6.3.5 Land use and property

Assessment methodology

The assessment of impacts from the proposed modification on land use and property has been carried out by undertaking the following key tasks:

- Providing an overview of the existing land use and zoning in the vicinity of the proposed modification
- Identifying properties and land uses that would be impacted by the proposed modification
- Identifying mitigation measures (general and specific) that would assist in reducing land use and property impacts.

The strategic land use and planning context is described in detail in Chapter 12 (Land use and property) of the EIS for the approved project (the EIS) and is considered to be consistent for the proposed modification.

Existing environment

Northcote Street civil and tunnel site

The Northcote Street civil and tunnel site is currently being used as a tunnelling site for the M4 East project and currently provides acoustic shed, offices, hoardings, noise walls and access for the construction access tunnel.

Construction of dive structures, tunnel portals and surface road upgrades and modifications along Wattle Street near the Northcote Street civil and tunnel site are being carried out as part of the M4 East project. Substantial changes to land use within this area at Haberfield as a result of property acquisition and construction activities including at Northcote Street have already been assessed and approved as part of the M4 East project.

The Northcote Street civil and tunnel site is located on land zoned B6 Enterprise Corridor and R2 Low Density Residential under the Ashfield Local Environmental Plan 2013 (Ashfield LEP 2013). The objective of these zones is to promote businesses along main roads and provide for the housing needs of the community within a low density residential environment respectively.

The area around the Northcote Street civil and tunnel site consists of predominantly residential land uses, comprising attached and detached dwellings and some residential apartments. Land use zoning surrounding the Northcote Street site is shown in **Figure 6-4**. The land is also subject to the *Parramatta Road Corridor Urban Transformation Strategy* (UrbanGrowth NSW 2016).

Refer to section 12.2.2 of the EIS for further information regarding existing land use and planning controls at the Northcote Street site.

Reg Coady Reserve

Reg Coady Reserve is located to the north of Wattle Street, east of the intersection with Martin Street. It forms part of a larger open space corridor which runs along Iron Cove Creek (Dobroyd Canal). A dedicated temporary construction vehicle turning lane (the G-loop) and a laydown area established by the M4 East project currently occupies part of the reserve. The G-loop allows eastbound trucks on Wattle Street from the M4 East project to turn right and head westbound on Wattle Street. The land is presently occupied pursuant to a lease with Inner West Council.

The M4 East EIS described the following land use impacts at Reg Coady Reserve:

- About 18 per cent of the total area of Reg Coady Reserve would be impacted during construction from construction activities, including the establishment of the G-loop. 12 per cent of the total area of the reserve would be required for operation and the widening of Wattle Street for the M4 East project
- The land use of part of Reg Coady Reserve would permanently change from open space to road infrastructure as a result of the widening of Wattle Street as part of the M4 East project.

- The area of Reg Coady Reserve to be leased for the G-loop would be rehabilitated and returned to Inner West Council for use as open space following the construction of the M4 East project.

Subsequent modifications to the M4 East project approval have increased the construction footprint in this area to allow for drainage, utility and other construction works.

The G-loop is located on land zoned RE1 Public Recreation and SP2 Infrastructure. The objective of these zones is to enable land to be used for public open space or recreational purposes and to provide for infrastructure and related uses respectively.

Land use zoning surrounding Reg Coady Reserve is shown in **Figure 6-4**.

Figure 6-4 Land use zoning surrounding Northcote Street civil and tunnel site and G-loop at Reg Coady Reserve

Assessment of potential impacts

Property acquisition

There would be no change to property acquisition at the Northcote Street civil and tunnel site or at Reg Coady Reserve relating to the G-loop. **Table 6-29** provides a comparison of property acquisition required for the approved project and the proposed modification.

Table 6-29 Comparison of property acquisition required for the approved project and the proposed modification

Location	Existing land use	Property acquisition assessed in the EIS	Additional property acquisition required for proposed modification
Northcote Street civil and tunnel site	Construction ancillary facility for the M4 East project	None[1]	No additional property acquisition required for modification
Reg Coady Reserve	G-loop for the M4 East project	None[2]	No additional property acquisition required for modification

Notes:

[1] Refer to the M4 East EIS (September 2015) for acquisitions that occurred at this location

[2] Leased from the former Inner West Council to Roads and Maritime

The part of the Reg Coady Reserve that is being used by the M4 East project for the G-loop is subject to a lease agreement between Roads and Maritime and Inner West Council. This lease agreement would need to be extended as a result of the proposed modification for the M4-M5 Link project.

Ground movement

Ground movement may occur in some areas along the tunnel alignment induced by tunnel excavation. The ground movement anticipated is predominantly settlement, which is downward (also termed subsidence). Upward movement may also occur and is known as heave.

Potential for ground movement would be associated with the provision the construction access tunnel (around 430 metres in length).

The construction access tunnel is located under Wattle Street beneath land acquired for the M4 East project, and under a limited number of residential properties in Walker Avenue and Alt Street. The access tunnel connects to the M4-M5 Link mainline tunnels at a depth of around 40 metres below ground. The horizontal and vertical alignment of the access tunnel has been selected to avoid impact to the M4 East motorway and ventilation tunnels. The construction access tunnel is located at least 30 metres below ground in the vicinity of residential properties in Walker Avenue and Alt Street.

The construction access tunnel excavation is anticipated to result in less than three millimetres of additional surface settlement in the zone of influence (refer to **Figure 6-5**). When combined with the predicted settlement levels described in section 12.3.4 of the EIS for this location associated with excavation of the mainline tunnels, the combined settlement impacts would be in the range of 10 to 12 millimetres (refer to **Figure 6-6**). The predicted settlement impacts at these residential properties would meet the maximum settlement criteria contained within condition E103.

Where the construction access tunnel passes under the M4 East tunnels in the vicinity of Wattle Street and Walker Avenue a maximum settlement at the level of the M4 East tunnels of around five to eight millimetres is anticipated.

A review of potential angular distortion for the construction access tunnel was carried out. The review did not identify any areas where angular distortion is steeper than one in 500.

Potential settlement impacts would be managed through the implementation of the approved project environmental management measures and in accordance with relevant conditions of approval for the project, including condition E103 which details the maximum settlement criteria as shown in **Table 6-30**.

Table 6-30 Project settlement criteria

Surface and sub-surface structures	Maximum Settlement	Maximum Angular Distortion	Limiting Tensile Strain (percent)[1]
Buildings – low or non-sensitive properties (i.e. ≤ 2 levels and carparks)	30 mm	1 in 350	0.1
Buildings and pools – High or sensitive properties (i.e. ≥ 3 levels and heritage items)	20 mm	1 in 500	0.1
Roads and parking areas	40 mm	1 in 250	n/a
Parks	50 mm	1 in 250	n/a

1 As defined in Burland et al. 'Building response to tunnelling – Case studies from construction of the Jubilee Link Extension', London, Thomas Telford (2001)

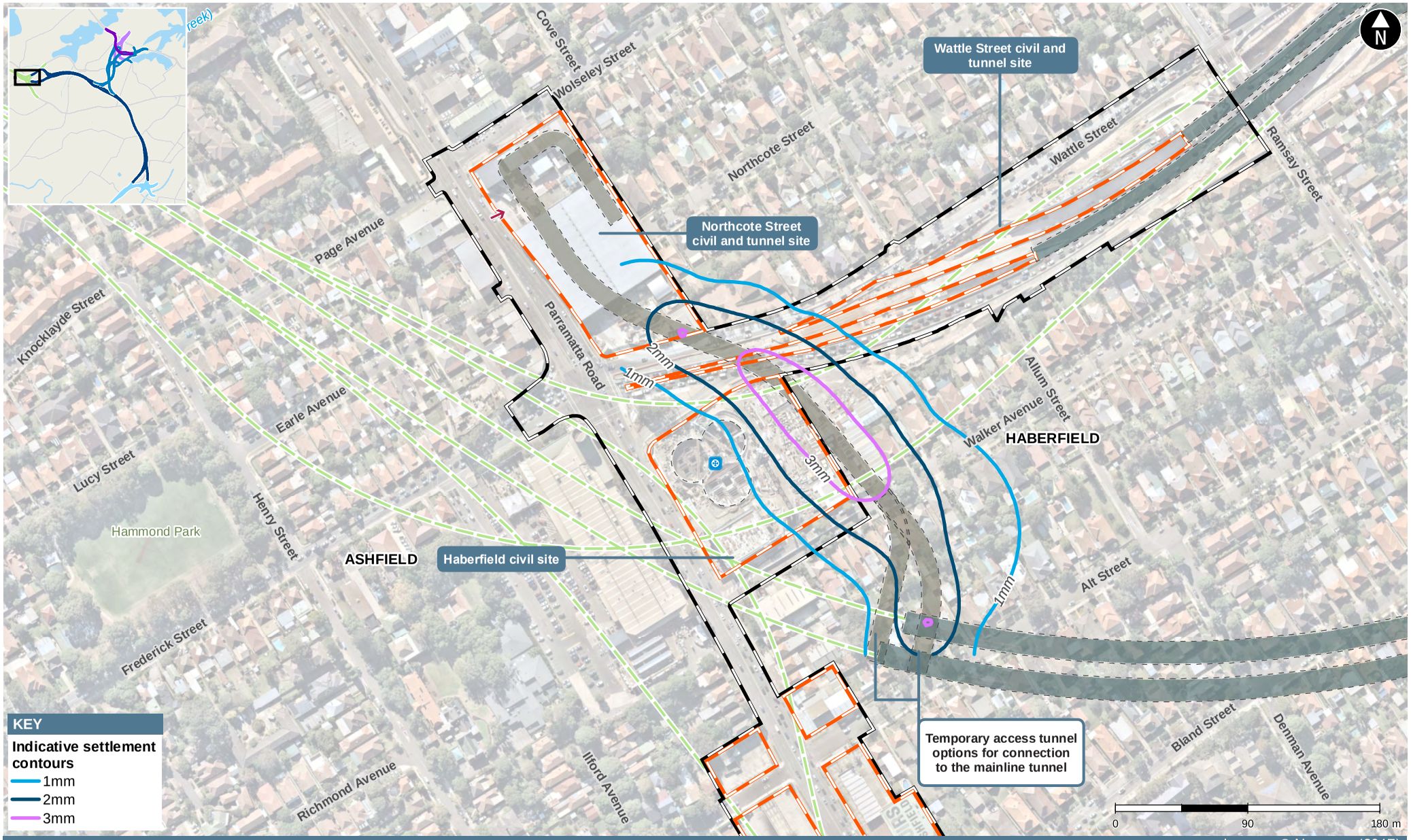

Figure 6-5 Predicted settlement levels for the construction access tunnel

Figure 6-6 Predicated settlement levels for the construction access tunnel and M4 East and M4-M5 Link motorway tunnels

Land use

The Northcote Street site is described in section 6.5.4 of the EIS as a civil site for construction workforce parking and to support construction activities at the nearby civil and tunnel sites, including laydown and storage of materials.

For the proposed modification, the Northcote Street site would be used as a civil and tunnel site. Construction activities would be carried out on land being used as a construction ancillary facility for the M4 East project and within the same surface construction footprint as assessed in the M4-M5 Link EIS.

The proposed modification would not change the temporary land use at this site as assessed in the EIS, as it would still be used for construction purposes. Once construction works are complete, the construction facilities would be removed and the site would be made suitable for a future use in accordance with the M4 East Residual Land Management Plan.

The proposed modification would retain the G-loop at Reg Coady Reserve that was established as part of the M4 East project as a heavy vehicle haulage route for the Northcote Street civil and tunnel site. The EIS for the M4 East project described that the area of Reg Coady Reserve used for construction would be restored and returned to Inner West Council for use as open space following the completion of construction of the M4 East project. The proposed modification would effectively delay the restoration of the area of Reg Coady Reserve required for the G-loop until after the completion of construction activities for the M4-M5 Link project in Q1 2023. The existing lease agreement between Roads and Maritime and Inner West Council would need to be extended (beyond 2021) to allow for the continued use of the G-loop.

Minor changes would be required to the proposed intersection design at Dobroyd Parade and Waratah Street (after completion of the M4 East project) to allow Route B to be used and these are detailed in **Chapter 4** (Proposed modification). On completion of construction of the M4-M5 Link project, the G-loop infrastructure would be removed and that part of Reg Coady Reserve would be rehabilitated in accordance with the M4 East Residual Land Management Plan.

The proposed design for the G-loop for the construction of the M4-M5 Link is shown in **Figure 6-7** and a comparison of land use impacts for the approved project and proposed modification is provided in **Table 6-31**.

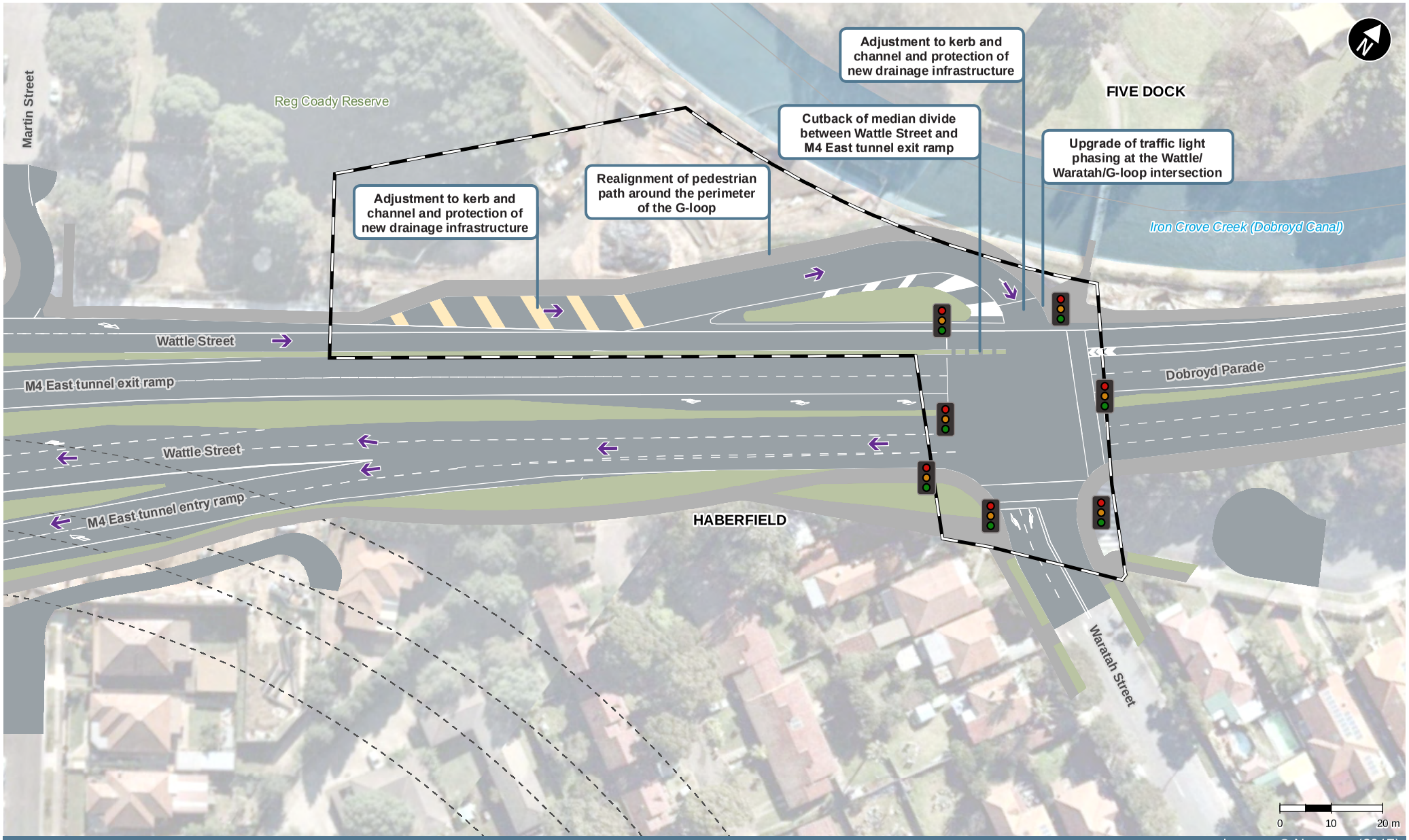

Figure 6-7 Proposed 'G-loop' at Reg Coady Reserve during construction

Table 6-31 Comparison of land use impacts for the proposed modification at Northcote Street civil and tunnel site and Reg Coady Reserve

	Construction		Operation	
Location	**Approved project**	**Proposed modification**	**Approved project**	**Proposed modification**
Northcote Street civil and tunnel site	Construction activities would be carried out on land being used as a construction ancillary facility for the M4 East project. The Northcote Street site would be used as a civil site.	The Northcote Street site would be used as a civil and tunnel site.	Remaining land on the site not used for transport infrastructure would be rehabilitated and landscaped consistently with the M4 East Residual Land Management Plan.	Remaining land on the site not used for transport infrastructure would be rehabilitated and landscaped consistently with the M4 East Residual Land Management Plan.
Reg Coady Reserve	No land use impacts at Reg Coady Reserve. Reg Coady Reserve to be reinstated at completion of construction for M4 East the project.	Reconfiguration works to facilitate continued use of the G-loop within Reg Coady Reserve by heavy vehicles for the M4-M5 Link project.	No operational land use impacts at Reg Coady Reserve. The M4 East project assessed permanent impacts associated with widening works for the Wattle Street interchange.	No operational land use impacts at Reg Coady Reserve. The G-loop would be demobilised and be rehabilitated and returned to Inner West Council for use as open space consistent with the proposal for the M4 East project.

Utility works

The proposed Northcote Street civil and tunnel site would require a new power supply connection. The power supply connection would be provided to the site from the Croydon Zone substation. The maximum demand of 10 Mega Volt Amp (MVA) would require two High Voltage Connections (HVCs) connected by underground cables to the Ausgrid (High Voltage) network.

The route of the power supply connection from the substation to Parramatta Road would generally be consistent with the approved route outlined in Appendix F Utility Management Strategy of the EIS. The main change would be the provision of a connection into the site from the western side of Parramatta Road and crossing to the eastern side of Parramatta Road into the site, near the intersection with Wattle Street (refer to **Figure 6-8**).

The connection would be included in the updated Utility Management Strategy as required by condition of approval E140.

A substation kiosk is proposed at the Northcote Street civil and tunnel site, subject to detailed design. The substation would be located in around the same position of the existing substation for the M4 East project near Wattle Street.

Management measures and conditions of approval

Potential land use and property impacts associated with the proposed modification would be effectively managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR.

The proposed modification would not require the modification of the conditions of approval for the project related to land use impacts at the Northcote Street civil and tunnel site and Reg Coady Reserve.

Figure 6-8 Construction power - Haberfield and Ashfield

6.3.6 Urban design and visual amenity

Assessment methodology

An assessment of impacts from the proposed modification on visual amenity has been carried out by undertaking the following key tasks:

- Review of the landscape and visual context as described in Chapter 13 (Urban design and visual amenity) of the EIS for the approved project
- Assessment of visual impacts during construction
- Assessment of landscape character and visual impacts during operation
- Assessment of night lighting impacts during construction and operation
- Identification of reasonable and feasible mitigation measures.

The methodology for the assessment of visual impacts for construction and the assessment of landscape character and visual impacts during operation is consistent with the methodology for the landscape character and visual impact assessment summarised in Chapter 13 (Urban design and visual amenity) of the EIS.

Existing environment

Northcote Street civil and tunnel site

The Northcote Street civil and tunnel site is located between Wattle Street and Wolseley Street at Haberfield on land that is currently being used as a construction ancillary facility for the M4 East project. The site includes a large-scale acoustic shed as well as storage, workshop and multi-level site offices.

Adjoining properties consist primarily of residential dwellings at Northcote Street and Wolseley Street and a religious congregation located at Wattle Street. The adjacent Parramatta Road corridor includes adjacent commercial development and roadside infrastructure such as signage, street lighting and traffic signals and caters for high traffic volumes. The ventilation facilities for the M4 East and M4-M5 Link projects are currently under construction on the opposite corner of Parramatta Road and Wattle Street.

Existing sources of night lighting at and around the site includes street lighting associated with Parramatta Road, Wattle Street and local streets such as Northcote Street and Wolseley Street, lighting associated with construction activities being undertaken at the site as part of the M4 East project, vehicular traffic and illuminated windows of the surrounding residential and commercial buildings along Parramatta Road and Wattle Street.

The existing acoustic shed is shown in **Plate 1** and additional photos of the existing environment in this area are provided in **Appendix F** (Site photos).

Plate 1 Existing M4 East acoustic shed at the Northcote Street civil and tunnel site

G-loop at Reg Coady Reserve

Reg Coady Reserve is located to the north of Wattle Street, east of the intersection with Martin Street. It forms part of a larger open space corridor which runs along Iron Cove Creek (Dobroyd Canal). The G-loop was established by the M4 East project. The turning lane allows eastbound trucks on Wattle Street associated with construction of the M4 East project to turn right and head westbound on Wattle Street. As part of the M4 East project, widening of the road corridor in this area is being carried out to accommodate the entry and exit ramps for the M4 East tunnels.

The existing G-loop is shown in **Plate 2** and additional photos of the existing environment in this area are provided in **Appendix F** (Site photos).

Plate 2 Existing M4 East G-loop at Reg Coady Reserve

Assessment of potential impacts

Northcote Street civil and tunnel site

The primary visual element that would change for the proposed modification at the Northcote Street civil and tunnel site would be the retention of the large acoustic shed that has been established by the M4 East project. The acoustic shed is an existing visual element on the site, and the existing visual impact of this structure would be extended over a further period of around four years. The acoustic shed is a large visual element in the order of 10 metres high. It is visible from Parramatta Road, Wattle Street and from adjacent residential properties located at Northcote Street and Wolseley Street.

Sensitive receivers are shown in **Figure 6-9**. A summary of visual and night lighting impacts on sensitive receivers during construction at the Northcote Street civil and tunnel site is provided in **Table 6-32**, including a comparison of the overall impact ratings described in Chapter 13 (Urban design and visual amenity) of the EIS.

Table 6-32 Summary of construction visual impacts on sensitive receivers at the Northcote Street civil and tunnel site

Receiver		Sensitivity to impact	Magnitude of impact	Overall impact rating (modification)	Overall impact rating (EIS)
Visual impacts					
NC1	Religious congregation – Wattle Street	Low	Low	Low	Low
NC2	Motorists – Wattle Street, Parramatta Road	Moderate	Moderate	Moderate	Moderate-Low

Receiver		Sensitivity to impact	Magnitude of impact	Overall impact rating (modification)	Overall impact rating (EIS)
NC3	Residents – Wattle Street, Northcote Street, Wolseley Street	Moderate	Moderate	Moderate	Moderate
NC4	Pedestrians – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road	Low	Moderate	Moderate-Low	Low
Night lighting impacts					
NC1	Religious congregation – Wattle Street	Low	Negligible	Negligible	Low
NC2	Motorists – Wattle Street, Parramatta Road	Low	Negligible	Negligible	Low
NC3	Residents – Wattle Street, Northcote Street, Wolseley Street	Moderate	Negligible	Low	Moderate-Low
NC4	Pedestrians – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road	Low	Negligible	Low	Low

The overall impact is considered to be 'moderate' for nearby receivers including residences and motorists with the exception of the religious congregation on Wattle Street which would have a limited view of the shed over the hoarding around the perimeter of the site.

Lighting would largely be contained within the acoustic shed and would be designed to minimise light spill, which would reduce the amount of light trespass onto adjoining residential properties. This would represent a reduction of potential night lighting impacts for the proposed modification compared to the EIS, which did not consider an acoustic shed at this location. Potential night lighting impacts would generally be consistent with existing conditions associated with the presence of the M4 East acoustic shed. The magnitude of the impact is considered to be 'low' for all nearby receivers. Night lighting would be designed to minimise light spillage to adjoining properties and would be generally consistent with the requirements of *AS 4282-1997 Control of the obtrusive effects of outdoor lighting*.

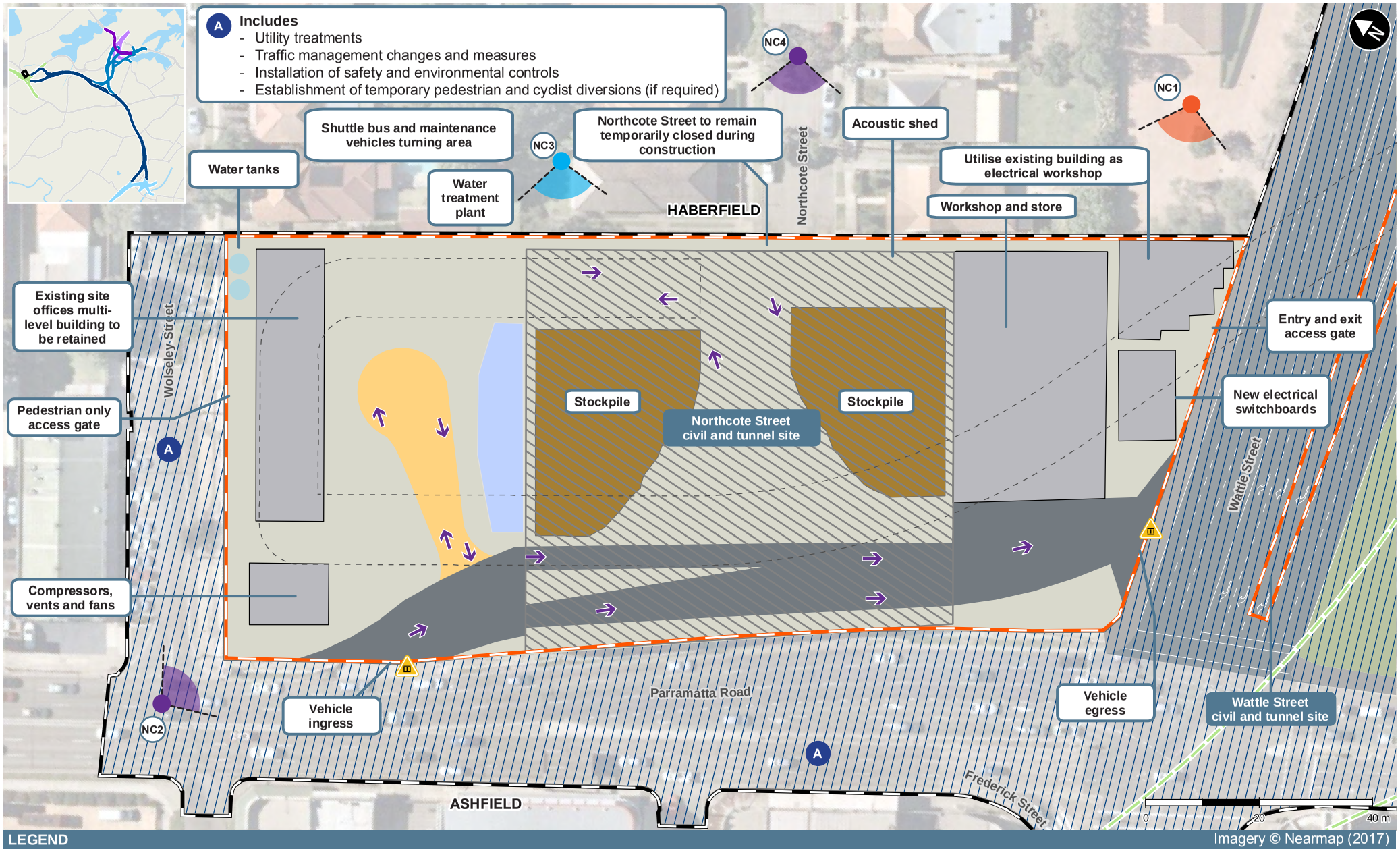

Figure 6-9 Northcote Street civil and tunnel site representative receiver locations

G-loop at Reg Coady Reserve

The reconfiguration works and use of the G-loop by heavy vehicles at Reg Coady Reserve would result in temporary visual impacts to motorists and pedestrians travelling on Dobroyd Parade, recreational users of Reg Coady Reserve and residential receivers on the southern side of Dobroyd Parade and along Martin Street to the west. The road corridor is currently being widened to accommodate the entry and exit ramps for the M4 East tunnels at the Wattle St interchange. Visual impacts would be temporary viewed in the context of an adjacent arterial road corridor which has been subject to construction works for the Wattle Street interchange and are therefore considered to be low.

The visual impacts from reconfiguration and use of the G-loop would be an extension of the existing visual impacts at this location as described in the M4 East project EIS. The impact will also include the use of the G-loop by construction heavy vehicles at a rate of around seven to eight trucks per hour. This impact would be negligible when considered in the context of the heavy traffic volumes using the adjacent traffic lanes on Wattle Street.

The G-loop would be demobilised and be rehabilitated and returned to Inner West Council for use as open space consistent with the proposal for the M4 East project. Residual impacts at this location would be limited to the impacts from operational infrastructure for the Wattle Street interchange which was described in the M4 East EIS.

Management measures and conditions of approval

Potential visual impacts associated with the proposed modification would be effectively managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR.

The proposed modification would not require the modification of the conditions of approval for the project related to visual impacts at the Northcote Street civil and tunnel site and Reg Coady Reserve.

6.3.7 Social and economic

Assessment methodology

An assessment of the potential social and economic impacts has been carried for the proposed modification. The assessment is informed by the outcomes of the assessments that have been prepared for the proposed modification. This includes assessments of air quality, urban design and visual amenity, traffic and transport and noise and vibration impacts.

The social and economic impact assessment in the EIS considered impacts related to:

- Demographic profile
- Community values
- Amenity
- Social infrastructure
- Business and industry
- Access and connectivity
- Economy
- Utilities
- Property acquisition
- Construction fatigue.

Potential impacts relating to demographic profile, community values, economy, utilities and property acquisition as described in the EIS are considered to be consistent for the proposed modification. Potential impacts of the proposed modification relating to amenity, social infrastructure, business and industry, access and connectivity and construction fatigue are assessed in the sections below.

Figure 6-10 outlines the assessment framework that was employed to determine the overall significance of socio-economic impacts. Project data and knowledge and professional judgement has been applied on a case-by-case basis to identify the duration, spatial extent, severity, consequence, likelihood and ultimately the significance of impact on the socio-economic environment for each identified impact.

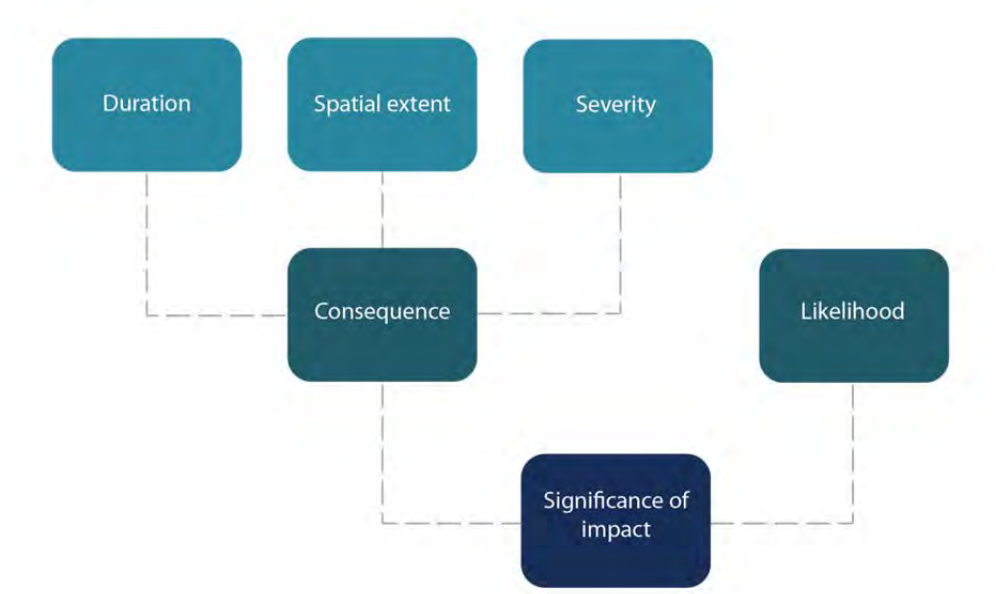

Figure 6-10 Socio-economic assessment framework

Existing environment

The surface construction footprint for the proposed modification at the Northcote Street civil and tunnel site would not change compared to the approved project and therefore the existing environment for the social and economic assessment is considered to be consistent with the existing environment for the approved project as described in section 14.2 of the EIS.

Reg Coady Reserve is located to the north of Wattle Street, east of the intersection with Martin Street. It forms part of a larger open space corridor which runs along Iron Cove Creek (Dobroyd Canal). The G-loop and other construction areas established by the M4 East project currently occupies part of the reserve (refer to **section 6.3.5** for further information). The remainder of the reserve is available to be used for open space and recreation.

Assessment of potential impacts

Potential social and economic impacts of the proposed modification during construction at the Northcote Street civil and tunnel site and Reg Coady Reserve are assessed in the sections below.

Road and intersection performance

Section 6.3.1 identifies the changes in level of service of roads and intersection performance during construction due to the proposed modification for the Route A and Route B haulage options for the Northcote Street civil and tunnel site. The impacts assessed indicate the proposed modification would result in minimal change to the traffic and transport impacts previously assessed in the M4-M5 Link EIS and SPIR. Impacts would therefore continue to be managed through the construction management measures contained in the conditions of approval for the project, specifically those in the Construction Traffic Transport and Access Management Sub-Plan and the Construction Parking and Access Strategy.

The Route B option, including use of the G-loop presents a number of benefits to reduce the potential social and economic impacts associated with spoil haulage for the Northcote Street civil and tunnel site including:

- Keeping heavy vehicles on major arterial roads
- Provision of access to the M4 East tunnels once completed
- Utilisation of existing infrastructure from the M4 East project.

Safety

Construction traffic and heavy vehicles associated with the proposed modification may affect community safety around roads and active transport connections, including along Ramsay Street for the Route A option, noting that these are state roads under the control of Roads and Maritime. A reduction in safety may be experienced on these roads with marginally higher traffic volumes and more heavy vehicles than would normally be experienced, as a result of the presence of construction traffic.

The proposed spoil haulage routes for the Northcote Street civil and tunnel site would be more direct and less constrained by comparison to the proposed spoil haulage route for the Parramatta Road West civil and tunnel site described in the EIS and SPIR. The proposed spoil haulage routes would be restricted to state roads that are controlled by Roads and Maritime. Use of the G-loop would allow spoil haulage vehicles the option of using the M4 East motorway tunnels and as a result reduce impacts on the surface road network.

Without mitigation, the traffic impact of construction activities would result in a moderate negative impact upon the safety of these roads. Impacts would therefore continue to be managed through the construction management measures contained in the conditions of approval for the project, specifically those in the Construction Traffic Transport and Access Management Sub-Plan and the Construction Parking and Access Strategy.

Access and connectivity

The provision of construction workforce car parking at Haberfield/Ashfield is described in **Chapter 4** (Proposed modification). The proposed modification would increase the amount of construction workforce car parking at Haberfield/Ashfield compared to Option A and Option B in the EIS. The White Bay civil site may also be used to supplement car parking for the construction workforce at Haberfield/Ashfield if necessary.

A preliminary assessment of parking provision, based on approximate peak workforce estimates, anticipate that the total parking provision within the Haberfield and Ashfield construction sites would be able to meet the forecast parking demand (refer to **section 6.3.1**)

Condition E54 of the project approval requires that a shuttle bus is provided as part of the Construction Parking and Access Strategy. It is proposed that a shuttle bus would be provided to transport the majority of construction workforce to and from designated parking areas, which are anticipated to be predominantly at the Parramatta Road West and Parramatta Road East civil sites to the Northcote Street civil and tunnel site. Where possible, the workforce will also be encouraged to walk the relatively short distance (around 400 metres) between these sites. This would help to mitigate potential impacts to on-street car parking around the Northcote Street civil and tunnel site.

A Construction Parking and Access Strategy would be developed in accordance with condition of approval E54. This plan would reduce the extent of the impact associated car parking on the socio-economic environment.

The proposed use of the Northcote Street site as a civil and tunnel site would not require the removal of on-street parking.

Local amenity – noise

The use of the Northcote Street civil and tunnel site will extend tunnelling operations and associated noise, air quality, traffic and parking impacts at this site for a further four years. This site is being used for tunnelling by the M4 East project. This enables existing infrastructure at the site such as the acoustic shed, driveways, water treatment plant, site offices and other structures to be re-used thereby reducing impacts associated with site establishment activities.

Potential noise impacts for the proposed modification are described in **section 6.3.3**. Potential impacts for the proposed modification would be generally consistent with the EIS and no additional environmental management measures would be required beyond those summarised in Part E of the SPIR. The potential social and economic impacts associated with noise amenity impacts described in the EIS would therefore be consistent for the proposed modification.

Local amenity – air quality

The proposed modification has the potential to affect local amenity due to the increase in dust in an environment. Potential air quality impacts for the proposed modification are described in **section 6.3.2**. Potential impacts for the proposed modification would be consistent with the EIS and are considered to be 'not significant' given the application of the environmental management measures summarised in Part E of the SPIR.

Local amenity – visual amenity

The primary visual element that would change for the proposed modification at the Northcote Street civil and tunnel site would be the retention of the large scale acoustic shed that has been established by the M4 East project. During construction, extended impacts to visual amenity may affect the enjoyment of an environment, business revenue and the well-being of individuals. Although the visual impacts would not substantially change from the existing use as a construction site, the ongoing use of these sites introduces construction fatigue risks with the adjacent residential properties likely to be more sensitive to ongoing impacts

With consideration of these factors, the overall impact on the socio-economic environment would be a moderate negative.

Social infrastructure

Changes in amenity may affect how users interact with, or enjoy an environment, or their ability to participate and concentrate. The sensitivity of social infrastructure to a construction impact would vary dependent on proximity to the construction activity, the individual's sensitivity to the construction impact (ie noise, dust, vibration) and the duration of the activity.

Table 6-33 details the social infrastructure that has a higher likelihood of experiencing multiple effects of construction activity at the Northcote Street civil and tunnel site. Social infrastructure users exposed to multiple construction activities may also be more susceptible to construction fatigue, which may have direct social and economic consequences.

Table 6-33 Social infrastructure likely to experience multiple construction effects

Use type	Social infrastructure facility	Change to environment	Potential socio-economic effects
Place of worship	Kingdom Hall of Jehovah's Witnesses at 12 Wattle St, Haberfield	• Day and night-time noise exceedances anticipated • Increased construction vehicles (Wattle Street) • Visual amenity reduction (acoustic shed) • Construction dust from tunnelling	• Reduced amenity and access, particularly when services and events are occurring.
Outdoor recreation	Reg Coady Reserve, Five Dock	• Ongoing occupation of part of the reserve for the G-loop for a longer duration • Noise and visual amenity reduction associated with reconfiguration works and use of the G-loop	• Reduced amenity and access, particularly when services and events are occurring • Reduced area available for outdoor recreation • Amenity impacts.

The EIS for the M4 East project described that the area of Reg Coady Reserve used for construction would be rehabilitated and returned to Inner West Council for use as open space following the construction of the M4 East project. The proposed modification would effectively delay the rehabilitation of this area of Reg Coady Reserve until after the completion of construction activities for the M4-M5 Link project in Q1 2023. Potential temporary amenity impacts such as visual and noise impacts to recreational users of the reserve associated with the operation of the G-loop would be extended as a result of the proposed modification.

M4 East construction traffic and public motorists are able to use the G-loop during construction of the M4 East project. The access to the G-loop for public motorists was provided because the construction of the M4 East project removed the ability to turn right into Waratah Street when travelling eastbound on Dobroyd Parade.

Use of the G-loop for the proposed modification would be restricted to M4-M5 Link construction vehicles. This restriction would be communicated through appropriate signage and line marking. Public motorists would not be able to use the G-loop. However, the completed M4 East project will provide a right turn lane from the M4 East eastbound lanes into Waratah Street at this location and a right turn lane from the Wattle Street eastbound lanes into Ramsay Street.

Construction fatigue

Construction fatigue relates to receivers that experience construction impacts from a variety of projects over an extended period of time with few or no breaks between construction periods. Construction fatigue typically relates to traffic and access disruptions, noise and vibration, air quality and visual amenity and social impacts from projects that have overlapping construction phases or are back to back.

Construction fatigue from cumulative construction projects or multiple construction effects of a single project may be felt by residents, businesses and social infrastructure users around Haberfield near the Northcote Street civil and tunnel site and G-loop at Reg Coady Reserve where extensive construction work associated with the M4 East project has already been undertaken on or in the immediate vicinity of these sites.

Where construction timeframes overlap or are proximal to other project activities for longer durations of time, individuals and communities may experience effects on mental health through stress and anxiety.

The proposed modification would increase the duration of potential environmental impacts for sensitive users near the Northcote Street civil and tunnel site and therefore would also increase construction fatigue impacts associated with the project. Key potential environmental impacts that would contribute to construction fatigue would include:

- Noise, including noise from 24 hour a day tunnelling
- Traffic impacts from the movement of construction heavy vehicles
- Impacts to on-street car parking from construction light vehicles
- Air quality impacts, including potential dust impacts from tunnelling activities
- Visual impacts from the ongoing use of construction ancillary facilities.

Management measures and conditions of approval

Potential social and economic impacts associated with the proposed modification would be effectively managed through the implementation of the approved environmental management measures for the project as summarised in Part E of the SPIR and the conditions of approval for the project, including:

- Preparation of a CNVMP to manage potential construction noise and vibration impacts
- At receiver noise mitigation as required by condition of approval E88 to address construction fatigue and amenity
- Preparation of Construction Traffic, Transport and Access Management Sub-Plan, and Construction Parking and Access Strategy to manage potential traffic, transport, access and car parking impacts during construction
- Preparation of a Construction Air Quality Sub-Plan to manage air quality impacts, including minimising dust generation during construction.

The proposed modification would not require the modification of the conditions of approval for the project related to social and economic impacts at the Northcote Street civil and tunnel site and Reg Coady Reserve.

6.3.8 Groundwater

The construction access tunnel at the Northcote Street civil and tunnel site would extend around 430 metres to the mainline tunnel. The access tunnel would be constructed through good quality Hawkesbury Sandstone and would not intersect alluvium. It therefore is expected that the rate of groundwater inflow (in litres per second per kilometre) compared to the approved project would be similar.

The EIS provided for a construction access tunnel from Parramatta Road West civil and tunnel site to the mainline tunnels over a distance of around 250 metres. This access tunnel was also to be constructed through good quality Hawkesbury Sandstone. The proposed modification would no longer require the provision of this construction access tunnel. The construction access tunnel for the Darley Road civil and tunnel site is also no longer required.

It is considered that the groundwater impacts associated with the proposed construction access tunnel from the Northcote Street civil and tunnel site are likely to be comparable to the impacts assessed in the EIS. It is considered that the environmental management measures related to groundwater as outlined in Part E of the SPIR and the conditions of approval relating to limiting groundwater inflows into the tunnels, further groundwater modelling and on-going groundwater monitoring would be sufficient to manage potential groundwater impacts.

The proposed modification would potentially result in cumulative groundwater impacts with the nearby M4 East tunnels during construction of the M4-M5 Link project. However, the impacts are likely to be consistent with those described in section 26.1.11 of the EIS and no additional management measures or conditions of approval are required.

6.3.9 Non-Aboriginal heritage

The construction footprint of the Northcote Street civil and tunnel site would not increase for the proposed modification and therefore there would be no additional direct impacts associated with the proposed modification compared to the impacts described in the EIS.

Section 6.3.5 describes potential settlement impacts associated with the construction access tunnel excavation at the Northcote Street civil and tunnel site. The predicted settlement impacts would comfortably meet the project settlement criteria for sensitive structures as summarised in in **Table 6-30** and specified in the condition of approval E103 of the project approval. As a result there is not likely to be any heritage impact to properties within the Haberfield HCA as a result of settlement associated with the construction access tunnel.

The ongoing use of the acoustic shed at the Northcote Street civil and tunnel site would result in minor temporary impacts to the visual setting of the Haberfield HCA as described in the M4 East EIS.

Reg Coady Reserve is located within the Haberfield HCA. The use of the G-loop and ongoing occupation of part of Reg Coady Reserve during construction would have minor temporary impacts to the visual setting of the Haberfield HCA, which would be generally consistent with the impacts described in the M4 East EIS at this location. The impacts would be temporary and Reg Coady Reserve would be rehabilitated on the completion of construction.

The environmental management measures related to Non-Aboriginal heritage as outlined in Part E of the SPIR would be sufficient to manage potential impacts to the Haberfield HCA. The proposed modification would not require the modification of the conditions of the project approval related to non-Aboriginal heritage at the Northcote Street civil and tunnel site and Reg Coady Reserve.

6.3.10 Resource use and waste

A construction water treatment plant was not proposed at Northcote Street civil and tunnel site in the EIS. The removal of the construction water treatment plants at the Darley Road site would result in changes to construction wastewater discharges at the Northcote Street civil and tunnel site and Pyrmont Bridge Road civil and tunnel site (refer to **section 6.5.6**). The existing M4 East water treatment plant outside the acoustic shed at the Northcote Street site would be modified to meet the requirements of the M4-M5 Link project during construction.

Construction wastewater (including groundwater ingress, rainfall runoff in tunnel portals and ventilation shafts, heat and dust suppression water and wash down runoff) discharges from the Northcote civil and tunnel site would be approximately 1,100 kilolitres per day. This discharge would be predominantly associated with tunnel groundwater ingress which would be treated at the construction WTP and then discharged to Dobroyd Canal. Intermittent surface water (surface water runoff from roof/paved surfaces) discharges from the site would also occur.

The discharge of 1,100 kilolitres of wastewater per day from the construction water treatment plant at the Northcote Street civil and tunnel site is comparable to the discharge of 1,200 kilolitres of wastewater for the Parramatta Road West civil and tunnel site as described in the EIS. A construction water treatment plant would not be provided at the Parramatta Road West civil site for the proposed modification.

With the proposed environmental management measures as described in Part E of the SPIR in place, impacts on water quality are considered to be negligible. The proposed modification would not require the modification of the conditions of approval for the project related to resource use and waste and discharge water quality criteria for the Northcote Street civil and tunnel site.

6.4 Parramatta Road West and Parramatta Road East civil sites

The following is an assessment of the issues relevant to Parramatta Road West and East civil and sites as identified in **Table 6-2**.

6.4.1 Traffic and transport

Assessment methodology

Changes to construction traffic associated with the use of the Parramatta Road West and Parramatta Road East civil sites and the Northcote Street civil and tunnel site have been considered as part of the assessment of construction traffic at Haberfield, Ashfield and Five Dock for the proposed modification provided in **section 6.3.1**.

Changes to construction traffic associated with the use of the Parramatta Road West and Parramatta Road East civil sites by comparison to the EIS would include:

- Decrease at the Parramatta Road East civil site from three heavy vehicles to one heavy vehicle (one-way) during the AM and PM peak hours
- Increase at the Parramatta Road West civil site from 10 light vehicles to 18 light vehicles (one-way) during the AM and PM peak hours
- Decrease at the Parramatta Road East civil site from 50 light vehicles to 12 light vehicles (one-way) during the AM and PM peak hours.

The impact of shuttle buses from the Parramatta Road West and Parramatta Road East civil sites was included in this assessment.

Light and heavy vehicle access points are provided for Parramatta Road West civil site from Parramatta Road, Bland Street and Alt Street. The entry along Parramatta Road would only be accessible for west-bound traffic via a left turn into the site. Exit onto Parramatta Road would be left turn out to travel west-bound. Entry and exit points are also proposed onto Bland Street and Alt Street to allow traffic to access between the sites or onto Parramatta Road.

Light and heavy vehicle access points for the Parramatta Road East civil site would be from Parramatta Road and Alt Street. Entry from Parramatta Road would be left turn in, only available for east-bound traffic. Exit would be left turn out to travel east bound along Parramatta Road. Vehicle access points would not be provided from Bland Street for the Parramatta Road East civil site.

Other construction traffic impacts associated with the use of the Parramatta Road West and Parramatta Road East civil sites would include impacts associated with the temporary overhead pedestrian walkway above Parramatta Road between the two sites.

Existing environment

Traffic movements at and around the site include movements associated with:

- The former commercial properties located at the site and in the immediate vicinity of the site along Parramatta Road
- Traffic accessing and exiting the residential streets of Alt Street and Bland Street from Parramatta Road including traffic travelling to and from the Haberfield Public School
- Through traffic travelling along Parramatta Road.

Access to the Parramatta Road West and Parramatta Road East sites is currently available from Parramatta Road, Alt Street and Bland Street at multiple locations.

Assessment of potential impacts

Impacts on the road network from the temporary overhead pedestrian walkway above Parramatta Road would occur primarily during establishment and decommissioning and therefore over a short duration. It is likely Parramatta Road would need to be closed overnight for installation of the pedestrian bridge. Approval would be required from TMC for a Road Occupancy Licence and diversion routes would be in place during the overnight installation.

The temporary overhead pedestrian walkway would provide sufficient clearance for vehicles travelling along Parramatta Road with the base of the walkway being around six metres above Parramatta Road. This would be sufficient to accommodate all light vehicles and most heavy vehicles travelling along Parramatta Road. The Roads and Maritime Special Permits Unit are to be notified for the management of over height vehicle permits.

A road safety audit would be carried out during detailed design to ensure that the bridge would not obstruct or reduce motorists' sight distance to any signs / directional signs or important traffic directions / infrastructure (refer to condition E56 of the project approval).

Impacts on pedestrian, cycle or public transport users are likely to be negligible and able to be adequately managed through the Construction Traffic Transport and Access Management Sub-Plan that will be prepared for the project, which would aim to provide safe routes for pedestrians and cyclists during construction.

It is proposed that the existing bus stop on the western side of Parramatta Road north of the intersection with Bland Street would be relocated to avoid conflict between buses and heavy vehicles attempting to access the nearby Parramatta Road West civil site. The bus stop would be moved to a new location around 150 metres to the north on Parramatta Road. The relocation of the bus stop would be subject to on-going consultation with Transport for NSW, Transit Services and other stakeholders and would be detailed in the Construction Traffic Transport and Access Management Sub-Plan.

Environmental management measures and conditions of approval

Based on the assessment of traffic impacts associated with the use of the Parramatta Road West and Parramatta Road East civil sites, no further environmental management measures are deemed necessary beyond those summarised in Part E of the SPIR.

The proposed modification would also not require changes to the conditions of the project approval which relate to traffic and transport. Impacts would continue to be managed through the construction management measures contained in the Construction Traffic Transport and Access Management Sub-Plan (condition C4 of the project approval) and the Construction Parking and Access Strategy (condition E54 of the project approval). Safe pedestrian and cyclist access would be maintained during construction in accordance with condition E57 of the project approval.

6.4.2 Air quality

Potential air quality impacts for the proposed modification at the Parramatta Road West and Parramatta Road East civil sites are assessed as part of impacts to Haberfield and Ashfield as summarised in **section 6.3.2**.

As identified in **section 6.3.2**, the proposed modification would involve carrying out some construction activities at the Northcote Street civil and tunnel site that were approved to be carried out at the Parramatta Road West civil and tunnel site, including earthworks associated with tunnelling activities. It is anticipated that there would be a minor change to the potential risk of dust impacts to nearby receptors compared to the impacts described in the EIS. The potential air quality impacts associated with proposed modification would be 'not significant' given the application of appropriate mitigation measures, which is consistent with the assessment in the EIS.

Demolition works would still occur at the Parramatta Road West and East civil sites as well as the construction of a temporary overhead pedestrian walkway between the two sites. Potential air quality impacts associated with these works would be managed in accordance with the environmental management measures for the project as summarised in Part E of the SPIR and relevant conditions of approval for the project.