

Figure 13.3 Central landscape character zones

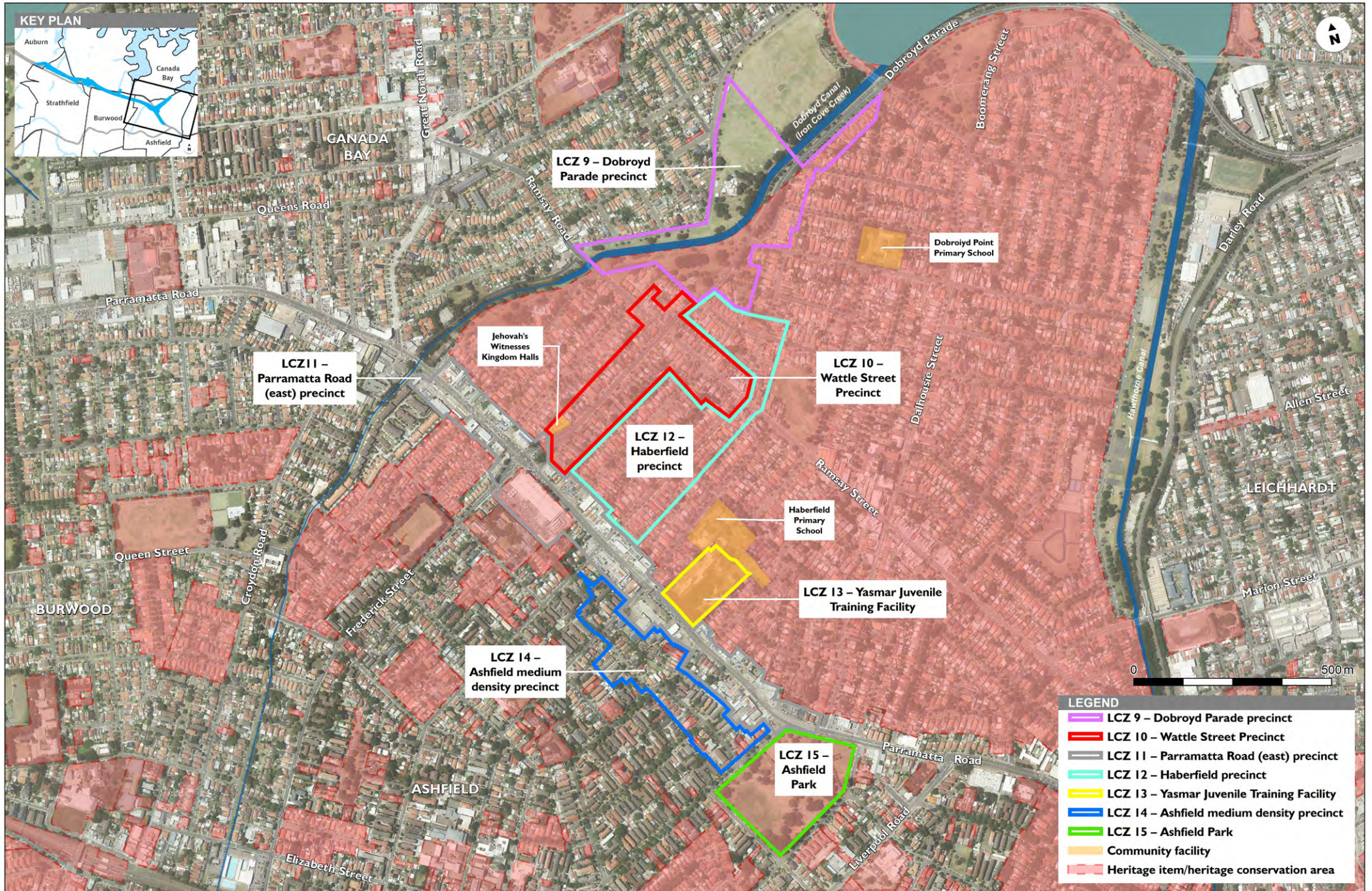


Figure 13.4 Eastern landscape character zones

Table 13.3 Characteristics of construction viewpoints

Characteristics	Receiver location	Sensitivity to change
Homebush Bay Drive civil site (C1)		
The site would be at grade with the M4 and the DFO Homebush car park. The site is currently medium to low density planted vegetation including grassland and mature trees.	1 – Motorists on M4	Low sensitivity due to the short period of time the facility would be visible, and driver's attention is likely to be focussed on the road.
	2 – Carpark users – DFO Homebush carpark	Low sensitivity due to the short period of time users would be occupying the car park and the utilitarian nature of the carpark environment.
	3 – Residents – Verley Drive townhouses	Moderate sensitivity due to the potential substantial visibility of the construction ancillary facility from upstairs windows, although these views are unlikely to be from living areas.
Pomeroy Street civil site (C2)		
The site is currently an open, turfed area bordered with mature trees and the boundary fences of adjoining multistorey residences. The southern embankment from the edge of Bill Boyce Reserve down to the M4 is densely vegetated.	1 – Residents – Pomeroy Street and Underwood Road	Moderate sensitivity due to the views only being available from some upstairs windows of some residences, but with the potential for light spill into these rooms at night (potentially bedrooms), and viewing a 4.5 metre wall along their boundary from both within the residences and from public and private outdoor spaces.
	2 – Pedestrians – Pomeroy Street and M4 overbridge	Low sensitivity as although pedestrians walk for recreation in this area, the site would only be viewed for a short period of time. Relatively low receptor numbers are expected.
	3 – Motorists – M4	Low sensitivity due to the short period of time the facility would be visible, and the driver's attention is likely to be focused on the road.
Underwood Road civil and tunnel site (C3)		
Three separate sites are included in the Underwood Road civil and tunnel ancillary facility. These are referred to as the west, east and tunnel sites. All three sites sit within a residential context and adjacent to the M4 corridor. The batter slope up to the M4 provides a dense vegetative screen to the motorway from vantage points at ground level.	1 – Residents – Short Street East, Underwood Road, Ismay Avenue and Allen Street	High sensitivity due to the long viewing period of receptors and the proximity of residences to the construction ancillary facilities.
	2 – Pedestrians – Short Street East, Underwood Road, Ismay Avenue, Allen Street and Powell's Creek open space	High sensitivity as pedestrians are likely to be local residents walking for recreation in local streets or in the Powells Creek open space.
	3 – Motorists – Underwood Road, Ismay Avenue and Allen Street	Low sensitivity due to the relatively small extent of the view which would primarily comprise hoarding, within the context of a longer journey.
	4 – Motorists – M4	Low sensitivity. Vegetation on the northern edge of the motorway would be removed, breaking the continuous wall of vegetation, however the construction ancillary facilities and their activities and much of the vegetation would be obscured by the barriers alongside the motorway.
Powells Creek civil site (C4)		
The site would occupy the vegetated area between Powell Street, Parramatta Road and the M4.	1 – Residents – Powell Street	High sensitivity as the multistorey residential building on the bend of Powell Street would have views down into the construction ancillary facility. The building has windows and balconies facing the vegetated batter up to the M4.

Characteristics	Receiver location	Sensitivity to change
The context of the area is a mix of commercial and multistorey residential buildings.	2 – Pedestrians – Powell Street	Low sensitivity due to the existing context of multistorey residential and large commercial buildings.
	3 – Recreational users – Powells Creek open space	Low sensitivity due to the extended periods of time spent there, but also taking into account the existing context of large infrastructure eg the M4, the electricity easement.
	4 – Workers – commercial premises, Powell Street	Low sensitivity of the workers as their focus would be on internal activities.
Concord Road civil and tunnel site (C5)		
The site would sit within a residential context and multiple properties would be acquired to accommodate construction ancillary facilities.	1 – Residents – Concord Road, Concord Lane, Sydney Street, Edward Street, Alexandra Street, Ada Street, Daly Street, Franklyn Street	High sensitivity given the proximity to the construction ancillary facility. Some buildings and equipment would likely be visible above noise barriers, fences and hoarding. The high noise barriers are also a significant change from the existing condition.
	2 – Pedestrians – Concord Road, Concord Lane, Sydney Street, Edward Street, Alexandra Street, Ada Street, Daly Street, Franklyn Street	High sensitivity as pedestrians on streets, except on Concord Road and Parramatta Road, are likely to be local residents walking for recreation.
	3 – Motorists – Concord Road	Low sensitivity due to the short viewing duration.
Cintra Park tunnel site (C6)		
This site sits within the the existing Cintra Park hockey facility. Stadium seating for Concord Oval lies to the west of the site, to the south is Parramatta Road, to the north sits Gipps Street and to the east are residential properties.	1 – Residents – Taylor Street	High sensitivity due to houses backing on to the construction ancillary facility and the recreational utility in private open space. There is however a vegetative screen, that would be retained, between the properties and the construction ancillary facility. Some buildings within the construction ancillary facility would be visible above the noise barrier and the noise barrier itself would be visible above back fences, however the view would be filtered by vegetation.
Northcote Street tunnel site (C7)		
This construction ancillary facility would sit adjacent to Parramatta Road and span from Wolseley Street to Wattle Street in the footprint of commercial premises facing Parramatta Road and a number of residential properties sitting adjacent. The	1 – Residents – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road	Moderate sensitivity due to their views being predominantly side on to the construction ancillary facility making the construction ancillary facility visible from side windows and back yards.
	2 – Pedestrians – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road, Page Avenue, Earle Avenue, Frederick Street	Low sensitivity as it is unlikely that pedestrians would be walking past the site for recreation purposes.

Characteristics	Receiver location	Sensitivity to change
construction ancillary facility would temporarily dead-end Northcote Street at Parramatta Road for the period of construction.	3 – Motorists – Northcote Street, Wattle Street, Parramatta Road	Low sensitivity due to the short viewing duration and the focus of being on the activity of driving.
Eastern ventilation facility site (C8)		
This site is located on the corner of Parramatta Road and Wattle Street. Commercial properties facing Parramatta Road and residential properties behind would be acquired to accommodate the construction ancillary facility.	1 – Residents – Wattle Street and Walker Avenue	High sensitivity as residents would have varying views to the construction ancillary facility from front yards, the back yards and the sides of properties.
	2 – Pedestrians – Wattle Street and Walker Avenue	Low sensitivity as it is unlikely that pedestrians would be walking past the site for recreation purposes.
	3 – Motorists – Wattle Street and Walker Avenue	Low sensitivity due to the short period of viewing time and the focus of the driver of the activity of driving.
Wattle Street and Walker Avenue civil site (C9)		
This site consists of three sections; two sites on the eastern edge of Wattle Street and one site on the western edge of Wattle Street. The large site runs from the eastern ventilation facility (C8) to Ramsay Street and then another section of the construction ancillary facility runs from Ramsay Street to just past Martin Street. The northern edge of the construction ancillary facility would occupy a section of Reg Coady Reserve between Martin Street and Dobroyd Canal (Iron Cove Creek).	1 – Residents – Wattle Street, Walker Avenue, Ramsay Street, Martin Street and Dobroyd Parade	High sensitivity due to long viewing periods from the likely location of living rooms, kitchens and back yards.
	2 – Pedestrians – Reg Coady Reserve, Wattle Street, Walker Avenue, Ramsay Street, Martin Street, Dobroyd Parade and Parramatta Road	Moderate sensitivity as it is unlikely pedestrians would be walking past the site for recreation along Parramatta Road or Wattle Street, although locals would use Walker Avenue, Ramsay Street, Martin Street or Dobroyd Parade and Reg Coady Reserve for recreation.
	3 – Motorists – Wattle Street, Walker Avenue, Ramsay Street, Martin Street, Dobroyd Parade and Parramatta Road	Low sensitivity due to the short period of viewing time and the focus of the driver of the activity of driving.

Characteristics	Receiver location	Sensitivity to change
Parramatta Road civil site (C10)		
The Parramatta Road civil site would be located on the south-western side of Parramatta Road between Bland Street and Orpington Street. Chandos Street would be dead-ended at Parramatta Road.	1 – Residents – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road	Moderate sensitivity due to the relatively low number of residents with views. Only a small proportion of residences would have views over the hoarding and into the construction ancillary facility. This is because some of the residences are only single-storey and the majority of others, although multistorey, do not have windows that would face the site. The exception is on Chandos Street, where a multistorey residential building would have views into the adjacent construction ancillary facility. The properties currently addressing Parramatta Road are active commercial, derelict commercial, vacant land and a few residential properties.
	2 – Pedestrians – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road	Low sensitivity as pedestrians on Parramatta Road are unlikely to be walking for recreation and the Parramatta Road footpath, along the northern edge of the construction ancillary facility, would be closed during construction. On the smaller roads such as Bland Street, Chandos Street, Orpington Street and Loftus Street, pedestrians are more likely to be walking for recreation, however their exposure to the site would be minimal. For the most part, site activity would be obscured by the hoarding, except fleetingly where pedestrians use the Parramatta Road overbridge and would see into the site.
	3 – Users – Ashfield Bowling Club	Moderate sensitivity as although users would tend to be at the club for extended periods of time, their focus would be directed towards their activity.
	4 – Workers – Commercial premises, Parramatta Road	Low sensitivity as their focus would be on internal activities.
	5 – Motorists – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road.	Low sensitivity due to the short period of viewing time and the focus of the driver on the activity of driving.



Figure 13.5 Homebush Bay Drive civil site (C1) receiver locations



Figure 13.6 Pomeroy Street civil site (C2) receivers



Figure 13.7 Underwood Road civil and tunnel site (C3) receivers



Figure 13.8 Powells Creek civil site (C4) receivers



Figure 13.9 Concord Road civil and tunnel site (C5) receivers



Figure 13.10 Cintra Park tunnel site (C6) receivers



Figure 13.11 Northcote Street tunnel site (C7) receivers

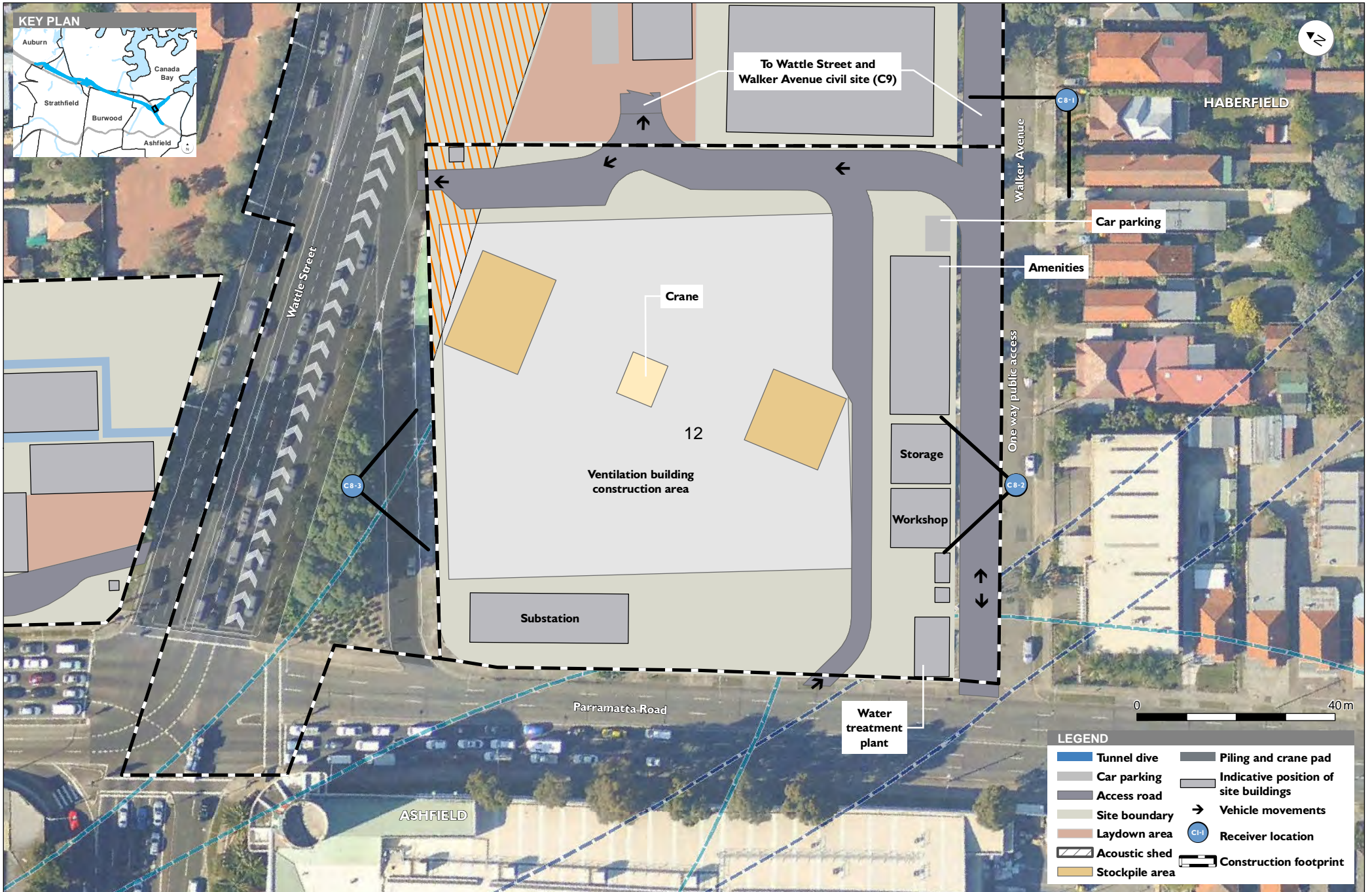


Figure 13.12 Eastern ventilation facility site (C8) receivers



Figure 13.13 Wattle Street and Walker Avenue civil site (C9) receivers

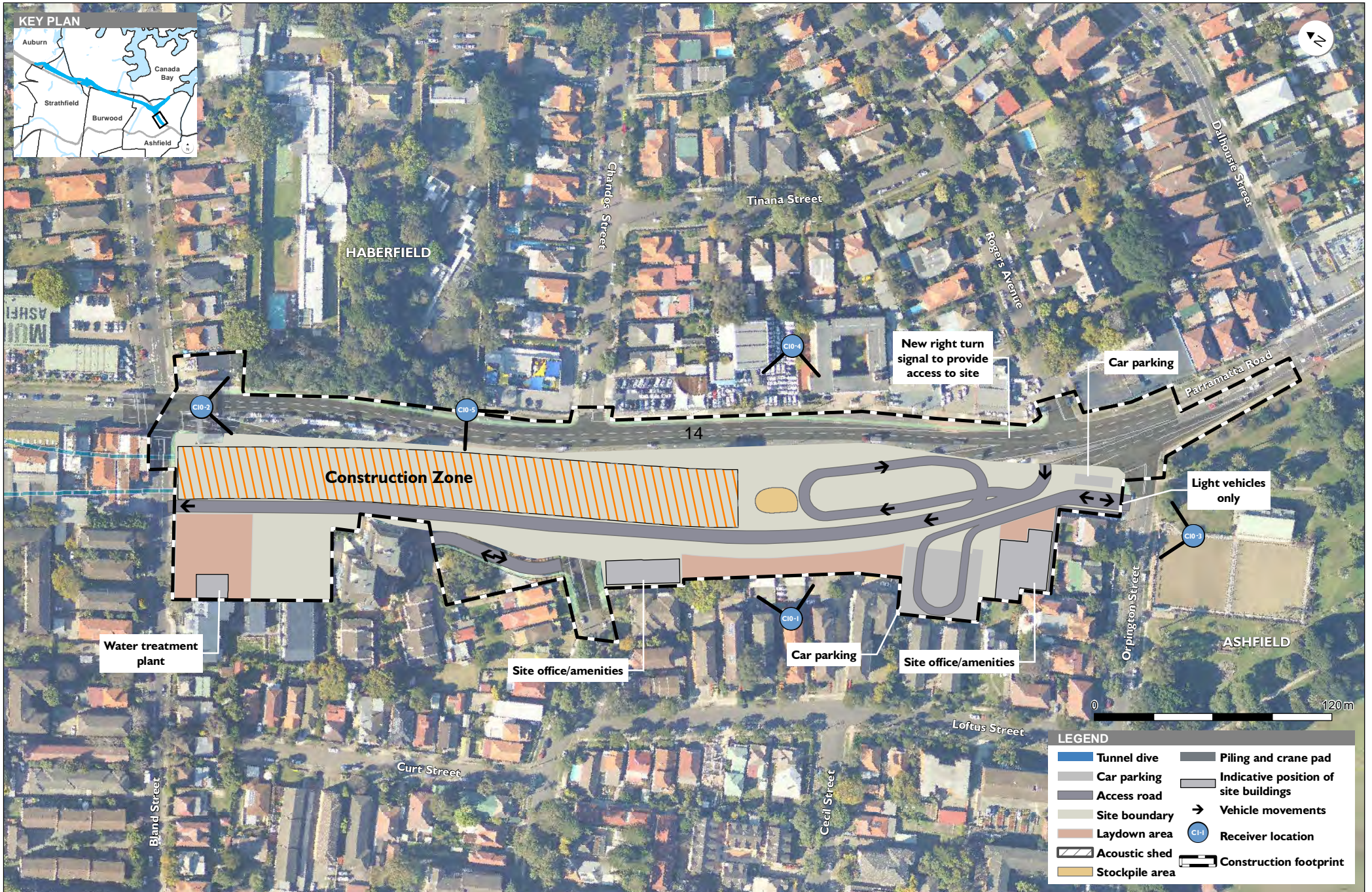


Figure 13.14 Parramatta Road civil site (C10) receivers

Eight receiver locations have been identified as part of the operational visual impact assessment. These receiver locations are illustrated on **Figure 13.15** and a summary of their sensitivity is provided in **Table 13.4**. A summary of the sensitivity of receivers affected by the operational lighting is provided in **Table 13.5**.

Table 13.4 Operational visual receiver locations

Receiver location	Characteristics of views experienced from the receivers	Receiver	Sensitivity to change
1 – M4 east of Homebush Bay Drive looking east	View comprises a relatively narrow and strongly visually enclosed corridor. Screening is provided by steep batters along much of the southern edge with dense plantings. The northern edge is distinguished by landscaping undertaken for the Sydney Olympics.	Motorists	Low sensitivity due to motorists being engaged in the activity of driving. The character of the motorway would change from a well vegetated corridor to a predominantly hard landscape, although subject to further architectural and urban design considerations during the design development phase.
2 – Underwood Road looking south towards M4	A small glimpse of the M4 bridge over Underwood Road is visible to centre of frame. Even though the M4 runs across the centre of frame, it is currently substantially screened by a dense tree planting along the motorway's edge that predominantly either causes it to be visually recessive or unseen.	Residents/ church congregation	High sensitivity due to their sense of proprietary interest in the view from their homes and local church, and within the context of their knowledge of the function of the ventilation facility.
		Pedestrians	Moderate sensitivity as these receivers can be expected to be nearby residents either strolling recreationally/walking, or local residents on their way to or from work. These receivers can generally be expected to be walking at a slow or moderate pace with an interest in their surroundings, although the view experienced would just be a small part of a longer walk.
		Motorists	Low sensitivity given these receivers are likely to comprise only a small proportion of a larger vehicle journey.
3 – Parramatta Road looking north to Powells Creek corridor	The site currently comprises an open rough-grassed area with Powells Creek to the east and a line of large trees to the west and south. The existing M4 travels over the Powells Creek corridor with a viaduct at this location. Development near Powells Creek comprises a warehouse/commercial building and a multi-storey apartment block at the eastern end of Powell	Future park users	High sensitivity given that this would be a place of both informal/passive and active recreation within the otherwise harsh environment of Parramatta Road, and strongly connected both visually and physically to the main northern, quiet part of the park, and also to the centre of the Bakehouse Quarter cafe strip.
		Motorists	Moderate sensitivity given the rarity of seeing a well-planned, corridor park/green space along this section of Parramatta Road, including the framed view under the M4 through to the park beyond, notwithstanding that this receiver location comprises only a potentially fleeting component of a larger vehicle journey.

Receiver location	Characteristics of views experienced from the receivers	Receiver	Sensitivity to change
	Street is currently moderately well screened from the M4 by existing trees on the M4 embankment. A large advertising billboard is brightly lit at night.	Residents	High sensitivity given that lighting currently associated with the M4 is unlikely to be visually prominent from the residences. This effect would be visible from balconies/elevated locations that look across the motorway, and potentially also living spaces within the units.
4 – Edward Street looking west towards Concord Road	Edward Street contains free-standing residential bungalows from the Federation era. Some new, low density housing on existing blocks is also present, and is generally sympathetic with the existing character of the area. The street is lined by mature heritage listed brush box trees	Residents	High sensitivity to residents living in Edward Street and other local residents who recreationally walk along the street. The consistent Federation-era period character of free-standing residences within the street and the heritage listed avenue tree planting provides an attractive, high quality streetscape experience for receivers.
5 – Entry road to Cintra Park hockey facility looking south	Key elements of the view comprise lines of mature trees which enclose Cintra Park to varying degrees. Stormwater tanks and large infrastructure shed within the south west corner of the precinct comprises visually uncharacteristic elements with the sporting precinct.	Active recreation users	Low sensitivity given that the primary focus of this user group would be playing their particular sport. Notwithstanding, this user group could also be expected to have a secondary interest in the landscape amenity of the setting within which the fields/courts are located.
		Local residents – walking	Moderate sensitivity given that this is a recreational space.
		Local residents – Taylor Street	High sensitivity given that the reserve is a recreational space and both the proposed water treatment plant and distribution substation buildings may be partially visible from back gardens above back fences.
		Motorists	Low sensitivity given the generally fleeting views that would be available from a moving vehicle.
6 – Reg Coady Reserve near Iron Cove Creek looking south	Key elements of the view comprise Dobroyd Parade with adjoining residential development well screened from the road, informal plantings of large and medium sized trees with some park furniture, a tidal channel of Iron Cove Creek, Timbrell Park children's play area, and playing fields. Within Haberfield HCA.	Active recreation users	Low sensitivity given that the primary focus of this user group would for active recreation such as jogging, but a secondary element of the experience could be expected to be an appreciation of the landscape settings.
		Passive recreation users	Low sensitivity given that the area is already highly exposed to traffic (both visually and perceived via pulsing levels of traffic noise), and the level of detail with which the new infrastructure would be viewed. This is notwithstanding that the seating facilities provide the opportunity to face away from Dobroyd Parade, looking north across Iron Cove Creek to Haberfield and Timbrell Park.

Receiver location	Characteristics of views experienced from the receivers	Receiver	Sensitivity to change
		Residents	Moderate sensitivity given the small number of receptors likely to experience increased and prominent views of road infrastructure and traffic, and the level of detail with which the infrastructure would be viewed.
		Motorists	Low sensitivity given that vehicles would generally be moving past the site at moderate speed, notwithstanding that vehicles travelling east and queuing on Dobroyd Parade at the Waratah Street lights would obtain relatively long views through the reserve.
7 – Parramatta Road at corner of Frederick Street looking north	Key elements of the view comprise the wide view along Wattle Street which crests about 80 metres from the corner, the dense island planting of trees on the corner of Wattle Street, the brightly coloured Bunnings building (formerly Peek Freans Biscuit Factory) on the corner of Frederick Street, and Parramatta Road with its distinctive corner tower.	Pedestrians	Low sensitivity. It is unlikely that pedestrians would walk along Parramatta Road by choice, if they could otherwise travel along quiet side streets. However pedestrians would also be travelling slowly through the landscape and may cross Parramatta Road at this point as part of a recreational walk, eg to access Reg Coady Reserve and Timbrell Park, and the quiet, Federation-era streets of Haberfield. Within this context, the view from this receiver location would be seen at a relatively high level of detail, but for a short period of time as part of a longer walk.
		Motorists	Low sensitivity due to receiver being focussed on driving. The landscape character of the Parramatta Road corridor in particular generally has very low levels of visual amenity, and this view would be seen briefly as a small part of a larger journey.
8 – Parramatta Road at corner of Rogers Avenue looking west	The view comprises a substantially hard landscape dominated by the road and lined with low-rise, predominantly commercial development. There are very few street trees, except for the large tree planting within the Yasmar site. The receiver has a long view down Parramatta Road, with a background district view of a highly urbanised ridgeline.	Pedestrians	Low sensitivity as the number of receivers would be low to moderate. It is unlikely that pedestrians would walk along the busy Parramatta Road by choice, if they could otherwise walk along quiet side streets. Where they did choose to walk along Parramatta Road, they would be travelling slowly and have time to view elements at close range. Local residents may walk along/cross Parramatta Road near this location to access the park.
		Motorists	Low sensitivity given that receiver is likely to be focussed on driving. The landscape character of the Parramatta Road corridor in particular generally has very low levels of visual amenity, and this view would be seen briefly as a small part of a larger journey.

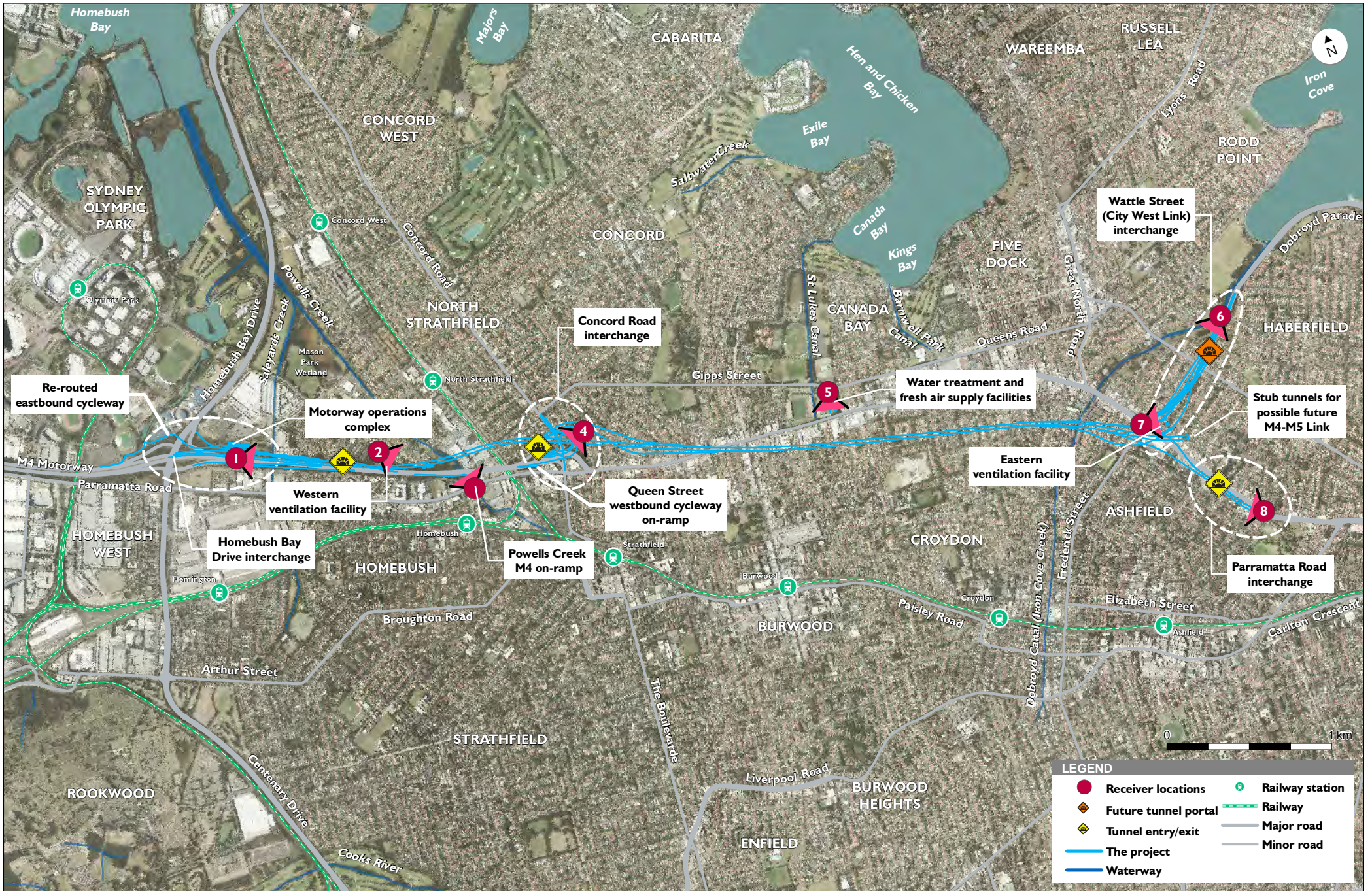


Figure 13.15 Operational receiver locations

Table 13.5 shows the sensitivity of change to lighting associated with the operation of the proposal. Three additional receivers have been identified as potentially being affected by lighting.

In general, motorists are considered to have a low sensitivity to change as they already experience lighting associated with current road infrastructure. Pedestrians, park users and recreation users generally have a low sensitivity to the change due to the use of the area being part of a larger walk/use and less receivers at night. An exception is receiver location 4 where receivers are considered to be moderately sensitive to the change in lighting in the residential street. Sensitivity of change to lighting for the majority of residents is considered high as this could impact on living spaces within the residences.

Table 13.5 Operational visual receiver locations for lighting considerations

Receiver location	Receiver	Sensitivity to change
1 – M4 east of Homebush Bay Drive looking east	Motorists	Low
	Residents	Moderate
2 – Underwood Road looking south towards the M4	Residents/church congregation	Moderate
	Pedestrians	Low
	Motorists	Low
3 – Parramatta Road looking north to Powells Creek corridor	Future park users	Moderate–low beneficial
	Motorists	Low
	Residents	High
4 – Edward Street looking west towards Concord Road	Residents	High
	Pedestrians	Moderate
5 – Entry road to Cintra Park hockey facility looking south	Active recreation users	Low
	Local residents – walking	Low
	Local residents – Taylor Street	Low
	Motorists	Low
6 – Reg Coady Reserve near Iron Cove Creek looking west	Active recreation users	Low
	Passive recreation users	Low
	Residents	High
	Motorists	Low
7 – Parramatta Road at corner of Frederick Street looking east through south	Pedestrians	Low
	Motorists	Low
8 – Parramatta Road at corner of Rogers Avenue looking north	Pedestrians	Low
	Motorists	Low
	Residents	High

13.3 Assessment of construction impacts

13.3.1 Overview

Construction activities that would take place at each construction ancillary facility are discussed in **Chapter 6** (Construction work). In general, visible construction activities would include:

- Vegetation removal
- Noise barriers/hoarding/fencing
- Heavy and/or light vehicle access potentially 24 hours a day, seven days a week
- Staff amenities buildings
- Workshops and storage containers
- Stockpile and laydown areas
- The operation of plant and equipment, including cranes
- Lighting for night time works

- Water storage tanks
- The construction of infrastructure for the operation of the project.

13.3.2 Impacts on sensitive receivers

The sensitivity of the receiver location is discussed in **Table 13.6**, and the magnitude of the change and the overall visual impact rating is provided.

Table 13.6 Construction visual impact assessment

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
Homebush Bay Drive civil site (C1)	1 – Motorists on M4	The removal of vegetation would open views towards the construction ancillary facility and DFO beyond.	High	Moderate
	2 – Carpark users – DFO Homebush carpark	Although background vegetation is expected to be removed, it is likely that the narrow planting of trees along carpark boundary fence would be retained and would provide a partial screen to the works.	Moderate	Moderate–low
	3 – Residents – Verley Drive townhouses	Residents backing onto the construction ancillary facility (eight town houses) would have views into the construction ancillary facility from upstairs windows.	High	High–moderate
Pomeroy Street civil site (C2)	1 – Residents – Pomeroy Street and Underwood Road	Existing vegetation would be removed and the previous visual amenity provided by Bill Boyce Reserve would be impacted. This also considers the duration that the construction ancillary facility would be in place.	High	High–moderate
	2 – Pedestrians – Pomeroy Street and M4 overbridge	Construction would result in a loss of vegetation in Bill Boyce Reserve and on the batter up from the M4.	Moderate	Moderate to low
	3 – Motorists – M4	Although the construction ancillary facility would be obscured by hoarding and the angle of view, the existing continuous wall of vegetation on the northern edge of the motorway, next to the construction ancillary facility, would be broken, opening views up to the northern edge of the motorway.	Moderate	Moderate–low
Underwood Road civil and tunnel site (C3)	1 – Residents - Short Street East, Underwood Road, Ismay Avenue and Allen Street	Existing vegetation would be removed which would open views to the M4. Some residents may look over noise barriers into the construction ancillary facilities. Plant and equipment in the tunnelling site would be expected to be visible above the noise barrier hoarding.	Moderate	High–moderate

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
	2 – Pedestrians - Short Street East, Underwood Road, Ismay Avenue, Allen Street and Powell's Creek open space	The loss of vegetation in this location is a major negative effect, however the majority of the construction ancillary facility activities would be hidden by hoarding except the acoustic shed and the construction of the ventilation facility.	Moderate	High–moderate
	3 – Motorists – Underwood Road, Ismay Avenue and Allen Street	The loss of vegetation would be a major negative effect, however the majority of the construction ancillary facility activities would be hidden.	Moderate	Moderate–low
	4 – Motorists - M4	Vegetation on the northern edge of the motorway would be removed, breaking the continuous wall of vegetation. The construction ancillary facilities and their activities and much of the vegetation would be obscured by the barriers alongside the motorway.	Low	Low
Powells Creek civil site (C4)	1 – Residents – Powell Street	The loss of vegetation on the embankment would open views to the M4 which would result in a visual impact for these receptors.	High	High
	2 – Pedestrians – Powell Street	The loss of vegetation would open up views to the M4 which would result in a visual impact for these receptors.	High	Moderate
	3 – Recreational users – Powells Creek open space	The majority of the site would be obscured by the M4 embankments and existing vegetation.	Low	Moderate–low
	4 – Workers – commercial premises, Powell Street	The removal of vegetation on the M4 embankment would result in a visual impact for these receptors.	High	Moderate
Concord Road civil and tunnel site (C5)	1 – Residents – Concord Road, Concord Lane, Sydney Street, Edward Street, Alexandra Street, Ada Street, Daly Street, Franklyn Street	Some buildings and equipment would likely be visible above noise barriers, fences and hoarding. The high noise barriers would also be a significant change from the existing condition. Views from residential areas towards Concord Road currently consist of filtered views through street trees, which would be interrupted by the high walls associated with the construction ancillary facilities.	High	High
	2 – Pedestrians – Concord Road, Concord Lane,	Construction would result in loss of vegetation and a large area being occupied by the construction ancillary facilities. Views from residential areas	High	High

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
	Sydney Street, Edward Street, Alexandra Street, Ada Street, Daly Street, Franklyn Street	towards Concord Road currently consist of filtered views through street trees, which would be interrupted by the high walls associated with the construction ancillary facilities.		
	3 – Motorists – Concord Road	The loss of vegetation would be a negative visual impact however the majority of the construction ancillary facility activities would be hidden. Hoarding and noise barriers would confine views to the road edge where currently the view is open to vegetation and residences set back from the road edge.	High	Moderate
Cintra Park tunnel site (C6)	1 – Residents – Taylor Street	A vegetative screen would be retained, between the properties and the construction ancillary facility. Some buildings within the construction ancillary facility would be visible above the noise barrier and the noise barrier itself would be visible above back fences, however the view would be filtered by vegetation.	Moderate	High–moderate
Northcote Street tunnel site (C7)	1 – Residents – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road	The existing land use in the locality is predominantly commercial, consisting of large two-storey buildings with a row of residential properties. Residential buildings directly adjacent to the construction ancillary facility are currently next to other residences, however the existing commercial buildings would likely be currently visible.	Moderate	Moderate
	2 – Pedestrians – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road, Page Avenue, Earle Avenue, Frederick Street	The existing land use in this area is predominantly commercial. Noise barriers would be directly adjacent to the footpath on Parramatta Road, where buildings are currently set back. The dead-ending of Northcote Street would also obscure what is currently an open view out to Parramatta Road.	Moderate	Moderate–low
	3 – Motorists – Northcote Street, Wattle Street, Parramatta	The existing land use in this area is predominantly commercial. Northcote Street would be dead-ended at Parramatta Road, however this would only affect a relatively small number	Low	Low

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
	Road	of motorists on this street. These motorists would have a beneficial visual impact from fewer vehicles on their section of road.		
Eastern ventilation facility site (C8)	1 – Residents – Wattle Street and Walker Avenue	The visual context would change from a residential outlook to visible construction activities and the introduction of noise barriers.	High	High
	2 – Pedestrians – Wattle Street and Walker Avenue	The visual context would change from a residential outlook to the likelihood of visible construction activities and the introduction of noise barriers.	High	Moderate
	3 – Motorists – Wattle Street and Walker Avenue	The visual context would change from a residential outlook to visible construction activities and the introduction of noise barriers.	High	Moderate
Wattle Street and Walker Avenue civil site (C9)	1 – Residents – Wattle Street, Walker Avenue, Ramsay Street, Martin Street and Dobroyd Parade	Residences would have varying views to the construction ancillary facility from front yards, back yards and the sides of properties. There would be extensive work to reconfigure Wattle Street at this location.	High	High
	2 – Pedestrians – Reg Coady Reserve, Wattle Street, Walker Avenue, Ramsay Street, Martin Street, Dobroyd Parade and Parramatta Road	The change would be greater on the main roads of Parramatta Road and Wattle Street and lower on local roads where retained houses obscure views to the construction ancillary facilities.	Moderate	Moderate
	3 – Motorists – Wattle Street, Walker Avenue, Ramsay Street, Martin Street, Dobroyd Parade and Parramatta Road	There would be a major change in the street layout to Wattle Street and Walker Avenue at this location.	High	Moderate

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
Parramatta Road civil site (C10)	1 – Residents – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road	It is not considered that the change to a construction ancillary facility would be a significantly negative visual impact considering the current land uses along Parramatta Road.	Low	Moderate–low
	2 – Pedestrians – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road	The properties currently addressing Parramatta Road are active commercial, derelict commercial, vacant land and a few residential properties. The existing visual condition is considered to be a low quality.	Low	Low
	3 – Users – Ashfield Bowling Club	Only a small section of the construction ancillary facility would be visible and the view would not be significantly diminished from the existing view of the car sales yard.	Low	Moderate–low
	4 – Workers – Commercial premises, Parramatta Road	The site would be visible from the higher vantage point.	Moderate	Moderate–low
	5 – Motorists – Bland Street, Chandos Street, Orpington Street, Loftus Street, Parramatta Road.	The change to views in this area is considered to be low as the existing land use in the area is largely commercial.	Low	Low

13.3.3 Construction lighting impacts

A number of construction ancillary facilities would be used outside of standard hours in order to support tunnelling, which would be carried out 24 hours per day seven days per week. The operation of these ancillary facilities during the night has the potential to result in light spill. For the purposes of the assessment, only those construction ancillary facilities required for tunnelling activities or to support these activities have been assessed.

Table 13.7 outlines the impacts of construction lighting on each of the receiver locations in the vicinity of each of the construction ancillary facilities assessed. Impacts on pedestrian receivers have not been assessed in **Table 13.7**, as pedestrian numbers are considered to be low at night.

Table 13.7 Construction lighting assessment for receiver locations

Construction ancillary facility	Receiver location	Visual impact assessment	Impact ratings	
			Magnitude	Significance
Concord Road civil and tunnel site (C5)	1 – Residents – Concord Road, Concord Lane, Sydney Street, Edward Street, Alexandra Street, Ada Street, Daly Street, Franklyn Street	Residential dwellings around the site are generally not directly adjacent to the site or are not tall enough to see over perimeter fencing or walls. Light spill measures would assist in reducing light spill,	Low	Moderate to low
	3 – Motorists – Concord Road	Road lighting would dominate views and therefore light from ancillary facility would be minimal.	Moderate	Moderate to low
Cintra Park tunnel site (C6)	1 – Residents – Taylor Street	Residents in Taylor Street are already subject to night time lighting from the adjacent hockey field. The lighting during construction would however be on longer (ie all night) than the existing lighting.	Low	Moderate to low
Northcote Street tunnel site (C7)	1 – Residents – Wattle Street, Northcote Street, Wolseley Street, Parramatta Road	Impacts of light spill would be reduced due to the existing lighting along Parramatta Road and the existing commercial buildings. Works at this site would also largely be contained to the acoustic shed which is to occupy a large percentage of the site.	Low	Low
	3 – Motorists – Northcote Street, Wattle Street, Parramatta Road	Road lighting and lighting from existing commercial developments would dominate views and therefore light from ancillary facility would be minimal.	Low	Low
Eastern ventilation facility site (C8)	1 – Residents – Wattle Street and Walker Avenue	The nearest residential dwellings are not located directly adjacent to the site as the existing nearest properties are being acquired as part of the project. The nearest receptors are on the eastern side of Walker Street. Existing lighting along Parramatta Road and from commercial development also reduces the impacts of lighting from the site.	Low	Low
	3 – Motorists – Wattle Street and Walker Avenue	Road lighting and lighting from existing commercial developments would dominate views and therefore light from the construction ancillary facility would be minimal.	Negligible	Negligible

13.4 Assessment of operational impacts

13.4.1 Landscape character impacts

A summary of the impacts of the project on the 15 landscape character zones is provided in **Table 13.8**. Some of the character zones would experience indirect impacts as a result of the visibility of project features located in adjoining zones. Other zones would be directly impacted as a result of the presence of project features in that zone, which would change the character of the zones to differing degrees depending on the assessed sensitivity of the zone to change. The impacts on the following character zones are expected to be of moderate–high, or high significance:

- LCZ 4 Underwood Road precinct
- LCZ 7 Edward Street precinct
- LCZ 8 Concord Oval precinct
- LCZ 10 Wattle Street precinct
- LCZ 12 Haberfield precinct
- LCZ 13 Yasmar Juvenile Training Facility.

The sensitivity of the above zones is higher as a result of the importance of key landscape features (particularly heritage listed buildings, existing residential character, and visually important trees).

The project would result in moderate beneficial impacts to LCZ 11 – Parramatta Road (east).

13.4.2 Visual receivers

Eight operational receiver locations have been identified as part of the visual impact assessment. These receiver locations are illustrated on **Figure 13.15** and a summary of the impacts, likely magnitude of change and overall visual impact is provided in **Table 13.9**.

Lighting impacts for each operational receiver location are discussed in **Table 13.10**.

Table 13.8 Impacts on landscape character zones

Key visual features of the proposal in zone	Summary of impacts	Impact ratings	
		Magnitude	Significance
LCZ 1 – M4 (to Concord Road)			
<ul style="list-style-type: none"> Retaining walls up to about six metres high Three flyover bridges Tunnel portals and associated dive structures Noise barriers Removal of screening vegetation in some sections. 	The zone would continue to function as a significant transport corridor with a similar landscape character. Visually, the appearance of the road and associated infrastructure would intensify and become more dominant. In general, the existing road would change from a four lane motorway with vegetated embankments to a substantially wider corridor incorporating multiple lanes, elevated road sections with bridges, and tunnel portals.	High	High–moderate
LCZ 2 – Homebush commercial			
<ul style="list-style-type: none"> Reduction in the width of the open space between the Homebush Bay Drive on-ramp and the adjacent car park and electrical substation The proposed maintenance facility and motorway control centre buildings would be visible to this zone. 	The function and visual character of this zone during operation would be consistent with the existing situation. The existing vegetated edge would be broadly maintained, which would minimise the visibility of the proposal. While the proposed buildings would be partially visible, they would be consistent with the existing scale and appearance of the zone’s built form.	Low	Low
LCZ 3 – Parramatta Road (west)			
<ul style="list-style-type: none"> Reduction in vegetation along the M4 edge Retaining walls and noise barriers associated with the Homebush Bay Drive off-ramp would be located close to the residential areas in this zone. 	The function and visual character of this zone would be broadly consistent with the existing situation, however the reduction in screening vegetation and the presence of the off-ramp has the potential to increase the visibility of the project/road infrastructure from receivers in this zone.	Moderate	Moderate
LCZ 4 – Underwood Road			
<ul style="list-style-type: none"> Reduction in vegetation along the M4 edge Built facilities on the edge of the zone, including the western ventilation facility Flyover located in close proximity to the end of Verley Drive. 	The function and visual character of this zone would be broadly consistent with the existing situation, however the reduction in screening vegetation and the presence of the built facilities in close proximity to residential receivers has the potential to increase the visibility of the project/road infrastructure from receivers in this zone. In this zone, the M4 would be brought about 35–40 metres closer to residences near the eastern end of Bill Boyce Reserve, with cut-and-cover treatment adjacent to residences at the end of Ismay Avenue.	High	High–moderate

Key visual features of the proposal in zone	Summary of impacts	Impact ratings	
		Magnitude	Significance
LCZ 5 – Powells Creek			
<ul style="list-style-type: none"> On-ramp from Parramatta Road and new intersection Bridge about 120 metres long. 	The new bridge would comprise a relatively low, contrasting diagonal form, and potentially visually bulky element that has the potential to reduce the sense of openness and accessibility currently available under the M4 viaduct. The project would introduce a new visual feature in this zone.	Moderate	Moderate
LCZ 6 – Concord Road			
<ul style="list-style-type: none"> Interchange with associated ramps, bridges and portals, flyover ramp Loss of frontage and planting from the Sydney Cheil Church. 	The introduction of the project in this zone would change the character from residential, to a stronger road infrastructure character. The main impacts of the project within this LCZ would be contained to Sydney Street west and the ends of Sydney Street east, Edward Street, and Alexandra Street, creating a new interchange landscape character including two large informal parks.	High	Moderate
LCZ 7 – Edward Street			
<ul style="list-style-type: none"> Retaining and noise barriers at Sydney Street east and Edward Street Landscape plantings. 	The function and visual character of this zone would be broadly consistent with the existing; however, the presence of the noise barriers would change views from the edge of the zone.	Moderate	High–moderate
LCZ 8 – Concord Oval			
<ul style="list-style-type: none"> Removal of trees New infrastructure comprising a water treatment plant and pond, a distribution substation and a fresh air supply facility Landscaping. 	The project would add road infrastructure-related buildings into the existing setting, and remove most of the mature trees along the Parramatta Road frontage. This would change the character of the zone. Some land would be retained for active recreation.	Moderate	High–moderate
LCZ 9 – Dobroyd Parade			
<ul style="list-style-type: none"> Widening from four to up to seven lanes Removal of screen planting in front of two residences Decrease frontage to Reg Coady Reserve Removal of two large trees, and additional small- and medium-sized trees in Reg Coady Reserve Removal of the two metre setback of the footpath from the kerb to the south side of Dobroyd Parade, between Waratah Street and Martin Street. 	The magnitude of change is considered to be moderate, given the doubling in the width of the road, but also taking account of the retention of existing privacy screening to the residential development facing onto Dobroyd Parade, and the relatively minor loss of parkland to Reg Coady Reserve within the context of the capacity of the reserve to visually absorb the change.	Moderate	Moderate

Key visual features of the proposal in zone	Summary of impacts	Impact ratings	
		Magnitude	Significance
LCZ 10 – Wattle Street			
<ul style="list-style-type: none"> • Eastern ventilation facility and associated electrical substations on the corner of Wattle Street and Parramatta Road • Widening of Wattle Street from about 20 metres to about 80 metres wide, with the addition of: <ul style="list-style-type: none"> – Two tunnel portals at Ramsay Street – Two portals midway between Ramsay Street and Parramatta Road • Noise barrier to the eastern side of Wattle Street. 	<p>The project would change the landscape character of the zone, introducing a number of road infrastructure-related structures into the existing setting. The magnitude of change is considered to be high given the increase in the width of the road corridor, the introduction of the dive structure/tunnel portals and loss of housing.</p>	High	High–moderate
LCZ 11 – Parramatta Road (east)			
<ul style="list-style-type: none"> • Widening of the road from about 25 to 75 metres at its widest point • Introduction of a wide boulevard type design, incorporating a substantial soft landscape component with semi-formal planting of tall eucalypt street trees. 	<p>The zone would continue to function as a significant transport corridor. However, the project would improve the character and appearance of the zone. The character of intersecting residential streets would be broadly maintained.</p>	High	Moderate beneficial
LCZ 12 – Haberfield			
<ul style="list-style-type: none"> • Ventilation outlet (around 25 metres high) at the Parramatta Road end of Walker Avenue • Proposed boulevard planting of large eucalypts to Wattle Street and the end of Martin Street • Close to the proposed Wattle Street interchange. 	<p>The project would impact on the landscape character of Walker Street, and the ends of Walker Avenue and Martin Street. The project would change the landscape character of the zone, introducing a number of road infrastructure-related structures into/visible from the existing setting. The magnitude of change is considered to be high given the existing residential character and the concentrated impacts at the ends of Walker Avenue and Martin Street.</p>	High	High
LCZ 13 – Yasmar Juvenile Training Facility			
<ul style="list-style-type: none"> • Gradual widening of the road verge to the southern half of the frontage of Yasmar • Addition of a row of street trees to the verge within this widened area. 	<p>The project would impact on the frontage of the Yasmar site, which would impact on the character of this landscape zone.</p>	High	High

Key visual features of the proposal in zone	Summary of impacts	Impact ratings	
		Magnitude	Significance
LCZ 14 – Ashfield medium density			
<ul style="list-style-type: none"> Close to the Parramatta Road interchange Residual land with uses to be determined. 	The project would result in a change in the existing residential landscape character of Loftus Street, and the eastern end of Chandos Street, to one that directly adjoins the Parramatta road frontage in a number of locations. The proposed substantial boulevard tall tree planting along Parramatta Road would be a positive impact to the character of the zone.	Moderate	Moderate
LCZ 15 – Ashfield Park			
<ul style="list-style-type: none"> Adjacent widening of Parramatta Road and Street tree planting along both sides of Parramatta Road. 	The magnitude of change is considered to be low (beneficial) within the context of the improved outcome from street tree planting.	Low beneficial	Low

Table 13.9 Operational visual impact assessment for receiver locations

Key visual features of the proposal at the receiver location	Summary of impacts	Receiver	Overall visual impact	
			Magnitude	Significance
Receiver 1 – M4 east of Homebush Bay Drive looking east				
<ul style="list-style-type: none"> Six M4 eastbound and westbound lanes and entry and exit points Noise barriers, retaining walls, bridge abutments On and off ramps Increase in carriageway width from 25 to 95 metres. 	While the project is upgrading an existing motorway, the motorway would change from narrow (generally four lanes) visually enclosed by cut batters and vegetation to one up to 14 lanes wide with bridging structures and changes in level, tunnel portals and limited landscape integration. Noise barriers are proposed along the northern M4 boundary east of this location.	Motorists	Moderate	Moderate–low
Receiver 2 – Underwood Road looking south towards M4				
<ul style="list-style-type: none"> Removal of housing Ventilation facility Distribution substation Mass planted batter A triangular open park space in front of the ventilation facility. 	The current relatively quiet, leafy suburban character of the view would be subject to the introduction of visually uncharacteristic infrastructure development and a substantial view of the M4, in conjunction with a tall eucalypt and turf landscape setting.	Residents/church congregation	High	High
		Pedestrians	High	Moderate
		Motorists	Moderate	Moderate–low

Key visual features of the proposal at the receiver location	Summary of impacts	Receiver	Overall visual impact Magnitude	Significance
Receiver 3 – Parramatta Road looking north to Powells Creek corridor				
<ul style="list-style-type: none"> Construction of on-ramp from Parramatta Road, single lane 120 metre bridge Landscaping, screening and tree planting. 	<p>Impacts would include the introduction of large infrastructure elements such as the on-ramp from Parramatta Road which would encircle the park. This could result in a physical disconnect of this area of the park from the main northern end of the park. The design of the ramp would minimise both the bulk and scale of the structure, and loss of open space through detailed design. Much of the new view may not be able to be screened from within the project boundary.</p>	Future park users	Moderate	High
		Motorists	Moderate	Moderate
		Residents	High	High
Receiver 4 – Edward Street looking west towards Concord Road				
<ul style="list-style-type: none"> Removal of housing and loss of green park space at Edward Street Retaining wall and noise barrier Changed road termination point/road closure 60 metres east of the current street end. 	<p>The change would only occupy a small portion of the street view. The impact would occur at the visual termination point of the street and would be experienced by most people in the street given that the street crests near its eastern end. This has the potential to affect all residents each time they return home by car, and all recreational pedestrians would view at a high level of detail. The change in the view is out of character with the very specific character of the street.</p>	Residents	High	High
Receiver 5 – Entry road to Cintra Park hockey facility looking south				
<ul style="list-style-type: none"> Loss of existing sporting infrastructure Loss of trees along the Parramatta Road frontage Retain the trees along the eastern boundary of the hockey field New project elements comprising a water treatment plant, a water quality basin, a distribution substation and a fresh air intake facility. 	<p>The area already contains a substantial amount of infrastructure. The project would result in the introduction of three new infrastructure buildings, plus water quality basin with associated security fencing and maintenance vehicle access driveway, in addition to the existing stormwater treatment and storage facilities. This would result in a change in visual character from a more open area enclosed with large mature trees, particularly along the eastern boundary and Parramatta Road frontage, to one where infrastructure facilities would line the eastern boundary and a part of the Parramatta Road frontage. The existing line of mature trees within the reserve and along the rear boundary are proposed to be retained, and these comprise a major element of the view from residences.</p>	Active recreation users	Moderate	Moderate–low
		Local residents – walking	Low	Moderate–low
		Local residents – Taylor Street	Low	Moderate
		Motorists	Low	Low

Key visual features of the proposal at the receiver location	Summary of impacts	Receiver	Overall visual impact Magnitude Significance	
Receiver 6 – Reg Coady Reserve near Iron Cove Creek looking south				
<ul style="list-style-type: none"> Widening of Dobroyd Parade from about 20 metres to between 30 and 40 metres wide (from four up to seven lanes) Noise barriers Loss of some screen planting Loss of parkland frontage. 	<p>The area already contains a busy road. The reserve is considered to have the capacity to substantially retain its open, informally planted character. Activities undertaken at the reserve are likely to be a small component of a longer journey/activity.</p>	Active recreation users	Low	Low
		Passive recreation users	Low	Low
		Residents	Moderate	Moderate
		Motorists	Moderate	Moderate–low
Receiver 7 – Parramatta Road at corner of Frederick Street looking north				
<ul style="list-style-type: none"> Infrastructure buildings: ventilation facility, air supply inlet building, fire pump and water tanks building, two electrical substation buildings Noise barriers Tall screen tree planting Major widening of Wattle Street with provision for tunnel entry lanes. 	<p>There would be a substantial change in character that would occur to the view from this location, and particularly to the change in visual character of Wattle Street. However the location is already a busy major road intersection. The proposed ventilation facility would be architecturally well-considered within the context of the area.</p>	Pedestrians	High	Moderate
		Motorists	Low	Low
Receiver 8 – Parramatta Road at corner of Rogers Avenue looking west				
<ul style="list-style-type: none"> Development on the southern side of Parramatta Road would be lost Tall avenue tree planting, median planting of shrubs and trees Future development of the residential land. 	<p>The project would result in a substantial widening and change in character to the view from this location, including the increased street tree planting, and potentially increased volumes of traffic at peak periods. The nature of future development within the project residual land is not known at this time.</p>	Pedestrians	High	Moderate
		Motorists	High	Moderate

Table 13.10 Operational lighting visual impact assessment for receiver locations

Key lighting features of the proposal at the receiver location	Summary of lighting impacts	Receiver	Overall visual impact	
			Magnitude	Significance
Receiver 1 – M4 east of Homebush Bay Drive looking east				
<ul style="list-style-type: none"> Lighting for tunnel portals, on and off ramps, new eastbound and westbound elevated surface flyovers Illumination of toll gantries Security lighting of motorway control centre, maintenance facility, carpark, access paths, buildings. 	Lighting would be fitted and directed to avoid light spill. The extent of glare emanating from the new lighting towards adjacent residential development is likely to be moderate given the inability to provide vegetative screening to areas within the project boundary however, despite removal of vegetation, existing and new noise barriers would have a similar, if not greater function. Some residents not previously affected by lighting would be. The impact to motorists would be in the context of a motorway setting.	Residents	High	High
		Motorists	Moderate	Moderate–low
Receiver 2 – Underwood Road looking south towards M4				
<ul style="list-style-type: none"> Low level security lighting for substation and ventilation facility Lights from vehicles using the M4. 	Existing M4 lighting is not likely to be highly visible from these receivers, but can be expected to be highly visible from some receivers as a result of the project. The visibility of this effect would reduce as proposed landscaping matured	Residents/ church congregation	Moderate	Moderate
		Pedestrians	Low	Low
		Motorists	Low	Low
Receiver 3 – Parramatta Road looking north to Powells Creek corridor				
<ul style="list-style-type: none"> Lighting for on-ramp and new signalised intersection on Parramatta Road Lights from vehicles using the M4. 	Glare from new lighting towards the proposed new park and park users is likely to be moderate, although is expected to reduce as landscaping matures. Glare from on ramp lighting, and existing M4 lighting, for residents within units on the eastern end of Powell Street is likely to be high. This is due to new lighting and the loss of existing tall screening alongside the M4, and the inability to reinstate screening vegetation.	Future park users	Moderate	Moderate–low
		Motorists	Low	Low
		Residents	Moderate	High–moderate
Receiver 4 – Edward Street looking west towards Concord Road				
<ul style="list-style-type: none"> Lighting for Concord Road interchange including on-ramp. 	The street is currently quite dark at night. Glare from the new lighting is anticipated to be high due to the extent of lighting associated with the interchange, direct (line of sight to lighting) impacts from the interchange and the on-ramp flyover. This rating is expected to reduce as proposed landscaping matures although it may be difficult to achieve a high level of screening for direct lighting and lighting glow.	Residents	High	High
		Pedestrians	High	High–moderate

Key lighting features of the proposal at the receiver location	Summary of lighting impacts	Receiver	Overall visual impact	
			Magnitude	Significance
Receiver 5 – Entry road to Cintra Park hockey facility looking south				
<ul style="list-style-type: none"> Low level safety and security lighting for project infrastructure. 	<p>The safety and security lighting may be visible at night from the rear gardens of housing in Taylor Street backing onto the project.</p>	<p>Active recreational users, Residents – walking, Residents – Taylor Street, Motorists</p>	Low	Low
			Low	Low
			Low	Low
			Low	Low
Receiver 6 – Reg Coady Reserve near Iron Cove Creek looking south				
<ul style="list-style-type: none"> Road infrastructure, including lighting, moving closer to the park Headlight glare associated with a closer road. 	<p>Existing high levels of screening to Dobroyd Parade would generally be retained. However, glare from the new lighting towards the precinct is anticipated to be high due to the increased extent of lighting associated with the tunnel entry and exit ramps and tolling gantries, in addition to the road being closer to the park, and the relatively small area of the reserve. This high rating would be expected to reduce by a minor extent as the proposed landscaping matured.</p>	Active recreational users	Moderate	Moderate–low
		Passive recreational users	Moderate	Moderate–low
		Residents	Moderate	High–moderate
		Motorists	Low	Low
Receiver 7 – Parramatta Road at corner of Frederick Street looking north				
<ul style="list-style-type: none"> Road infrastructure lighting Headlight glare associated with a closer road. 	<p>The area is already subject to high levels of lighting along Parramatta Road. In addition, motorists would experience the view for a short duration.</p>	Pedestrians	Low	Low
		Motorists	Low	Low
Receiver 8 – Parramatta Road at corner of Rogers Avenue looking west				
<ul style="list-style-type: none"> Road infrastructure lighting for tunnel entry and exit ramps and tolling gantries Headlight glare associated with a closer road. 	<p>The extent of glare emanating from the new lighting towards adjoining medium density residential development south of Parramatta Road is anticipated to be high due to the loss of shielding buildings on Parramatta Road and the road being closer to the residences. This level of glare may be locally reduced in some instances where relatively tall new buildings are located on residual land parcels</p>	Pedestrians	High	Moderate
		Motorists	Low	Low
		Residents	High	High

13.4.3 Desired future character assessment

The desired future character of the area has been determined based on the strategic direction provided in local and regional planning documents (as outlined in **Appendix L**). **Appendix L** provides detailed consideration on the impact of the project on the future characters of the 15 LCZs. In summary, the assessment found that the project is generally in accordance with the desired future characters across the 15 LCZs, but notes some unavoidable exceptions as follows:

LCZ 5 – Powells Creek precinct

The Powells Creek precinct is zoned RE1, which identifies that this area should provide for public open space or recreational activities. The Powells Creek M4 westbound on-ramp passes through this RE1 zoned precinct. It should be noted however that the on-ramp has been located so that:

- It commences from Parramatta Road close to the eastern edge of the RE1 zone, thereby protecting existing mature fig trees within the RE1 zone along the Parramatta Road boundary
- It then swings east, climbing over the Powells Creek stormwater drainage channel, before swinging west close to the M4 viaduct
- It then enters the SP2 zone, continuing to climb along the M4 batter before entering the motorway.

In this way, the design of the ramp minimises the land take and visual impact of the structure on the RE1 land. Additionally, the ramp structure provides the capability for pedestrian connection beneath it, and then beneath the M4 viaduct through to the RE1 land north of the motorway. Further, the ramp makes provision for access under it and through to the main part of the open space corridor.

Although the on-ramp is not consistent with the RE1 zoning for this precinct, significant efforts have been made to minimise the impact of this necessary project element on the RE1 zone. The on-ramp itself is compatible with the adjoining SP2 Infrastructure zoned land.

LCZ 6 – Concord Road precinct

All 10 houses within the R2 Medium Density Residential zone fronting the east side of Concord Road, from Edward Street north to Patterson Street would be acquired for the project, with the remaining property on the corner of Patterson Street and the Uniting Church on the corner of Sydney Street both subject to partial acquisition of the road frontage. Given the R3 zoning for the west side of Concord Road in this area, and the reduced depth of all of the residential lots north of Sydney Street on the east side of the proposed wider Concord Road, an R2 zoning would appear to no longer be appropriate for this section of Concord Road.

LCZ 7 – Edward Street precinct

The project extends into the R2 Low Density Residential zone, impacting on the ends of Sydney Street East, Edward Street and Alexandra Street with a flyover on-ramp to the M4 directly adjoining the precinct, tunnel dive structures, and a pedestrian overbridge. Residual land between the on-ramp and the R2 precinct would comprise green spaces with a linking pathway. Implementation of mitigation measures proposed in **section 13.5** would assist in the integration of the project with this precinct.

LCZ 8 – Concord Oval precinct

The Concord Oval Precinct is zoned RE1 Public Recreation. The hockey field area within which the project would take place primarily adjoins R2 Low Density Residential development to the east. Even though the proposed infrastructure is not in keeping with the desired future character for this area, i.e. as being one that provides for recreational and/or environmentally significant open space, the infrastructure required for the project at this site, has been positioned to maximise the future use of this land for recreational purposes. Additionally, the project infrastructure would be an addition to an existing substantial infrastructure development undertaken by council for stormwater treatment and storage within the same hockey field area. By making provision for reinstatement of a similar hockey field, the project infrastructure minimises the impact on the recreational attributes of this area. The landscaping associated with the infrastructure further assists in visual integration of the project and landscape amenity within the recreational setting.

LCZ 12 – Haberfield precinct

Almost all of the land within the Haberfield precinct is zoned R2 Low Density Residential, with the desired future character comprising the retention of the existing low density housing, with an upper development height of seven metres. The project does not meet the desired future character for this precinct, impacting upon the western end of Walker Avenue through the introduction of major infrastructure, and the loss of housing within the street for which no redevelopment plans are yet in place, and to the northern end of Martin Street through the loss of housing. The project does provide substantial landscaping where these impacts occur, to assist visual integration with the R2 zone. Measures such as those provided in **section 13.5** may further assist in the integration of the project within this precinct.

13.4.4 Urban design assessment

The urban design elements of the project are intended to embody the project vision, design philosophy, objectives and principles in a built outcome. A series of urban design elements have been developed for specific preferred design areas and the various motorway facility precincts.

These preferred design areas have been reviewed and assessed against the objectives of the WestConnex Urban Design Framework, which are outlined in **section 3.3** in **Chapter 3** (Strategic context and project need). The outcome of the assessment is provided in **Appendix L** which found that the preferred design is generally consistent with the objectives and design principles set by the WestConnex Urban Design Framework and Roads and Maritime design guidelines.

It is difficult at this early stage of the design resolution to be conclusive with regard to all of the required urban design elements. Where exceptions exist, it is generally due to the lack of detailed design resolution rather than inappropriate design.

The M4 currently has large areas of vegetative screening (see **Figure 13.16**). The current preferred design for the project includes narrow shards of landscaping within the active road corridor. The project footprint provides limited opportunities for new structure planting to be established along the corridor boundaries, especially the southern alignment. Within the M4 section the result is likely to be similar to the Lane Cove Tunnel approaches at Artarmon.



Figure 13.16 Existing aerial view of the M4, showing existing levels of vegetative screening

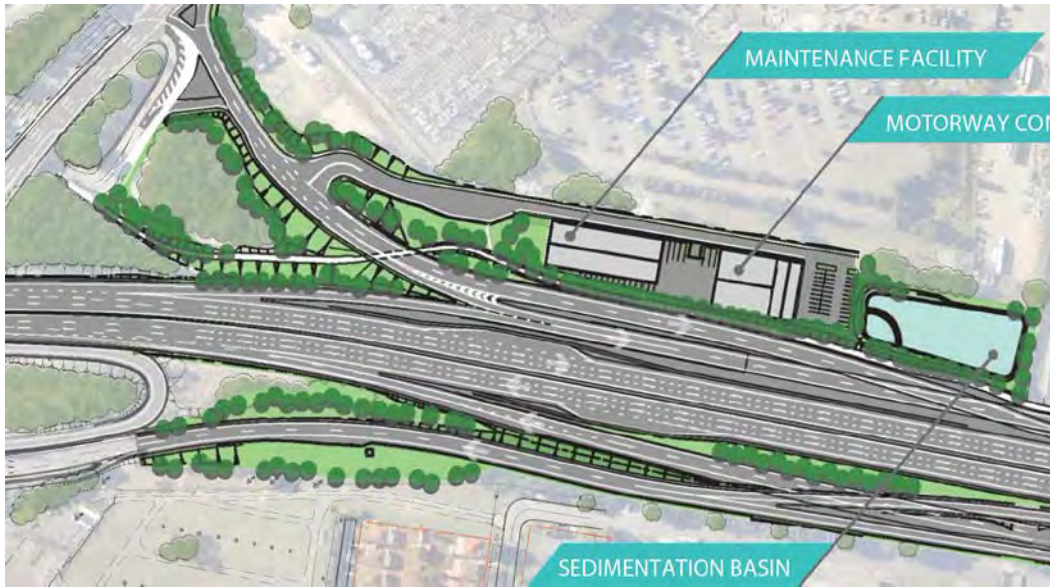


Figure 13.17 Indicative landscape design elements at Homebush Bay Drive Interchange. This image is conceptual and is included for illustration purposes only.

In particular, there would be major physical impacts associated with the proposed intersections, such as at Concord Road and Wattle Street, which would result in the loss of existing residential blocks and associated street grids and street trees. The project would minimise these impacts by reinstating landscape infrastructure and integrating the project within its urban setting. The transition from intersection precincts, such as from the Concord Road interchange, into existing streetscapes includes shared footpath upgrades and street tree planting to mediate the scale of the infrastructure intervention and to provide improved pedestrian amenity (see **Figure 13.18** (note that landscaping in this figure is indicative only and subject to detailed design)).

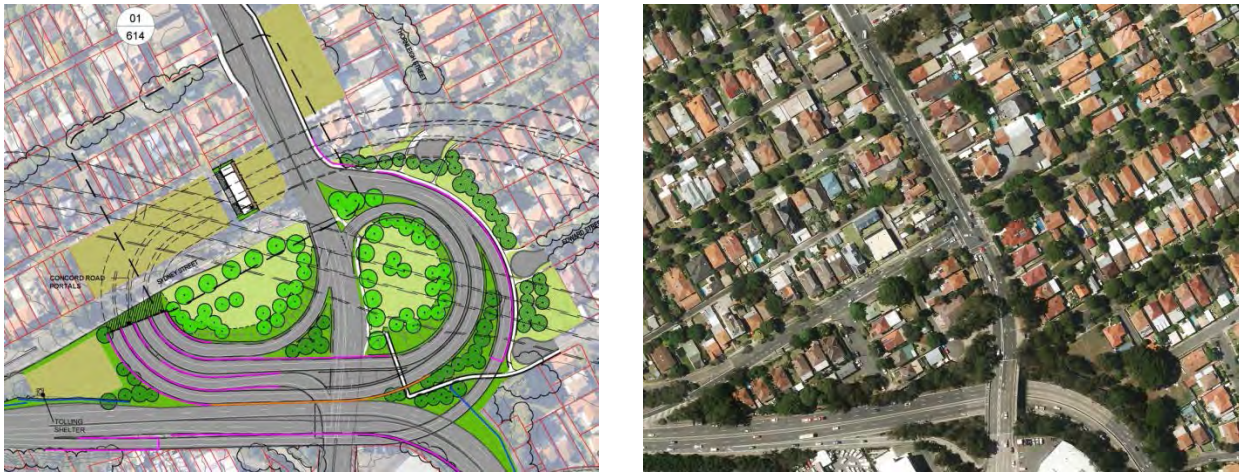


Figure 13.18 Indicative Concord Road interchange compared with the existing aerial view



Figure 13.19 Indicative Wattle Street interchange compared with the existing aerial view

Error! Reference source not found. provides a summary of the assessment of the key urban design elements of the project. Urban design elements for the project are discussed in more detail in **Appendix L**.

Table 13.11 Urban design assessment for key urban design elements of the project

Aspect	Assessment
Homebush Bay Drive interchange	The design at the interchange is relatively neutral and therefore is not considered to become outdated. A key aspect to ensure that the interchange would fit in with the surrounding area is to ensure vegetation is retained where possible and include vegetation in the design to help counteract the loss of vegetation. Overall the interchange would be in character with the surrounding area. Interaction of the project with the surrounding area would be considered further detailed design to ensure that the design (in particular the portals) responds to the local landscape and ecological context.
Motorway operations complex	The design of the motorway operations complex has been considered well, with building heights generally single storey and able to be easily screened with vegetation. The building materials are considered to be appropriate. Re-vegetation of the site would be required in order to ensure that the site would integrate with the surrounding area, including vegetation along the M4.

Aspect	Assessment
Western ventilation facility	<p>The ventilation facility would be positioned adjacent to the existing elevated section of the M4. However, on the northern elevation the building would be up to 10 storeys high (subject to detailed design). Landscaping would be required to integrate the facility with its setting.</p> <p>The use of residual land in the vicinity of the facility would be considered during detailed design and beyond to further integrate the facility into its setting. The areas of residual land are considered to be large enough to support trees of appropriate stature and density. The architectural treatment for the facility would reduce the apparent mass of the structure, particularly the northern elevation.</p>
Powells Creek M4 on-ramp	<p>The on-ramp would sit below the level of the existing M4 and would consist of a new, contrasting diagonal form and potentially visually bulky element that would reduce the sense of openness and accessibility currently available under the M4. The close proximity of the on-ramp to the existing viaduct means that the two structures would be viewed as one. It is therefore essential that the proposed structure be evolved and considered as part of the existing structure. The design of the on-ramp would be further developed during detailed design to ensure that the new ramp does not affect the existing context, character and form of the existing viaduct. The final design would also consider the Powells Creek masterplan.</p>
Concord Road interchange	<p>The design at the Concord Road interchange provides a compact solution which would minimise the impact on the surrounding community. There would be further opportunity to integrate the interchange with the surrounding area during detailed design. The use of residual land at the interchange could also be considered during detailed design or beyond to better integrate the project into the area.</p> <p>The interchange would include a distribution substation which would be designed to be unobtrusive in context with the surrounding residential area.</p>
Fresh air intake and water treatment facilities at Cintra Park	<p>The use of residential scale buildings at Cintra Park would assist with integrating the project with the adjacent residential neighbourhoods. The neighbouring area is generally characterised by Californian bungalows and Federation-era style homes; however, some contemporary homes are located in Taylor Street. These homes have similar finishes to the proposed facility. All of the proposed elevations of the water treatment facility would include vertical bandings around door features that express modularity reflective of the local residential scale.</p>
Wattle Street interchange	<p>Implementation of the intended public realm and landscape design at Wattle Street would ensure that it is well integrated with the surrounding context. The inclusion of mature vegetation would be required in order to provide shade and to make an early visual impact. The planting of vegetation on the cut-and-cover structures would be required to achieve an integrated project outcome. Further development of pedestrian paths and potential screening from the road way would be considered further during detailed design. The use of residual land along Wattle Street would also need to be considered and where possible aim to activate the area.</p>
Eastern ventilation facility	<p>The taller eastern ventilation facility buildings would be of a similar scale and form to the commercial building on the southern side of Parramatta Road (Bunnings). Having the ventilation facility and commercial property on either side of Parramatta Road would help create a 'portal' feature for this section of the road. The remaining buildings within the ventilation facility would be similar in height and scale to the adjacent residential typologies. The visual relationship between the project and the residential buildings on Walker Avenue would be likely to be mediated by the retained and newly planted mature street trees. The proposed facility has the opportunity to engage directly with Parramatta Road and fits comfortably visually within the street grid and the Bunnings 'street wall' opposite.</p>

Aspect	Assessment
Parramatta Road interchange	Implementation of the intended public realm and landscape design at the Parramatta Road interchange would ensure that it is well integrated with the surrounding context. The inclusion of mature vegetation would be required in order to provide shade and to make an early visual impact. The planting of vegetation on the cut-and-cover structures would be required to achieve an intended project outcome. Further development of the design during detailed design would be required to ensure that urban design objectives are met.
Proposed noise barriers and headlight screens	Noise barrier selection along the project is considered to be appropriate and in context with areas along the project, while also integrating with existing noise barriers. The design of noise barriers would be further developed during detailed design to ensure that are sympathetic with the surrounding area. The design of noise walls is considered to be consistent with the WestConnex Urban Design Framework.

It should be noted that the nature of the design process is iterative and will continue to evolve as various elements become realised in detail and better coordinated as part of the whole project. With this in mind, a number of project design commitments are provided to guide the continued development of the project in line with the mitigation measures provided in **section 13.5**.

Urban design elements proposed for each preferred design area is discussed in more detail in **Appendix L**.

13.4.5 Parramatta Road Urban Transformation Program

Parramatta Road Urban Transformation Program identifies eight urban renewal precincts located along the Parramatta Road corridor between Granville and the Sydney CBD. Three of these precincts are located in the vicinity of the project: Homebush, Burwood and Kings Bay (Five Dock).

The project (in the vicinity of the Homebush Bay Drive interchange and the tunnel portals) travels through the southern extent of the Homebush precinct, while work at Cintra Park would be located close to the Burwood and Kings Bay precincts.

While the project would not directly result in the development of these precincts, it may influence the outcomes of the transformation program. These are discussed below.

Reuse of residual land

The project would result in a number of residual pieces of land (discussed in **section 12.3.1** in **Chapter 12** (Property and land use)) that would be used during construction but would be surplus to requirements for the operation of the project. There is an opportunity to utilise this land to assist in activating the precincts in which they are located. This is particularly the case in the vicinity of Underwood Road where residual land is located within the Homebush precinct and could be used to stimulate the activation of the precinct.

The project would also result in some residual land outside of the precincts highlighted in the transformation program. Areas of residual land located along Parramatta Road at the Wattle Street and Parramatta Road interchanges provide an opportunity to activate the Parramatta Road frontage through new development.

Future use of residual land would be subject to separate assessment and approval as appropriate.

Improve connectivity across Parramatta Road

One of the main benefits of the project would be the reduction in traffic along Parramatta Road at most locations. With this reduction in traffic, there is an opportunity to improve north–south connections across the corridor which are currently limited, as east–west movements are given preference at signalised intersections. This leads to long wait times for vehicles and pedestrians wishing to cross the corridor. The reduction in traffic along Parramatta Road would allow for increased frequency of north–south movements across Parramatta Road, improving connections between communities and centres located on either side of Parramatta Road. This increased connection would allow precinct activation to occur and would contribute to the transformation program.

Improve public transport

The reduction in traffic along Parramatta Road as a result of the project would provide an opportunity to improve public transport (predominantly buses) along the Parramatta Road corridor. The improvement of public transport services would also assist with activating precincts, particularly where access is significantly improved due to improved travel times.

Enhancement of the existing road network

The reduction of traffic as a result of the project would not be limited to Parramatta Road, with other surface roads also likely to see a reduction in the number of vehicles. This would ensure that the local road network would function more efficiently, improving access between communities and centres. The improvement of the local road network would also assist with activating precincts, particularly where access is significantly improved due to improved travel times.

Creation of a more attractive environment

The Parramatta Road corridor is currently not a very attractive environment, due largely to traffic congestion and the associated noise and air quality impacts. Such impacts have led to the corridor being run down with limited new development. The project would assist in removing traffic from Parramatta Road, in particular within the Burwood and Kings Bay precincts, which would make these areas more attractive for new development. The reduction of traffic would improve air quality and noise levels which would also make it a healthier area to visit, live or work in.

Summary

Connectivity across the Parramatta Road corridor, residual land redevelopment typology, pedestrian and cycle activation and public transport connectivity, would be developed further during detailed design and specifically addressed in the context of the Parramatta Road Urban Transformation Program. Improvements to pedestrian and shared path amenity should be considered. For example, it would be appropriate to optimise amenity along connecting pathway systems by introducing shade trees of appropriate scale and by separating users from busy traffic lanes wherever possible behind a landscape amenity strip.

13.5 Management of impacts

13.5.1 Urban design

The Preferred design is generally consistent with the objectives and design principles set by the WestConnex Urban Design Framework and Roads and Maritime design guidelines. Where exceptions exist it is due to the lack of detailed design resolution at this early stage, rather than inappropriate design.

The nature of the design process is iterative, its direction is not always fixed or linear, but rather must evolve as various elements become more realised in detail and better coordinated as part of the project.

13.5.2 Landscape character and visual amenity

Environmental management measures relating to landscape character and visual amenity are outlined in **Table 13.12**. These measures would be considered during detailed design and implemented where feasible and reasonable.

Table 13.12 Environmental management measures – landscape character and visual amenity

Impact	No.	Environmental management measure	Responsibility	Timing
Construction				
General	V1	The urban design and landscape objectives would continue to be considered during development.	Contractor	Pre-construction
	V2	Explore opportunities to rationalise the project footprint during pre-construction.	Contractor	Pre-construction
	V3	Engineer slopes with gradients no steeper than 3H:1V where possible.	Contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V4	Explore ways to integrate the project into existing streetscapes, to improve connectivity, amenity and community value.	Contractor	Pre-construction
	V5	Optimise the integration of noise barriers and other features to improve amenity.	Contractor	Pre-construction
	V6	Consider a standard design for retaining walls and major structures across the project, to present a coordinated 'suite of elements'.	Contractor	Pre-construction
	V7	Consider use of LED lighting, which saves energy, costs less to maintain and provides better, safer light quality for roads.	Contractor	Pre-construction
	V8	Consider ways to maximise opportunities for tree planting, while also satisfying road design requirements.	Contractor	Pre-construction
	V9	Consider the inclusion of an arts strategy across the project.	Contractor	Pre-construction
	V10	Where practicable, areas of residual land should be made good with appropriately sized street planting, especially those areas where mature street trees have been removed.	Contractor	Construction
	V11	Provide guidance about the future development of residual land, including ways to promote project integration and activation.	Roads and Maritime	Pre-construction/ construction
	V12	Consider having the detailed design regularly reviewed by an independent design and sustainability review panel to ensure design quality throughout each stage of works, in accordance with the WUDF Principle 6.6.	Contractor	Pre-construction
General visual amenity	V13	Retain existing vegetation around the perimeter of construction sites where feasible and reasonable.	Contractor	Construction
	V14	Early implementation of noise barriers and landscape planting around ancillary facilities to provide visual screening and minimise noise impacts during construction.	Contractor	Construction
	V15	Locate equipment on construction sites to minimise visual impacts as far as feasible and reasonable.	Contractor	Construction
	V16	Acoustic shed design would aim to blend into the background where feasible and reasonable.	Contractor	Pre-construction/ construction
	V17	Design of site hoardings would consider the use of artwork or project information.	Contractor	Pre-construction/ construction
	V18	Maintain site hoardings and perimeter areas including the prompt removal of graffiti.	Contractor	Construction
	V19	Revegetation and landscaping would be undertaken progressively.	Contractor	Construction
Construction lighting	V20	Cut-off and directed lighting would be used to ensure glare and light spill are minimised.	Contractor	Construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V21	Lighting within ancillary facilities will be turned off or reduced to a level which maintains site safety, whenever the facility is not in use.	Contractor	Construction
Signage	V22	Develop a signage strategy during pre-construction. Potentially affected receivers would be consulted on the final signage in relation to its location and associated impacts.	Contractor	Pre-construction/ construction
Tree planting on structures	V23	Consider engaging an appropriately qualified and experienced arborist and/or soil scientist to assess the feasibility of proposed tree planting (such as above the cut-and-cover sections) on structures.	Contractor	Pre-construction
	V24	Consider the use of water sensitive urban design (WSUD) measures eg water harvesting off roads, incorporation of bio-retention planting areas/planted swale treatment for stormwater polishing.	Contractor	Pre-construction
Tunnel interiors	V25	Consider the 'integration of lighting and art to enhance the travel experience,' subject to detailed design, and user and safety audits.	Contractor	Pre-construction
	V26	During pre-construction, consider the gradation of light on approach to tunnel portals, subject to detailed design, and user and safety audits.	Contractor	Pre-construction
	V27	Consider 3D animation testing of the tunnel interior designs from the driver's perspective.	Contractor	Pre-construction
Ventilation and substation facilities	V28	During pre-construction, refinements to the ventilation facilities' designs should be considered to further moderate their visual impact.	Contractor	Pre-construction
	V29	Refine substation designs during pre-construction to be integrated as far as possible within each landscape and urban context.	Contractor	Pre-construction
	V30	During pre-construction (if feasible), consider how the eastern ventilation facility addresses Walker Avenue. Explore whether the exterior of the ventilation facility can be oriented to mirror the Bunnings 'street-wall', with street trees providing scale mitigation and shade amenity.	Contractor	Pre-construction
Bridges	V31	Further develop the interface between the project pedestrian bridge and the existing shared paths and retaining walls.	Contractor	Pre-construction
	V32	Further develop the bridge lighting, in particular pedestrian bridges and connecting shared path systems, during pre-construction.	Contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V33	Design the highly visible bridge parts, such as piers, girders and parapets, to ensure a controlled, integrated and high quality finish taking into account the Roads and Maritime <i>Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW.</i>	Contractor	Pre-construction
	V34	Refine composite sub-structures – such as Super-T girders, headstocks and piers – having regard to the bridge aesthetics guidelines.	Contractor	Pre-construction
	V35	Develop the lighting of bridges and undercrofts to enhance safety and add character to these spaces.	Contractor	Pre-construction
	V36	Explore opportunities to enhance accessible public areas under viaduct and bridge structures to create inviting, safe and interesting environments with good solar access.	Contractor	Pre-construction
	V37	Develop the design of the Powells Creek on-ramp to consider access, amenity and safety.	Contractor	Pre-construction
	V38	Develop the integral abutment connection with the proposed cantilevered Concord Bridge deck.	Contractor	Pre-construction
	V39	Create links between the project elements and realigned pedestrian access, and the existing footpaths.	Contractor	Pre-construction
	V40	Develop fascia wall panels and/or reinforced earth wall details for the proposed soil nail walls and reinforced earth walls.	Contractor	Pre-construction
Landscaping	V41	Refine the size, numbers and densities of proposed trees, to foster robust, rapid growth and canopy closure for shade and screening.	Contractor	Pre-construction
	V42	Undertake appropriate soil analysis and adopt a soil management strategy.	Contractor	Pre-construction
	V43	Engage an ecologist to select appropriate species for mass plantings at project boundaries, and for sedimentation basin planting.	Contractor	Pre-construction
	V44	Minimise the earthworks and embankment modifications required to support the proposed cycleway on-ramp at Queens Street, in order to minimise tree loss.	Contractor	Pre-construction
Parramatta Road Transformation Program	V45	Maintain and enhance pedestrian and cycle connectivity across the Parramatta Road corridor.	Roads and Maritime	Operation
	V46	Residual land redevelopment typology, land use and design controls would be developed to provide certainty about future street amenity and activation	Roads and Maritime	Operation
	V47	Maintain and enhance public transport connectivity across the Parramatta Road corridor and to adjacent suburbs, through appropriate location of bus stops, provision of shelters and attendant furniture	Roads and Maritime	Operation

Impact	No.	Environmental management measure	Responsibility	Timing
	V48	Consider opportunities to improve pedestrian and shared path amenity, for example by: <ul style="list-style-type: none"> Introducing shade trees of appropriate scale Separating users from busy traffic lanes behind a landscape amenity strip Providing appropriate lighting for pedestrian functions. 	Roads and Maritime	Operation
LCZ 1 – M4	V49	Maximise opportunities for tree planting within the road corridor, where this is feasible and appropriate.	Construction contractor	Pre-construction
	V50	Provide a visually compelling, beautiful urban design overlay for the corridor that includes vegetation as one component.	Construction contractor	Pre-construction
	V51	Minimise tall tree planting between Powells Creek and the Northern Line to maintain district views from the M4.	Construction contractor	Pre-construction
	V52	Consider at-receiver planting to reduce visual and lighting impacts on residential receivers.	Construction contractor	Pre-construction
LCZ 2 – Homebush commercial	V53	Where practicable, incorporate substantial avenue planting along the northern edge of the motorway operations complex access road.	Construction contractor	Pre-construction
	V54	Where possible, provide trees within the carpark within the motorway operations complex to provide shade and visually break up the hard landscape.	Construction contractor	Pre-construction
	V55	Consider the incorporation of WSUD measures to provide passive irrigation of trees, particularly within carparks and other areas where stormwater run-on is limited.	Construction contractor	Pre-construction
LCZ 3 – Parramatta Road (west)	V56	Explore opportunities with Strathfield Council to provide landscape screening and tree planting between the project corridor and the Park Road/Powell Street precinct.	Construction contractor	Pre-construction
	V57	Investigate with Strathfield Council the feasibility of providing a pedestrian/cycleway link along the northern edge of Powell Street where it joins the M4, to link directly to the Powells Creek Corridor between the M4 and the property on the eastern corner of Powell Street and Parramatta Road.	Construction contractor	Pre-construction
LCZ 4 – Underwood Road	V58	During pre-construction, consider a formal park design that incorporates measures (eg mounding/deeper soils areas) to facilitate a successful large tree planting program between Underwood Road and Ismay Avenue.	Construction contractor	Pre-construction
	V59	Explore opportunities with local councils to provide avenue planting down both sides of the street, and a linking canopy across the road.	Construction contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V60	Consider the use of a planting mix for the proposed park on the corner of Short Street East and Underwood Road that draws upon the suburban setting of cultural plantings, and which may include elements such as park seating, other park furniture, paving, signage and lighting.	Construction contractor	Pre-construction
	V61	Consider at-receiver planting for residences at 65-71 and 73 Underwood Road and at the end of Short Street East.	Construction contractor	Pre-construction
	V62	Consider the use of street trees along both sides of Short Street East.	Construction contractor	Pre-construction
LCZ 5 – Powells Creek	V63	During pre-construction of the M4 on-ramp at Powells Creek, consider incorporating design features that maximise the height of the opening, and facilitate views and pedestrian/cycle access under the structure to the northern end of the park.	Construction contractor	Pre-construction
	V64	Consider the provision of active recreation facilities within the park area, e.g. basketball or skateboarding, which are compatible with traffic noise, relatively high background light levels at night and adjacent development.	Construction contractor	Pre-construction
	V65	Consider ways to increase the level of screening between the apartment block at the eastern end of Powell Street and the project.	Construction contractor	Pre-construction
LCZ 6 – Concord Road	V66	Design the two large 'island' parks within the ramps to meet Crime Prevention Through Environmental Design (CPTED) requirements including, where feasible, spaces that would actively encourage a significant level of park use, eg active recreational facilities such as basketball courts or a skateboard facility.	Construction contractor	Pre-construction
	V67	Where residual land is used for housing, provide an architectural outcome that is responsive to the adjoining/adjacent Powell's Estate HCA.	Construction contractor	Pre-construction
	V68	For the replacement boundary wall on Concord Road fronting the Sydney Cheil Church, consider matching the design and materials of the existing wall, which is in keeping with the design of the church.	Construction contractor	Pre-construction
LCZ 7 – Edward Street	V69	Refine the design of the end of Edward Street to minimise the visual prominence of the on-ramp wall and noise barrier. Facilitate a planting edge between the on-ramp wall and the footpath, and between the footpath and the Edward Street turning head, that reflects the Federation-era character of the streetscape.	Construction contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V70	Minimise the landscaping required between the carriageway and noise barrier (between Parramatta Road and the pedestrian bridge over the tunnel on- and off-ramps), which could be difficult to maintain. Instead, retain sufficient room to provide screen planting along the edge of the M4.	Construction contractor	Pre-construction
	V71	Consider ways to better integrate the existing disused land between the end of Alexandra Street and Parramatta Road eg a pocket park responding to the Federation era residential setting of the Edward Street area.	Construction contractor	Pre-construction
LCZ 8 – Concord Oval	V72	Configure the construction and operational layout of the Cintra Park site so as to retain the mature line of trees running along the boundary and screening to adjoining receivers.	Construction contractor	Pre-construction
	V73	Investigate opportunities during pre-construction to minimise the removal of established trees at Cintra Park.	Construction contractor	Pre-construction
LCZ 9 – Dobroyd Parade	V74	Consider the provision of a landscape design response to Reg Coady Reserve that re-integrates the new road edge with the landscape character of the park.	Construction contractor	Pre-construction
	V75	Consider a landscape response along the edge of Reg Coady Reserve edge which more closely reflects the existing, generally informal planting character of the reserve.	Construction contractor	Pre-construction
	V76	Where feasible, consider moving the footpath away from the busy road edge on both sides of Dobroyd Parade.	Construction contractor	Pre-construction
	V77	Consider augmentation of the existing screen planting to the area between Waratah Street and Crane Avenue on the residential side to maximise screening of the noise barrier on the southern edge of Dobroyd Parade.	Construction contractor	Pre-construction
	V78	Consider setting the noise barrier far enough back from Dobroyd Parade to provide an avenue of tall planting continuing up to Martin Street, as currently proposed north of Martin Street.	Construction contractor	Pre-construction
LCZ 10 – Wattle Street	V79	Consider an opportunity to extend the street tree planting along the western side of Wattle Street and Dobroyd Parade.	Construction contractor	Pre-construction
	V80	Investigate opportunities to locate the footpath away from the busy kerb and provide tall tree planting between the kerb and the footpath, to match that proposed between Ramsey Street and Martin Street.	Construction contractor	Pre-construction
	V81	Consider an integrated artwork approach to the noise barriers along Wattle Street and Dobroyd Parade.	Construction contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
	V82	Consider ways to provide pedestrian and streetscape amenity between the noise barriers and the street, and to integrate the area between the back fences of the Walker Street residences and the curving noise barrier.	Construction contractor	Pre-construction
LCZ 11 – Parramatta Road (east)	V83	Consider increasing the extent of street tree planting along the frontage between Chandos Street and Rogers Avenue.	Construction contractor	Pre-construction
	V84	Consider refining the verge design to the southern edge of Parramatta Road to create a planted verge and avenue tree planting.	Construction contractor	Pre-construction
	V85	Consider providing a planted verge and avenue tree planting between the footpath and the carriageway to the Parramatta Road frontage to the residual land on the corner of Bland Street.	Construction contractor	Pre-construction
LCZ 12 – Haberfield	V86	Investigate opportunities to increase the proposed street tree planting to Walker Avenue, and seek to reinstate the original brush box street tree avenue character. This would reduce the view of the infrastructure for pedestrians and residential receivers.	Construction contractor	Pre-construction
	V87	Consider whether the proposed development of residual land on Walker Avenue visually complements the remaining row of low density housing on the other side/end of the street, and whether it reinforces the Federation-era landscape/heritage qualities and character of the street.	Construction contractor	Pre-construction
LCZ 13 – Yasmar Juvenile Training Facility	V88	Ensure that no street trees are removed from in front of, and immediately adjoining, Yasmar Estate.	Construction contractor	Pre-construction
LCZ 14 – Ashfield medium density	V89	Consider the provision for street tree planting within the parking lanes along Loftus Street to provide an increased level of street amenity and to mitigate the landscape character impact of the Parramatta Road edge effect on the street.	Construction contractor	Pre-construction
LCZ 15 – Ashfield Park	V90	Consider establishing a stand of brush box trees to the northern corner of Orpington Street and Parramatta Road to tie in with the brush box tree planting in the opposite northern corner of Ashfield Park.	Construction contractor	Pre-construction
Operation				
Collaboration with councils	OpV1	In consultation with the relevant council, provide pre-construction for park/residual area landscape treatments that reflect the cultural setting of the adjoining residential precincts.	Contractor	Operation
	OpV2	Undertake the design, development and implementation of proposed 'pocket park' spaces adjacent to residential areas.	Contractor	Operation

Impact	No.	Environmental management measure	Responsibility	Timing
	OpV3	Undertake screen planting in consultation with the relevant council to council verge areas.	Contractor	Operation

14 Social and economic

This chapter outlines the potential social and economic impacts associated with the M4 East project (the project). A detailed social impact assessment has been undertaken for the project and is included in **Appendix M**. A detailed economic impact assessment has also been undertaken for the project and is included in **Appendix N**.

The Secretary of the NSW Department of Planning and Environment has issued a set of environmental assessment requirements for the project; these are referred to as Secretary's Environmental Assessment Requirements (SEARs). **Table 14.1** sets out these requirements as they relate to social and economic matters, and identifies where they have been addressed in this environmental impact statement (EIS).

Table 14.1 Secretary's Environmental Assessment Requirements – social and economics

Secretary's Environmental Assessment Requirement	Where addressed in the EIS
<ul style="list-style-type: none"> impacts on directly affected properties and land uses, including impacts related to access, land use, property acquisition (including relations and expenses for those properties acquired) and amenity related changes; 	Sections 14.3 and 14.4 Appendix M , Section 6 and Section 7
<ul style="list-style-type: none"> social and economic impacts to businesses in the vicinity of the project, including Parramatta Road and other, and to the community associated with traffic, access, property, public domain and amenity related changes; 	Sections 14.3 and 14.4 Appendix M , Section 6 and Section 7
<ul style="list-style-type: none"> social impact assessment for Concord Oval, including details of existing uses, proximity of sporting club membership and fan bases to Concord Oval, consideration of relocation options and offsets for affected clubs, and consideration of alternative sites (including the Burwood bus depot site); and 	Relocation of the Cintra Park Hockey Field is considered under a separate approval in <i>St Luke's Park Sporting Facilities Works Review of Environmental Factors</i> . The findings are summarised in sections 14.3.6 and 14.4.7
<ul style="list-style-type: none"> a draft Community Consultation Framework identifying relevant stakeholders, procedures for distributing information and receiving/responding to feedback and procedures for resolving community complaints. Key issues that should be addressed in the draft framework should include: <ul style="list-style-type: none"> – traffic management (including property access, pedestrian access), – landscaping/urban design matters, – construction activities, including out of hours work, and – noise and vibration mitigation and management. 	Chapter 7 (Consultation) and Appendix F

14.1 Assessment methodology

This section provides a summary of the methods employed to characterise and assess the potential adverse and/or beneficial impacts on businesses and the community as a result of the project. Further detail on the methods applied to the social and economic impact assessments are provided in **Appendix M** and **Appendix N** respectively.

14.1.1 Approach

The methods for assessing the social and economic impacts of the project were developed with consideration of the *Environmental Impact Assessment Practice Note – Socio-economic Assessment* (Roads and Maritime 2013).

The methodology for the socio-economic assessment included:

- Establishing a definition for the study area, considering the components of the project and potential impacts during construction and operation
- Conducting site visits to review existing land uses and local conditions
- Development and analysis of a community profile from desktop sources including the Australian Bureau of Statistics (ABS) 2011 Census data
- Developing a baseline profile for current businesses and the economy within the defined study area, using published data sources including the ABS (2012 and 2015) and NSW Bureau of Transport Statistics (BTS) (2014)
- Conducting social research to identify and consider local issues and community values
- Conducting a desktop review of businesses currently located within the study area that may be directly affected by acquisition or indirectly affected by the project (for example, due to losses in passing trade)
- Reviewing project technical reports prepared for the EIS relating to transport, noise and vibration, non-Aboriginal heritage, and visual impact and urban design
- Consulting with stakeholders (community and business) to further understand the local socio-economic environment and the potential impacts of the project on local communities
- Analysing the outcomes of community consultation undertaken by WestConnex Delivery Authority (WDA) during the periods December 2013 to February 2014 and June to August 2015
- Identifying the potential beneficial and/or adverse impacts on businesses and the community as a result of the project, including impacts relating to economy, amenity, access, health and social infrastructure changes
- Quantifying, where possible, the beneficial and/or adverse impacts on businesses as a result of the project, measured through
 - Employment: The projected net change in the number of people employed in local businesses
 - Turnover: The projected net change in turnover generated by local businesses
 - Other: Additional components of business operations that may be impacted by the project, which are unable to be quantified
- Identifying measures to mitigate or manage the potential impacts on businesses and the community.

14.1.2 Social impact assessment framework and rating

A range of categories and associated concepts relevant to assessing the social impacts of transport infrastructure have been applied. These include property acquisition, community networks and amenity. **Table 14.2** provides the impact assessment rating criteria applied to the social impact assessment: the first criterion assesses the duration of social impacts; the second criterion considers the spatial or receptor scope of project related change processes on receptors; and the third criterion establishes a level of impact from the attribute being considered.

Table 14.2 Impact assessment rating criteria

Duration	Spatial scope	Level of impact
Temporary Less than one year	Locality Two to three level 1 statistical areas (neighbourhood level) or specific location (eg a single street)	Negligible Marginal change from the baseline conditions such that no discernible effect is expected and a functional recovery occurs within several months.
Short-term One year or more but less than three years	Suburb A suburb as defined by the ABS	Minor A small but measurable change from baseline social conditions. Changes are expected to be temporary and/or only affect a small number of people. Can be mitigated and would not cause substantial impact.
Medium-term Three years or more but less than 10 years	Municipality Local government area (LGA)	Moderate Noticeable and substantial change from the social baseline. The impacts may be temporary or long term, affecting large numbers of people, but respond to mitigation measures.
Long-term 10 years or more	Region Inner western region of Sydney	Major A significant change from baseline conditions, fundamentally altering the social conditions in the community and affecting a large or moderate number of people in the long term (more than 10 years). This category also includes more localised impacts such as land acquisition and other impacts that require compensation.

14.1.3 Economic multipliers

Economic multipliers are used to quantify economic impacts or changes in economic activity resulting from a stimulus, such as construction of the project. These multipliers have been calculated from the most recent ABS input-output tables (ABS Australian National Accounts: Input-Output Tables 2012/13, 5209.0.55.001, 25 June 2015). The tables describe inter-industry transactions among 114 industries, showing the levels of inputs required to produce a given output at the national level.

State-level input-output tables can be derived by adjusting the national table to reflect each state's inter-industry transactions and final demand flows, based on information and data at the state level within the Australian national accounting system and on the latest Census data.

14.1.4 Study area

The regional study area for the social and economic impact assessment has been identified as a combination of the Ashfield, Auburn, Burwood, Canada Bay and Strathfield local government areas (LGAs). This region represents the broader communities that would experience changed access and traffic conditions in their regional area as a result of the project. Additionally, the greater Sydney region has been used for comparative purposes and as the wider catchment for the project.

Figure 14.1 presents a map of the study area used for the social and economic impact assessment.

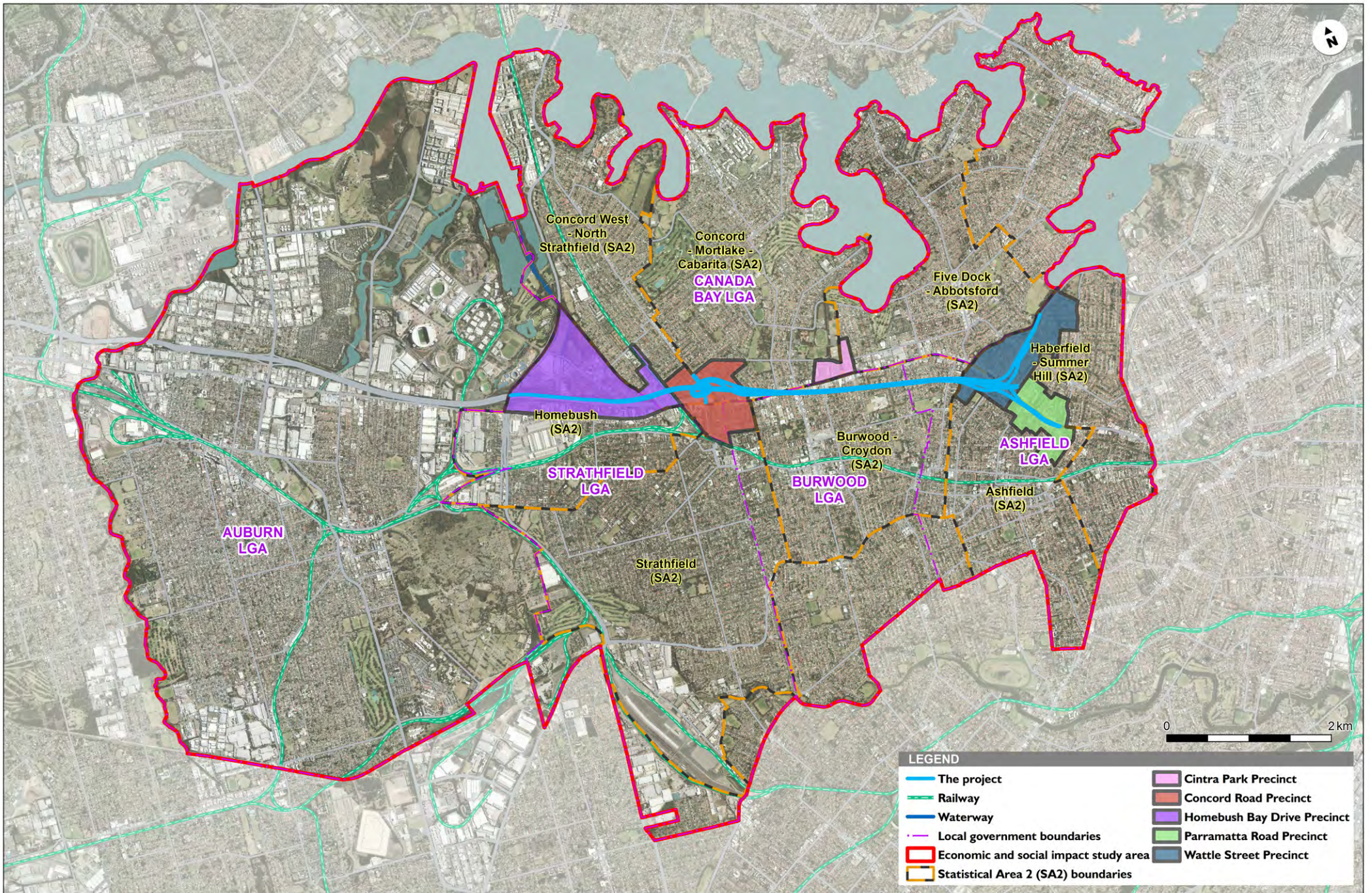


Figure 14.1 Economic and social impact assessment study areas

Social impact assessment

The social impact assessment considers five local precincts that may experience surface impacts: Homebush, Concord, Cintra Park, Wattle Street (Haberfield) and Parramatta Road (Ashfield), as described in **Table 14.3**. The precincts of impact have been created by amalgamating relevant statistical area level 1 (SA1) districts. These are the smallest units of ABS Census data released. Details of the SA1s that make up the precincts are provided in section 1.5 of the social impact assessment in **Appendix M**.

The local precincts have been chosen to consider potential social changes to communities in close proximity to the project surface works and in particular those that would experience the most physical change. Significant subsurface works associated with the project, such as tunnelling, would occur outside these precincts; however, these are not expected to impact at the surface.

Table 14.3 Description of the local study area precincts

Study area	Description
Homebush precinct	This precinct comprises six SA1s. It is roughly bounded by Homebush Bay Drive in the west; Underwood Road/Pomeroy Street in the north; Parramatta Road in the south; and the railway line in the east near North Strathfield station. It covers the area surrounding the western end of the project, including the M4 Widening and access to the tunnel near Pomeroy Street.
Concord precinct	This precinct comprises eight SA1s. It is roughly bounded by the railway line in the west near North Strathfield station; Napier Street/Gipps Street in the north; Coles Street/Wentworth Road in the east; and Cooper Street in the south. It covers the area surrounding the Concord Road Interchange and tunnel access.
Cintra Park precinct	This precinct comprises two SA1s. It is roughly bounded by Loftus Street in the west; Renown Street in the north; Walker Street in the east; and Parramatta Road in the south. It covers the Cintra Park tunnel site (C6), Concord Oval and the residential area adjacent to Cintra Park in the east.
Wattle Street precinct	This precinct comprises six SA1s. It is roughly bounded by Henry Street in the west; Iron Cove Creek in the north; Mortley Avenue/Boomerang Street in the east; and Alt Street in the south. It covers the area surrounding the Wattle Street (City West Link) interchange at Haberfield.
Parramatta Road precinct	This precinct comprises five SA1s. It is roughly bounded by Julia Street in the west; Alt Street in the north; Denham Avenue in the east; and Ormond Street/Dalhousie Street in the south. It covers the area surrounding the interchange at Parramatta Road at Ashfield.

Economic impact assessment

The economic impact assessment considers the following statistical area level 2 (SA2) districts as the areas that are most likely to experience business impacts due to the project:

- Homebush SA2
- Strathfield SA2
- Concord West – North Strathfield SA2
- Concord - Mortlake – Cabarita SA2
- Burwood – Croydon SA2
- Five Dock – Abbotsford SA2
- Ashfield SA2
- Haberfield – Summer Hill SA2.

Sydney Olympic Park has been included in the study area (located within Auburn LGA) because of its proximity to the Homebush Bay Drive Interchange. However, apart from some disruption during construction works to traffic accessing the area, Sydney Olympic Park is not expected to experience significant business impacts.

While social impacts generally occur on a community level, business impacts such as changes to turnover or employment generally occur at the location of the business activity. This is due to the fact that businesses generally rely on the attractiveness and accessibility of their location to induce business activity. As such, businesses that reside far beyond the boundaries of the project are unlikely to be significantly affected by the project, unless they are road transport companies that rely on the project corridor for freight or delivery purposes.

14.1.5 Community consultation

The socio-economic assessment has drawn significantly on consultation with stakeholders affected by the project, undertaken by WDA during land acquisition and community engagement activities. WDA also consulted with representatives of local councils within the study area during 2014 and 2015 and augmented consultation with key affected social infrastructure providers (see **section 14.2.1** for details of social infrastructure providers). Ongoing consultation during the EIS assessment, detailed design, construction and operational phases of the project will further inform the mitigation of potential social impacts.

Community members have provided comments through a range of mechanisms, including information sessions, emails, an online forum, stakeholder meetings, letters and phone calls. The feedback was documented under broad headings, with the key issues, impacts and community values relating to:

- Property impacts
- Traffic and transport
- Air quality, ventilation and health
- Preferred design
- Open space, recreational and community facilities
- Heritage and environment
- Noise and vibration
- Amenity
- Construction
- Community consultation process.

Details of the comments received are provided in **Appendix M**.

Between May and July 2014, the project team consulted with four local councils (Ashfield, Burwood, Canada Bay and Strathfield) that would be directly affected by the project (ie the project passes through these LGAs).

These four directly affected councils, along with City of Sydney Council, made submissions to the then NSW Department of Planning and Infrastructure on the preliminary concept design. City of Sydney Council LGA is outside the project footprint and would be indirectly affected. A summary of the key social impacts and issues raised by each council is provided in **Appendix M**.

Between June and August 2015, WDA consulted with social infrastructure providers, including those directly affected by property acquisition and those indirectly affected by impacts such as changes to access and amenity. **Appendix M** outlines the potential impacts and proposed mitigation measures identified by each social infrastructure provider from these consultations.

14.2 Existing environment

14.2.1 Study area existing environment

The assessment of the existing social and economic environment for the study area considered:

- Population profile
- Workforce characteristics
- Business and industry
- Passenger vehicles and public transport
- Freight and commercial travel patterns
- Social infrastructure.

Detail on the existing environment relating to individual precincts is provided in **section 14.2.2**.

Population profile

The total population of the study area in 2011 was approximately 258,326 people. Within the region, Canada Bay and Auburn LGAs had the largest populations (both 29 per cent of the total). **Table 14.4** shows the population of the region by LGA.

Table 14.4 Population of the region

LGA	Number of persons (2011)	Percentage change from 2006 to 2011 Census	Percentage of the region (2011 Census)	Forecast population as at 2031*	Percentage change from 2011 to 2031
Auburn	73,738	14%	29%	130,600	77%
Strathfield	35,188	10%	14%	50,900	45%
Canada Bay	75,763	15%	29%	111,350	47%
Burwood	32,423	5%	13%	47,500	47%
Ashfield	41,214	4%	16%	53,400	30%
Region	258,326	11%	100%	393,750	52%

Source: ABS Census data 2006 and 2011. (*Department of Planning and Environment 2014)

Workforce characteristics

The following indicators describe the key characteristics of people employed in businesses within the SA2 study area and offer a comparison with the workforce of the Greater Sydney Greater Capital City Statistical Area, as defined by the ABS:

- Businesses in the study area employed around 64,000 people in 2011 (ABS 2012). The highest employing industry was health care/social assistance (14.6 per cent), followed by retail trade (11.6 per cent), education/training (8.9 per cent) and wholesale trade (8.3 per cent). The study area had a higher proportion of employment in these industries than the Greater Sydney average
- The BTS estimates that employment in the study area could increase to around 100,000 employees by 2031 (ABS 2015). This is equivalent to a 25 per cent increase in employment between 2011 and 2031. Between 2011 and 2031, Strathfield SA2 is expected to experience the fastest growth (28 per cent), while Concord West–North Strathfield SA2 is estimated to experience the slowest growth (22 per cent). These estimates do not include the potential growth in jobs that may arise from the renewal of Parramatta Road
- Employment in the study area was predominantly (67 per cent) full-time; this figure is the same as the Greater Sydney average (ABS 2012). Part-time employment in the study area (29 per cent) was slightly higher than the Greater Sydney average of 28 per cent. Concord West–North Strathfield SA2 and Homebush SA2 had higher proportions of full-time workers (75 per cent and 74 per cent, respectively), while Five Dock–Abbotsford SA2 and Haberfield–Summer Hill SA2 had lower proportions of full-time workers (both 57 per cent) than the study area average
- Workers in the study area were predominantly employed in professional occupations (26 per cent), followed by community and administrative occupations (20 per cent) and managerial occupations (14 per cent) (ABS 2012). This distribution closely reflected the Greater Sydney distribution of employment of 27 per cent of employees in professional occupations, 17 per cent of employees in community and administrative occupations, and 14 per cent of employees in managerial occupations

- The total weekly personal income for employees in the study area closely reflected the Greater Sydney distribution of income. The majority of employees (61.3 per cent) earned a total weekly personal income of more than \$799 (ABS 2012). Around five per cent of employees in the study area earned under \$200 per week and an additional 13 per cent earned over \$2,000 per week
- Local councils that make up the study area (Auburn, Strathfield, Burwood, Canada Bay and Ashfield LGAs) and those surrounding the study area (Canterbury and Parramatta LGAs) had the greatest concentration of employees residing within them. However, residents from across the Greater Sydney region travel to the study area to work (ABS 2012)
- The most common mode of transport (for trips using one method of travel only) used by employees in the study area was private car, with 74 per cent of employees driving to work and five per cent of employees travelling as a passenger. Around 11 per cent of employees in the study area travelled by train to work (ABS 2012).

Further detail on these key indicators is provided in the economic impact assessment in **Appendix N**.

Business and industry

A gross regional product (GRP) model developed by AECOM estimated that the study area had an estimated GRP of \$21.4 billion in 2012–13.

- Auburn LGA had an estimated GRP of \$8.5 billion and a relatively diverse economy, with the largest contributing industries being financial/insurance services, manufacturing and wholesale trade
- Strathfield LGA had an estimated GRP of \$3.4 billion and a relatively diverse economy, with the largest contributing industries being transport/postal/warehousing and wholesale trade
- Canada Bay had an estimated GRP of \$5.3 billion, with financial/insurance services making up 20 per cent of total industry value add and being the largest contributing industry to the economy
- Burwood LGA had an estimated GRP of \$2.4 billion and a relatively diversified economy, with the largest contributing industries being transport/postal/warehousing and health care/social assistance
- Ashfield LGA had an estimated GRP of \$1.7 billion and a relatively diverse economy, with the largest contributing industries being health care/social assistance and rental/hiring/real estate services.

There were 18,200 businesses in the study area in 2014 (ABS 2015). The largest numbers of businesses were in the rental/hiring/real estate services (16 per cent), professional/scientific/technical services (14 per cent) and construction (13 per cent) industries. Most of the businesses in the study area were small businesses, with 63 per cent of businesses having a turnover of less than \$200,000 and 91 per cent of businesses employing fewer than 20 employees (ABS 2015). The project footprint does not contain any major retail or commercial centres.

A significant number of commercial properties on Parramatta Road, between Homebush Bay Drive in Homebush and Liverpool Road in Ashfield, have been closed and the premises have been untenanted for long periods. Accessibility to these commercial premises is difficult due to the high level of congestion on Parramatta Road and limited availability of on-street parking. The amenity of Parramatta Road does not provide an attractive environment for businesses or customers, and as such foot traffic is low. As a result, some types of businesses have difficulty in remaining viable in the environment of Parramatta Road.

A Plan for Growing Sydney (NSW Government 2014a) identifies a number of strategic centres. These are locations that currently, or are planned to, have at least 10,000 jobs and are priority locations for employment, retail, housing, services and mixed uses. The following strategic centres have been identified in the M4 and Parramatta Road corridor within the study area:

- Sydney Olympic Park – located immediately to the north-west of the M4 and Homebush Bay Drive intersection. This is currently primarily a sporting precinct, but also contains a number of commercial and residential buildings. Sydney Olympic Park has been identified as a future employment area, particularly for future commercial/office space, due to its transport connections and location within the Global Economic Corridor (defined in Chapter 3)

- Rhodes – located about three kilometres to the north of the Concord Road interchange. It is centred around Rhodes Station and extends south along Concord Road, Rider Boulevard and Homebush Bay Drive. It contains a large shopping centre, and commercial and residential buildings. Rhodes has been identified as a future employment area, particularly in health-related services, due to its close proximity and connections with Concord Hospital
- Burwood – located about 600 metres to the south of Cintra Park. It is centred on Burwood Station and also extends north and south along Burwood Road, and east and west along Railway Parade. It includes a large shopping centre, and commercial and residential buildings. Burwood has been identified as a future employment area, particularly for mixed-use development including offices, retail, services and housing, due to its transport connections with the Sydney and Parramatta CBDs.

A number of priority revitalisation precincts were identified within the Parramatta to Olympic Peninsula Priority Growth Area (NSW Government 2014). The following priority precincts have been identified in the M4 and Parramatta Road corridor, in proximity to the project:

- Wentworth Point – located at the northern end of Wentworth Point in Sydney's inner west, adjacent to Sydney Olympic Park. Wentworth Point is expected to deliver 2,300 additional homes, local jobs and required social infrastructure. It is close to ferry services, Sydney Olympic Park and marina facilities
- Carter Street – located adjacent to Sydney Olympic Park and within 800 metres of Olympic Park station. The renewal project is expected to deliver a mix of housing, office-based employment and retail services. It is also expected to deliver 5,500 additional homes, local jobs and required social infrastructure. The precinct has strong connections to Sydney Olympic Park's sporting, recreational and entertainment facilities.

Clusters of businesses occurring close to the project include the following:

- Lidcombe Business Park and Campus Homebush Business Park. These are clusters of bulky goods, automotive services, transport and courier services, and personal services businesses, along with a number of cafes and restaurants catering to workers and customers, located on Parramatta Road adjacent to the M4 in Lidcombe/Homebush
- Sydney Markets on Parramatta Road in Flemington. The markets are open seven days a week offering fresh produce, flowers, food services and retail trade
- Direct Factory Outlets (DFO) Homebush is a large regional retail shopping centre located on Homebush Bay Drive, adjacent to the M4
- The Bakehouse Quarter is a cluster of retail trade, cafes and restaurants, personal services and a supermarket, located on George Street in North Strathfield adjacent to the M4
- Parramatta Road between Homebush Bay Drive and the City West Link is lined with businesses including:
 - Automotive services such as car dealerships, petrol stations, car washes, mechanics and tyre/audio/electronic car services. Parramatta Road in this location is the hub of Sydney's motor vehicle dealership industry
 - Cafes and restaurants, fast food restaurants and hotels/pubs
 - Retail businesses such as liquor stores, including Dan Murphy's and First Choice Liquor, homewares, electrical goods and hardware stores, including Bunnings and Mitre 10 stores
 - Storage, shipping and transport services.
- A number of town centres and shopping/business precincts are located in the suburbs surrounding the M4 and Parramatta Road corridor in the study area, including:
 - A cluster of businesses located adjacent to Strathfield station in Strathfield. The businesses are located approximately 600 metres from Parramatta Road and include cafes and restaurants, retail stores, personal services, real estate services, food services and a supermarket located in and around Strathfield Plaza Shopping Centre

- Great North Road in Five Dock is lined with businesses, including cafes and restaurants, personal services, supermarkets, retail, homewares and real estate services
- Burwood Road in Burwood is lined with businesses, including personal services, automotive services, retail, health services, cafes and restaurants, commercial office space and Burwood Westfield Shopping Centre
- Liverpool Road (Hume Highway) in Ashfield has a number of businesses located in and around Ashfield Mall, including supermarkets, cafes and restaurants, retail services, real estate services and personal services.

A map of business activity in the study area is presented in **Appendix N**.

Passenger vehicles and public transport patterns

Private vehicles are the predominant mode of transport in the study area. However, the number of private vehicle users is lower in the study area than the Greater Sydney average. The SA2s that make up the study area have averages of 1.3 to 1.6 vehicles per household, equal to or less than the Greater Sydney average of 1.6 vehicles per household. Overall, the study area average was lower than Greater Sydney's, with 65 per cent of weekday trips undertaken by private vehicle.

There is limited parking available along Parramatta Road. Clearways are in operation in both directions between the M4, North Strathfield and Wattle Street in Ashfield from 6.00 am to 7.00 pm Monday and Friday and between 8.00 am and 8.00 pm on weekends. On-street parking is available west of Concord Road but is sporadic and generally limited to off-peak hours. A small amount of local parking is available on side streets.

Rail passengers and bus passengers represent 14 per cent and two per cent respectively of average weekday travel mode share in the study area.

Pedestrian footpaths are provided along the length of Parramatta Road, with regular crossings via signalised intersections, as well as pedestrian overpasses near the intersection with Broughton Street in Concord and at Bland Street in Ashfield. The Parramatta Road environment is not particularly conducive to walking due to the large volumes of light and heavy vehicle traffic, peak period congestion along the corridor and associated noise and air quality issues.

There is a lack of segregated cycling facilities along the Parramatta Road corridor. Cycling is generally restricted to the surrounding local roads. Where dedicated cycleways or cycle lanes are provided, they are geared towards leisure trips rather than commuter trips, with off-road cycle paths predominantly restricted to recreational foreshore or park areas.

Freight and commercial travel patterns

Currently, around 30 per cent of vehicles using the M4 in the morning peak are on work related trips. This increases to 40 per cent during business hours (Infrastructure NSW 2012b).

In 2011, the NSW Freight and Ports Strategy (Transport for NSW 2013d) reported that approximately 63 per cent of the total freight task in NSW was carried by road. As the population grows, non-containerised freight and commercial trips are also forecast to grow in line with demand for goods. By 2031, the freight task in NSW is projected to nearly double to 794 million tonnes (Transport for NSW 2013d); maintaining an efficient and effective road network is vital to support this growth. The Parramatta Road and M4 corridor currently present a major challenge because additional capacity is limited during peak periods.

Congestion on the M4 is no longer restricted to peak travel times only, with an estimated 13 hours of congestion per day (Infrastructure NSW 2012a). The M4 and Parramatta Road have average morning peak speeds as low as 38 kilometres per hour and 17 kilometres per hour, respectively. Sustained congestion increases the time and cost of travel for freight and commercial movements, reduces the efficiency of freight movements and business travel, and hinders economic growth. The cost of congestion to the NSW economy in 2011 was estimated at \$5.1 billion, and is expected to rise to \$8.8 billion by 2020, if there are no major improvements to existing road infrastructure as Sydney's population grows (Transport for NSW 2013d).

Social infrastructure

Key social infrastructure in the study area that could be affected by the construction and operation of the project has been identified as part of the social impact assessment. Potential impacts could include changes to how the infrastructure is used by the community, or how it is accessed.

The social impact assessment identifies directly or indirectly impacted local social infrastructure within approximately 500 metres of the project footprint, as well as regional facilities in the broader area that are likely to be indirectly affected. A summary of these is provided below, with more detailed descriptions provided in **Appendix M**.

Community facilities

Various community facilities are located close to the project alignment, providing spaces for community use, education and social cohesion. These are listed below

- Strathfield Girl Guides Hall (affected by acquisition)
- Yasmar Training Facility – a NSW Juvenile Justice facility that provides counselling and programs for young offenders (adjacent to the project footprint, not affect by the project)
- Strathfield Men's Shed – a meeting place for men to share skills and activities
- Concord Community Centre – which provides space/rooms for hire
- Ella House – which is operated by the St David's Uniting Church and provides aged care and respite, along with training, social and respite activities for young people with intellectual and physical disabilities
- Haberfield Library – an Ashfield library branch library
- A former student hostel located on Concord Road.

Aged care

Several residential aged care facilities are located in the study area that provide high, low, dementia and respite care. These include:

- Haberfield Presbyterian Aged Care
- The Willows Private Nursing Home
- Chandos Nursing Home
- Ashfield Presbyterian Aged Care
- Ainsley Nursing Home
- Linburn Nursing Home
- Woodfield Retirements Village and Nursing Home
- Wyoming Nursing Home.

Education and childcare

Five primary schools are located in the study area:

- Dobroyd Point Public School (also provides out of school hours and vacation care)
- Haberfield Public School
- Concord Public School
- St Mary's Primary School
- St Joan of Arc Primary School (also provides out of school hours care).

High schools in the study area are:

- Concord High School

- Rosebank College
- Burwood Girls High School.

There are three combined (Kindergarten to Year 12) schools:

- Methodist Ladies College
- McDonald College
- Lucas Gardens School, which provides educational programs for students with intellectual and physical disabilities.

Additional information on schools in the local and broader area is provided in **Appendix M**.

There is only one tertiary education provider near the local area, the TAFE NSW Western Sydney Institute – Open Training and Education Network (OTEN) Strathfield, which provides distance education.

There are five childcare centres in the area which offer long day care, outside of school hours care, preschool and playgroups. One of these centres, the Infants Home, provides five services within its grounds, as well as offering care for vulnerable children and children with special needs. Additional information on childcare centres in the local and broader area is provided in **Appendix M**.

Sport and recreation

Sport and recreation facilities provide important opportunities for both exercise and social interaction. A number of sport and recreation facilities are located in the area, including:

- Bill Boyce Reserve (passive recreational space) (affected by the project)
- Arnotts Reserve (passive recreational space) (land that is currently fenced off and inaccessible by the public is affected by the project)
- Ismay Reserve (passive recreational space)
- Concord Oval (rugby union, rugby league and soccer) (adjacent to the project footprint)
- Cintra Park (affected by the project)
- Reg Coady Reserve (passive recreational space) (partially affected by the project)
- Ashfield Park (playing field, passive recreational space, and Ashfield Bowling Club) (adjacent to the project footprint and not affected by the project)
- Cintra Park tennis courts (12 tennis courts) (adjacent to the project footprint)
- St Lukes Park (playing fields and relocated hockey field) (adjacent to the project footprint)
- Sydney Olympic Park.

Health and emergency services

Several hospitals are located in the regional study area, including the Concord Repatriation General Hospital (NSW Health) and three private hospitals (Strathfield, Concord and St John of God Burwood). No health and emergency services would be directly affected by the project. Residents in the eastern parts of the study area are also likely to use Royal Prince Alfred Hospital at Camperdown, which is outside the regional study area.

Police, fire and ambulance emergency services are also located in the study area. The closest police stations are Five Dock (Burwood local area command (LAC)), Ashfield (Ashfield LAC) and Strathfield (Flemington LAC). Fire stations are located in Ashfield, Burwood and Concord. The closest NSW Ambulance station is in Summer Hill, and St John's Ambulance Australia (NSW) also operates an ambulance service in Burwood.

Three State Emergency Service (SES) units (Canada Bay, Burwood and Ashfield/Leichhardt) are also located in the area.

Religious services

In addition to their faith based activities, places of worship can play other important roles in communities, providing places for community interaction, services to local communities, and facilities for community use.

The Zongde Buddhist is located on Parramatta Road at Ashfield and is located within a commercial building. This building is located within the project footprint and would be acquired as part of the project.

There are several Christian churches in the area (Baptist, Catholic, Anglican and Uniting). Two of these are also affiliated with particular ethnic groups (Korean, Lebanese). The predominantly Korean Sydney Cheil Uniting Church at Concord would require partial property acquisition for the project.

Additional information on religious services in the area is provided in **Appendix M**.

Shopping areas

Surrounding the study area are several shopping areas which attract both local and regional shoppers, including:

- Burwood Town Centre, which includes the main retail strip along Burwood Road, a major shopping centre (Westfield Burwood) and smaller shopping centre (Burwood Plaza)
- Bakehouse Quarter along George Street, North Strathfield, which is a commercial, retail and entertainment precinct with supermarkets, restaurants, bars and cafes
- Rhodes Peninsula, which includes a major shopping centre (Rhodes Waterside)
- Ashfield Town Centre along Liverpool Road, which includes a major shopping centre (Ashfield Mall) and restaurants
- Strathfield Town Centre, which includes a major shopping precinct and Strathfield Plaza shopping centre along The Boulevard
- Majors Bay Road Shopping Village, which comprises a retail and commercial strip with cafes and restaurants.
- Neighbourhood shopping areas close to the study area include Concord Road in North Strathfield, Great North Road in Five Dock and Ramsay Street in Haberfield.

Access and connectivity

Parramatta Road, the M4, Concord Road and Homebush Bay Drive/Centenary Drive provide the major traffic routes through the study area. However, slow travel times and intersection delays can deter local and regional travel which is required to cross these major corridors. Consultation undertaken as part of the project highlighted that Burwood residents wishing to access open space areas to the north of Parramatta Road are influenced in their decision to travel by traffic volumes along the Parramatta Road corridor.

Public transport

There are seven train stations located near the study area: North Strathfield, Flemington, Homebush, Strathfield, Burwood, Croydon and Ashfield. Strathfield and Burwood stations (to the south) accommodate the highest volumes of passengers due to the large number of morning and evening peak services.

Multiple buses travel throughout the area, linking the suburbs in the west with the inner west and the Sydney CBD. The bus routes that travel along sections of Parramatta Road between Homebush Bay Drive and Wattle Street are summarised in **Table 14.5**.

Table 14.5 Bus route details

Relevant road	Bus number	Route
Underwood Road/ Parramatta Road	525	Parramatta – Newington - Burwood
	526	Sydney Olympic Park Wharf – Newington - Strathfield
Parramatta Road	415	Campsie – Strathfield – Burwood – Chiswick
	461	Burwood – Parramatta Road – City – Domain
	490	Drummoyne – Burwood – Kingsgrove – Hurstville
	491	Five Dock – Canterbury – Bardwell Park – Hurstville
	492	Drummoyne – Burwood – Kingsgrove – Rockdale

Pedestrians and cyclists

The nature of the pedestrian network in the region varies. Residential areas generally provide good local walking connections and footpaths, particularly in areas away from major roads. Sydney Markets, Sydney Olympic Park, Rhodes and Burwood are located in the region and within walking distance to rail station and bus connections.

There is a limited number of signalised pedestrian crossings on Parramatta Road, with the distance between signalised pedestrian crossings up to 800 metres in some sections. Generally, arterial roads and rail lines in the region inhibit or deter pedestrians and cyclists. The key transport barrier for local communities, as noted by all councils, was Parramatta Road, due to its long intersection and journey times and limited pedestrian and cyclist amenity and crossing points.

There are limited segregated cycling facilities along the Parramatta Road corridor. Dedicated cycleways or cycle lanes are generally aimed towards leisure rather than commuter trips. There are major gaps in north–south connections, due to the lack of permeability of Parramatta Road and the M4. Cyclists currently use the shoulders of the existing M4. In the eastbound direction, cyclists are required to leave the M4 at Sydney Street due to the inadequate shoulder east of Sydney Street. In the westbound direction, cyclists access the M4 from the westbound on-ramp at Concord Road, due to the inadequate shoulder east of this location. Of relevance to the project, Bill Boyce Reserve in Homebush (which will be occupied for construction) is located on a pedestrian and cycle route, which links to the south side of the M4 via an adjacent pedestrian bridge.

14.2.2 Precinct existing environment

The assessment of the existing environment considered the following population attributes for each precinct identified within the study area:

- Age profile
- Cultural diversity
- Employment and education
- Dwellings and household composition
- Household income
- Tenure
- Length of residence
- Socio-economic disadvantage
- Vehicle ownership
- Travel to work
- Travel for other activities.

A summary of these population attributes for each precinct within the study area is provided in the following sections. Further detail on these attributes is provided in **Appendix M**.

Homebush precinct

The total population of the Homebush precinct was approximately 2,093 people in 2011. Compared to the regional study area and Greater Sydney, the population was characterised by:

- A younger age profile, with significantly more people aged 18 to 34 years
- A culturally diverse community
- Higher labour force participation and more people completing Year 12
- Consistent unemployment rate
- Mostly high density and low density housing, with a higher proportion of family households
- Higher median weekly household incomes
- Higher level of renting as well as transience within the community, with most people aged between 18 to 49 years moving in and out of the precinct
- More people paying a mortgage and parts of the population generally less disadvantaged, similar to Strathfield LGA
- High rates of vehicle ownership and car dependency for travel to work
- Higher train usage for travel to work.

Concord precinct

The total population of Concord precinct was approximately 3,693 people in 2011. Compared to the region and Greater Sydney, the population was characterised by:

- A younger age profile, with significantly more people aged 18 to 34 years
- A culturally diverse community
- Similar labour force participation and more people completing Year 12
- Higher unemployment rate
- Mostly low density housing with a similar proportion of family households
- Lower median weekly household incomes
- Higher level of renting as well as transience within the community, with mostly people likely aged between 18 to 49 years moving in and out of the precinct
- More people paying a mortgage and parts of the population more disadvantaged, compared to Canada Bay LGA
- Lower rates of vehicle ownership and car dependency for travel to work
- Higher train usage for travel to work.

Cintra Park precinct

In 2011, Cintra Park precinct had a small population of 245 people compared to the other precincts. Compared to the region and Greater Sydney, the population was characterised by:

- An older age profile, with more 70 to 84 year olds
- A culturally diverse community
- Similar labour force participation and fewer people completing Year 12
- Higher unemployment rate
- Mostly low density housing, with a higher proportion of family households
- Higher median weekly household incomes
- Higher level of home ownership, with more long-time residents and a generally less disadvantaged population, with a score slightly lower than Canada Bay LGA

- Higher rates of vehicle ownership and car dependency for travel to work
- Lower public transport usage for travel to work.

Wattle Street precinct

The population of Wattle Street precinct was approximately 2,703 people in 2011. Compared to the region and Greater Sydney, the population was characterised by:

- An older age profile, with fewer people aged 18 to 34 years
- A culturally diverse community
- Similar labour force participation and a consistent number of people completing Year 12 compared to the region, but higher than the Greater Sydney average
- Slightly lower unemployment rate
- Mostly low density housing, with a slightly higher proportion of family households
- Higher median weekly household incomes
- Higher level of home ownership and long-time residents. Parts of the population generally less disadvantaged, compared to Ashfield LGA
- Higher rates of vehicle ownership and car dependency for travel to work
- Higher bus usage for travel to work.

Parramatta Road precinct

The population of the Parramatta Road precinct was approximately 2,244 people in 2011. Compared to the region and Greater Sydney, the population was characterised by:

- More 25 to 34 year olds
- A culturally diverse community
- Similar labour force participation and a higher number of people completing Year 12
- Higher unemployment rate
- Mostly high density housing with a smaller proportion of family households
- Lower median weekly household incomes
- Higher level of renting as well as transience within the community. Parts of the population generally less disadvantaged, compared to Ashfield LGA
- Lower rates of vehicle ownership and car dependency for travel to work
- Higher public transport usage for travel to work.

14.2.3 Parramatta Road Urban Transformation Program

The *New Parramatta Rd: Draft Parramatta Road Urban Renewal Strategy* (UrbanGrowth NSW 2015) (Parramatta Road Strategy) identifies areas along the corridor where there will be a focus on encouraging growth and changes in the long term (about 20 years). The aim of the Urban Transformation Program is to create an environment with good design, land use mix, housing choice and infrastructure, as well as improved access to community facilities and services and access to public and active transport. It is envisaged that up to 40,000 new dwellings and 50,000 new jobs would be generated in the urban renewal precincts (UrbanGrowth NSW 2015).

To improve the corridor, the Parramatta Road Strategy has identified eight urban renewal precincts at Granville, Auburn, Homebush, Burwood, Kings Bay (Five Dock), Taverners Hill, Leichhardt and Camperdown. Three of these precincts are located in the vicinity of the project:

- The Homebush precinct is generally located between Homebush Bay Drive, Parramatta Road and the Main North Rail Line. It has been identified for significant future growth given its central location and very good access to transport and employment opportunities in Sydney Olympic Park, Burwood, Parramatta CBD, Rhodes, Macquarie Park and the Sydney CBD, to complement the adjoining Sydney Olympic Park
- The Burwood precinct is centred on the intersection of Burwood Road and Parramatta Road, extending south towards commercial and medium density residential development in Burwood, and north towards Crane Street in Concord. The Burwood precinct has been identified for future growth given its good access to transport, as well as employment opportunities accessible by rail and bus, including Sydney Olympic Park and the Parramatta and Sydney CBDs. The north part of the precinct has also been identified for future growth, given the amenity offered by Kings Bay and its associated network of foreshore open spaces. The precinct could evolve to support the existing Burwood town centre with business uses fronting Burwood Road to Parramatta Road, surrounded by mixed use/residential development
- The Kings Bay (Five Dock) precinct is located along Parramatta Road and Queens Road, generally between Regatta Road and Courland Street. The Kings Bay precinct has been identified for future growth given its very good access to bus services traveling to Sydney CBD and Burwood. The precinct could evolve to have a residential/mixed use focus, while maintaining the employment lands south of Parramatta Road.

A key element of this program is improved public transport services along Parramatta Road. WestConnex would enable traffic reductions on Parramatta Road between Concord Road, Concord and Wattle Street, Ashfield. This would free up road space for better public transport choice for existing and new residents along the Parramatta Road corridor. The Parramatta Road Urban Transformation Program is also planning for the construction and delivery of walking and cycling infrastructure in key locations along the corridor.

14.3 Assessment of construction impacts

The following potential adverse and beneficial impacts during project construction have been identified:

- Economic stimulus from construction expenditure and employment
- Changes in amenity due to construction activities in proximity to individual businesses, or commercial/retail centres
- Changes in accessibility due to changes in access arrangements for pedestrians, cyclists or vehicles, increased congestion due to construction traffic, or reductions in car parking availability
- Acquisition of properties where businesses are located
- Health of the community
- Changes to social infrastructure.

These are discussed in the following sections.

14.3.1 Economic stimulus – construction expenditure and employment

During the three-year construction period of the project, there is the potential for a boost in the economy due to construction expenditure in the region. Local business would benefit from this expenditure through purchases made by construction businesses and associated workers to build and support the development of the project. The expenditure would also have indirect effects to other businesses in the area. 'Indirect effects' are flow-on effects to the wider state economy, such as increased expenditure and employment within industries that supply to the businesses that directly supply the project with their goods or services.

Employment opportunities would grow in the region through the potential increase in business customers and through the increase in demand for construction workers. The increase in demand for labour may increase wages in the region, particularly for construction workers, who would be in high demand.

Table 14.6 provides the estimated construction expenditure that would directly and indirectly contribute to industry output, household income, full-time equivalent (FTE) jobs and to the value added contribution to the NSW economy per year of construction.

Table 14.6 Direct, indirect and total impacts of construction expenditure on the NSW economy per year of construction

Impact	Increase in industry output	Increase in household income	Increase in employment	Increase in value added
	\$ million (2015 prices)	\$ million (2015 prices)	FTE positions	\$ million (2015 prices)
Direct	1,310	290	2,540	470
Indirect	500	130	1,580	220
Total	1,810	420	4,120	690

Note: Average number of FTE positions supported for the 39 month construction period

14.3.2 Changes in amenity

Noise and vibration impacts can cause stress and anxiety, affect the enjoyment of outdoor spaces and disturb normal indoor activities. High levels of construction noise at night can also interrupt sleep patterns, with consequent impacts on health and wellbeing. With a construction period of approximately three years, management of noise and vibration impacts, especially outside standard working hours, would be integral to limiting negative impacts on community wellbeing.

The project has the potential to generate considerable noise, with greatest impacts generated during site establishment works and roadworks. These activities are generally of a shorter duration at any point as the works move along the alignment. However, longer duration impacts would be experienced in the vicinity of ancillary infrastructure and tunnel excavation/spoil removal sites. Temporary hoardings, noise walls, acoustic sheds and scheduling of works would be used to minimise these impacts. Noise generated by tunnelling and associated works is predicted to be of a short duration, with primarily short-term impacts at any one location of several days. In locations where the tunnel is less than 40 metres deep (ie in the vicinity of Concord Road and Wattle Street), there is the potential for ground borne noise to exceed noise criteria for longer periods.

In most cases noise generated by construction traffic would be negligible due to the use of the arterial road network. However, for local roads such as Short Street East and Powell Street in Homebush, there is the potential for an increase in the number of maximum noise events. More consideration of management measures would be required during detailed design to minimise and mitigate these impacts.

The project also presents the potential for vibration above human comfort vibration goals; however, such impacts would be site specific, would occur intermittently and would be scheduled to moderate impacts.

Construction works would also change the visual environment in the project precincts.

Together, these amenity impacts influence the way residents and workers experience their environment. They affect how and where they choose to travel and relax, both at home and outside the home, how they enjoy outdoor areas, and how much they identify with their environment. This relationship to environment therefore has strong links to physical and psychological wellbeing. Measures to avoid, mitigate and manage amenity impacts are therefore important for community health.

There is also the potential for businesses to experience amenity impacts from the project in the form of increases in noise and vibration and changes to visual amenity. The majority of construction activity would occur underground, which would limit the extent of amenity impacts on businesses along the corridor. Businesses such as outdoor restaurants and cafes, hotels and pubs, childcare centres and aged care facilities would be the most affected by noise and visual amenity impacts.

14.3.3 Changes to accessibility

Surface construction works such as portals, interchanges, ancillary infrastructure and the establishment of construction ancillary facilities may result in traffic induced impacts including changes to:

- Property access
- Pedestrian and cyclist access and movements
- Locations of bus stops
- Local roads and intersections
- Travel times due to traffic delays and detours.

Major construction works would be primarily accessed from Parramatta Road and the M4. Construction ancillary facilities would be located to provide the most direct access for heavy vehicles to and from arterial roads such as Parramatta Road, M4, Concord Road and Wattle Street and to avoid or minimise use of local roads. In **Chapter 8** (Traffic and transport) construction traffic is estimated to represent only two per cent of total daily traffic on Parramatta Road. The construction workforce is expected to increase the volume of light vehicles on the surrounding road network. Specific local road from construction traffic would be:

- Minor impacts on Pomeroy Street
- Moderate impacts on Underwood Road and Short Street East from the Underwood Road civil and tunnel site (C3), which would be accessed from Short Street East via Underwood Road and Parramatta Road
- Negligible impacts from the Powells Creek Civil site (C4), as the construction vehicle access and egress is directly to and from Parramatta Road
- Minor impacts on Ada Street and Alexandra Street
- Minor impacts for road users along Gipps Street, including those accessing the adjacent Concord Oval, with substantial increases in light vehicle traffic potentially increasing travel times
- Minor impacts on Orpington Street.

The proposal would also potentially result in short-term closures of the pedestrian bridge over the M4 at Pomeroy Street and the Bland Street pedestrian bridge. These impacts would be avoided where possible, with the community to be made aware of any closures. This would result in some short-term access issues, particularly at the M4 pedestrian bridge where the nearest alternate access is along Underwood Road. These impacts would only occur over a short period of time.

Most construction ancillary infrastructure would include some parking for the construction workforce, and dedicated car parking would also be available at Concord Oval (250 spaces) and at Railway Place in North Strathfield (50 spaces). However, this is not likely to be sufficient to accommodate all construction staff. The availability of on-street parking is a pressing local issue throughout the study area. A construction car parking strategy would be developed, which would promote the use of public transport and car pooling and would investigate alternative car parking arrangements. This strategy would aim to ensure that impacts on on-street parking are minimised during the construction period.

The existing cycleway along the M4 between Haslams Creek in Newington and Concord Road would be unavailable during construction, and a detour route is proposed to the north of the M4 corridor.

During construction, traffic delays are possible due to increased waiting times at intersections, and may affect motorists, bus passengers, cyclists and pedestrians. These impacts relate to:

- An increase in bus travel times due to slower travel speeds and increased intersection delays
- Longer travel times to and from bus stops by supplementary travel modes (eg as a car passenger, or walking to and from a bus stop) due to an increase in traffic volumes, slower travel speeds and increased intersection delays

- Reduced reliability of bus services and therefore greater likelihood of missing connections with other public transport
- Reduced amenity for bus users waiting at stops
- Reduced pedestrian roadside safety due to an increase in traffic
- Reduced overall pedestrian and cyclist amenity throughout the study area
- Potential adverse impact on pedestrian wait times at signalised intersections if adjustments are made to accommodate increased traffic volumes
- Increased delays at intersections for road cyclists due to an increase in traffic volumes along the corridor
- Increase in journey time and distance due to closed road shoulders and detours
- Reduced overall amenity throughout the study area.

Businesses that are reliant on deliveries may experience longer transit times as a result of construction related impacts on the road network. Freight and commercial vehicles that use Parramatta Road and the M4 may also experience longer transit times and reduced efficiencies over the construction period.

Access to private properties would be maintained at all times. Where direct impacts on property access are unavoidable, consultation would be undertaken with the property owner and/or tenant to develop appropriate alternative access arrangements.

14.3.4 Property and household impacts

The project has been designed to minimise land acquisition and limit the severance of private properties.

A total 291 properties would be required for the project; this includes properties to be acquired and properties already in the ownership of Roads and Maritime. A total of 203 dwellings would be affected by the project: this includes 35 dwellings already in the ownership of Roads and Maritime and 168 dwellings that would be acquired. The project would also affect eight additional residential properties which contain dwellings, however dwellings on these properties would not be impacted (ie partial acquisition).

All properties would need to be vacated by the end of the first quarter of 2016, to enable construction to begin. WDA commenced a process of voluntary acquisition of residential properties in November 2013 based on the WDA concept design. Subsequently in June 2015, WDA and Roads and Maritime notified individual property owners that their property was required under the preferred design, with information on the land acquisition process provided. Valuations by Roads and Maritime and property owners were subsequently sought and negotiations commenced. Some residential acquisition agreements have already been concluded and a number of properties have been acquired. A detailed list of acquired properties is contained in **Appendix M**.

Assuming that the Roads and Maritime properties are already vacant, it is likely that property requirements for the project would result in the relocation of 168 households.

Table 14.7 Summary of residential dwellings to be occupied as part of the project

	Homebush	Concord	Wattle Street	Parramatta Road	Total
Total residential dwellings to be fully acquired	14	46	83	25	168
Roads and Maritime owned residential dwellings required for project	3	8	24	0	35
Partially acquired residential properties	1	2	4	1	8

Note: There is no residential property acquisition required in the Cintra Park precinct.

The social risks related to land acquisition include:

- Inaccessibility of equivalent housing at a comparable cost. If compensation does not allow property owners to access similar housing in the local area, acquisition may result in residents relocating to other more affordable areas, or incurring increased levels of debt to remain in the area
- Relocation health risks. Relocation can be an emotionally and physically taxing process, especially when externally instigated. Vulnerable members of the community, including the frail elderly, people with a disability or poor health and those with low English language skills may be most at risk of stress and in need of support when relocating
- Altered access to social infrastructure. If land acquisition results in households needing to moving to other areas, this may affect continuing access to social services, family and local social networks.

Of the 168 households to be relocated, it is estimated that 40 per cent would be renting and 60 percent would own or hold a mortgage on their property. While acquisition may present an opportunity for some households to downsize, upsize or otherwise move on (eg to other areas, or to alternative accommodation such as aged care facilities for elderly residents), it is expected that the majority of owner-occupiers would aim to relocate within the local area. Many landlords may be less emotionally invested in their property and the local area.

The project also requires the acquisition of 23 commercially zoned properties and one residentially zoned property, which contain a total of 20 buildings used for commercial purposes. In addition, one property owned by Ausgrid would be partially acquired as a result of the project.

Overall, it is anticipated that the social impacts of relocating for many of the directly affected households would be major short-term impacts. In some cases, where households are unable to relocate locally, the social impact may involve an extended recovery time to re-establish social networks and daily routines for work, study and recreation. Alternatively, where households need to incur higher levels of debt in order to remain in the local area, increased mortgage or rental stress may result in greater and longer term social impacts.

14.3.5 Social infrastructure

The project has where possible avoided impacts on social infrastructure.

Table 14.8 outlines the impacts on all directly impacts and potentially indirectly social infrastructure facilities.

Table 14.8 Social infrastructure

Infrastructure Impacts	
Direct impacts	
Strathfield Girl Guides Hall	The Strathfield Girl Guides Hall would be directly impacted as it would be acquired as part of the project. Consultation with Strathfield Council is underway in regards to interim accommodation for the Girl Guides. Council would consult with users of the hall (mainly the Guide Guides) to discuss their requirements to assist with requirements during temporary relocation. Relocation is anticipated to be within Homebush or adjoining suburbs and therefore impacts to access would be minor.
Bill Boyce Reserve	Bill Boyce Reserve would be directly impacted during construction, as it would be leased in its entirety (ie 100 per cent) for use of a construction ancillary facility. During this period the reserve would not be available for use by the public. This loss of this reserve would result in a small reduction in open space within the community during the construction phase. The location of similar nearby passive open space on Wentworth Street is expected to adequately meet the needs of the local community during construction. The reserve would be restored and returned to public use at the conclusion of construction works.

Infrastructure	Impacts
Arnotts Reserve	<p>Part of Arnotts Reserve would be directly impacted during construction. Impacts would result in loss of around 26 per cent of the reserve during construction. 19 per cent of the reserve would be returned following construction. The part of the reserve that would be affected is currently not accessible by the public and therefore there would be no loss of public open space during construction. The use of this land during construction, however, may lead to a minor, short term impact on visual amenity for the local community.</p> <p>The project would not affect Arnotts Reserve north of the M4, including the part that has recently opened. Some noise and visual impacts would be experienced due to the nearby construction facilities.</p>
Sydney Chiel Uniting Church	<p>The project would require the partial acquisition along the Concord Road frontage. Impacts on the church would include: loss of green space (including playground), loss of four parking spaces, and alterations to the driveway access. The loss of parking and green space has been identified by the church as an area of concern. Consultation with the church would be undertaken to explore opportunities for increasing access to green space and parking.</p>
Cintra Park	<p>The project would involve the acquisition of the Cintra Park site which is currently occupied by a hockey field. The existing hockey field is being relocated by WDA to St Lukes Park on the northern side of Gipps Street, under a separate environmental approval. The existing hockey field at Cintra Park would not be decommissioned until the new hockey field and associated amenities building are constructed and commissioned. There would therefore be no loss of hockey field availability. Careful staging of the works in coordination with the organisations that use the sporting fields at St Lukes Park would mitigate temporary impacts on these users. The new site is consistent with Canada Bay Council recreational facilities plans and is being implemented without any reduction in the number of playing fields.</p> <p>A substantial increase in light vehicle traffic (up to 330 vehicles daily) entering and exiting the Cintra Park compound via Gipps Street would potentially increase travel times for local traffic and for people accessing Concord Oval and St Lukes Park. This impact is expected to be greater on weekends when games are scheduled at Concord Oval. This is considered a minor short-term impact on these users.</p> <p>Wests Tigers lease the adjacent Concord Oval from the City of Canada Bay. The club has 100–120 players with daily activities at the site. West Harbour Rugby and Inter Lions Soccer Club also use the field for games. As West Tigers also use the St Lukes fields for training sessions for their lower grade teams, an upgrade of these grounds and facilities would be of benefit to the club.</p> <p>Effective management of dust, noise and parking would be key to minimising impacts on players and maintaining the functioning of the clubs throughout construction.</p>
Reg Coady Reserve	<p>Reg Coady Reserve would be directly impacted during construction. A total of 18 per cent of the reserve would be required during construction, however six per cent of the reserve would be returned following construction. The permanent loss of 12 per cent of the reserve is considered a minor impact; however, the adjacent parkland would also be subject to some noise, visual and other amenity impacts.</p>
Zongde Temple	<p>The temple serves a community of around 2,000 people. Consultation is being undertaken to discuss a temporary alternate location for the temple. Relocation of the temple in the short term would be an inconvenience to their community, however it is expected that suitable alternative accommodation can be found within a similar geographic area.</p>
Indirect impacts	
Our Lady of Assumption Catholic Church	<p>Views from the church would be impacted, as the Underwood Road civil and tunnel site (C3) would be located across the road. The church would also experience noise, traffic and parking impacts during construction. Impacts on the church services are expected to have a short-term moderate impact on users of the church.</p>

Infrastructure	Impacts
St Michael's Serbian Orthodox Church	The church is located on Wentworth Road and is already subject to traffic noise from the M4. The impact on amenity of this church is expected to have a short term minor impacts on church users.
Concord Baptist Church	The Church may experience local amenity impacts from noise and traffic. They consider the permanent closure of nearby Carrington Street to be a minor impact with regard to access and convenience, but have expressed concern about air quality impacts.
St Andrew's Anglican Church	The church, located on Parramatta Road opposite the end of the existing M4, has raised concerns with regard to potential for local parking competition with the construction workforce, and construction noise impacts; however, parking impacts are considered to be negligible, with noise impacts considered minor.
Jehovah's Witnesses Church	This church has been designed to minimise traffic noise, with minimal glass facing Wattle Street, with double glazing provided. The project is not expected to impact on access to the property beyond the general traffic delays due to existing traffic. The loss of street parking would impact accessibility for some users due to the need to find alternate parking. Visual and amenity impacts maybe experienced due to the nearby construction area.
The Infants Home	Visual and noise impacts on The Infants Home are partially screened by the adjacent commercial building (Bunnings). Parking in the area is an ongoing concern and therefore there are concerns that construction parking would further increase these impacts. Impacts on parking for the facility are considered to be minor with parking provided within the construction work site and due to the facility being located on the southern side of the Parramatta Road opposite the nearest construction site.
Haberfield Public School	Haberfield Public School could potentially be affected by the construction of the interchanges and the construction compound, in relation to noise, vibration, potential safety and accessibility. Road closures, traffic changes (eg Walker Street) and the overall amenity and navigability of area may change for school community members, particularly those who walk or cycle. Pedestrian safety when crossing Parramatta Road would be maintained with the Bland Street pedestrian bridge remaining open for the majority of construction. Potential noise impacts would be managed or mitigated when construction environmental management plans are developed.
Willows Private Nursing Home	This nursing home is located near the Parramatta Road civil site (C10) and would be affected by amenity impacts with noise and privacy for residents identified during consultation with the facility. As this facility is a high care facility, such impacts could potentially lead to detrimental to the health of the residents. The potential for noise attenuation treatments as part of the project may reduce construction noise impacts if implemented at the start of construction.
Haberfield Aged Care	There are no expected impacts to access, however being located directly opposite the Wattle Street and Walker Avenue civil site (C9) and works, noise and visual impacts would be expected. The facility is a converted hotel which has been upgraded to address existing noise impacts from Parramatta Road and it is expected that this would mitigate additional construction noise to some extent.
Peek-A-Boo Early Learning Centre	This child care centre was also previously identified for relocation. However, acquisition is now no longer required under the preferred design. The centre provides long day care for 76 children. Noise impacts would be most relevant for children during outdoor play times, as the centre's outdoor areas are otherwise screened from visual impacts. The potential for noise attenuation treatments as part of the project may reduce construction noise impacts if implemented in advance of construction.
Ashfield Park and Bowling Club	Impacts on the park and bowling club would be limited to noise and visual impacts due to the adjacent construction works. Impacts would be most felt by recreational users, however alternate areas of the park would be available for use to avoid these impacts. Users of the bowling club would be impacted and therefore the desirability of the venue would be negatively impacted.

Infrastructure	Impacts
Yasmar Training Facility	Some amenity impacts (including noise) are likely to be experienced at this location due to the presence of works along its southern boundary on Parramatta Road. While it is likely that some users would travel by public transport to the site, proposed short term relocation of bus stops on Parramatta Road (westbound) are relatively minor and unlikely to be an inconvenience.

14.3.6 Business impacts

The assessment found that 20 buildings used for commercial purposes and occupied by private businesses would be fully acquired for the project. The properties that would be fully acquired for the project comprise:

- One motel with 50 guest rooms and a restaurant
- Four commercial offices
- Nine automotive sales and services
- One personal services
- Three homeware sales and services
- Two retail businesses.

For the purpose of the EIA, an affected business has been defined as a business that would be impacted by property acquisition, changes in amenity, changes to accessibility or changes in the volume of passing trade due to the construction and operation of the project.

The majority of businesses located on land to be acquired for the project are tenants/lessees of their premises. These businesses would be required to vacate their current location and move to an alternate location or close down. Businesses that chose to relocate would be subject to costs associated with relocation and set-up at their new premise. Property owners that also own and operate the business located on their property would be compensated for relocation costs for these businesses under the terms of *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) and under the *Roads and Maritime Land Acquisition Information Guide* (Roads and Maritime 2014d).

The acquisition of these properties and consequent relocation of businesses would result in impacts to the local economy through loss of business turnover and employment. However local social impacts through loss of access to services or facilities would be very limited as many of the businesses affected service a more regional clientele. Business property acquisition would impact a large liquor store and car mechanic services which are likely frequently used by the local community. The loss of these services locally is not expected to have a significant social impact as for each business type, several comparable services or retail outlets are located within a few kilometres of the current site. Affected businesses have identified that they would intend to relocate; this could potentially happen to areas along Parramatta Road due to high vacancy levels in existing commercial developments.

14.4 Assessment of operational impacts

The following potential adverse and beneficial impacts during project operation have been identified:

- Economic stimulus from operational expenditure and employment
- Improvements in amenity and accessibility
- Improvements to freight transport efficiencies
- Changes in trade and employment due to changes in volumes of passing traffic
- Changes in visibility of businesses
- Health of the community
- Changes to social infrastructure.

14.4.1 Economic stimulus – operational expenditure and employment

Table 14.9 presents a summary of the estimated impacts of operational expenditure on the New South Wales economy per year of operation of the project.

Table 14.9 Direct, indirect and total impacts of operational expenditure on the New South Wales economy per year of operation

Impact	Increase in industry output \$ million (2015 prices)	Increase in household income \$ million (2015 prices)	Increase in employment FTE positions	Increase in value added \$ million (2015 prices)
Direct	31	7	80	14
Indirect	8	2	30	4
Total	39	9	110	18

Notes: 1) Average number of FTE positions supported each year of operation

2) Totals may not sum due to rounding

14.4.2 Changes in amenity

The project has the potential to have both adverse and beneficial impacts on amenity. **Chapter 10** (Noise and vibration) found that road traffic noise impacts during operation would, in 96 per cent of cases, result in minor reductions in noise along the M4 and Parramatta Road corridors due to traffic diversion into the new tunnels.

With much of the project underground, traffic displacement from the surface M4 and Parramatta Road are expected to deliver visual amenity benefits, facilitating the urban renewal proposed for the corridor. Where surface works have been undertaken, some visual amenity and heritage impacts would remain, largely due to:

- Loss of vegetation screening
- New road infrastructure – interchanges, tunnel ramps, bridges/flyovers and new noise walls
- Closer proximity to new road infrastructure for some properties
- Ancillary operational facilities such as ventilation facilities, the motorway control centre, electricity sub-stations and the water treatment facility
- Loss of heritage items and changes to streetscapes.

These impacts are primarily along the M4 corridor in Homebush at the western and eastern ventilation facilities, Concord Road interchange, and Parramatta Road and Wattle Street interchanges. Project design and landscaping plans aim to minimise visual intrusion of project elements and respect and respond to the existing and desired character of these areas.

Changes to the amenity of a street or suburb can negatively impact the sense of belonging and identity of its residents and consequently their cohesion and connectedness. Areas with heritage values can also be a significant contributor to local character and community sense of place. Impacts on heritage assets affect not only the value of the assets, but the value communities place on the quality of their environment, and their connections to it, both past and present.

Businesses located along Parramatta Road, east of Concord Road and not located adjacent to the eastern or western portal, would experience reduced noise levels, improved air quality and improved visual amenity due to the reduction in vehicle numbers, particularly heavy vehicles on Parramatta Road. Businesses located at the eastern and western portals and west of Concord Road are likely to experience increases in noise, reduced air quality and reduced visual amenity due to increased traffic volumes and the introduction of new infrastructure.

14.4.3 Freight and efficiency

The project would improve network efficiency, delivering travel time savings and provide more efficient movement of freight and commercial vehicles, thereby reducing operational costs. The project would also provide increased road capacity along the M4 and Parramatta Road corridor, which is a key corridor for the movement of freight between Sydney Airport, Port Botany and the western suburbs, particularly for those businesses located in the vicinity of the M4, and commercial vehicle movements between major centres. This benefit would be fully realised upon the completion of the M4–M5 Link, which would create a direct connection between Sydney Airport, Port Botany, Sydney CBD and Western Sydney.

It is anticipated that travel times between Homebush Bay Drive and Flood Street would decrease by between 40 and 60 per cent in either direction in peak periods for vehicles using the project in 2021. Travel time savings in 2031 are more substantial, resulting in a 55 to 70 per cent reduction for vehicles using the project. While indicative only, these estimates suggest generous travel time savings despite a large increase in volumes on the corridor and the provision of kerbside bus lanes on Parramatta Road.

The reduced travel times for freight and commercial vehicles would reduce operational costs associated with fuel and wages and improve safety by reducing stop–start traffic conditions caused by congestion. In 2013, travel time for freight movement has been valued by Transport for NSW at \$57.84 per vehicle hour, demonstrating significant benefits associated with reduced travel times.

14.4.4 Acquisition

At the completion of construction, 12 commercially zoned properties acquired for the construction period only would potentially be available for sale and redevelopment. The future use of this residual land would be subject to separate assessment and planning approval in accordance with the existing land use zoning. At this stage, Roads and Maritime does not intend to rezone acquired land or to subdivide/consolidate properties.

14.4.5 Changes in passing trade

As a significant volume of traffic currently using Parramatta Road would be diverted into the tunnel, businesses that are reliant on passing trade would be affected by the project. It has been estimated that there could be an annual reduction of around \$7.3 million in output and around 33 FTE jobs due to loss in passing trade. This equates to a loss of 19 per cent of total output and FTE employment from the businesses reliant on passing trade. Reductions in passing trade would potentially be offset to some degree by improved amenity and accessibility for the businesses affected.

This assessment does not take into account the potential increase in passing trade for businesses located along Parramatta Road, west of Concord Road, from an increase in traffic volumes associated with drivers choosing to avoid the motorway tolls. Five businesses were identified as potentially benefitting from an increase in passing trade, comprising services stations, a car wash and cafes/restaurants.

14.4.6 Changes to accessibility

The traffic and transport assessment described in **Chapter 8** (Traffic and transport) has identified large reductions in vehicle delay along the corridor between Homebush Bay Drive in the west, and City West Link and Haberfield/Leichardt in the east. This is evident both within the project mainline tunnels, which would ultimately provide connectivity to the possible future M4–M5 Link (which is subject to planning approval), and also on the existing Parramatta Road, despite the reduction in capacity due to the provision of kerbside bus lanes. The assessment has also identified benefits on the parallel route along Queens Road and Gipps Street. This improvement would enhance regional connectivity.

In the medium term, before the M4–M5 Link is built, the project is expected to significantly reduce traffic on Parramatta Road between the M4 and Dalhousie Street, with small deteriorations elsewhere, particularly at the M4 project ramps at Parramatta Road and Dobroyd Parade. Completion of the M4–M5 Link would rectify much of this congestion, delivering significant traffic improvements for most of Parramatta Road east of the project.

These medium term traffic impacts would negatively impact local and regional access along and across the Parramatta Road corridor in these areas and increase travel times. Peak morning travel times are expected to be reduced by six to eight minutes on other strategic routes before the M4–M5 Link is constructed, and thereafter travel time savings are expected to increase to a substantial 10 to 18 minutes.

Travel time savings (or transport efficiency) provide significant social benefits, freeing more time for recreation, social interaction and economic activities, all of which contribute to physical and mental health. With reduced congestion on major roads in the long term, local mobility would also likely be enhanced. Parramatta Road is currently a barrier to many local and regional social networks. Reduced congestion at intersections to cross the corridor and on the road itself would be an incentive for increased expansion across the corridor for community interaction, enhancing access to regional social infrastructure such as Sydney Olympic Park and Flemington Markets.

Public transport

A limited number of bus routes currently use Parramatta Road within the study area. However, Transport for NSW has identified the potential for a new high frequency bus route between Burwood and the CBD, which would be provided following delivery of the project. The traffic study has also indicated that the project could deliver significant travel time savings for buses (between three and 15 minutes during peak periods) between Burwood and Bland Street, with a dedicated bus lane provided east from Burwood on Parramatta Road.

Improvements in public transport availability and efficiency would have broad social benefits. The use of public transport includes incidental exercise (eg walking to and from bus or train stops), increasing the chance of travellers meeting recommended daily physical activity targets. A more active lifestyle can help reduce the risk of preventable diseases, including coronary heart disease, stroke, type 2 diabetes, obesity and some cancers. It can also help improve mental health, community life, social wellbeing and community safety.

Pedestrians and cyclists

Reduced traffic volumes and intersection wait times on Parramatta Road would improve conditions for cyclists and pedestrians. Greater priority for pedestrians at crossings would be possible in tandem with the reductions in traffic volume. Reduced traffic volumes also provide opportunities to improve cycling routes through the study area and these are being investigated as part of the Parramatta Road Urban Transformation Program.

Improved urban amenity and cycling infrastructure could attract more recreational and commuter cyclists, with consequent health benefits. Consideration should also be given to how residual lands could be used to increased connectivity through walking and cycling routes, especially in the Homebush precinct, where many local streets terminate at the M4.

The project would modify pedestrian and cyclist access at the Concord Road interchange. Access would be most affected for residents and those moving between the north and north-east of the interchange and the south of the interchange, including the southbound bus stop on Concord Road. Travel distance would increase due to the need to travel around new project element such as the on-ramps. Together these changes would potentially reduce ease of access for public transport users travelling to/from the north and north east of the interchange, particularly in relation to accessing the bus stop which provides connections to Strathfield and Burwood. As walkable bus stop catchment areas is generally regarded as 400 metres, increasing walking distances beyond these could create a disincentive to public transport use.

Property access

Two properties would have permanent changes to their access as a result of the project:

- Sydney Cheil Uniting Church, located at the corner of Concord Road and Sydney Street (81 Concord Road, Concord). The historic (though not functional) entrance would be acquired, though the existing driveway access on its Sydney Street frontage would be retained (although modified)

- The apartment block located at 98 Chandos Street at Ashfield would have its battle-axe access road relocated and slightly offset from the existing route.

Both of these properties would require adjustment to their access driveways to account for permanent changes to the local road network proposed as part of the project. Changes to access points would be planned in consultation with affected property owners, and are not expected to have a wider social impact.

Business

It is not anticipated that businesses would be affected by changes in access as a result of the project. It is anticipated that the project would result in reduced traffic volumes on Parramatta Road in 2031 and thus would facilitate the introduction of bus lanes along the Parramatta Road corridor, providing greater accessibility to businesses in the area by public transport.

The project would improve network efficiency, delivering travel time savings and providing more efficient movement of freight and commercial vehicles, thereby reducing operational costs. The project would also provide increased road capacity along the M4 and Parramatta Road corridor.

Increased traffic volumes on Parramatta Road between Concord Road and Homebush Bay Drive/Centenary Drive may impact on accessibility to Flemington Markets and the Homebush DFO. However, this additional traffic is not considered likely to have a significant impact on accessibility to these two precincts. In addition, north-south connectivity across Parramatta Road to these two precincts will be improved.

14.4.7 Social infrastructure

Various community facilities are located in the project area, providing spaces for community use, education and social cohesion.

Homebush precinct

- Strathfield Girl Guides Hall: Strathfield Council would undertake consultation with the operators of the Girl Guides to ensure the needs of the organisation and other users are met in the long term
- Bill Boyce Reserve: The park would be restored and returned to Strathfield Council for public use at the conclusion of construction works
- Powells Creek/Arnotts Reserve: The new Powells Creek on-ramp would intrude on the eastern and northern perimeter of the Powells Creek site that is proposed for development as open space, following remediation to address previous contamination. The ramp would be likely to cause some overshadowing and detract from the visual amenity of the open space. The Powells Creek M4 westbound on-ramp would be located in the context of an existing concrete-lined drain along the eastern boundary, the elevated M4 to the north and commercial properties along this section of Parramatta Road. In this context the potential visual amenity impacts are not considered to be significant.

Concord precinct

- Sydney Cheil Uniting Church: Operational impacts on the Cheil Church would largely be related to reduced visual amenity and increased noise due to its proximity to the new tunnel and ramps as well as a noise wall. Appropriate landscaping treatments could significantly reduce these impacts for key outdoor use areas. Reduced parking is the key concern for the church. WDA is working with the church to explore opportunities for increasing access to green space and parking.

Cintra Park precinct

- The operational aspects of the project would remain on the site (smoke extraction facility, a water treatment facility for operations and an electricity distribution substation). The footprint of proposed operational infrastructure at Cintra Park is limited and would only result in minor visual changes for park users. The remainder of the site would be rehabilitated and landscaped for return to Canada Bay Council for use as a public reserve, resulting in a net gain in public open space and a minor regional benefit

- The upgraded car park to be built on the northern side of Concord Oval for construction purposes (providing about 250 car parking spaces) would be wholly available to users of the adjacent sporting fields at the conclusion of construction.

Wattle Street precinct

- Parts of Reg Coady Reserve would require permanent acquisition to allow for realignment of Wattle Street. The reserve forms part of a wider open space corridor which runs along Iron Cove Creek and connects with Timbrell Park. Therefore, the permanent loss of about 1,813 square metres of open space located directly adjacent to Wattle Street/Dobroyd Parade is not considered to be a significant impact on the availability of open space in the local area
- Impacts on the Jehovahs Witness Church during operation would be related to a change in noise and visual amenity due to its location adjacent to the expanded road infrastructure
- Operational social impacts of the project on the Infants Home and Haberfield Public School are expected to be minor due to minor noise and direct amenity changes.

Parramatta Road precinct

- The Zongde Temple would need to be relocated to a location that can deliver similar financial advantage (ie passive income from advertising, mobile phone tower hosting and other tenants)
- Operational social impacts of the project on the adjacent and nearby Haberfield Aged Care, Peek-A-Boo Early Learning Centre, Willows Private Nursing Home, Yasmar, Ashfield Park and Ashfield Bowling Club are expected to be minor–moderate, due to limited traffic noise and direct amenity changes in the context of the existing low amenity and high noise environment. The integrated introduction of landscape planting elements would also moderate this impact.

14.5 Assessment of cumulative impacts

Construction

Cumulative impacts on the community, local businesses and the economy are most likely to result from the concurrent construction activity associated with WestConnex, such as the construction of the New M5 and M4 Widening.

Cumulative impacts are likely to intensify the impacts identified in this chapter, particularly with regard to employment and economic stimulus. The demand for labour for WestConnex component projects and other similar projects in the area would increase employment opportunities for local residents. There is potential for wages to increase due to high demand for construction workers.

The opportunity for local businesses to supply goods or services to the construction of these projects and their construction workforces has the potential to increase business turnover due to high demand from the multiple projects.

Construction fatigue is likely to arise for motorists and users of the M4 from the staggered construction of this project and M4 Widening. Construction fatigue generally occurs during a lengthy construction phase. M4 Widening is expected to begin in 2015 and be completed by 2017 and, as such, the combined construction period of M4 Widening and this project spans four calendar years.

There is the potential for construction vehicles for other projects to contribute further to congestion on the road network and further increase travel times along the M4 and Parramatta Road, intensifying the impact on freight movements during the construction of the project.

Operation

Cumulative impacts on the community, local businesses and the economy are most likely to result from the concurrent operation of the wider WestConnex project and the Parramatta Road Urban Renewal Project.

It is estimated that in 2023, upon completion of all stages of WestConnex, there would be a significant reduction in traffic on Parramatta Road. This, in combination with the Parramatta Road Urban Transformation Program, would result in improved amenity and increased accessibility to businesses along Parramatta Road. It would also facilitate job growth and enable freight to move efficiently through and across Sydney.

The freight industry would benefit greatly from the efficient movement of traffic between western and south-western Sydney and interstate and international markets through connections with the wider National Land Transport Network, Sydney Airport and Port Botany. WestConnex provides one of the missing links in the Sydney motorway network, by providing a connection between the M4 and M5, resulting in benefits for freight including the opportunity to streamline interstate movements around and through Sydney. This provides businesses with connections to more diverse and dispersed markets across Sydney.

The Parramatta Road Urban Transformation Program is facilitated by the project and has the potential to provide a more amenable environment for living and working within the Parramatta Road corridor. The project would be instrumental to the amenity and accessibility improvements for three of the proposed eight urban renewal precincts – Homebush, Burwood and Kings Bay – with the preceding M4 Widening project also benefiting the Auburn renewal precinct. These four precincts are expected to account for 60 per cent of the 51,600 new residents expected to be accommodated by 2031. Development of these renewal precincts is unlikely to occur within the project construction period, avoiding potential simultaneous and cumulative construction impacts.

The project facilitates the potential development of faster and more reliable public transport along Parramatta Road that may further reduce traffic volumes. The project also facilitates active transport options along the corridor to improve north-south connectivity as well as providing potential for streetscape improvements. Improvements in public and active transport and improvements in public amenity have the potential to drive residential and mixed use development and the ability to attract new and different types of businesses into the area.

14.6 Management of impacts

14.6.1 Ongoing stakeholder engagement

Stakeholder and community involvement in program planning and ongoing environmental management would be key to avoiding, minimising and mitigating the social impacts of the project. Consultation with the community during the construction phase of the project is outlined in the Draft Community Consultation Framework (**Appendix F**).

Implementation of the project community consultation framework would include ongoing consultation with key social stakeholders, including directly and indirectly affected social infrastructure providers. The framework would ensure that local residents, businesses and workers are provided timely and clear information about local changes and the progress of construction and operation. Project communication would need to consider the cultural and linguistic diversity in the project area, so that project information is communicated effectively in community languages (ie through translation of published materials and web content, use of interpreters, specific language broadcast services and cultural organisations).

The framework should also provide opportunities for local communities and specific key stakeholders discussed in the social impact assessment to have input into the development and refinements of construction management plans, and for the use and management of residual lands on operation. The framework would also provide for community feedback or monitoring by telephone and online.

14.6.2 Environmental management measures

Mitigation and management measures would be implemented to avoid, minimise or manage social and economic impacts. As described above, a number of potential social and economic impacts are associated with changes to amenity (such as noise, air quality and visual) and changes in traffic and access during the construction and operation period. Mitigation measures identified in each of those respective chapters are relevant to managing potential social and economic impacts.

Additional mitigation and management measures specific to social or economic impacts are summarised in **Table 14.10**.

Table 14.10 Construction mitigation measures

Impact	No.	Environmental management measure	Responsibility	Timing
Construction				
Property acquisition	SE1	All acquisitions will be under the terms of the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> (NSW) and in accordance with the <i>Land Acquisition Information Guide</i> (Roads and Maritime 2014d).	Roads and Maritime	Pre-construction
Relocation	SE2	Home owners will be supported to acquire alternative independent property valuations, with a commitment from Roads and Maritime to ensure property owners will not be left out of pocket (ie property valuation fees to be paid at the time the invoice is due, if this is before settlement). Relocation support teams will be provided to assist households that must relocate (both renters and owners) and land owners. These services could include: <ul style="list-style-type: none"> • Assistance with identifying alternate properties • Social support for households relocating within the area and to other areas, providing contacts and information in regard to social services, facilities and logistical matters (eg the logistics of moving including required administrative tasks) • Access to financial advice for affected households. • Advertising of the WestConnex Assist counselling program will continue as well as providing first language support for households with English as a second language. 	WDA	Pre-construction
Access and connectivity	SE3	A community communication strategy (or equivalent plan) will be implemented to provide timely, regular and transparent information about changes to access and traffic conditions, details of future work programs and general construction progress throughout the construction phase of the project. Information will be provided in a variety of ways including letter box drops, media releases, website, signage and 24 hour project information line.	WDA/ Construction contractor	Pre-construction and construction

Impact	No.	Environmental management measure	Responsibility	Timing
	SE4	<p>The following specific measures will be undertaken to minimise traffic-related impacts on the community:</p> <ul style="list-style-type: none"> • Consultation (with Haberfield Public School and Ashfield Council) to determine if traffic management is required at egress points at the Parramatta Road civil site exit at Bland Street • Consultation with key local infrastructure providers will be undertaken when developing the construction traffic and safety management plan (or equivalent plan), including notification to local emergency services about changes to local road networks, particularly road closures • Relocating Orpington Street bus stop in consultation with the Willows Private Nursing Home to minimise walking distance between the relocated bus stop and the nursing home where possible • Bus stop, pedestrian and cycle way changes will be advertised locally, including to local social infrastructure providers • Appropriate signage will be applied to ensure motorists understand how to access local businesses adjacent to construction works. 	Construction contractor	Pre-construction and construction
Amenity - visual	SE5	Support will be given to local beautification of construction ancillary infrastructure sites through temporary plantings, decorated hoardings, or similar, to assist in reducing visual impacts. Consultation will be undertaken with the community in planning and implementing these approaches to contribute to sustaining community cohesion and identity throughout the construction period.	WDA and construction contractor	Construction
	SE6	Local communities will be consulted in the development of options and plans for the reuse of residual land for open public spaces, or as part of the public domain to increase community connectedness and sense of belonging through landscaped areas with public art.	WDA and Roads and Maritime	Construction
	SE7	Providing support for local community development activities, such as community events, to assist with restoring and increasing community cohesion during construction.	WDA and Roads and Maritime	Construction

Impact	No.	Environmental management measure	Responsibility	Timing
Business impacts	SE8	A business management plan will be developed to effectively communicate with affected businesses during the construction of the project. The plan will address the key issues raised by businesses, including access arrangements, traffic conditions, parking and local supplier opportunities.	WDA	Construction
	SE9	A 24 hour project information line and website will be maintained to enable business owners and operators to receive prompt responses to their concerns, access information and view assistance measures in place during construction related work.	WDA	Construction
Social infrastructure	SE10	Consultation will continue with all key social infrastructure providers to assist them and their clients in planning for and adapting to the changes expected during the construction period.	WDA and construction contractor	Pre-construction and construction
	SE11	Notification of any traffic and access changes during construction periods will be provided to emergency services well in advance of the changes occurring.	Construction contractor	Pre-construction and construction
	SE12	Route changes will be notified to emergency services and social infrastructure providers to ensure they can continue to operate effectively.	Construction contractor	Pre-construction and construction
	SE13	Opportunities will be explored to provide alternative land for the Cheil Church to accommodate open space, a children's playground and parking in consultation with the property owners and the congregation of users.	Roads and Maritime and WDA	Pre-construction
	SE14	Strathfield Council and Strathfield Girl Guides will be assisted to identify and access temporary premises.	Roads and Maritime and WDA	Pre-construction
	SE15	Continued support will be provided to the Zongde Temple in planning for relocation in the short and long term.	Roads and Maritime and WDA	Pre-construction
	SE16	Restoration of Bill Boyce and Reg Coady reserves to at least their pre-construction condition in consultation with the relevant councils and local communities.	Roads and Maritime and WDA	Pre-construction
	SE17	Consultation will be undertaken with social infrastructure providers (specifically aged care and child care facilities) in regard to any respite periods (where reasonable and feasible) for the most intrusive construction activities undertaken during the day.	Construction contractor	Pre-construction

Impact	No.	Environmental management measure	Responsibility	Timing
Operation				
Access and connectivity	OpS E1	Opportunities for providing increased pedestrian and cyclist connectivity, especially in the vicinity of Wentworth Street, Underwood Road and Allen Street, Homebush, will be explored.	WDA	Operation
	OpS E2	Consult with Transport for NSW in regard to improving pedestrian access in the vicinity of the Concord Road Interchange and specifically to bus stops.		
Amenity – noise and vibration	OpS E3	Long-term amenity impacts (eg changes to local noise) can affect individual wellbeing and also the cohesion and connectedness of communities. Support for local community development activities (eg grants provided through councils or local community organisations) will assist with restoring and increasing community cohesion following construction, through activities such as community events.	WDA	Operation
Amenity - Visual	OpS E4	Support will be given to local beautification of operational facilities and spaces through public art and landscaping to assist in reducing visual impacts associated with these facilities. Consultation will be undertaken with the community in planning and implementing these approaches to contribute to sustaining community cohesion and identity following the construction period. Support will be provided for local community development activities such as community events to assist with restoring and increasing community cohesion post construction. Consideration will be given to the creation of legacy projects that deliver social benefit, such as developing residual land as open space areas. Legacy projects will be identified and developed in consultation with local councils. Tree planting will be maximised in those areas within the project corridor where this is feasible and appropriate within an overall design framework.	WDA	Operation

15 Soil and water quality

This chapter outlines the potential soil and water quality impacts associated with the M4 East project (the project). A detailed soil and water quality assessment has been undertaken for the project and is included in **Appendix O**.

The Secretary of the NSW Department of Planning and Environment has issued a set of environmental assessment requirements for the project; these are referred to as Secretary's Environmental Assessment Requirements (SEARs). **Table 15.1** sets out these requirements, and identifies where they have been addressed in this environmental impact statement (EIS).

Table 15.1 Secretary's Environmental Assessment Requirements – soil and water quality

Secretary's Environmental Assessment Requirement	Where addressed in the EIS
Soil and Water, including but not limited to: <ul style="list-style-type: none"> Assessment of construction and operational erosion and sediment and water quality impacts, taking into account impacts from both accidents and runoff (ie acute and chronic impacts), having consideration to impacts to surface water runoff, soil erosion and sediment transport, mass movement, and urban and regional salinity. The assessment of water quality is to have reference to relevant public health and environmental water quality criteria, including those specified in the <i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i> (ANZECC/ARMCANZ 2000), any applicable regional, local or site-specific guidelines and any licensing requirements 	Erosion and sediment and surface water quality impacts are addressed in sections 15.3, 15.4 and 15.5 (this chapter) Ground movement and groundwater quality are addressed in Chapter 18 (Groundwater)
<ul style="list-style-type: none"> Consideration of waterways likely to be affected by the project, including existing riparian vegetation and rehabilitation of riparian land 	Waterways likely to be affected by the project are identified in section 15.2 . Riparian vegetation is addressed in Chapter 20 (Biodiversity)

15.1 Assessment methodology

15.1.1 Overview

A soil and surface water quality assessment has been undertaken in relation to the existing environment and to determine the potential impacts of the construction works and operation of the project. A summary of the soil and water quality assessment is provided in this chapter. The full report is included in **Appendix O**.

The assessment considers:

- The nature of soils and potential impacts on soils in the vicinity of the project footprint
- Impacts on surface water quality and receiving environments from the construction activities of the project
- Environmental impacts on existing watercourses and receiving environments in terms of potential changes in water quality during the operational phase of the project.

The methodology undertaken for the assessment of soil and water quality impacts for the project included:

- Collation and review of existing documentation including reports, design plans, geographic information system (GIS) mapping, soils and climate data and related legislation and guidelines relevant to the project
- A review of the existing environment including topography, soils and water, sensitive receiving environments and catchment characteristics
- A review of surface water quality monitoring results
- Identification of the objectives, guiding principles and requirements for the assessment of surface water quality and soils
- An identification and assessment of potential soil and water quality impacts from the project, including surface and tunnel infrastructure. This is based on consideration of typical impacts for a project such as this one, and also potential impacts specific to the project for both construction and operation phases
- Identification of measures to manage those impacts identified, specifically related to the management of soil and surface water quality issues.

15.1.2 Legislation and policy framework

The soil and surface water quality assessment has been prepared to assess the impacts of the project in accordance with relevant legislation as described in **Table 15.2**.

Table 15.2 Legislation relevant to the project – soil and water quality

Legislation	Relevance to project
<i>Water Management Act 2000</i> (NSW) (WM Act)	<p>The WM Act controls the extraction of and use of water, the construction of works such as dams and weirs, and the carrying out of activities in or near water sources in NSW. It provides for the implementation of water sharing plans that establish rules for sharing a water resource while taking into account the environmental need of the resource. The project footprint is covered by the <i>Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011</i> and the <i>Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2011</i>.</p> <p>Section 56 of the WM Act establishes access licences to take water from a water source. Roads authorities are exempt from the requirement to obtain a water access licence under clause 2, Schedule 5 of the <i>Water Management (General) Regulation 2011</i> (NSW).</p> <p>Under section 89 of the WM Act a water use approval is required to use water taken from a water source that is covered by a water sharing plan. As discussed above, roads authorities are currently exempt from the need for a water access licence. In accordance with clause 31(1) of the <i>Water Management (General) Regulation 2011</i>, Roads and Maritime is also therefore exempt from requiring a water use approval.</p> <p>Under section 90 of the WM Act, a water management work approval is required for a water supply work, a drainage work or a flood work. The project does not involve any of these and approval is therefore not required.</p> <p>The project involves works within 40 metres of a number of watercourses. These works are therefore a 'controlled activity' in accordance with the WM Act and a controlled activity approval under section 91 of the WM Act would be required. Clause 38 of the <i>Water Management (General) Regulation 2011</i> (NSW) exempts public authorities from the need for a controlled activity approval.</p>
<i>Protection of the Environment Operations Act 1997</i> (NSW) (POEO Act)	<p>The project would result in a road classified as a freeway or tollway under the <i>Roads Act 1993</i> (NSW) and containing four or more traffic lanes over a distance of more than one kilometre in the Sydney metropolitan area. In accordance with clause 35 of Schedule 2 of the POEO Act, an environment protection licence would be required for construction of the project. This licence would cover discharges to surface water during construction.</p> <p>There is no requirement under the POEO Act to hold an environment protection licence during operation.</p>

The assessment has also considered the following guidelines and policies relevant to the management of surface water quality and soils:

- *Managing Urban Stormwater – Soils and Construction*, volume 1, 4th Edition (NSW Government 2004) (the Blue Book) volume 2
- *Soil and Landscape Issues in Environmental Impact Assessment* (Department of Land and Water Conservation 2000)
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC 2000a) (ANZECC Guidelines)
- *Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting* (ANZECC 2000b)
- *NSW Water Quality Objectives* (NSW Government 2014c)
- *Australian Runoff Quality* (Institute of Engineers Australia 2005).
- *Controlled Activities – Guidelines for Riparian Corridors* (NOW 2011c)
- *Controlled Activities – Guidelines for Laying Pipes and Cables in Watercourses* (NOW 2011d)
- *Controlled Activities – Guidelines for Watercourse Crossings* (NOW 2010a)
- *Controlled Activities – Guidelines for Instream Works* (NOW 2010b)
- *Controlled Activities – Guidelines for Outlet Structures* (NOW 2010c)
- *Guidelines for Controlled Activities on Waterfront Land* (NOW 2012c)
- *Fish Passage Requirements for Waterway Crossings* (Fairfull and Witheridge 2003a)
- *Guidelines for Design of Fish and Fauna Friendly Waterway Crossings* (Fairfull and Witheridge 2003b)
- *NSW State Rivers and Estuaries Policy* (NSW Water Resources Council 1993).

The assessment has considered the water quality impacts with reference to relevant public health and environmental water quality criteria. This includes the NSW Water Quality Objectives, which provide environmental values for NSW waters, and the ANZECC Guidelines, which provide the technical guidance to assess the water quality needed to protect those values. It should be noted that these guidelines are intended for slightly disturbed ecosystems; the surrounding environment for the project is considered highly disturbed. Therefore, these guidelines are conservative for this project. In consideration of this, and consistent with the SEARs requirement to give reference to applicable local guidelines, the Strathfield Council water quality pollutant reduction targets are intended for consideration in an urbanised environment. The pollutant reduction targets are provided in section 3.3 of the Soil and Water Quality Assessment in **Appendix O**.

The relevant council guidelines and policies that have been considered in this assessment are:

- *Strathfield Municipal Council Stormwater Management Code* (Strathfield Council 1994)
- *Part N of Strathfield Consolidated Development Control Plan 2005 – Water Sensitive Urban Design* (WSUD) (Strathfield Municipal Council 2005)
- *City of Canada Bay Specification for the Management of Stormwater* (City of Canada Bay Council 2009 revision)
- *Burwood Development Control Plan* (Burwood Council 2013)
- *Burwood Council Stormwater Management Code* (Burwood Council 1994)
- *Ashfield Council Stormwater Management Policy* (Ashfield Council 1998 amendment)
- *Auburn City Council Development Control Plan* (Auburn City Council 2010).

15.1.3 Water quality monitoring

A baseline surface water monitoring program has commenced, and is monitoring surface water quality at a total of 10 locations on the five waterways that are crossed by the project. Where possible, this includes an upstream and downstream location on each waterway. In addition, monitoring is being conducted at two reference sites, one each to the east and west of the project area, giving a total of 12 surface water quality monitoring locations. These reference sites allow identification of water quality impacts unrelated to the project.

The baseline monitoring sites, including reference sites not directly affected by the project, are presented in **Table 15.3** and are shown on Figure 7.1 in the soil and water quality assessment in **Appendix O**.

Table 15.3 Baseline surface water quality monitoring sites

Creek	Location	Street address
Finlaysons Creek	Upstream	68 Killeen Street, Wentworthville (Lytton Street Park)
Saleyards Creek	Upstream	Airey Park, Kessel Avenue, Homebush
Saleyards Creek	Downstream	5 Underwood Road, Homebush
Powells Creek	Upstream	4 Elva Street, Strathfield
Powells Creek	Downstream	Mason Park, Conway Avenue Homebush
Barnwell Park Canal	Upstream	104 William Street car park, Five Dock
Barnwell Park Canal	Downstream	2 Bellbird Close, Canada Bay
St Lukes Park Canal	Upstream	Northern carpark, Concord Oval, Gipps Street entrance
St Lukes Park Canal	Downstream	Crane Street car park, Concord
Dobroyd Canal (Iron Cove Creek)	Upstream	Gregory Avenue
Dobroyd Canal (Iron Cove Creek)	Downstream	Henley Marine Drive, Timbrell Park
Hawthorne Canal	Downstream	Hawthorne Parade

Where appropriate, these sites would be retained for monitoring during construction and post-construction phases. These sites would be reviewed during detailed design and the final suite of sites would be approved by the relevant regulators through development of the construction water quality monitoring program and during the environment protection licence discharge point selection and approval process.

At the time of writing, two baseline surface water monitoring events were completed on 29 June and 28 July 2015. Baseline surface water quality monitoring will be ongoing until the start of construction.

15.2 Existing environment

15.2.1 Soils

Soil landscapes and geology

The project footprint is generally aligned parallel to the Parramatta River over a distance of approximately seven kilometres. The 1:100 000 Sydney Basin geology map (NSW Department of Mineral Resources 1983) indicates the surface geology of the study area primarily consists of Triassic-aged Ashfield Shale deposits, which comprise shallow marine sediments characterised by black to dark grey shale and laminite, and some sandstone beds. Further details of the underlying geology are provided in **Chapter 18** (Groundwater).

Three soil landscapes (Birrong, Blacktown and Disturbed) are encountered in the vicinity of the project footprint (refer **Figure 15.1**). The predominant soil type in the Parramatta River catchment is the Blacktown landscape. The character of these residual soils is moderately reactive highly plastic subsoil, low soil fertility and poor soil drainage. Fluvial soils are generally found along the line of the valley and river margins. These soils are subject to very high to extreme soil erosion hazard and flooding, and are generally highly permeable. There is the potential for some of the project footprint to be reclaimed land or landfill, and consequently it is classified as a disturbed soil.

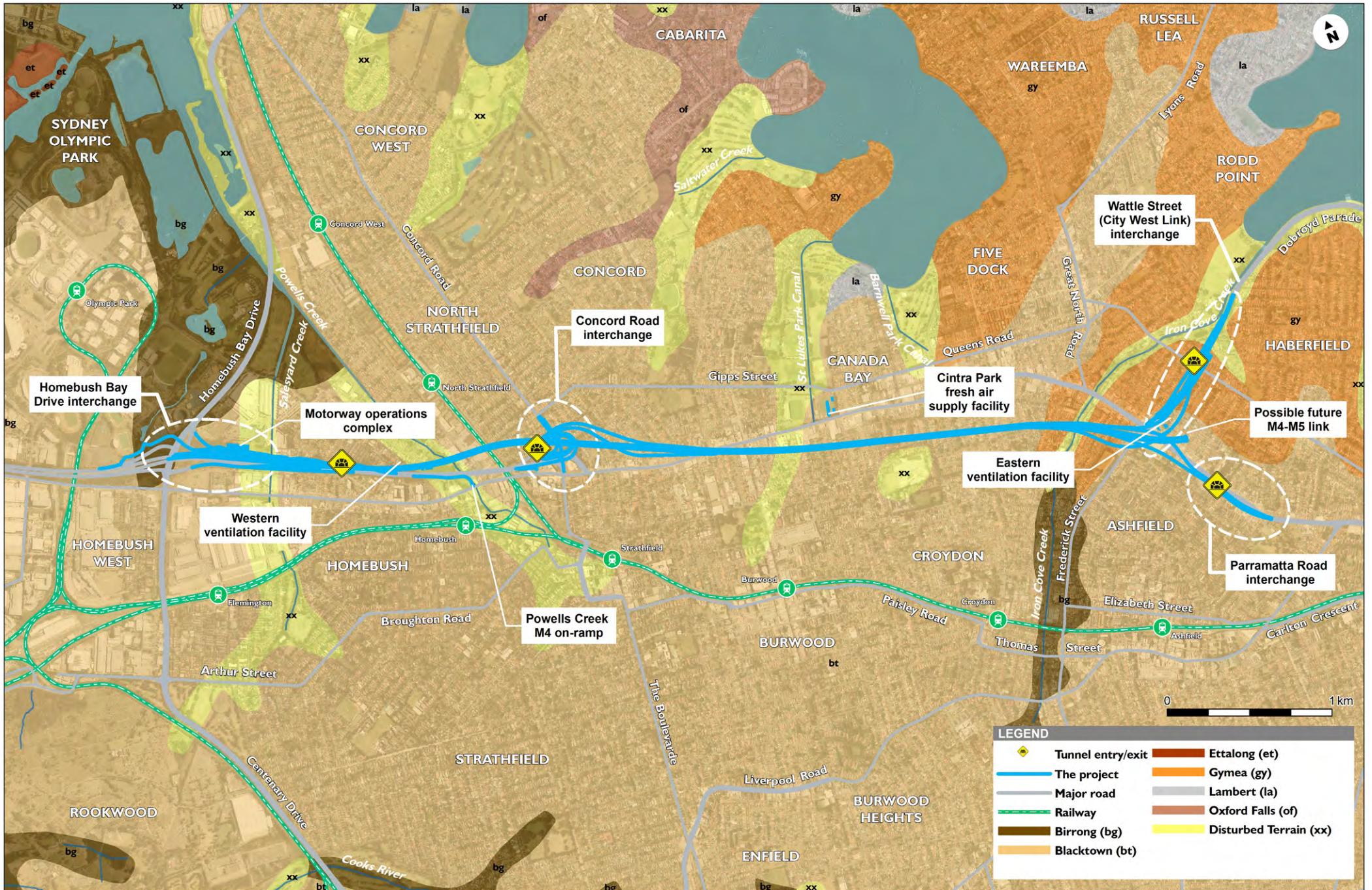


Figure 15.1 Published soils along the project alignment

Soil landscape classes are generally classified for the project footprint as erosional or residual. This is particularly apparent along the Parramatta River estuary margins, where nearshore areas have been reclaimed for human usage in a number of locations.

Soil salinity

Saline soils and groundwater are part of the natural landscape of the Parramatta River sub-catchments with salt being found in the rocks, soils and the estuarine sections of the sub-catchments. Salinity occurs when salts found naturally in the soil or groundwater are mobilised. Capillary rise and evaporation concentrate the salt on, and close to, the ground surface.

Urban salinity becomes a problem when the natural hydrogeological balance is disturbed by human interaction. This may occur in urban areas through changes to the water balance, increases in the volume of water entering a natural system altering subsurface groundwater flows and levels, exposure of saline soils, and removal of deep rooted vegetation reducing rates of evapotranspiration. Small changes in sensitive areas can result in the balance being altered and salinisation occurring.

Acid sulfate soils

Acid sulfate soils are widespread among low lying coastal areas of NSW, in estuarine floodplains and coastal lowlands. The probability of acid sulfate soils within the project footprint and potential impacts is considered in **Chapter 16** (Contamination).

15.2.2 Waterways and riparian zones

The project is located within the Parramatta River estuary catchment, which ultimately discharges into Sydney Harbour. The project crosses four main waterways and their associated sub-catchments (refer to **Figure 15.2**) with a fifth waterway close to the project footprint. The total catchment area relevant to the proposed alignment is about 1,553 hectares. The sub-catchments are well established urban catchments with predominantly residential and commercial land use.

The five waterways from west to east are:

- Saleyards Creek
- Powells Creek
- St Lukes Park Canal (unnamed channel)
- Barnwell Park Canal (unnamed channel)
- Dobroyd Canal (Iron Cove Creek).

Saleyards Creek is a concrete-lined channel originating from Rookwood Cemetery and flowing in a northerly direction past Airey Park, underneath the M4 to Bressington Park, where it joins the Powells Creek channel at Mason Park. The tributary flows parallel to Homebush Bay Drive. The project is about 2.4 kilometres upstream of the Parramatta River estuary at this waterway. Saleyards Creek has a highly urbanised riparian corridor at the point where it is crossed by the project. The riparian corridor is a highly modified environment, consisting predominantly of commercial land uses and related impervious surfaces and pockets of localised vegetation.

Powells Creek is predominantly a concrete-lined channel that flows through the suburbs of Strathfield and Concord, discharging into the Parramatta River via Homebush Bay. The creek flows parallel to the Northern rail line and adjacent to Powells Creek Reserve, Mason Park, Bicentennial Park and the Sydney Olympic Park precinct. The downstream end of the creek flows through the Homebush Bay wetland area. The project is about 2.7 kilometres upstream of the Parramatta River estuary at this waterway. Powells Creek has a highly urbanised riparian corridor at the point where it is crossed by the project. The riparian corridor is a highly modified environment, consisting predominantly of commercial land uses and related impervious and grassed surfaces, with localised pockets of trees. Sydney Water is naturalising the creek and riverbed in Powells Creek. The work will involve the removal of the current concrete channel lining and replacement with banks stabilised with native plants, trees and rocks. Works are currently in the detailed design phase and it is understood that the naturalisation works area is downstream of the project and beyond the construction footprint.