closer to nearby sensitive receivers east of Westfield Street compared to the original alignment through Hughes Park. However, the section of street along which the cable is proposed is not fronted by residential dwellings. The open space on the eastern side of the roadway means that the minimum distance to receivers would be about 40 metres, minimising the potential for impacts. Any potential noise and vibration impacts are also expected to be short-term as the works would move progressively along the alignment.

Revised mitigation measures

A reduction in impacts to receivers is predicted as a result of the preferred project. This would result in similar reductions in the requirements for additional mitigation measures in all NCAs. Table 15.5 compares the number of receivers predicted to need additional mitigation presented in the Environmental Impact Statement of the exhibited project, to that of the preferred project.

Other minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.

Table 15.5 Receivers identified for additional mitigation

NCA	Number of receivers						
	Standard daytime	Possession/closedown works-night-time (out of hours work period 2)[1]					
		With ballast tamping				Without ballast tamping	
	LB, M[2]	LB[2]	M, LB[2]	M, IB, LB, PC, SN[2]	AA, M, IB, LB, PC, SN[2]	M, IB, LB[2],	LB, M[2]
Exhibited project (Environmental Impact Statement)							
NCA01	565	29	452	363	152	277	99
NCA02	594	67	620	334	191	213	164
NCA03	462	6	306	260	140	181	94
NCA04	121	25	150	74	38	65	32
NCA05	291	-	168	136	73	99	65
NCA06	161	27	245	175	101	115	65
NCA07	291	120	457	312	79	134	50
NCA08	88	122	295	111	19	83	1
NCA09	126	86	300	132	46	105	40
NCA10	73	172	326	102	15	71	-
NCA11	116	169	316	153	43	129	29

NCA	Number of receivers						
	Standard daytime	Possession/closedown works-night-time (out of hours work period 2)[1]					
		With ballast tamping				Without ballast tamping	
	LB, M[2]	LB[2]	M, LB[2]	M, IB, LB, PC, SN[2]	AA, M, IB, LB, PC, SN[2]	M, IB, LB[2],	LB, M[2]
Preferred project							
NCA01	188	196	510	205	78	205	78
NCA02	233	326	564	187	125	187	125
NCA03	196	88	387	154	83	154	83
NCA04	77	68	123	70	26	70	26
NCA05	132	-	188	119	70	98	62
NCA06	69	74	260	151	63	104	47
NCA07	81	256	527	134	33	108	33
NCA08	23	291	177	73	-	73	-
NCA09	65	171	271	102	20	102	20
NCA10	2	372	144	52	-	52	-
NCA11	77	170	318	152	41	117	16

Note 1: Out of hours work Period 2: Mon-Fri (10pm - 7am), Sat (10pm - 8am), Sun/Pub Hol. (6pm - 7am)

Note 2: The following abbreviations are used: Alternative accommodation (AA), Monitoring (M), Individual briefings (IB), Letter box drops (LB), Project specific respite offer (RO), Phone calls (PC), Specific notifications (SN).

15.2.3 Non-Aboriginal heritage

Overview

Potential impacts during construction of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment). Due to the revised construction scope of the preferred project, the non-Aboriginal heritage impact assessment has been updated and is provided in full in Appendix F and a summary of the main findings is provided below.

Methodology

The construction assessment of heritage items within the preferred project area and in the buffer zone considered the potential direct (vibration) impacts and impacts from construction compounds. Further detail on the methodology of the updated assessment is provided in Appendix F.

The assessment methodology, details and significance of the heritage features for the non-Aboriginal heritage impact assessment for the preferred project remain as outlined for the exhibited project that is described in the Environmental Impact Statement and Technical Paper 3 (Non-Aboriginal heritage impact assessment).

The updated assessment considers changes to nine stations resulting from the preferred project. There are no changes proposed at Bankstown Station compared to the exhibited project. Therefore, the heritage impact assessment for Bankstown Station provided in the Environmental Impact Statement remains relevant. Figure 12.2 shows the location of the heritage listed items and areas discussed.

The archaeological significance within the project area has not changed from that assessed for the exhibited project. As the preferred project footprint sits within the exhibited project footprint and because of the level of historical disturbance, potential impacts during construction of the preferred project would not differ from those described in the Environmental Impact Statement. The assessment of potential construction impacts to archaeology presented in the Environmental Impact Statement therefore remains applicable to the preferred project and is not assessed further. Impacts would continue to be managed as outlined in the Archaeological Assessment and Research Design Report (Appendix I).

Construction impact assessment summary of findings

Potential direct impacts - vibration

The construction vibration assessment for the exhibited project assessed rockbreakers as the most vibration intensive item of equipment. As the requirement for rockbreakers has been removed from the preferred project the most vibration intensive piece of construction equipment is now a ballast tamper. The ballast tamper was previously assessed as part of the exhibited project, however the locations it would be required for the preferred project have been significantly reduced.

The vibration levels generated by a ballast tamper are significantly lower than those generated by a rockbreaker and the ballast tamper would only be used on the rail tracks in a small number of locations of the preferred project. It is also noted that ballast tampers are routinely used without significant impact for Sydney Trains rail maintenance works across the project area. All other items of equipment required by the preferred project are generally not considered vibration intensive.

Construction works associated with platform alterations would be required to be completed in the vicinity of several heritage structures when working at stations. These works however are unlikely to require the use of vibration intensive equipment and the potential vibration impacts from items such as concrete saws and excavators are expected to be minimal.

The required vibration intensive equipment should be reviewed during construction planning to ensure the potential vibration impacts are minimised. If impacts are considered likely then vibration monitoring should be completed to ensure acceptable levels of vibration are not exceeded.

A summary of the potential direct impacts resulting from construction related vibration of the preferred project, in comparison to the exhibited project are outlined in Table 15.6.

Table 15.6 Potential direct impacts (vibration) summary assessment

Heritage item	Exhibited project impact summary	Preferred project impact summary
Marrickville Railway Station Group	Minor	**Negligible**
Sewage Pumping Station 271	Minor	**Negligible**
Stone house, including interiors	Minor	**Negligible**
Stonewalling, terracing and street planting	Negligible	Negligible
Dulwich Hill Railway Station Group	Minor	**Negligible**
South Dulwich Hill Heritage Conservation Area	Minor	**Negligible**
Inter-War Heritage Conservation Area Group	Minor	**Negligible**
Gladstone Hall, including interiors	Minor	**Negligible**
Hurlstone Park Railway Station Group	Minor	**Negligible**
Hurlstone Park Railway Underbridge	Negligible	Negligible
Canterbury Railway Station Group	Minor	**Negligible**
Canterbury (Cooks River) underbridge	Negligible	Negligible

Heritage item	Exhibited project impact summary	Preferred project impact summary
Canterbury (Cooks River/Charles St) Underbridge - Main Line	Negligible	Negligible
Old Sugarmill	Minor	**Negligible**
Inter-War Hotel (former Hotel Canterbury)	Negligible	Negligible
Federation Post Office Building (former Canterbury Post Office)	Minor	**Negligible**
Electricity substation no. 275	Negligible	Negligible
Campsie Railway Station Group	Minor	Minor
Federation commercial building–Coffill's Buildings	Negligible	Negligible
Inter-War Commercial Building–Station House	Minor	**Negligible**
Inter-War Court House (former) Campsie Court House	Negligible	Negligible
War Memorial Clock Tower	Negligible	Negligible
Federation house	Negligible	Negligible
Federation villa	Negligible	Negligible
Belmore Railway Station Group	Minor	**Negligible**
Post-war bus shelter and public lavatories	Negligible	Negligible
Federation House (former station master's cottage)	Minor	**Negligible**
Lakemba Railway Station Group	Minor	**Negligible**
Federation weatherboard house	Negligible	Negligible
Inter-War post office building - Lakemba Post Office	Negligible	Negligible
Electricity Substation no. 143	Negligible	Negligible
Wiley Park Railway Station Group	Minor	**Negligible**
Inter-War water pumping station– Lakemba Pumping Station (WP0003)	Negligible	Negligible
Punchbowl Railway Station Group	Minor	**Negligible**
War Memorial and street trees	Negligible	Negligible
Post-war Civic Building (former Punchbowl Baby Health Centre)	Negligible	Negligible

Note 1: **Bold** text represents a change in impact.

Further detail for each heritage item is provided in Appendix E.

Corridor works and compound sites

The construction activities required for the preferred project would be reduced when compared to the exhibited project. Impacts to heritage items, as a result of construction of the preferred project and from construction sites would be reduced from that assessed in the Environmental Impact Statement for the exhibited project.

Revised mitigation measures

Changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report. Mitigation has been updated to include additional measures to protect heritage items during construction and repurposing for buildings which are now being retained for the preferred project.

15.2.4 Landscape character and visual amenity

Overview

Potential impacts during construction of the preferred project would differ from those of the exhibited project that are described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment). The landscape and visual impact assessment has been updated for the preferred project and is provided in full in Appendix G and a summary of the main findings is provided below.

Methodology

The assessment methodology, and sensitivity ratings of landscape and viewpoint locations for the visual impact assessment for the preferred project remain as outlined for the exhibited project that is described in the Environmental Impact Statement and Technical Paper 7 (Landscape and visual impact assessment).

The assessment provided in Appendix G compares the landscape and visual impacts identified in the Environmental Impact Statement for the exhibited project and the changes in impacts resulting from the preferred project. This includes the re-assessment of landscapes and station viewpoints previously assessed in the Environmental Impact Statement, which require reconsideration in light of the changes incorporated into the preferred project. This includes a construction assessment of the landscape impact, daytime visual impact and night time visual impact for each station. There are no changes proposed at Bankstown Station compared to the exhibited project. Therefore, the assessment for Bankstown Station provided in the Environmental Impact Statement remains relevant.

Construction impact assessment summary of findings

The majority of construction impacts to landscape character identified in the Environmental Impact Statement for the exhibited project have all been reduced from moderate adverse to minor adverse or remain consistent with the Environmental Impact Statement at minor adverse. This is because the preferred project would retain the existing station buildings and entrances.

The construction impacts of the preferred project at Dulwich Hill Station precinct would remain consistent with the exhibited project at a moderate adverse impact. Construction of the preferred project, including works to relevel platforms and construct the new concourse, would still result in reduced legibility and accessibility within the precinct.

Table 15.7 summarises the predicted changes to local landscape character for each station precinct during construction of the preferred project, in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail is provided in Appendix G.

Table 15.7 Construction impacts to landscape character

Location	Sensitivity rating	Exhibited project (Environmental Impact Statement)	Preferred project[1]
Marrickville Station precinct	Local	Minor adverse	Minor adverse
Dulwich Hill Station precinct	Local	Moderate adverse	Moderate adverse
Hurlstone Park Station precinct	Local	Moderate adverse	**Minor adverse**
Canterbury Station precinct	Local	Moderate adverse	**Minor adverse**
Campsie Station precinct	Local	Moderate adverse	**Minor adverse**
Belmore Station precinct	Local	Moderate adverse	**Minor adverse**

Location	Sensitivity rating	Exhibited project (Environmental Impact Statement)	Preferred project[1]
Lakemba Station precinct	Local	Moderate adverse	**Minor adverse**
Wiley Park Station precinct	Local	Minor adverse	Minor adverse
Punchbowl Station precinct	Local	Moderate adverse	**Minor adverse**

Note 1: **Bold** text represents a change in impact.

During construction of the preferred project, daytime visual impact at all viewpoints would remain consistent with the exhibited project as described in the Environmental Impact Statement or result in a reduced adverse impact. The majority of daytime visual impacts are assessed as negligible or minor adverse for the preferred project principally due to the following:

- existing station buildings would not be demolished and would be refreshed, leading to a reduced scale of construction seen in views
- the removal of vegetation and street trees has been reduced for the preferred project which preserves some existing views and screens some construction work
- visual impact would be experienced for a shorter duration.

Table 15.8 summarises the predicted daytime visual amenity impacts during construction of the preferred project in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail is provided in Appendix G.

Table 15.8 Construction daytime visual amenity impacts

	Viewpoint	Sensitivity rating	Exhibited project	Preferred project[1]
	Marrickville Station			
1	View south-east from Illawarra Road	Local	Moderate adverse	**Negligible**
2	View south-west from O'Hara Street playground	Neighbourhood	Minor adverse	Minor adverse
3	View north from Riverdale Avenue	Neighbourhood	Minor adverse	Minor adverse
4	View north from Schwebel Street	Neighbourhood	Minor adverse	**Negligible**
5	View north from Station Street	Neighbourhood	Minor adverse	**Negligible**
	Dulwich Hill Station			
1	View south from Jack Shanahan Reserve	Local	Minor adverse	**Negligible**
2	View southeast from Dulwich Hill light rail stop	Local	Minor adverse	Minor adverse
3	View south from Bedford Crescent to Dulwich Hill light rail stop entrance	Local	Minor adverse	Minor adverse
4	View west to Dulwich Hill Station from Wardell Road bridge	Local	Moderate adverse	**Minor adverse**
5	View west from corner of Wardell Road and Dudley Street	Local	Minor adverse	**Negligible**
6	View southeast from Ewart Lane	Neighbourhood	Minor adverse	Minor adverse

	Viewpoint	Sensitivity rating	Exhibited project	Preferred project[1]
	Hurlstone Park			
1	View southwest from the Floss Street commuter carpark	Local	Moderate adverse	Moderate adverse
2	View southwest across Floss Street	Local	Moderate adverse	**Minor adverse**
3	View southwest from the Duntroon Street bridge	Local	Moderate adverse	**Minor adverse**
4	View north from Commons Street	Neighbourhood	Minor adverse	**Negligible**
5	View from Railway Street	Neighbourhood	Minor adverse	Minor adverse
	Canterbury Station			
1	View southwest from Robert Street	Neighbourhood	Minor adverse	**Negligible**
2	View northwest from Broughton Street	Local	Moderate adverse	**Minor adverse**
3	View southwest form corner of Broughton Street and Canterbury Road	Local	Moderate adverse	**Minor adverse**
4	View northeast from Charles Street	Neighbourhood	Negligible	Negligible
5	View from the lane south of Canterbury Station	Local	N/A	Minor adverse
	Campsie Station			
1	View southeast from corner of Wilfred Avenue and London Street	Neighbourhood	Minor adverse	**Negligible**
2	View west along North Parade	Neighbourhood	Minor adverse	**Negligible**
3	View southwest from Beamish Street	Local	Moderate adverse	**Negligible**
4	Northeast from Lilian Lane	Neighbourhood	Minor adverse	**Negligible**
5	View west from Lilian Street	Neighbourhood	Minor adverse	Minor adverse
6	View east from Lilian Street	Neighbourhood	Minor adverse	Minor adverse
	Belmore Station			
1	View east from Burwood Road overbridge	Local	Moderate adverse	**Minor adverse**
2	View northeast from Tobruk Avenue	Local	Moderate adverse	**Minor adverse**
3	View northwest from shared path linking to the Terry Lamb Reserve	Neighbourhood	Minor adverse	Minor adverse
4	View west from the Terry Lamb Reserve	Neighbourhood	Minor adverse	Minor adverse
5	View southwest from Redman Parade	Local	Moderate adverse	**Minor adverse**

	Viewpoint	Sensitivity rating	Exhibited project	Preferred project[1]
	Lakemba Station			
1	View northeast from Railway Parade	Local	Minor adverse	Minor adverse
2	View southwest along The Boulevarde	Local	Moderate adverse	**Negligible**
3	View southwest from The Boulevarde commuter car park	Neighbourhood	Minor adverse	Minor adverse
4	View southeast from Jubilee Reserve	Neighbourhood	Minor adverse	**Negligible**
	Wiley Park Station			
1	View southwest from Wiley Lane at King Georges Road	Local	Minor adverse	Minor adverse
2	View northwest across King Georges Road	Local	Minor adverse	Minor adverse
3	View northwest along The Boulevarde	Neighbourhood	Negligible	Negligible
4	View northeast from The Boulevarde	Neighbourhood	Minor adverse	Minor adverse
	Punchbowl Station			
1	View south from Warren Reserve	Local	Minor adverse	Minor adverse
2	View east along Urunga Parade	Neighbourhood	Minor adverse	**Negligible**
3	View west along The Boulevarde at Matthew Street	Local	Minor adverse	Minor adverse
4	View north from The Boulevarde	Local	Minor adverse	Minor adverse

Note 1: **Bold** text represents a change in impact.

During construction of the preferred project, night-time visual impact at the assessed viewpoints would be reduced to negligible from minor adverse or remain consistent with the impacts identified in the Environmental Impact Statement. The principal reason for the reduced predicted impact is that these impacts would be experienced across a reduced area and over a shorter duration.

Table 15.9 summarises the predicted night-time visual amenity impacts during construction of the preferred project in comparison to the exhibited project assessed in the Environmental Impact Statement. Further detail, including a description of sensitivity ratings, are provided in Appendix G.

Table 15.9 Construction impacts night-time visual amenity

Location	Sensitivity rating	Exhibited project	Preferred project[1]
Marrickville Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Dulwich Hill Station precinct	E3: Medium district brightness	Minor adverse	Minor adverse
Hurlstone Park Station precinct	E3: Medium district brightness	Minor adverse	Minor adverse
Canterbury Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Campsie Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Belmore Station precinct	E3: Medium district brightness	Minor adverse	**Negligible**
Lakemba Station precinct	E3: Medium district brightness	Minor adverse	Minor adverse

Location	Sensitivity rating	Exhibited project	Preferred project[1]
Wiley Park Station precinct	E3: Medium brightness district	Minor adverse	Minor adverse
Punchbowl Station precinct	E3: Medium district brightness	Minor adverse	Minor adverse

Note 1: **Bold** text represents a change in impact.

Revised mitigation measures

Minor changes to mitigation measures have been made for the preferred project. These are presented in Section 16.1 of this report.

16. Revised mitigation measures and performance outcomes

This section includes the revised set of mitigation measures for the preferred project, highlighting how they have changed compared with the mitigation measures for the exhibited project.

16.1 Revised mitigation measures

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 additional assessment work undertaken and the submissions received. Some new measures have been added, and the wording of existing measures has been adjusted. The approach to environmental management and mitigation for the preferred project is provided in Chapter 17 of this report.

Table 16.1 provides the revised consolidated environmental mitigation measures. This table supersedes the mitigation measures presented in the Environmental Impact Statement. New mitigation measures or additions to existing mitigation measures are shown in **bold** text, with deletions shown with a ~~strikethrough~~. The non-Aboriginal heritage mitigation measures have been subject to detailed refinement, and the new set of measures, which replaces the previous measures, are indicated in bold.

The measures are broadly grouped according to the main stage of implementation. However, it is noted that the implementation of some measures may occur across a number of stages.

The location/s applicable to each mitigation measure are identified by using a unique identifier as follows:

- All – Project as a whole
- BW – Bridge works
- AS – All stations
- MA – Marrickville Station
- DU - Dulwich Hill Station
- HP – Hurlstone Park Station
- CB – Canterbury Station
- CP – Campsie Station
- BE – Belmore Station
- LA – Lakemba Station
- WP – Wiley Park Station
- PB – Punchbowl Station
- BA – Bankstown Station
- SS – Substations.

The approach to environmental management and mitigation for the preferred project is provided in Chapter 17 of this report.

Table 16.1 Revised environmental mitigation measures

ID	Impact	Mitigation measures	Relevant location(s)
Traffic, transport and access			
Design/pre-construction			
TC1	*Temporary transport arrangements*	Guided by the Temporary Transport Strategy, detailed temporary transport plan/s would be developed prior to construction to manage the movement of people along the T3 Bankstown Line during possession periods. The plans would be developed in consultation with key stakeholders (including the Sydney Coordination Office, Roads and Maritime Services, Sydney Trains, local councils, emergency services, and bus operators), and would address the requirements specified by the Temporary Transport Strategy. The development of each plan would consider, as a minimum: • a review of the road network constraints along any proposed rail replacement bus route • further traffic analysis of key intersections used by rail replacement buses • potential impacts to local road networks affected by rail passengers diverting to cars to reach their destinations • the design of temporary facilities at bus stop locations in consultation with the relevant road authority • expected changes to parking demand at other stations, displacement of existing parking, and any upgrades that may be required.	AS
TC2		Transport for NSW would consult with Roads and Maritime Services, the State Transit Authority, **the Inner West and Canterbury-Bankstown councils**, and bus operators, to identify opportunities to minimise impacts to bus layovers and existing bus stops during operation of rail replacement buses.	AS
~~TC3~~	~~*Impacts of bridge works*~~	~~Detailed analysis of the network impacts of proposed bridge work would be undertaken, and management measures would be developed, in consultation with Roads and Maritime Services, and the Sydney Coordination Office. Measures would include restricting work to some bridges during off peak and/or holiday periods, where practicable, including the following bridges as a minimum:~~ ~~• Charlotte Avenue underbridge~~ ~~• Illawarra Road underbridge~~ ~~• Burwood Road overbridge~~ ~~• Haldon Street overbridge~~ ~~• King Georges Road overbridge~~ ~~• Stacey Street overbridge.~~	~~BW~~

ID	Impact	Mitigation measures	Relevant location(s)
TC3		The impacts on the surrounding road network of lane closures resulting from bridge works across the rail corridor would be assessed in detail, to identify the suite of management measures to be implemented for each closure required. This would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, the Inner West and Canterbury-Bankstown councils, emergency services, and relevant bus operators. Planning for partial bridge closures would consider bus rerouting and timetabling, with the intention of minimising impacts to bus customers and bus operators.	BW
~~TC6~~	~~*Pedestrian access to Belmore Sports Ground*~~	~~Work affecting the pedestrian underpass providing access to and from the Belmore Sports Ground would be timed, in consultation with the facility manager and owners, to ensure that suitable access is provided. This would include (if necessary) avoiding disruptions to access during events, such as game days at Belmore Oval. Local diversions would be put in place during periods of closure.~~	~~BE~~
TC4	*Parking impacts during construction*	Opportunities to reduce the loss of existing on and off street car parking (including the amount of spaces reduced and the time associated with this reduction) would be reviewed during detailed design and construction planning.	AS
TC5		Where parking spaces are lost or access is impeded, particularly for extended periods, alternative parking would be provided wherever feasible and reasonable. This would include consideration of other privately owned (or vacant) land within close proximity to affected stations.	AS
TC6	*Impacts of intersection performance*	Further consideration of the need for intersection modifications would be undertaken, to improve intersection performance at locations most affected by the addition of construction heavy vehicles **and** rail replacement buses ~~and diverted traffic~~. This would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, and the relevant road authority. The improvements considered would include: • modification to the existing traffic signal phasing • lane priority changes • changing lane designations (line markings and signage) • kerbside changes (such as removing on street parking or implementing no standing zones at peak times to increase lane capacity) • physical geometric changes (such as minor kerb cut-backs to enable large vehicles to safely move through intersections) • restricting turning movements where traffic demand is low.	All
TC7	*Changes to cyclist facilities during construction*	Where existing cycle facilities (e.g. bike parking) would be temporarily unavailable at a station, suitable replacement facilities would be provided while the facility is unavailable.	AS

ID	Impact	Mitigation measures	Relevant location(s)
TO1	*Parking impacts during operation*	Further consideration of car parking management at stations would be undertaken in consultation with Roads and Maritime Services, the Sydney Coordination Office, and the Inner West and Canterbury-Bankstown councils, to minimise adverse impacts of operation on parking and other kerbside use in local streets.	AS
TO2	*Consideration of cross corridor connections*	Transport for NSW, in consultation with Canterbury-Bankstown Council, would investigate the feasibility of the provision of a cross-corridor connection between Bankstown and Punchbowl stations. Should a cross-corridor connection be deemed feasible, Transport for NSW would work with Canterbury-Bankstown Council and the Department of Planning and Environment to safeguard its future delivery.	All
Construction			
TC8	*Management of traffic, transport and access*	A construction traffic management plan would be prepared and implemented prior to construction. The plan would be prepared in accordance with the Construction Environmental Management Framework, and would detail, as a minimum: • how traffic would be managed when construction works are being carried out • the activities proposed and their impact on the road network and on road users • how these impacts would be addressed. The plan would be prepared in consultation with the Traffic and Transport Liaison Group, and would be approved by the relevant authority before construction commences.	All
TC9	*Changes to public transport services and alternative transport arrangements*	Modification of existing bus stops, or implementation of new stops and alterations to service patterns, would be carried out by Transport for NSW in consultation with the Sydney Coordination Office, Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and bus operators.	AS
TC10		Transport for NSW would undertake an extensive community awareness and information campaign before changes to public transport services are implemented. This would include a range of communication activities such as: • information at stations • wayfinding signage • clearly marked bus stop locations • letter box drops • web based information and transport 'app' where changes to travel are found in a single place • information via 131 500 • advertising in local papers • email information bulletins.	AS

ID	Impact	Mitigation measures	Relevant location(s)
~~TC13~~	~~*Impacts on intersection performance*~~	~~Intersection operation would be optimised, where reasonable and feasible, to improve intersection performance at the worst affected intersections along construction haulage routes and/or rail replacement bus routes. This may include modifying signal phase times or sequences at traffic signal controlled intersections.~~	~~Affected intersections~~
TC11	*Impacts on special events*	Consideration of special events would be undertaken as part of construction work programming. For special events that require specific traffic and pedestrian management, measures would be developed and implemented in consultation with Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and the organisers of the event.	All
TC12	*Impacts of construction compounds and work sites*	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, barrier placement, temporary traffic signals, modifications to existing traffic signals, or police assistance.	All
TC13	*Construction vehicles*	Construction vehicles (including contractor staff vehicles) would be managed to: • minimise parking or queuing on public roads • minimise use of residential streets to gain access to work sites or compounds • minimise vehicle movements near schools, particularly during school start and finish times.	All
TC14	*Signage*	Directional signage and line marking would be used to direct and guide drivers, pedestrians, and other road users past construction compounds and work sites, and on the surrounding road network. This may be supplemented by variable message signs to advise drivers of potential delays, traffic diversions, speed restrictions, or alternate routes.	All
TC15	*Construction parking impacts*	Construction sites would be managed to minimise construction worker parking on surrounding streets. A worker car parking strategy would be developed in consultation with the relevant local council to identify measures to reduce the impact on the availability of on street and off street parking. The strategy would identify potential mitigation measures including alternative parking locations. The strategy would encourage contractor staff to: • use public transport • car share • park in a designated off site area and access construction sites via shuttle bus.	All
TC16	*Traffic incidents*	In the event of a traffic related incident, co-ordination would be carried out with the Sydney Coordination Office and Transport Management Centre's Operations Manager.	All
TC17	*Changes to road, pedestrian and cyclist networks*	The community would be notified in advance of proposed road and pedestrian network changes through appropriate forms of community notification.	All

ID	Impact	Mitigation measures	Relevant location(s)
TC18	*Impacts on pedestrian or cyclist paths*	A condition survey would be undertaken to confirm changes to routes proposed to be used by pedestrians and/or cyclists are suitable (e.g. suitably paved and lit), with identified modification requirements discussed with the Inner West and/or Canterbury-Bankstown councils and implemented prior to use of the routes.	All
TC19	*Pedestrian, cyclist and motorist safety*	Pedestrian, cyclist, and motorist safety in the vicinity of the construction sites would be addressed during construction planning and development of the construction traffic management plan. Measures that may be implemented to assist in multi modal traffic management include: • speed awareness signs in conjunction with variable message signs near construction sites to provide alerts to drivers • a community engagement program to provide road safety education and awareness to road users about sharing the road safely with heavy vehicles • heavy vehicle training for drivers to understand route constraints, safety issues, and limiting the use of compression braking • safety technology and equipment installed on heavy vehicles to enhance vehicle visibility, eliminate vehicles' blind spots, and monitor vehicle location, speeding compliance, and driver behaviour.	All
TC20	*Impacts to access*	Access for residents, businesses, and community infrastructure would be maintained. Where disruption to access cannot be avoided, consultation would be undertaken with the owners and occupants of affected properties, to confirm their access requirements and to discuss alternatives.	All
TC21		Access to stations and surrounding properties for emergency vehicles would be provided at all times. Emergency service providers (i.e. police and ambulance) would be consulted throughout construction to ensure they are aware of **station closures**, changes to access, including bridge lane closures, and changes to station or rail corridor access.	All
TC22	*Co-ordination of cumulative traffic effects*	The potential cumulative effects of construction traffic from multiple construction sites within the project ~~(including bridge works)~~ would be further considered during development of the construction traffic management plan. Where there is potential for cumulative impacts across the project, these issues would be addressed with the assistance of the Traffic and Transport Liaison Group.	All

ID	Impact	Mitigation measures	Relevant location(s)
Operation			
TO3	*Walking and Cycling*	Transport for NSW would **develop a Walking and Cycling Strategy in consultation with Inner West Council, Canterbury-Bankstown Council and other relevant stakeholders, which would identify walking and cycling facilities to encourage active transport to the station precincts.** ~~work with the Inner West and Canterbury-Bankstown councils to identify and provide improvements and minimise adverse impacts to the surrounding pedestrian network.~~	AS
~~TO4~~	~~*Cycling*~~	~~Transport for NSW would work with the Inner West and Canterbury-Bankstown councils and other relevant stakeholders to enhance areas around stations for cyclists.~~	~~AS~~
TO4	*Bus*	Transport for NSW would work with the Sydney Co-ordination Office, Roads and Maritime Services, the Inner West and Canterbury-Bankstown councils, and bus operators to identify improvements to bus stops and services.	AS
~~TO6~~	~~*Active transport corridor*~~	~~Transport for NSW would work with, the Department of Planning and Environment, and, to support the development of an active transport corridor along the alignment, including walking and cycling infrastructure. Transport for NSW would deliver sections of the active transport corridor around stations.~~	~~All~~
TO5	*Commuter parking*	Transport for NSW would monitor the demand for additional commuter car parking spaces and consider opportunities for, and implications of, meeting this demand between Bankstown and Marrickville stations. Transport for NSW would investigate ways to manage demand, ~~consider provision for additional commuter car parking,~~ subject to consideration of local station and town centre implications, including local traffic conditions.	AS
Noise and vibration			
Design/pre-construction			
NVC1	*Predicted construction noise impacts*	**In accordance with the *Construction Noise and Vibration Strategy,* construction noise impact statements would be prepared prior to the commencement of construction components, to consider the scale and duration of construction noise impacts, and identify measures to minimise impacts to sensitive receivers.** ~~A construction noise and vibration review would be undertaken during detailed design.~~ This would include noise modelling to confirm the results of modelling ~~previously~~ undertaken **as part of the Environmental Impact Statement and Submissions and Preferred Infrastructure Report**. Where **increases** ~~changes~~ in noise levels and exceedances are **identified,** ~~modelled, reasonable and feasible~~ mitigation measures would be reviewed.	All

ID	Impact	Mitigation measures	Relevant location(s)
NVC2		In accordance with the *Construction Noise and Vibration Strategy*, all employees, contractors and subcontractors would receive an environmental induction. The induction must at least include: • relevant project specific and standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • designated loading/unloading areas and procedures • site opening/closing times (including deliveries).	All
NVC3	*Predicted vibration impacts*	Where vibration levels are predicted to exceed the **vibration** screening **level** ~~criteria~~, a more detailed assessment of the structure would be carried out to determine the appropriate vibration limits for that structure.	All
NVC4		For heritage items where **vibration** screening ~~vibration~~ levels are predicted to be exceeded, the more detailed assessment would include condition assessment and specifically consider the heritage values of the structure in consultation with a heritage specialist to ensure sensitive heritage fabric is adequately monitored and managed.	Heritage items along the project area
NVO1	*Predicted operational noise and vibration impacts*	An operational noise and vibration review would be undertaken to guide the approach to identifying reasonable and feasible mitigation measures to incorporate in the detailed design. This would include noise modelling to confirm the results of modelling previously undertaken. Where **increases** ~~changes~~ in noise levels and exceedances are **identified** ~~modelled~~, ~~reasonable and feasible~~ mitigation measures would be reviewed.	All
NVO2		The height and extent of noise barriers adjacent to the project would be confirmed during detailed design with the aim of not exceeding trigger levels from the *Rail Infrastructure Noise Guidelines* (EPA, 2013). At-property treatments would be offered either on their own or in combination with a noise barrier where there are residual exceedances of the noise trigger levels. **Where practicable, operational stage noise mitigation would be installed early to assist with the management of construction noise.**	All
NVO3		Operational noise from substations would be controlled by inclusion of appropriate mitigation, such as shielding or enclosures, and specification of equipment selection, to comply with the *Industrial Noise Policy* (EPA, 2000).	All

ID	Impact	Mitigation measures	Relevant location(s)
Construction			
NVC5	*Construction noise and vibration management*	The *Construction Noise and Vibration Strategy* would be implemented with the aim of achieving the noise management levels where feasible and reasonable. This may include the following example mitigation measures alone or in combination, where feasible and reasonable: • The provision of noise barriers around each construction site. • The coincidence of noisy plant working simultaneously close together would be avoided. • ~~Offset distances between noisy plant and sensitive receivers would be increased.~~ • Residential grade mufflers would be fitted to all mobile plant. • ~~Dampened rock hammers would be used.~~ • Non-tonal reversing alarms would be fitted to all permanent mobile plant. • High noise generating activities would be scheduled for less sensitive periods considering the nearby receivers, where reasonable and feasible. • The layout of construction sites would consider opportunities to shield receivers from noise. • Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. • Loading and unloading of materials/deliveries is to occur as far as possible from noise sensitive receivers. • Select site access points and roads as far as possible away from noise sensitive receivers. • Dedicated loading/unloading areas to be shielded if close to noise sensitive receivers wherever feasible and reasonable. • Use quieter and less vibration emitting construction methods where feasible and reasonable. • The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in the *Construction Noise and Vibration Strategy*. • Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. • Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible. • Where reasonable and feasible heavy vehicle movements would be limited to daytime and evening hours, with night-time movements avoided where possible. • Active community consultation and the maintenance of positive, cooperative	All

ID	Impact	Mitigation measures	Relevant location(s)
		relationships with schools, local residents and building owners and occupiers, through: – periodic notification or work activities and progress (e.g. regular letterbox drops, e-consult) – specific notification (letter-box drop) prior to especially noisy activities – comprehensive website information – project information and construction response telephone line – email distribution lists.	
NVC6		**Noise intensive plant for construction activities, including** ballast tampers ~~and hydraulic rock breakers,~~ would not be used during the night-time period (10pm to 7am) **unless:** • **during a weekend rail possession or shut down** • **a requirement of a road authority, emergency services or Sydney Coordination Office requires works to be undertaken during this period.** ~~*Other noise intensive construction activities such as platform demolition, earthworks and track works would generally be limited to day time and evening periods (between 7am and 10pm), unless technical constraints exist such as:*~~ ~~• *works requiring a rail shutdown*~~ ~~• *requirements of road authorities, emergency services or Sydney Coordination Office.*~~	All
NVC7		When working adjacent to schools, medical facilities and child care centres, particularly noisy activities would be scheduled outside normal working hours, where reasonable and feasible.	All
NVC8		When working adjacent to churches and places of worship, particularly noisy activities would be scheduled outside services, where reasonable and feasible.	All
NVC9		Alternative accommodation may be offered to residents living in close proximity to construction works where detailed **construction planning identifies** ~~design investigations confirm~~ unreasonably high noise impacts over a prolonged period. Alternative accommodation arrangements would be offered and discussed with residents on a case-by-case basis.	All
NVC10		High noise and vibration generating activities including ~~rock breaking,~~ ballast tamping~~, demolition and ground and track earthworks~~ may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block and these works.	All
NVC11		Ongoing noise monitoring would be undertaken during construction at sensitive receivers during critical periods (i.e. times when noise emissions are expected to be at their highest ~~– e.g. piling and hammering)~~ to identify and assist in managing high risk noise events.	All

ID	Impact	Mitigation measures	Relevant location(s)
NVC12	*Vibration monitoring*	Where vibration levels are predicted to exceed the **vibration** screening **level** ~~criteria~~, attended vibration monitoring would be carried out to ensure vibration levels remain below appropriate limits for that structure.	All
NVC13	*Groundbourne noise*	Reasonable and feasible measures would be implemented **in accordance with the *Construction Noise and Vibration Strategy*** to minimise groundbourne noise where exceedances are predicted.	All
NVC14	*Utility adjustments/ relocation works*	Reasonable and feasible mitigation measures would be implemented where power supply works would result in elevated noise levels at receivers. This could include: • carrying out works during the daytime period when in the vicinity of residential receivers • where out of hours works are required, scheduling the noisiest activities to occur in the evening period (up to 10pm) • use of portable noise barriers around particularly noisy equipment.	All
NVC15	*Road traffic noise*	The routes for construction haulage vehicles and bus services associated with the Temporary Transport Strategy would be selected on the basis of compliance with the relevant ~~night time road traffic noise criteria, where reasonable and feasible~~ **road traffic noise criteria, where reasonable and feasible. Where compliance with the noise criteria is not possible, reasonable and feasible noise mitigation would be implemented.**	All
NVC16	***Out of Hours Work Strategy***	**An Out of Hours Work Strategy would be prepared, in consultation with the Environment Protection Authority, to guide the assessment, management, and approval of works outside recommended standard hours.**	**All**
Non-Aboriginal heritage			
Design/pre-construction			
NAH1	***Minimising impacts during design***	**The project design would minimise adverse impacts to heritage buildings, elements, fabric, spaces and vistas that contribute to the overall heritage significance of the Bankstown Line.**	**All heritage items**
NAH2		**The project design would maximise the retention and legibility of heritage buildings, structures, fabric, spaces and vistas that are individually significant and contribute to the overall heritage significance of the Bankstown Line.**	**All heritage items**
NAH3		**The project design would complement retained heritage buildings, elements, fabric, spaces and vistas to avoid outcomes that compromise the significance of these heritage items.**	**All heritage items**
NAH4		**The project design would be developed with guidance from an appropriately qualified and experienced conservation architect.**	**All heritage items**

ID	Impact	Mitigation measures	Relevant location(s)
NAH5	***Reuse of retained items***	**Where heritage significant items or elements are to be retained within the operational area, an adaptive reuse strategy would be prepared by an appropriately qualified and experienced heritage architect.**	**All heritage items**
NAH6	*Interpretation*	**A Heritage Interpretation Plan would be prepared to document the development of the Bankstown Line and detail the history of each station and its contribution to both the Bankstown Line and the surrounding suburbs.** **Appropriate heritage interpretation would be incorporated in the design and would provide legible connection between stations.**	AS ~~Hurlstone Park Railway Underbridge~~ ~~Overbridge - Illawarra Road~~ ~~Canterbury (Cooks River) Underbridge~~ ~~Canterbury (Cooks River/Charles St) Underbridge - Main Line~~ ~~Post-war bus shelter and public lavatories (Belmore Station)~~ Bankstown Parcels Office (former)
NAH7	*Management of moveable heritage and heritage fabric*	A moveable heritage item strategy would be prepared by an appropriately qualified and experienced heritage specialist in consultation with Sydney Trains, and would include a comprehensive record of significant railway elements to be impacted. This would include items contained within station and platform buildings as well as of any other significant equipment within the curtilage of the heritage railway stations. The moveable heritage item strategy would form part of the broader interpretation strategy.	AS apart from BA and Bankstown Parcels Office (former)
NAH8	***Station Building repurposing and refreshing***	**Where significant buildings are to be re-purposed or refreshed:** • **the inherent character of the building should be retained with new additions, including form, palette and materiality, sympathetic to its heritage values** • **a suitably qualified and experienced heritage architect should advise on appropriate materials and finishes which would be sympathetic to the heritage values of each individual station.** • **the internal layout of the building should be retained where possible, and rooms should not be subdivided unless it can be completed without adverse impact and/or is reversible without any long term adverse impact.** • **a significant element register should be prepared by a suitably qualified and experienced heritage architect. The register should list significant fabric, assess its condition, tolerance for change and recommend retention or salvage.**	**All**

ID	Impact	Mitigation measures	Relevant location(s)
		• **Where fabric of high significance is to be removed, adequate assessment should be carried out that outlines impact and justification in accordance with the Statements of Heritage Impact guidelines (NSW Heritage Council 2002).**	
NAH9	***Design of new access stairs, concourses, canopies and lift shafts***	**The design and materials used for the construction of new access stairs, concourses, canopies and lift shafts should be as sympathetic as possible to the existing character of the stations with the aim of minimising visual impacts.** **The design should use unobtrusive, modern, lightweight materials such as glass panelling and slim frame elements. The Design Review Panel should be consulted in regard to the design, form and material of these additions.**	**All**
NAH10	***Design of platform re-levelling***	**Where platforms are re-levelled, door thresholds and steps should be accessible without raising or relocation of entries. Sub-floor ventilation should remain open to avoid long term impacts to the structures.**	**All**
NAH11	*Impacts to the Old Sugarmill*	A landscape scheme would be prepared for the Old Sugarmill to re-instate planting within and close to the curtilage of the item. The scheme would consider appropriate period plants and trees. Any boundary wall treatment would be designed in consultation with a heritage architect.	Old Sugarmill
NAH12	***Impacts to archaeology***	**The archaeological research design, including any mitigation measures identified in the Archaeological Assessment and Research Design report, would be implemented.**	**All**
NAH13	*Archival recording*	Photographic archival recording ~~and reporting~~ would be carried out 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).	AS ~~Overbridge - Illawarra Road~~ ~~Hurlstone Park Railway Underbridge~~ ~~Canterbury (Cooks River) Underbridge~~ ~~Canterbury (Cooks River/Charles St) Underbridge - Main Line~~ ~~Post war bus shelter and public lavatories (Belmore Station)~~ Bankstown Parcels Office (former)
NAH14	*Unexpected finds*	An unexpected finds procedure would be developed and included in the construction heritage management plan.	All

ID	Impact	Mitigation measures	Relevant location(s)
Construction			
NAH15	*Minimising impacts during construction*	Methodologies for the removal of existing structures and construction of new structures would be developed and implemented during construction to minimise direct and **indirect** ~~visual~~ impacts to other elements within the curtilages of the heritage items, or to heritage items located in the vicinity of works.	All
NAH16		**All retained heritage buildings, structures, fabric and moveable heritage items would be protected to avoid damage during works in the vicinity of these items, including from vibration. Retained significant buildings or elements susceptible to damage would be protected by hoardings or screens.**	**All**
NAH17		**Prior to construction commencing, a detailed inventory of all buildings, structures, fabric, spaces and vistas of heritage significance that are to be retained or removed would be prepared by appropriately qualified and experienced heritage specialists. The inventory must provide an assessment of the heritage impact based on the significance of each element and sub-element that comprises it and include recommendations for protection and conservation relative to the identified level of heritage significance.**	**All**
NAH18	*Unexpected finds*	In the event that unexpected archaeological remains, relics, or potential heritage items are discovered during construction, all works in the immediate area would cease, and the unexpected finds procedure would be implemented.	All
NAH19	***Human skeleton material***	**In the event that a potential burial site or potential human skeletal material is exposed during construction, the Sydney Metro Exhumation Management Plan would be implemented.**	**All**
NAH20	***Works to heritage fabric***	**All works to conserve, protect or remove significant heritage fabric would be undertaken by skilled tradespeople with experience working on heritage sites, in consultation with an appropriately qualified conservation heritage architect.**	**AS Bankstown Parcels Office (former)**
Operation			
NAH21	*Conservation management*	A conservation management plan would be prepared for all State Heritage Register listed stations, in accordance with NSW Heritage Council guidelines. The plan would address any changes to the item, including updated assessment of significance of elements and recommendations on curtilage changes. It would also provide suggested site specific exemptions and management policies.	MA, CA, BE
NAH22		A conservation management strategy would be prepared for nominated Section 170 register listed stations not listed on the State Heritage Register, in accordance with NSW Heritage Council guidelines.	**DU,** HP, CP, LA, **WP, PB,** BA

ID	Impact	Mitigation measures	Relevant location(s)
Aboriginal heritage			
Design/pre-construction			
AH1	*Consultation*	Aboriginal stakeholder consultation would continue to be undertaken in accordance with *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECC, 2010).	All
AH2	*Avoiding impacts to Aboriginal heritage*	**The** ~~An~~ Aboriginal Cultural Heritage Assessment Report would be **implemented**. ~~prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment and Heritage, 2011a). The report would include:~~ • ~~details of Aboriginal stakeholder consultation conducted~~ • ~~an assessment of cultural significance for the project area and identification of any specific areas of cultural significance based on consultation with Aboriginal stakeholders~~ • ~~a methodology for archaeological test excavation and salvage, to be undertaken by suitably qualified personnel~~ • ~~procedures for any unexpected finds.~~	All
AH3	*Managing impacts to identified PADs*	Archaeological test excavation (and salvage if required) would be carried out at S2B PAD02 at Punchbowl Station. Excavations would be conducted in accordance with the methodology outlined by the Aboriginal cultural heritage assessment report.	S2B PAD02
AH4	*Interpretation*	Appropriate Aboriginal heritage interpretation would be incorporated into the design in consultation with Aboriginal stakeholders.	All
Construction			
AH5	*Unexpected finds*	If potential Aboriginal items are uncovered **during the works, all works in the immediate area would cease, and the unexpected finds procedure included in the construction heritage management plan would be implemented.** ~~works within 10 metres of the item would cease. The item would then be assessed and managed by a suitability qualified person in accordance with the unexpected finds procedure in the Aboriginal cultural heritage report.~~ During pre-work briefings, employees would be made aware of the unexpected finds procedures and obligations under the *National Parks and Wildlife Act 1974*.	All
Land use and property			
Design/pre-construction			
~~LU1~~	~~*Acquisitions*~~	~~All acquisitions/adjustments would be undertaken in consultation with landowners and in accordance with the requirements of the *Land Acquisition (Just Terms Compensation) Act 1991*.~~	~~All~~

ID	Impact	Mitigation measures	Relevant location(s)
LU1	*Future planning*	Transport for NSW would continue to work the Department of Planning and Environment, the Greater Sydney Commission, **and the Inner West and Canterbury-Bankstown councils** in relation to future planning for the Sydenham to Bankstown corridor.	All
LU2		**Transport for NSW would work with the Department of Planning and Environment, Greater Sydney Commission, Canterbury-Bankstown Council and other key stakeholders to plan for the strategic transformation of the Bankstown CBD, including an investigation into the long-term development and viability of an underground station configuration.** ~~Transport for NSW will contribute funding towards, and work with, the Department of Planning and Environment and Canterbury-Bankstown Council, on a master plan and business case for the Bankstown town centre, including how the station fits with the centre.~~	BA
Construction			
LU3	*Temporary use*	Temporary use areas, including public open space, would be restored to their pre-existing condition (as a minimum) as soon as practicable following completion of construction. This would be undertaken in consultation with the relevant council and/or the landowner.	All
Socio-economic impacts			
Design/pre-construction			
SO1	*Socio-economic impacts*	Transport for NSW would continue to work with stakeholders and the community to ensure they are informed about the project and have opportunities to provide feedback to the project team. The existing community contact and information tools would remain in place throughout the duration of the project. Consultation prior to and during construction would involve the use of appropriate tools, including, but not limited to, tools such as community information sessions, forums, briefings, and displays; distribution of project materials in a variety of languages; door knocks; Place Managers; and site signage.	All
SO2	*Community facilities*	Prior to construction, consultation would be undertaken with sensitive community facilities (including aged care, childcare centres, educational institutions, and places of worship). Consultation would aim to identify and develop measures to manage the specific construction impacts for individual sensitive community facilities. These measures would be incorporated into the relevant management plans.	All

ID	Impact	Mitigation measures	Relevant location(s)
Construction			
SO3	*Community facilities and infrastructure*	Access to community facilities and infrastructure would be maintained during construction, where possible. Where alternative access arrangements need to be made, these would be developed in consultation with relevant service providers, and communicated to users.	All
SO4	*Employment*	A workforce development plan would be prepared and implemented during construction, to support local employment and business opportunities, provide skills development, and increase workplace diversity.	All
Business impacts			
Design/pre-construction			
BI1	*Managing construction impacts*	A business management plan would be prepared and implemented during construction, to define the location specific measures and strategies to minimise impacts on individual businesses during construction. The plan would also include: • a business consultation forum • roles and responsibilities • monitoring, auditing, reporting, and complaints management procedures.	All
BI2	*Supporting businesses during construction*	The **Sydney Metro City & Southwest** Small Business Owners Support Program would be ~~developed and~~ implemented to provide assistance to small business owners adversely impacted by construction. The program would be administered by a retail advisory/support panel established by Transport for NSW.	All
Landscape and visual impacts			
Design/pre-construction			
LV1	*General visual impacts*	The design would ~~continue to~~ be guided by the **Transport for NSW Around the Tracks – urban design for heavy and light rail.** ~~*Sydney Metro City & Southwest Sydenham to Bankstown Design Guidelines.*~~	All
LV2		**Transport for NSW would work with the Inner West and Canterbury-Bankstown councils to identify relevant urban design principles, and deliver agreed urban design outcomes on council land, where reasonable and feasible.**	**All**

ID	Impact	Mitigation measures	Relevant location(s)
LV3		**Transport for NSW would prepare Station Design and Precinct Plans for each station. The plans would aim to ensure that the stations and facilities are sympathetic and complement local character, and are integrated with future plans for development. The plans would consider the following:** • **urban design context** • **sustainable design and maintenance** • **community safety, amenity and privacy, including 'safer by design' principles where relevant** • **opportunities for public art** • **landscaping and design opportunities to mitigate the visual impacts of rail infrastructure and operation facilities** • **incorporation of salvaged historic and artistic elements on the project design** • **details of where and how recommendations from the Design Review Panel have been considered in the plan.** **Documents to be considered by the plans include, but are not limited to:** • **Inner West Council's Dulwich Hill Station Precinct public domain master plan** • **Outcomes of the master plan for Bankstown Station.** **The plans would be prepared and implemented in consultation with the Department of Planning and Environment, Inner West and Canterbury-Bankstown councils, Chambers of Commerce, and the local community.**	**AS**
LV4	*Impacts to trees and screening vegetation*	The management of trees during detailed design and construction planning would be guided by the project's tree management strategy**, which would be developed in consultation with councils and include consideration of relevant local plans and strategies.** Where removal cannot be avoided, trees would be replaced in accordance with the tree management strategy, **including replacement of removed trees in a two for one ratio**. Opportunities to retain and protect existing trees would be defined during detailed design and construction planning, in accordance with the project's tree management strategy. The design would aim to reduce tree removal to the extent practicable, particularly where they contribute to screening vegetation or landscape character.	All
LV5	*Light spill*	Lighting would be designed in accordance with *AS 4282 Control of the Obtrusive Effects of Outdoor Lighting*. Lighting would be designed to minimise light spill and glare into adjoining areas.	All
LV6	*Noise barriers and fencing*	The selection of materials and colours for noise barriers and hoardings would aim to minimise their visual prominence.	Noise barrier locations

ID	Impact	Mitigation measures	Relevant location(s)
LV7		The use of transparent panels in noise barriers would be considered where views to local landscape features and district views would be obstructed.	Noise barrier locations
LV8		Fencing would be designed to be of a high quality urban finish near stations.	AS
LV9	*Substations*	The detailed design of the substations would ensure that they incorporate appropriate architectural treatments and landscaping~~, guided by the design guidelines,~~ to minimise the potential for visual impacts. **Surrounding property owners would be consulted during design of the substations.**	Substations
Construction			
LV10	*Visual impacts*	A visual amenity management plan would be prepared and implemented during construction, to define the measures to minimise visual impacts during construction. The plan would include requirements in relation to construction site remediation.	All
LV11		Mitigation measures for landscape and visual impacts would be implemented as soon as feasible and reasonable after the commencement of construction, and remain for the duration of the construction period.	All
LV12	*Impacts to trees*	Trees to be retained would be protected prior to the commencement of construction in accordance with *AS4970-2009 Protection of trees on development sites* and the project's tree management ~~and replacement~~ strategy. Any tree pruning would be undertaken in accordance with the project's tree management strategy, guided by a tree report prepared by a qualified arborist.	All
LV13	*Impacts from construction, including compounds and work sites*	The design and maintenance of construction compound hoardings would aim to minimise visual amenity and landscape character impacts. Graffiti would be removed promptly, and public art opportunities would be considered.	All
LV14		The selection of materials and colours would aim to minimise their visual prominence.	All
LV15		Lighting of work areas, compounds and work sites would be oriented to minimise glare and light spill impact on adjacent receivers.	All
LV16		Following completion of construction, site restoration would be undertaken in accordance with the visual amenity management plan. Temporary impacts to public open space would be rehabilitated in consultation with the relevant local council and/or landowner.	All

ID	Impact	Mitigation measures	Relevant location(s)
Soils and contamination			
Design/pre-construction			
SC1	*General soil and erosion management*	Erosion and sediment control measures would be implemented in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2A* (DECC, 2008). Measures would be designed as a minimum for the 80th percentile, five day rainfall event.	All
SC2	*Acid sulfate soils*	Prior to ground disturbance in high probability acid sulfate areas, testing would be carried out to determine the presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee, 1998) and the *Waste Classification Guidelines* - Part 4: Acid Sulfate Soils (EPA, 2014).	MA, CB, CP
SC3	*Saline soils*	Prior to ground disturbance in areas of potential soil salinity, testing would be carried out to confirm the presence of saline soils. If saline soils are encountered, they would be managed in accordance with *Site Investigations for Urban Salinity* (DLWC, 2002).	PB, BA
SC4	*Contamination*	WorkCover dangerous goods searches would be carried out for properties that have potential contamination near Belmore Station, to provide additional site characterisation and identify the risk of contamination in these areas.	BE
SC5		**Prior to ground disturbance, a** detailed contamination assessment would be undertaken in areas with a medium to high risk of contamination, to confirm the nature and extent of contamination, specific requirements for further investigation and remediation, and/or management requirements of any contamination.	MA, CP, BE, PB, BA
SC6		Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities, and for utility adjustments as required.	All
SC7		In the event a Remediation Action Plan is required, it would be developed in accordance with *Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land* (Department of Urban Affairs and Planning and Environment Protection Authority, 1998) and a NSW Environment Protection Authority Accredited site auditor would be engaged to audit the works.	MA, CP, BE, PB, BA
Construction			
SC8	*Unexpected contamination*	In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area would cease, and the finds would be managed in accordance with the unexpected contamination finds procedure.	All

ID	Impact	Mitigation measures	Relevant location(s)
Operation			
SC9	*Soil erosion and sedimentation*	During any maintenance work where soils are exposed, sediment and erosion control devices would be installed in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).	All
Hydrology, flooding and water quality			
Design/pre-construction			
~~FHW1~~	~~*Flooding*~~	~~The design would be reviewed to, where feasible and reasonable, not worsen existing flooding characteristics up to and including the one per cent AEP event (incorporating a 10 per cent allowance for climate change) in the vicinity of the project.~~ ~~Detailed flood modelling would consider:~~ ~~• potential changes to flood prone land and flood levels, including areas of flood risk not already addressed~~ ~~• potential changes to overland flow paths~~ ~~• redistribution of surface runoff as a result of project infrastructure~~ ~~• behaviour of existing stormwater runoff, including the results of any recent flood events~~ ~~• results of detailed asset surveys (e.g. floor levels)~~ ~~• potential changes required to flood evacuation routes, flood warning systems and signage.~~ ~~Flood modelling to support detailed design would be carried out in accordance with the following guidelines:~~ ~~• *Floodplain Development Manual* (DIPNR, 2005)~~ ~~• *Floodplain Risk Management Guideline: Practical Consideration of Climate Change* (DECC, 2007)~~ ~~• *Floodplain Risk Management Guide: Incorporating Sea Level Rise Benchmarks in Flood Risk Assessments* (DECCW, 2010)~~ ~~• *New guideline and changes to section 117 direction and EP&A Regulation on flood prone land, Planning Circular PS 07-003* (NSW Department of Planning, 2007).~~ ~~Flood modelling and consideration of mitigation measures would be carried out in consultation with the relevant local council, **Sydney Water**, and the NSW State Emergency Service.~~	~~All~~
FHW1	*Stormwater runoff*	Where feasible and reasonable, detailed design would result in no net increase in stormwater runoff rates in all storm events, unless it can be demonstrated that increased runoff rates as a result of the project would not increase downstream flood risk.	All
~~FHW3~~		~~Where space permits, on-site detention of stormwater would be introduced where stormwater runoff rates are increased. Where there is insufficient space for the provision of on-site detention, the upgrade of downstream infrastructure would be implemented where feasible and reasonable.~~	~~All~~
~~FHW4~~	~~*Consultation*~~	~~Where relevant, detailed design would occur in consultation with **Sydney Water**, the NSW State Emergency Service, and the Inner West and Canterbury-Bankstown councils, to ensure that flood related outcomes are consistent with floodplain risk management studies.~~	~~All~~

ID	Impact	Mitigation measures	Relevant location(s)
~~FHW5~~	~~*Scour potential*~~	~~Further analysis of potential scour would be undertaken during detailed design. This would include the development of appropriate mitigation measures where required, including the installation of detention basins for the duration of construction.~~	~~All~~
FHW2	*Water quality*	The project would be designed to ensure there is minimal potential for water quality impacts, including incorporating water sensitive urban design elements.	All
FHW3	*Water quality monitoring*	A **construction** water quality monitoring program would be developed and ~~implemented~~ **would commence prior to construction**, to monitor water quality at identified discharge points. The program would include relevant water quality objectives, parameters, and criteria and specific monitoring locations identified in consultation with DPI (Water) and the EPA.	All
Construction			
FHW4	*Flooding*	Detailed construction planning would consider flood risk for all compounds and work sites. This would include identification of measures to not worsen existing flooding characteristics. Not worsen is defined as: • a maximum increase in flood levels of 50 mm in a one per cent AEP event • a maximum increase in time of inundation of one hour in a one per cent AEP event • no increase in the potential for soil erosion and scouring from any increase in flow velocity in a one per cent AEP flood event.	All
FHW5		The site layout and staging of construction activities would: • avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required • consider how works would affect the existing stormwater network such that alternatives are in place prior to any disconnection or diversion of stormwater infrastructure.	All
FHW6	*Watercourse impacts*	Works within or near watercourses (including the Cooks River) would be undertaken with consideration given to the NSW Office of Water's guidelines for controlled activities.	All
FHW7	*Water quality*	Erosion and sediment mitigation measures would be installed and maintained for the duration of the construction period.	All
FHW8	*Water quality monitoring*	**The** ~~A~~ water quality monitoring program **would continue during construction**, to monitor water quality at identified discharge points. ~~The program would include relevant water quality objectives, parameters, and criteria and specific monitoring locations identified in consultation with DPI (Water) and the EPA.~~	All
FHW9		Discharges from construction water treatment devices would be monitored to ensure compliance with the discharge criteria in the environment protection licence.	All

ID	Impact	Mitigation measures	Relevant location(s)
Operation			
FHW10	*Water quality*	Operational water discharges would be managed in accordance with the water quality management requirements specified in the environment protection licence.	All
Biodiversity			
Design/pre-construction			
B1	*Direct impacts to biodiversity*	Detailed design and construction planning would **avoid** direct impacts to vegetation mapped as threatened ecological communities **or native plant community types, specifically Downy Wattle Turpentine - Grey Ironbark open forest on shale, Degraded Turpentine - Grey Ironbark open forest on shale and Broad-leaved Ironbark – Grey Box.** ~~as far as practicable, and have regard to the habitat management measures provided in the biodiversity assessment report.~~	All
B2		Pre-clearing surveys and inspections for endangered and threatened flora and fauna species would be undertaken by qualified ecologists prior to any clearing occurring. The surveys and inspections, and any subsequent relocation of species, would be undertaken in accordance with the measures provided in the biodiversity assessment report.	All
Construction			
B3	*Direct impacts to biodiversity*	Areas of biodiversity value outside the project area would be marked on plans, and fenced or signposted where practicable, to prevent unnecessary disturbance.	All
B4		Impacts to Downy Wattle **Turpentine - Grey Ironbark open forest on shale, Degraded Turpentine - Grey Ironbark open forest on shale and Broad-leaved Ironbark – Grey Box** would be avoided. The locations of **these species and communities** would be marked on plans, fenced on site, and avoided.	All
B5		Equipment storage and stockpiling would be restricted to identified compound sites and already cleared land.	All
B6		A trained ecologist would be present during the clearing of native vegetation or removal of potential fauna habitat to avoid impacts on resident fauna and to salvage habitat resources as far as is practicable.	All
B7	*Management of weeds*	**Priority** ~~Noxious~~ weeds would be managed in accordance with the ***Biosecurity Act 2015*** ~~*Noxious Weeds Act 1993*~~. Weeds of national environmental significance would be managed in accordance with the *Weeds of National Significance Weed Management Guide*.	All

ID	Impact	Mitigation measures	Relevant location(s)
Operation			
B8	*Management of weeds*	Annual inspections would be undertaken for weed infestations and to assess the need for control measures.	All
B9		Any outbreak of priority weeds and/or weeds of national environmental significance would be managed in accordance with the relevant guidelines.	All
B10	***Threatened species and habitats***	**Transport for NSW would take necessary steps to locate and protect threatened species and habitats where they occur inside the Sydenham to Bankstown rail corridor. Suitable protection measures would include fencing, signage and other measures where this would not impede the safe maintenance and operation of trains and related infrastructure.**	**All**
Air quality			
Design/pre-construction			
AQ1	*Air quality impacts*	An air quality management plan would be prepared and implemented during construction, to define the measures to minimise air quality impacts during construction.	All
Sustainability And Climate Change			
Design/pre-construction			
SCC1	*Sustainability*	Sustainability initiatives and targets would be reviewed and incorporated into the detailed design to support the achievement of the project's sustainability objectives. A best practice level of performance would be targeted using relevant sustainability rating tools e.g. ISCA as built 'excellent' level rating.	All
SCC2		A sustainable procurement strategy would be developed and implemented to apply to Principal Contractors, their subcontractors and their suppliers.	All
SCC3		A workforce development and industry participation strategy would be developed covering both construction and operation.	
SCC4	*Climate change*	**The need for c**limate change risk treatments would be **assessed and incorporated into the detailed design, where required.** ~~including ensuring that adequate flood modelling is carried out and integrated with design~~.	All
SCC5	*Greenhouse gas emissions*	An iterative process of greenhouse gas assessments and design refinements would be carried out during detailed design and construction to identify opportunities to minimise greenhouse gas emissions. Performance would be measured in terms of a percentage reduction in greenhouse gas emissions from a defined reference footprint.	All

ID	Impact	Mitigation measures	Relevant location(s)
Construction			
SCC6	*Sustainability*	Sustainability reporting (and corrective action where required) would be undertaken during construction.	All
SCC7		The construction workforce development plan would be implemented.	All
SCC8	*Greenhouse gas emissions*	25 per cent of the greenhouse gas emissions associated with consumption of electricity during construction would be offset.	All
Operation			
SCC9	*Sustainability*	Prior to operation commencing, sustainability initiatives would be reviewed and updated, and relevant initiatives would be implemented to support the achievement of the project's sustainability objectives.	All
SCC10		The operation workforce development plan would be implemented.	All
SCC11	*Climate change risks*	Periodic review of climate change risks would be carried out to ensure ongoing resilience to the impacts of climate change.	All
SCC12	*Greenhouse gas emissions*	100 per cent of the greenhouse gas emissions associated with consumption of electricity during operation would be offset.	All
Hazards, risks and safety			
Design/pre-construction			
HRS1	*Public safety*	A hazard analysis would be undertaken during the detailed design stage to identify risks to public safety from the project, and how these can be mitigated through safety in design.	All
HRS2	***Electric and magnetic fields***	**Substations would be designed to ensure that electric and magnetic fields remain within the limits set by the following guidelines:** • **RHS 30 (Radiation Health Series 30), *Interim Guidelines on Limits of Exposure to 50/60Hz Electric & Magnetic Fields* (1989), National Health and Medical Research Council** • **RPS 3 (Radiation Protection Series No.3), *Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz* (2002), Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)** • **AS/NZS 2344:1997 and Amdt 1:2006 *Limits of electromagnetic interference from overhead a.c. powerlines and high voltage equipment installations in the frequency range 0.15 to 1000 MHz.*** **During commissioning of the substations, monitoring would be undertaken to determine the electric and magnetic field levels. Should exceedances of the criteria be found, measures to reduce these exceedances would be implemented.**	**SS**
HRS3	***Utilities***	**All utilities adjustments or relocation would be undertaken in accordance with the Utilities Management Framework.**	**All**

ID	Impact	Mitigation measures	Relevant location(s)
Construction and operation			
HRS4	*Hazardous materials and substances*	All hazardous substances that may be required for construction and operation would be stored and managed in accordance with the *Storage and Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005) and the *Hazardous and Offensive Development Application Guidelines: Applying SEPP* 33 (Department of Planning, 2011).	All
Waste management			
Design/pre-construction			
WM1	*Waste generation and recycling*	Detailed design would include measures to minimise excess spoil generation. This would include a focus on optimising the design to minimise spoil volumes, and the reuse of material on-site.	All
WM2		A recycling target of at least 90 per cent would be adopted.	All
Construction			
WM3	*Waste and spoil management*	Spoil would be managed in accordance with the spoil management hierarchy.	All
WM4		Target 100 per cent reuse of reusable spoil.	All
WM5		Construction waste would be minimised by accurately calculating materials brought to the site and limiting materials packaging.	All
WM6		All waste would be assessed, classified, managed and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014).	All
WM7		Waste segregation bins would be located at various locations within the project area, if space permits, to facilitate segregation and prevent cross contamination.	All
Cumulative impacts			
Pre-construction and construction			
CI1	*Cumulative impacts*	Transport for NSW would manage and co-ordinate the interface with projects under construction at the same time. Co-ordination and consultation with the following stakeholders would occur, where required: • Department of Planning and Environment • Roads and Maritime Services • Sydney Trains • NSW Trains • Sydney Buses • Inner West Council • Canterbury-Bankstown Council • Sydney Motorways Corporation • emergency service providers • utility providers • construction contractors.	All

ID	Impact	Mitigation measures	Relevant location(s)
		Co-ordination and consultation with these 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 construction program, work activities or haul routes; or adjustments to the program, activities or haul routes of Sydney Metro or other construction projects • co-ordination of traffic management arrangements between projects.	