

## C13 Urban design and visual amenity

This chapter addresses issues raised in community submissions associated with the urban design and visual amenity assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 13 (Urban design and visual amenity), Appendix L (Technical working paper: Urban design) and Appendix O (Technical working paper: Landscape and visual impact) of the EIS for further detail on the urban design and visual amenity assessment.

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## C13.1 Level and quality of the landscape and visual impact assessment

396 submitters raised concerns about the quality of the landscape and visual impact assessment. Refer to section 13.1 of the EIS for details of the landscape and visual impact assessment methodology.

### C13.1.1 Concerns regarding the quality of the landscape and visual impact assessment

Submitters raised concerns about the quality and level of the landscape and visual impact assessment for the project. Specific concerns relate to:

- The level of assessment is flawed and subjective
- The Urban Design and Landscape Plan (UDLP) should be part of the EIS to ensure that it is produced and that it is consistent with what the EIS proposes
- The community has no opportunity to comment on the urban design of the project as they are only concept plans
- The EIS does not justify the project on an urban design basis
- The EIS does not assess the visual impacts of the ventilation outlets on surrounding development
- Easton Park needs to be assessed from a visual design point as it will be dominated by a large ventilation outlet
- The EIS has not conducted an assessment of potential visual impact to residents on Lilyfield Road
- Potential night lighting impacts during construction have not adequately been assessed, including at the Darley Road civil and tunnel site (C4)
- Lighting outcomes for facilities and residual open space should be identified in the EIS so that the lighting impact on sensitive receivers can be assessed
- Increase of light during night hours has not been properly addressed around the Rozelle Rail Yards and The Crescent
- Active transport routes along Victoria Road and Whites Creek are designed indicatively as the construction is still decided upon by the construction contractor
- Artist's impressions of the open space in the EIS are not based on reality and have changed during the development of the project
- There are insufficient proposals for Haberfield/Ashfield and the project does not integrate with other EIS proposals
- The EIS fails to assess existing or potential bicycle routes as part of project
- The proposed active transport infrastructure lacks detail
- Haberfield and surrounding areas of Five Dock and Ashfield have been overlooked with regards to urban design and community connectivity.

## Response

### Quality of the landscape and visual impact assessment

The EIS, including the landscape character and visual impact assessment provided in Appendix O (Technical working paper: Landscape and visual impact) and the Urban design report provided in Appendix L (Technical working paper: Urban design) of the EIS, was prepared by a team of qualified professionals and is consistent with the key issues identified in the Secretary's Environmental Assessment Requirements (SEARs), which included requirements issued by key government regulatory agencies as well as industry standards and guidelines.

The assessment of landscape character and visual amenity impacts is also consistent with the *Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment* (NSW Roads and Maritime Services (Roads and Maritime) 2013b). The methodology comprised two components: an urban design process and a landscape character and visual impact assessment.

To assess landscape character impact, landscape character zones (LCZ) were identified in the study area. The landscape character zones are defined as areas of landscape with similar properties or strongly defined spatial qualities that are visually distinct from adjoining areas. LCZs were focused around areas of proposed surface work where permanent operational infrastructure would be located. The desired future character for each of the LCZs was drawn from the objectives and controls/provisions set out in relevant strategic and statutory planning documents, and considered as part of the landscape character impact assessment and the urban design principles developed for the project.

To assess visual impact, existing views were identified based on a range of criteria, including:

- Where there is potential for a significant change between the before and after view
- Where there is potential for a significant adverse visual outcome for sensitive receivers
- Where there is potential for a significant adverse visual outcome to locations of high visual amenity
- Where there is potential for a significant adverse visual outcome to heritage listed items or Heritage Conservation Areas (HCAs)
- Where the view is representative of other similar settings, in which there was potential for a similar adverse outcome, for example, on the character of a streetscape.

Areas where permanent operational infrastructure is proposed have been reviewed against the urban design principles developed for the project, which are outlined in Table 13-2 of the EIS. The outcome of this assessment is provided in Table 13-23 of the EIS.

The visual impact of the ventilation outlets for the project is assessed in section 13.5 of the EIS. Additional discussion regarding the visual impact of the ventilation outlets is provided in **section C13.4.1**.

The method applied to assess landscape character and visual impact comprised a sensitivity analysis of existing landscape zones or views subject to change, and an assessment of the magnitude of change on that zone or view. The method was applied consistently to all landscape character zones and views subject to change.

The landscape character and visual impact ratings presented in the EIS represent the potential impact of the project before the environmental management measures have been applied. Potential landscape character and visual impacts would be reduced by the application of environmental management measures and the implementation of UDLPs, which will be prepared based on the detailed design and in accordance with relevant commitments in the EIS (refer to **section C13.12.1** and **Chapter E1** (Environmental management measures)). The UDLPs will be prepared in consultation with relevant councils, stakeholders and the community.

The EIS, including all detailed technical studies, was reviewed by the NSW Department of Planning and Environment (DP&E) to confirm that it adequately addressed the SEARs prior to being placed on public exhibition. DP&E also commissioned independent technical peer reviews of key technical studies presented in the EIS to inform its assessment of the EIS including Appendix L (Technical working paper: Urban design) and Appendix O (Technical working paper: Landscape and visual impact).

### Assessment of visual impacts at Easton Park

The EIS includes consideration of the visual impact to the view looking south from Easton Park to the project in section 13.5.3 of the EIS. While the architecture and design of the ventilation facility building would be designed to minimise visual impacts, the structure may nonetheless be perceived as an out of context element given its purpose, bulk and scale in an open area and subsequent visual prominence. The final architecture and design of the facility would be subject to the UDLP for the Rozelle Rail Yards. Development of the UDLP would include consideration of the key ventilation facility design principles identified in Annexure 2 of Appendix L (Technical working paper: Urban design) of the EIS (see **section C13.4.1** for further detail).

For residents, the ventilation facility (primarily the ventilation outlets as part of the facility at the Rozelle Rail Yards) from this view would be of a high to moderate level of contrast with the existing view, notwithstanding that much of this would comprise new open space. The new open space would be an improvement to this component of the view, which currently consists of a light industrial area.

Measures would be investigated during detailed design to further reduce the height, bulk and scale of ventilation outlets at Rozelle and provide materials/finishes that reduce impacts to sensitive visual receiver locations.

### **Assessment of visual impacts at Lilyfield Road**

The EIS includes consideration of the visual impact to the view looking east along Lilyfield Road at the corner of Foucart Street. The visual impact of the project at this location was assessed as being Moderate for residents and Negligible for motorists. Refer to section 7.2.2 of Appendix O (Technical working paper: Landscape and visual impact) for further information regarding the assessment of visual impacts at this location.

### **Assessment of night lighting impacts**

A broad assessment of the impacts of night lighting during both the construction and operation of the project was undertaken by applying the methodology for assessment of visual impacts described above. Key visual receivers have been individually assessed and include neighbouring residential properties, users of recreational space and motorists in local streets.

A detailed lighting concept would be developed based around the considerations identified in Appendix L (Technical working paper: Urban design) of the EIS, and would be developed in accordance with AS/NZS 1158 Lighting for roads and public spaces, AS 2560 Guide to sports lighting, AS 4282 Control of the obtrusive effects of outdoor lighting, and AS/NZS 60598 – Series Luminaires.

The assessment of night lighting impacts is therefore based on assumptions that have been made with regard to the types and extent of lighting likely to be installed for both the construction and operation phases consistent with applicable guidelines.

An assessment of potential night lighting impacts, including at the Rozelle Rail Yards, The Crescent and Darley Road is provided in section 13.4.2 of the EIS for the construction of the project. Night lighting impacts during the operation of the project are assessed in section 13.5 of the EIS and specifically in section 13.5.3 of the EIS for the Rozelle Rail Yards and The Crescent.

### **Project concept design**

The urban design principles for the project and the landscape and visual impact assessment are based on the concept design for the project. The concept design defines:

- A definition of property acquisition requirements sufficient to allow construction to proceed
- A project footprint, including for construction and operation
- A clear description of the design principles, extent of impacts and impact management requirements
- A sound and clear basis for later development of the detailed design to a standard required to support project delivery.

Should the project be approved, the conditions of approval will require that the M4-M5 Link is constructed generally in accordance with the project as described in the EIS and as amended in the preferred infrastructure report (see **Part D** (Preferred infrastructure report)).

The project would deliver the key connectivity identified in the concept design which is outlined in Table 13-10 of the EIS. The exact alignments and dimensions of active transport links would be subject to the refinements during the development of UDLPs.

The UDLPs would be prepared based on the detailed design and in accordance with relevant commitments in the EIS. The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community. An Urban Design Review Panel (UDRP) will be established to provide advice and guidance regarding the UDLPs. Where an UDLP is required to address heritage matters, the UDRP will include an independent heritage architect. The community and stakeholders will be able to comment on the draft UDLPs during an exhibition period and the feedback will be considered in the final UDLPs.

The UDLPs cannot be finalised at this stage, given that the EIS considered a project concept design. The assessment of a concept design presents the community and stakeholders with an opportunity to consider and provide feedback on the project before the detailed design work for construction of the project is carried out (refer to **section C2.1.2** for further information). Detailed investigations, planning and surveys will be undertaken by design and construction contractor(s) appointed following the determination of the EIS. The UDLPs would build upon the detailed design by the design and construction contractor(s) while providing further opportunity for community and stakeholder consultation.

### Artist's impressions

Artist's impressions are provided for key visual receiver locations for general information purposes in Appendix L (Technical working paper: Urban design) and Appendix O (Technical working paper: Landscape and visual impact) of the EIS. Artist's impressions of the open space at the Rozelle interchange represent the concept design for the urban design and landscape works proposed for the area. The design would be refined during the development of UDLPs as outlined above.

Detail regarding the development of the Rozelle interchange design and reasons for changes to the location of operational infrastructure is provided in Chapter 4 (Project development and alternatives) of the EIS.

### Urban design integration with other WestConnex projects

Key objectives outlined in the *WestConnex Motorway Urban Design Framework* (Roads and Maritime 2013a) and *Beyond the Pavement: Urban Design Procedures and Design Principles* (Roads and Maritime 2014a) have informed the development of guiding principles for the urban design for the M4-M5 Link. The urban design principles for the project are outlined in Table 13-2 of the EIS and would be developed into detailed designs under UDLPs for the different staged components of the project. These UDLPs would relate to one another and the other stages of WestConnex. The UDLPs will be prepared in consultation with relevant councils, stakeholders and the community and will be exhibited for comment.

Areas where permanent operational infrastructure is proposed have been reviewed against the urban design principles developed for the project. The outcome of this assessment is provided in Table 13-23 of the EIS.

The project does not include urban design or landscape works at the Wattle Street interchange at Haberfield. The design of the Wattle Street interchange has been developed and assessed as part of the M4 East EIS. The approach is detailed in the Draft M4 East UDLP which was publicly exhibited in late 2016. An addendum to the UDLP containing plans for the M4 East eastern and western ventilation facilities was on public exhibition in early 2017.

Once construction of both projects is completed, remaining project land at this location not required for operational infrastructure or subject to landscape works as part of the M4 East project would be rehabilitated and would be subject to the M4 East project's Residual Land Management Plan, UDLPs and/or the M4 East Legacy Project. These plans are currently being prepared by the M4 East project team and would be subject to the consultation requirements and timeframes set out in the M4 East project conditions of approval. The M4-M5 Link would not alter the final urban design and landscape outcomes for the M4 East, but may impact the timing of implementation.

At the St Peters interchange, operational infrastructure for the Campbell Road motorway operations complex (MOC5) would be located above and adjacent to the interchange portals in the northwest corner of the site, consistent with the location originally identified in the EIS and UDLP for the New M5 project. The ventilation facility has been designed to minimise land-take from the St Peters interchange open space areas, to be delivered by the New M5 project. Landscape works and architectural design of M4-M5 Link operational infrastructure at the St Peters interchange would be undertaken in accordance with an UDLP and the urban design principles developed for the project.

Once construction of both projects is completed, remaining project land would be subject to the New M5 project's UDLP, RLMP and applicable conditions of approval. These plans are currently being prepared by the New M5 project team and would be subject to the consultation requirements and timeframes set out in the New M5 project conditions of approval.



### Active transport strategy

An active transport strategy has been developed for the project and is provided at Appendix N (Technical working paper: Active transport strategy) of the EIS. The active transport strategy was developed in consultation with stakeholders and through analysis of current and proposed active transport routes and relevant active transport policies and guidelines (see Appendix N (Technical working paper: Active transport strategy) for further information regarding the development of the active transport strategy).

A summary of the proposed connectivity around the Rozelle interchange that would be delivered by the M4-M5 Link and also by other separate projects subject to separate environmental assessment is provided in Table 13-10 of the EIS. Proposed open space and connectivity at the Rozelle interchange is shown in Figure 13-30 of the EIS.

## C13.2 Visual impacts during construction

1,026 submitters raised concerns about visual impacts during construction. Refer to section 13.4 of the EIS for details of potential construction impacts.

### C13.2.1 Visual impacts during construction (general)

Submitters raised concerns about general visual impacts during construction of the project. Specific concerns relate to:

- The design of the project does not address the negative visual impacts during construction as outlined in the EIS
- The EIS suggests that additional trees may be removed after opening as part of 'post-opening mitigation measures'
- Concern that the project will remove mature street trees and thereby reduce visual amenity
- Investigations should be undertaken in regards to how mature trees can be retained.

### Response

Visual impacts of the project during construction would relate primarily to residential receivers and result from building and tree removal, visibility and overshadowing of residences from acoustic sheds, noise walls and hoardings, and visibility of construction activities. The magnitude of these impacts would vary based on the proximity of receivers, duration of the view and the scale and visibility of construction works. These impacts would be mitigated where possible through appropriate siting of infrastructure, considered selection of materials and finishes for sheds and hoarding, and management of light spill.

Receivers with views of construction ancillary facilities and construction activities may include:

- Residents that adjoin and/or have views of the project
- Workers in commercial properties that adjoin and/or have views of the project
- Road users and pedestrians
- Users of recreation areas/reserves with views of the project.

As described in Appendix O (Technical working paper: Landscape and visual impact) of the EIS, the methodology for the landscape character and visual impact assessment considers the location and context of visual receivers.

A summary of the construction visual impacts on representative receiver locations from areas identified by submitters is provided in **Table C13-1**.

**Table C13-1 Summary of construction visual impact assessment**

Receiver		Sensitivity to change	Magnitude of change	Overall rating
<b>Rozelle civil and tunnel site (C5)</b>				
C5-1	Motorists – City West Link	Moderate	Moderate	Moderate
C5-2	Residents – Foucart Street and Cecily Street	High	High	High
C5-3	Residents – Lilyfield Road near Denison Street	High	High	High
C5-4	Residents – Breillat Street	Moderate	Low	Moderate–Low
C5-5	Recreational users – Easton Park	Moderate	High	High–Moderate
C5-6	Recreational users – Glebe Foreshore Parklands	High	Moderate	High–Moderate
<b>The Crescent civil site (C6)</b>				
C6-1	Residents – Bayview Crescent and Johnston Street	High	High	High
C6-2	Motorists – The Crescent	Low	Moderate	Moderate–Low
C6-3	Recreational users – Rozelle Bay	Moderate	Moderate	Moderate
C6-4	Recreational users – Glebe Foreshore Parklands	High	Moderate	High–Moderate
<b>Victoria Road civil site (C7)</b>				
C7-1	Residents – Lilyfield Road	Moderate	Moderate	Moderate
C7-2	Residents – Hornsey Street and Quirk Street	High	High	High
C7-3	Motorists – Victoria Road	Low	Low	Low
<b>Iron Cove Link civil site (C8)</b>				
C8-1	Recreational users – King George Park	Moderate	Moderate	Moderate
C8-2	Pedestrians – footpath across Iron Cove bridge	Low	High	Moderate
C8-3	Pedestrians – footpath near Byrnes Street	Low	Moderate	Moderate–Low
C8-4	Residents – Callan Street, Springside Street, Toelle Street and Clubb Street	High	High	High
C8-5	Residents – Nagurra Place, Terry Street and Victoria Road	Moderate	Moderate	Moderate
C8-6	Motorists – Victoria Road	Low	Moderate	Moderate–Low



Environmental management measures to manage visual impacts during construction are summarised in **Chapter E1** (Environmental management measures) and include:

- Ancillary facilities, including the locations of visible structures and plant and perimeter fencing and treatments, will be developed to minimise visual impacts for adjacent receivers where feasible and reasonable. Measures to minimise visual impacts for adjacent receivers will be implemented progressively during the site establishment phase (see environmental management measure LV1)
- Site lighting will be designed to minimise glare issues and light spillage in adjoining properties and will be generally consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting (see environmental management measure LV2)
- Regular maintenance of site hoarding and perimeter site areas will be undertaken, including the prompt removal of graffiti and litter (see environmental management measure LV3)
- Construction worksites and construction ancillary facilities will be established in such a manner as to minimise the need to remove screening vegetation wherever practicable (see environmental management measure LV4)
- Hoardings and temporary noise walls will be erected as early as possible within the site establishment phase to provide visual screening (see environmental management measure LV5)
- Acoustic sheds will be designed to be visually recessive and minimise potential overshadowing impacts where possible (see environmental management measure LV6).

Measures to manage potential visual impacts would be implemented during the construction of the project. If required, trees would be removed during the construction of the project and not during project operation.

### Impacts to trees and other vegetation

The visual impact of the removal of trees and other vegetation was considered as part of the assessment of visual impacts during construction and is summarised in section 13.4 of the EIS and provided in full in section 6 of Appendix O (Technical working paper: Landscape and visual impact) of the EIS. The project has been designed to minimise the requirement for vegetation clearing where possible and the arboricultural assessment provided at Annexure G of Appendix S (Technical working paper: Biodiversity) of the EIS makes recommendations for tree protection to ensure that impacts of the project on trees are minimised following the hierarchy of avoid, minimise and mitigate.

Trees would be removed during the construction of the project. Additional tree removal not assessed in the EIS would be subject to separate environmental assessment.

The arboricultural assessment in Appendix S (Technical working paper: Biodiversity) of the EIS provided a number of recommendations for tree protection to ensure that impacts of the project on trees are minimised following the hierarchy of avoid, minimise and mitigate, as follows:

- A Construction Flora and Fauna Management Plan (CFFMP) will be developed and implemented during construction. The CFFMP will include measures to manage potential impacts to trees, including:
  - The establishment of tree protection zones (TPZs)
  - Ground protection measures for trees to be retained
- As many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the UDLP to be developed and implemented for the project
- The CFFMP will include tree management protocols and provision for the development of tree management plans (in accordance with the requirements of AS 4970-2009) where required for specific trees. Protection of trees within and adjacent to the project areas will be carried out in consultation with an arborist with a minimum Australian Qualifications Framework (AQF) Level 5 qualification in arboriculture for each tree proposed for retention where works associated with the project have the potential to impact on the tree root zone
- Pruning and maintenance work will be carried out by an arborist with a minimum AQF Level 3 qualification in accordance with *AS 4373-2007 Pruning of Amenity Trees* and the NSW

WorkCover Code of Practice for the Amenity Tree Industry (1998) and advice provided by an arborist with a minimum AQF Level 5 qualification in Arboriculture (or equivalent).

The detailed design and construction of the M4-M5 Link project would be managed to ensure that, as far as possible, the identified landscape and visual impacts are minimised and amenity is improved once the project is complete. This would be achieved through the implementation of a range of general and specific measures, including the implementation of UDLPs. A landscape character and visual impact mitigation strategy is included in Appendix O (Technical working paper: Landscape and visual impact) of the EIS which includes the following objectives regarding trees:

- Provide street-tree planting for screening and shade, and mixed sizing of planting where stratification of the canopy is desired
- Improve open space to offset additional infrastructure, eg provision of street trees to adjoining local streets affected by the project.

The landscape character and visual impact mitigation strategy recommends specific design measures to manage the visual impact from the removal of trees including:

- At the Rozelle interchange, integrate the new open space at Rozelle with the Lilyfield Road streetscape through considered street tree planting and associated landscape works in accordance with the Austroads guidelines (see environmental management measure LV13 in **Chapter E1** (Environmental management measures))
- At The Crescent, investigate measures to retain the mature trees of high retention value adjacent to the light rail corridor at the corner of The Crescent and City West Link, and to provide screen planting alongside the retaining wall edge of the light rail corridor, to minimise landscape and visual impacts. Implement options where feasible and reasonable with consideration of site constraints. (see environmental management measure LV18 in **Chapter E1** (Environmental management measures)).

Environmental management measure B6 (see **Chapter E1** (Environmental management measures)) identifies that as many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the relevant UDLPs for the project. Opportunities for the provision of replacement trees outside the project boundary will be investigated in consultation with local councils. Additional environmental management measures for the potential retention, protection, removal and replacement of trees are provided in full in **Chapter E1** (Environmental management measures).

### C13.2.2 Visual impacts during construction (specific locations)

Submitters raised concerns about visual impacts at specific locations during construction. Concerns relate to:

- Removal of additional trees at Haberfield
- Requests that the mature trees on Darley Road be preserved. Submitters also suggest that a condition of approval include that if any of these trees are removed during construction, that they are replaced with mature trees at the conclusion of the construction at the site
- The mature trees on the north of the Darley Road civil and tunnel site should not be removed as they act as a visual screen for residents from City West Link traffic
- Visual impacts to Easton Park due to the construction of ventilation facilities at the Rozelle civil and tunnel site (C5)
- All mature trees in Easton Park should be retained and maintained during construction
- Concern about the removal of trees, bushes and vegetation around the general Rozelle area and specifically at and around the Rozelle Rail Yards adjacent roads Construction works impacting the visual appeal of the general Rozelle area
- Visual impact of construction site hoarding at The Crescent civil site (C6) would impact on residential views of Rozelle Bay
- Removal of trees near City West Link at Buruwan Park as they provide visual barriers for residents, and would provide screening of the ventilation outlets, suggesting if removed they should be replaced by mature trees

- Visual impacts for residents on Pyrmont Bridge Road near the Pyrmont Bridge Road tunnel site (C9) are High-Moderate in the EIS
- Visual impact of the removal of trees around the St Peters interchange
- Construction works proposed at Waratah Street at Haberfield are inconsistent with the single storey residential character of the street.

## Response

Construction visual impacts are described in full at Chapter 6 of Appendix O (Technical working paper: Landscape and visual impact) of the EIS.

The project footprint was developed to avoid and/or minimise impacts to neighbouring sensitive receivers and the removal of vegetation and open space where possible. Opportunities to further reduce the footprint and reduce the extent of impacts would be considered during detailed design.

The environmental management measures for the project include the provision to retain as many trees as possible during construction (see **Chapter E1** (Environmental management measures)). See **section C13.2.1** for further information regarding the management of potential impacts to trees.

Planting of mature and semi-mature trees will be considered for the project. Not all species of trees are conducive to transplanting and this will be considered when developing plans to provide street trees as part of landscaping works. The project will aim to use tree species that will eventually provide appropriate levels of screening. All planting of vegetation within streets would be in accordance with Austroads guidelines.

### Haberfield/Ashfield construction ancillary facilities

The Option A construction ancillary facilities at Haberfield/Ashfield would not require the removal of trees for the project as these sites would be located on land previously cleared by the M4 East project.

For the Option B construction ancillary facilities, the Parramatta Road West civil and tunnel site (C1b) would potentially require the removal of 19 trees which are a mix of native and exotic species. However, 17 of these trees would be investigated for retention. At the Parramatta Road East civil site (C3b), seven trees would be removed for the project. See **section C13.2.1** for further information regarding the management of potential impacts to trees.

Construction works are not proposed on Waratah Street at Haberfield for the project.

### Darley Road civil and tunnel site (C4)

As identified in Appendix S (Technical working paper: Biodiversity) of the EIS, four high retention value trees were identified at the eastern extent of the Darley Road motorway operations complex (MOC1) site. Opportunities to retain high retention value trees will be explored during detailed design and tree sensitive construction techniques will be considered. Compensatory planting will be considered for trees that cannot be retained as a result of the works. Replacement trees will be planted within, or in close proximity to the project footprint at the completion of the construction of the project. Options would be investigated in the UDLP for planting of vegetation to screen residents on the southern side of Darley Road from the Darley Road motorway operations complex.

The landscape works (including compensatory planting) and architectural design of operational infrastructure at Darley Road will be undertaken in accordance with a project UDLP for the site and the urban design principles developed for the project, as outlined in Table 13-2 of the EIS. The UDLP will be prepared prior to the commencement of permanent built surface and/or landscape works and would present an integrated urban design for the project, consistent with the projects urban design principles (refer to section 13.2.2 of the EIS). The community and stakeholders will be able to comment on the draft UDLP during an exhibition period and the feedback will be considered in the final UDLP.

An objective of the key urban design and landscape principles proposed for the motorway operations complex would include that the scale of built form respects the existing landscape character by using construction materials that are sympathetic to the quality of the local area, and providing landscape work around the motorway operations complex. The remainder of the Darley Road site would be remaining project land and rehabilitated for future development or use in accordance with the RLMP (see environmental management measure PL3 in **Chapter E1** (Environmental management measures)).

### **Rozelle civil and tunnel site (C5)**

Recreational users of Easton Park were identified as having an overall construction visual impact rating of High-Moderate. Specific environmental management measures (see **Chapter E1** (Environmental management measures)) that will be implemented to manage this impact include:

- Investigate measures to minimise view impacts of the project to sensitive residential receptors in the vicinity of the Rozelle Rail Yards as described in this assessment and include in the relevant UDLF where reasonable and feasible (see environmental management measure LV15)
- Develop a design that aims to incorporate the ventilation outlets at the Rozelle Rail Yards as an integral component of the larger open space composition, with reference and consideration to the Ventilation Facility Design Review (refer to Annexure 2 of Appendix L (Technical working paper: Urban design) of the EIS). See environmental management measure LV16 in **Chapter E1** (Environmental management measures).

Construction works, including the removal of trees at the Rozelle civil and tunnel site (C5) has been considered in the assessment of visual impacts in section 13.4.1 of the EIS and section 7.2.2 of Appendix O (Technical working paper: Landscape and visual impact) of the EIS. A separate project (the Rozelle Rail Yards site management works) will have cleared vegetation within the Rozelle Rail Yards boundary including alongside City West Link that provides intermittent screening of the site.

Impacts to trees would be managed in accordance with the measures described in **section C13.2.1**. Revegetation and planting, including tree planting, would be undertaken at key locations as part of urban design and landscape works at the Rozelle interchange including:

- Around motorway operational infrastructure such as the ventilation facility
- Around the constructed wetland, bioretention swale and the drainage channels
- Adjacent to pedestrian and cyclist paths
- Around the perimeter of the Rozelle Rail Yards.

Vegetation within the new open space created by the Rozelle interchange may eventually screen some of the view from Easton Park.

Refer to **section C13.2.1** for further discussion regarding impacts to trees for the construction of the project.

### **The Crescent civil site (C6)**

The residential receivers at Bayview Crescent and Johnston Street near The Crescent civil site (C6) were identified as having a construction visual impact rating of High.

The project would require the removal of Buruwan Park and all of the adjacent vegetation between Whites Creek and City West Link to facilitate the realignment of The Crescent. During construction, the residential receivers at the southern end of Bayview Crescent and Johnston Street would have clear views across the light rail corridor and The Crescent to the construction site. These impacts would be mitigated where possible through appropriate siting of infrastructure and considered selection of materials and finishes for sheds and hoarding.

Upon completion of the construction of the project, the view from residential receivers would include views to City West Link, the land bridge crossing of City West Link, pedestrian bridge crossing of The Crescent and the ventilation outlets at the Rozelle Rail Yards. However, it would also open up views to Rozelle Bay, Balmain industrial area and White Bay Power Station, and the city skyline, which were not previously available.

The landscape character and visual impact mitigation strategy included in Appendix O (Technical working paper: Landscape and visual impact) of the EIS includes that measures be investigated to retain the mature trees of high retention value adjacent to the light rail corridor at the corner of The Crescent and City West Link, or provide plant screening vegetation alongside the retaining wall edge of the light rail corridor, to minimise landscape and visual impacts.

### **Pymont Bridge Road tunnel site (C9)**

As identified in section 13.4.1 of the EIS, residents at around the Pymont Bridge Road tunnel site (C9) would experience High-Moderate visual impacts associated with construction activities at the Pymont Bridge Road tunnel site (C9). While these residents are in close proximity to the construction site and would potentially have views to it from within the residences, the current commercial/industrial land uses and frontage to busy Pymont Bridge Road comprises a landscape of relatively low amenity.

The extent of visibility of the construction site, ancillary works and construction traffic would be high and would be in close proximity to residences. The demolition of the warehouse building (as well as others adjoining it), construction of an acoustic shed, and the presence of temporary noise barriers, fences and hoarding would comprise a contrasting view to the existing view. This infrastructure would be removed at the end of construction.

### **Campbell Road civil and tunnel site (C10)**

The Campbell Road civil and tunnel site (C10) would use land on the surface that is being used as a construction site for the New M5 project and would not require the removal of trees at or around the site. Visual impacts associated with the Campbell Road civil and tunnel site (C10) are assessed in section 13.4.1 of the EIS, while visual impacts associated with the removal of trees for the New M5 project were assessed in the New M5 EIS. The landscape works and architectural design of operational infrastructure at the St Peters interchange would be undertaken in accordance with a UDLP. The UDLP would be prepared in consideration of the UDLP for the New M5 project at this location and would seek to provide a consistent urban design for this area.

Once construction of both projects is completed, remaining project land would be subject to the New M5 project's UDLP, RLMP and other applicable conditions of approval. These plans are currently being prepared and would be subject to the consultation requirements and timeframes set out in the New M5 project conditions of approval. The New M5 UDLP will identify landscaping and tree planting measures to be undertaken at the site.

### **C13.2.3 Lighting from construction ancillary facilities, vehicles and equipment (general)**

Submitters raised concerns about impacts from lighting of construction ancillary facilities, vehicles and equipment. Specific concerns included:

- Impacts to sleep from increased light illumination during construction outside of standard day time construction hours
- Rozelle Rail Yards and The Crescent will have an increase in light during the night hours from the construction sites
- Submitter requests that impacted residences should be provided an appropriate solution to ensure low level impacts from night lighting
- Lighting pollution during construction at the Pymont Bridge Road construction site.

### **Response**

A landscape and visual impact assessment was undertaken for the EIS (refer to Appendix O (Technical working paper: Landscape and visual impact) of the EIS). As part of the assessment night lighting impacts were identified for each of the construction ancillary facilities. Potential night lighting impacts on receivers at representative receiver locations for each construction ancillary facility are summarised in Table 13-6 of the EIS.

One residential receiver location (containing a number of residences) has been identified as having an overall construction lighting impact rating of High:

- Residents along Lilyfield Road near Denison Street in the vicinity of the Rozelle civil and tunnel site (C5).

Two residential receiver locations have been identified as having an overall construction lighting impact rating of High-Moderate:

- Residents along Darley Road, Charles Street, Hubert Street (south of Darley Road), Francis Street (south of Darley Road) and James Street at Leichhardt, south of the Darley Road civil and tunnel site (C4)



- Residents in the terraces on Campbell Road at St Peters, east of the Campbell Road civil and tunnel site (C10).

Remaining receivers have been assessed as being subject to potential Moderate, Low or Negligible lighting impacts during construction of the project. The outcome of the night lighting assessment for specific locations identified by submitters is provided in **Table C13-2**. Further detail regarding the night lighting assessment is provided in section 6 of Appendix O (Technical working paper: Landscape and visual impact) of the EIS.

**Table C13-2 Summary of construction night lighting assessment**

Receiver		Sensitivity to change	Magnitude of change	Overall rating
<b>Rozelle civil and tunnel site (C5)</b>				
C5-1	Motorists – City West Link	Low	Moderate	Moderate–Low
C5-2	Residents – Foucart Street and Cecily Street	Moderate	Moderate	Moderate
C5-3	Residents – Lilyfield Road near Denison Street	High	High	High
C5-4	Residents – Breillat Street	Low	Low	Low
C5-5	Recreational users – Easton Park	Low	High	Moderate
C5-6	Recreational users – Glebe Foreshore Parklands	Low	Low	Low
<b>Pymont Bridge Road tunnel site (C9)</b>				
C9-1	Residents – Pymont Bridge Road	Low	Low	Low
C9-2	Residents – Booth Street and Mallett Street	Moderate	Low	Moderate–Low
C9-3	Motorists – Parramatta Road	Low	Low	Low
C9-4	Residents – Parramatta Road	Low	Low	Low

Construction ancillary facility layouts and lighting requirements are indicative and would be confirmed during detailed design. This would include fixed night lighting at sites that involve or support tunnelling activities.

It is anticipated that construction work at The Crescent civil site (C6), the Victoria Road civil site (C7) and the Iron Cove Link civil site (C8) would be carried out predominantly during standard daytime construction hours and therefore impacts from night lighting have not been assessed at these locations. However, although the majority of surface construction would be undertaken during standard working hours, some construction activities would need to be undertaken outside standard construction hours (ie at night). Construction works that might be undertaken outside the recommended standard hours include:

- Utility works
- Surface works to arterial roads, such as Wattle Street, City West Link, The Crescent, Anzac Bridge, Victoria Road, to minimise impacts on peak traffic flows
- The delivery of oversized plant or structures which are determined by authorities and police to be transported at a time which minimises disruption and safety concerns
- Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- When emergency work is required to avoid the loss of life, damage to property or to prevent environmental harm
- Public infrastructure works that shorten the length of the project and are supported by the affected community

- Works where a justification of the need to operate outside the recommended standard hours is accepted.

Environmental management measure LV2 (see **Chapter E1** (Environmental management measures)) outlines how the impact of lighting from the construction ancillary facilities and access routes will be reduced. This environmental management measure will be applied at all construction ancillary facilities for the project, and includes designing site lighting to minimise glare issues and light spillage at adjoining properties, generally consistent with the requirements of Australian Standards 4282-1997 Control of the obtrusive effects of outdoor lighting. Where feasible and reasonable, ancillary facilities would be developed and established to minimise visual impacts. Glare and light spill from construction ancillary facilities would be minimised through the use of cut-off and directional lighting. Site hoarding would be erected early within the site establishment phase to provide visual screening (where practical).

A Complaints Management System will be in place for the duration of construction and would record any complaints related to night lighting. This system will include the recording of complaints and how the complaint was addressed (within a Complaints Register). A Community Complaints Commissioner, who is an independent specialist, would oversee the system and would follow-up on any complaint where the public is not satisfied with the response. Further information on future consultation with communities and stakeholders is provided in **section A2.5**.

## C13.3 Landscape character impacts during operation

267 submitters raised concerns about landscape character impacts during operation. Refer to section 13.5 of the EIS for details of potential operational impacts.

### C13.3.1 Landscape character impacts (general)

Submitters raised concerns about impacts to landscape character from the project. Specific concerns included:

- Loss of landscape character
- Impacts to the built fabric of the inner west suburbs
- WestConnex will impact areas of significant character in Sydney.

### Response

The concept design presented in the EIS has been developed and refined to avoid or minimise impacts to the character of local areas where possible. These design refinements include:

- Locating the majority of road infrastructure below ground
- Moving the Rozelle interchange mostly underground, reducing visual impacts and facilitating the provision of open space
- Revising the design in the area east of Victoria Road to reduce land take surrounding the White Bay Power Station
- Where feasible, locating ventilation facilities to provide reasonable separation distance to the closest sensitive receivers (at Rozelle, Iron Cove and St Peters)
- Removing the proposed ramps on Parramatta Road at Camperdown (the Camperdown interchange) from the project, avoiding impacts in a heritage sensitive area adjacent to the University of Sydney and Victoria Park.

Landscape character impacts are impacts on the aggregate of an area's built, natural and cultural character or sense of place as defined in the Roads and Maritime *Environmental Impact Assessment Practice Note – Guidelines for Landscape Character and Visual Impact Assessment* (Roads and Maritime 2013b).



The key landscape character impacts of the project relate to sensitive LCZs that are likely to experience a noticeable change in their character as a result of new operational infrastructure or landscape elements. The assessment of potential landscape character impacts detailed in the EIS did not identify any LCZs that would experience landscape character impacts with an overall rating of High (refer to Table 13-11 in Chapter 12 (Urban design and visual amenity) of the EIS). This is due to the project providing additional and upgraded road infrastructure within areas characterised by existing major arterial road corridors.

Site selection for project infrastructure has been based on either vacant or underutilised locations in the inner west where feasible, such as at the currently disused Rozelle Rail Yards. Operational infrastructure for the project would be of a semi-industrial nature which is generally consistent with the varied building types throughout the inner west, which includes a relatively large amount of industrial/semi-industrial buildings and other infrastructure.

UDLPs will be prepared prior to the commencement of permanent built surface and/or landscape works and will present an integrated urban design for the project, consistent with the project urban design principles (refer to section 13.2.2 of the EIS). The community and stakeholders will be able to comment on the draft UDLPs during an exhibition period and the feedback will be considered in the final UDLPs.

### C13.3.2 Landscape character impacts (specific locations)

Submitters raised concerns about impacts from the project on landscape character. Specific concerns relate to:

- Concern for the area around Victoria Road due to the proposed Iron Cove Link ventilation outlet, which would be inconsistent with the low rise buildings and streetscape standards of the Balmain and Rozelle community
- Concern that the character of Rozelle will be adversely impacted as a result of the project. The local sense of place needs to be protected and nurtured for future generations
- The M4-M5 Link will degrade the unique inner city Sydney suburb of Rozelle
- Concern for the loss of the local landscape character of the Alexandria area
- Concern for the Leichhardt area due to the proposed Darley Road motorway operations complex (MOC1), including the substation and water treatment plant, being inconsistent with the existing low rise streetscape of the area
- Concern about maintaining the character of the neighbourhood by keeping development complimentary in architectural style, form and materials and preserving the low scale cottage character at Leichhardt.

### Response

The operational landscape character of the project was defined through the identification of 33 LCZs. The assessment of LCZs focused on areas where permanent operational facilities are proposed. **Table C13-3** outlines the potential overall impact to LCZs as a result of the project for areas identified by submitters. Refer to section 13.5 of the EIS for further information regarding impacts to landscape character for the project.

**Table C13-3 Summary of LCZ assessments**

Landscape character zone area	Landscape character zone	Sensitivity to change	Magnitude of change	Overall rating
Central west landscape character zones (Darley Road MOC)	LCZ 1 – Darley Road residential precinct	Low	Low	Low
	LCZ 2 – Darley Road commercial precinct	Moderate	Moderate	Moderate
	LCZ 3 – Leichhardt light rail precinct	Low	Low	Low

Landscape character zone area	Landscape character zone	Sensitivity to change	Magnitude of change	Overall rating
Central east landscape character zones (Rozelle interchange)	LCZ 4 – Glebe Foreshore Parklands precinct	Moderate	Moderate	Moderate
	LCZ 5 – Johnston Street precinct	High	Negligible	Negligible
	LCZ 6 – Annandale Street and Young Street precinct	Moderate	Low	Moderate –Low
	LCZ 7 – Whites Creek Valley precinct	High	Low	Moderate
	LCZ 8 – Catherine Street precinct	Moderate	Negligible	Negligible
	LCZ 9 – Catherine Street neighbourhood centre precinct	Low	Low	Low
	LCZ 10 – Balmain Road precinct	Low	Negligible	Negligible
	LCZ 11 – Nanny Goat Hill residential precinct	Low	Low	Low
	LCZ 12 – Halloran Street commercial precinct	Low	Negligible	Negligible
	LCZ 13 – Easton Park residential precinct	High	Moderate	High–Moderate
	LCZ 14 – Victoria Road south precinct	Low	Moderate	Moderate –Low
	LCZ 15 – White Bay Power Station precinct	High	Moderate	High-Moderate
	LCZ 16 – Rozelle Bay wharves precinct	Low	Moderate	Moderate –Low
	LCZ 17 – City West Link precinct	Low	Moderate	Moderate –Low
	LCZ 18 – Rozelle light rail corridor and Whites Creek canal precinct	Moderate	Moderate	Moderate
Northern landscape character zones (Iron Cove Link)	LCZ 19 – Rozelle Rail Yards precinct	Low	Moderate	Moderate –Low
	LCZ 20 – Victoria Road north precinct	Low	Moderate	Moderate –Low
	LCZ 21 – Victoria Road light industrial precinct	Moderate	Negligible	Negligible
	LCZ 22 – Iron Cove residential precinct	Low	Moderate	Moderate-Low
	LCZ 23 – King George Park precinct	Moderate	Moderate	Moderate
	LCZ 24 – Callan Park residential precinct	High	Moderate	High–Moderate
	LCZ 25 – Sydney College of the Arts precinct	High	Negligible	Negligible

Landscape character zone area	Landscape character zone	Sensitivity to change	Magnitude of change	Overall rating
	LCZ 26 – Darling Street precinct	Low	Negligible	Negligible
Southern landscape character zones (St Peters interchange)	LCZ 27 – Sydney Park precinct	High	Low	Moderate
	LCZ 28 – Sydney Park residential precinct	Moderate	Moderate	Moderate
	LCZ 29 – Alexandra Canal industrial precinct	Low	Negligible	Negligible
	LCZ 30 – Barwon Park precinct	High	Moderate	High–Moderate
	LCZ 31 – Princes Highway precinct	Low	Low	Low
	LCZ 32 – St Peters triangle precinct	Moderate	Negligible	Negligible
	LCZ 33 – St Peters interchange precinct	Negligible	Low	Negligible

Of the 23 landscape character zones at Rozelle around the Rozelle interchange and Iron Cove Link, only three were identified as having a High-Moderate overall landscape character impact rating. This suggests that overall, the character of the area would be maintained and preserved for future generations and would only be subject to High-Moderate impacts at specific locations.

The project would be further refined through the detailed design process. Operational infrastructure would be subject to UDLPs that would be prepared in consultation with the community and relevant stakeholders. Design elements can reasonably be expected to comprise well-considered design elements within the context of both the project footprint and broader road corridor landscape.

A summary of the assessment of potential landscape character impacts on the LCZs identified by submitters is included in the following sections.

### LCZ 20 – Victoria Road north precinct

At the Victoria Road north LCZ, the inherent landscape value affected by the project is low, characterised primarily by a mix of later 1900s industrial style buildings, Victorian style two storey shops and residences, and housing from the inter-war years. The LCZ is characterised by high volumes of traffic, with vehicles travelling along Victoria Road, which serves as a main arterial road for the inner west of Sydney.

A number of buildings that front Victoria Road include original shop front detailing and weather protection through the incorporation of cantilevered awnings. A number also have nil setbacks and restricted vehicle access resulting from there being no formal lane structure. The former Balmain Leagues Club site is located near the ridgeline to the northwest of Darling Street and comprises a vacant and derelict building.

The project would have a high level of congruency with the existing arterial corridor in relation to scale and form, notwithstanding the introduction of new portal elements. The ventilation outlet at the Iron Cove Link motorway operations complex (MOC4) comprises an uncharacteristic element in terms of form, scale and mass. However, this element would be viewed within the context of a major widened road corridor landscape.

The project would be further refined during the detailed design process. In particular, the ventilation outlet, ventilation facility building, motorway portals and associated retaining walls, would be subject to a UDLP. As such, these elements can reasonably be expected to comprise well-considered design elements within the context of both the project footprint and broader road corridor landscape.

A detailed review and finalisation of architectural treatment of the project operational infrastructure, including ventilation facilities, will be undertaken during detailed design. The architectural treatment of these facilities would be guided by ventilation facility performance requirements, the outcomes of community consultation and the urban design principles identified in Appendix L (Technical working paper: Urban design) of the EIS.

Landscaping works will be carried out adjacent to disturbed areas, around operational infrastructure (such as ventilation facilities), and in areas of new open space that would be provided at the Rozelle Rail Yards and adjacent to Victoria Road at Rozelle.

### **LCZ 30 – Barwon Park precinct (St Peters)**

The Barwon Park precinct adjoins Sydney Park. This area will have undergone significant change in the landscape context due to the construction of the St Peters interchange and ancillary infrastructure and the widening of Campbell Road as part of the New M5 project. The ventilation facility proposed as part of the M4-M5 Link project (at the Campbell Road motorway operations complex (MOC5)) would contribute to a substantial change in the outlook from, and backdrop to, this primarily residential precinct.

### **LCZ 1 – Darley Road residential precinct**

Landscape character impacts to the Darley Road residential precinct would include the loss of the large 'warehouse' building, revealing an existing retaining wall to the elevated light rail corridor and the addition of a smaller group of project buildings and associated infrastructure (including water treatment plant) in conjunction with low landscaping and street trees to the Darley Road frontage.

The existing large-scale warehouse building and existing trees would be removed and replaced by the water treatment plant of smaller scale. The addition of the motorway operations complex comprising a water treatment plant and associated infrastructure elements would be viewed against the backdrop of the elevated light rail corridor and landscaping of its embankment.

The motorway operations complex building would have a high capacity for absorption within the landscape at this location, given the relationship with the adjoining elevated light rail corridor and City West Link and the separation to the adjacent residential precinct provided by Darley Road. The landscape works (including compensatory planting) and architectural design of operational infrastructure at Darley Road including the water treatment plant and substation (the need for a substation would be confirmed during detailed design) will be undertaken in accordance with a project UDLP.

The detailed design and construction of the M4-M5 Link project would be managed to ensure the identified landscape and visual impacts are minimised by implementation of a range of general and specific measures, as outlined in **Chapter E1** (Environmental management measures).

## **C13.4 Visual impact during operation**

648 submitters raised concerns about visual impacts during operation. Refer to section 13.5 of the EIS for details of potential operational impacts.

### **C13.4.1 General visual impacts from the project**

Submitters raised concern about general visual impacts from the project. Concerns included:

- This project will cause a reduction in visual amenity in the Inner West
- Ventilation outlets (up to 40 metres high) at Iron Cove Link and Rozelle would have visual impacts on surrounding residents
- Visual impacts from concrete roads and interchanges during operation
- The project will result in permanent impacts to views
- Visual impacts from ventilation structures during operation
- Visual impacts from the proposed noise walls
- Impacts to visual amenity in the areas adjacent to the tunnel portals

## Response

Visual impacts arising from the project primarily relate to new permanent operational infrastructure, in particular from the ventilation outlets and structures, tunnel portals, and landscape elements impacting on existing views. In particular, ventilation facilities at the Rozelle interchange, Iron Cove Link and St Peters interchange are of contrasting bulk, scale and form when compared to other built form elements within existing views. Key visual receivers subject to high visual impacts include:

- Residential and recreational receivers surrounding Easton Park at Rozelle, which would have open views of the Rozelle ventilation facility and outlets. Vegetation within the new open space created by the Rozelle interchange would eventually screen some of this view
- Recreational receivers at Glebe Foreshore parklands, which would have views across Rozelle Bay and to the Rozelle ventilation facility and outlets. This view would be experienced in the context of other infrastructure visible in the skyline such as Anzac Bridge and the Glebe Island silos
- Residential, pedestrian and light rail patron receivers near the Rozelle Bay light rail stop, who would have new views toward the Rozelle interchange including ventilation outlets, new open space and associated active transport infrastructure. New views towards the city skyline would also be created through the removal of vegetation
- Residential receivers at and around Terry Street at Rozelle, who would experience a change in view associated with the Iron Cove Link ventilation outlet encroaching into the existing, partial view to Callan Park.

Other key visual impacts comprise high view loss at two locations: free-standing dwellings located on Foucart Street near the corner of Lilyfield Road and residences within the vicinity of Hutcheson Street and Denison Street near Lilyfield Road. These dwellings look east across part of the Rozelle Rail Yards, and south across the western part of the Rozelle Rail Yards respectively with views to the city skyline.

While these locations would experience a change in skyline view, there would also be an enhancement of foreground view associated with the new open space and active transport connections through the Rozelle interchange, providing additional community benefits to these areas. For the Iron Cove Link, motorway infrastructure has been integrated within a well-considered streetscape setting, and the ventilation outlet would be located within the centre median of Victoria Road rather than abutting existing residential development.

Visual impacts of the project would be minimised through considered development and implementation of the urban design and landscaping features in accordance with UDLPs that would be developed for the project.

The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community. An Urban Design Review Panel would be established to provide advice and guidance regarding the UDLPs. Urban design and landscape works would include the provision of landscape planting along and around key visible infrastructure such as ventilation facilities and motorway operations complexes. Over time and as this vegetation matures, the benefits provided by landscape planting will improve.

Annexure 1 and Annexure 2 of Appendix L (Technical working paper: Urban design) include a portal design review and ventilation facility design review respectively. The design reviews consider national and international approaches to portal and ventilation facility design and identify strategies to be considered during the detailed design of the operational infrastructure.

Mitigation and design measures proposed for the project to minimise identified visual impacts are outlined in **Chapter E1** (Environmental management measures) and include:

- Integrate the new open space at Rozelle with the Lilyfield Road streetscape through considered street tree planting and associated landscape works in accordance with the Austroad guidelines
- Investigating measures during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle, Iron Cove and St Peters, and enhance the landscape setting of the ventilation outlets, subject to achieving desired ventilation outcomes, and in accordance with the design principles detailed in the M4-M5 Link Urban design report

- Consulting with UrbanGrowth NSW regarding the interface between the project footprint and the White Bay Power Station precinct. Design the interface to optimise compatibility between the two areas from a landscaping, visual, heritage and active transport connectivity perspective
- At the St Peters interchange, the UDLP sub-plan for the area adjoining Campbell Road motorway operations complex is to be consistent with the New M5 St Peters Interchange Recreational Area Sub-plan.

Noise walls may be required along/within the vicinity of the southern side of the widened Victoria Road at the Iron Cove Link, ranging between about four metres and five metres high, subject to detailed design. The noise walls are one of a number of noise mitigation options being considered including road pavement treatments and architectural treatments of properties and were therefore not included in the concept design for the project. The visual impacts of the noise walls were therefore not assessed in the EIS. If noise walls are deemed necessary, their location, form and function and potential visual impacts will be considered and assessed during detailed design. The design and treatment of permanent built works will be described in the relevant UDLPs for the project (see environmental management measure UD1 in **Chapter E1** (Environmental management measures)). Consultation will be undertaken with local residents in the event that noise walls are required for the project.

The project generally creates a moderate to low level of visual impacts. This is due in large measure to the following elements which have been incorporated into the concept design through a process of design development which involved gradual refinement to avoid or minimise impacts where possible:

- Locating the majority of the road infrastructure at Rozelle Rail Yards underground, and provision of extensive and well-considered open space above including two major north-south pedestrian/cycle connections over City West Link, linking Lilyfield with Rozelle, and one east-west pedestrian/cycle connection under Victoria Road, with potential for future connection to The Bays Precinct
- The integration of the Iron Cove Link within a well-considered streetscape setting, and locating of the ventilation outlet within the centre median of Victoria Road rather than abutting existing residential development
- Integration of the Campbell Road ventilation facility within the New M5 portals and separation from nearby residences.

#### **C13.4.2 Visual impacts around Darley Road**

Submitters raised concern about visual impacts from the project around Darley Road. Concerns included:

- Residents on Darley Road and Hubert Street will have a direct line of sight to the Darley Road motorway operations complex (MOC1) and subsequently a degraded visual environment
- The motorway operations complex, including a permanent water treatment plant and substation on Darley Road, will have a visual impact and it is inconsistent with the character of the neighbourhood of Leichhardt, which comprises of low rise homes
- The Darley Road motorway operations complex (MOC1) will be a prominent feature in the landscape that will impact the landscape character and visual amenity of the area
- Opposition to the 10 to 12 metre high building at Darley Road due to the bulk and scale being inconsistent with the streetscape
- If approved, the Darley Road motorway operation infrastructure should be moved to the north of the site out of line of sight of residents.

#### **Response**

An assessment of the visual impacts of the Darley Road motorway operations complex (MOC1) was undertaken in the EIS for areas where built operational infrastructure would be visible (refer to section 13.5.2 of the EIS and the visual envelope mapping in Appendix O (Technical working paper: Landscape and visual impact) of the EIS).



The operational visual impact assessment did not identify the potential for High visual impacts on views for any key viewpoints at the Darley Road motorway operations complex (MOC1). A summary of the operational visual impact assessment is provided in **Table C13-4**. The view to the location where the Darley Road motorway operations complex (MOC1) is proposed from nearby residences is of poor to moderate quality within the context of the refurbished retail warehouse outlet that is currently present at this location.

At the Darley Road motorway operations complex (MOC1), the project would comprise a low scale, architecturally well-considered development. The scale, size and character of the project would be expected to comprise an appropriate level of visual 'fit' with the streetscape, within the context of its infrastructure purpose, including the provision of low perimeter landscape works and street tree planting along the Darley Road frontage of the project. The project would be visually compatible with the adjoining light rail corridor and Charles Street Underbridge. The development would be of a lower height compared to the existing retail warehouse building.

The indicative siting of operational project infrastructure has been developed to maximise areas of land that would be available for potential future development (ie remaining project land). This has primarily been achieved by optimising the design to co-locate facilities at the western end of the site, thereby reducing land-take. The siting of the operational project infrastructure at the western end of the site also allows for the remaining project land component to be located nearest to the Leichhardt North light rail stop, creating opportunities for future integration with the public transport network.

The landscape works and architectural design of operational infrastructure at Darley Road would be undertaken in accordance with a project UDLP and the urban design principles developed for the project (refer to section 13.2.2 of the EIS). The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community. Around 0.2 hectares of the site is proposed to be used for the Darley Road motorway operations complex (MOC1) and would be subject to a UDLP, with the remainder subject to the RLMP that would be prepared for the project (refer to section 12.4.3 of the EIS).

While the project would be visible by motorists travelling north on Hubert Street, views of the project from the residences on Hubert Street would be limited as identified in the visual envelope mapping included in section 7.3.1 of Appendix O (Technical working paper: Landscape and visual impact) of the EIS. Only one residential building on Darley Road faces directly onto Darley Road in the vicinity of the motorway operations complex, with other residential buildings facing onto the streets that run perpendicular to Darley Road (ie Francis Street, Hubert Street and Charles Street).

**Table C13-4 Summary of operational visual impact assessment at Darley Road**

Receiver location	Receiver type	Sensitivity to change	Magnitude of change	Overall rating
<b>Darley Road</b>				
View looking east from Darley Road near corner of Charles Street (D1)	Residents	Low	Moderate	Moderate–Low
	Pedestrians	Low	Low	Low
View looking west from Darley Road at entry to lane between James Street and Francis Street (D2)	Residents	Low	Low	Low
	Pedestrians	Low	Low	Low

### C13.4.3 Visual impacts around the Rozelle interchange

Submitters raised concern about visual impacts from the project around the Rozelle interchange. Concerns included:

- Visual impacts from the realignment of The Crescent, the associated retaining wall and land bridge near the Rozelle Bay light rail stop once trees and vegetation are removed at Buruwan Park
- The project would impact the visual amenity of The Bays Precinct



- Visual impacts on Easton Park from the ventilation facility and re-designed urban environment
- Visual impacts alongside Rozelle Bay, due to the presence of a ventilation facility
- Visual impacts of the ventilation outlets at the Rozelle interchange
- Concern that facilities at the Rozelle interchange would visually isolate the areas of open space
- Measures should be implemented to minimise the visual impact of ventilation facilities, especially at the Rozelle Rail Yards
- Concern the wetland at the Rozelle Rail Yards will be unsightly.

## Response

An assessment of the visual impacts of the Rozelle interchange was undertaken in the EIS for areas where built operational infrastructure would be visible (refer to section 13.5.3 of the EIS). The Rozelle interchange would have a highly functional and ordered landscape character, comprising architecturally well-considered design elements and new open space.

General impacts associated with the ventilation outlets at the Rozelle interchange and measures to manage these visual impacts are discussed in **section C13.4.1**. Impacts to specific views around the Rozelle interchange identified by submitters are discussed below.

### Impact to views around The Crescent

The realignment and upgrade of The Crescent/Victoria Road intersection would require the removal of Buruwan Park and the adjacent vegetation between Whites Creek and City West Link. This would have the effect of removing the existing screening between the Rozelle Bay light rail stop and the project, opening up views to City West Link, the land bridge crossing of City West Link, pedestrian bridge crossing of The Crescent and the ventilation outlets at the Rozelle Rail Yards. However, it would also open up views to Rozelle Bay, Balmain industrial area and White Bay Power Station, and the city skyline, which were not previously available.

A key element of this change in view is that the extent of the project would make it highly unlikely that tree cover could be reinstated to this area, and consequently, this change would be permanent. As identified in Appendix O (Technical working paper: Landscape and visual impact) of the EIS and **Chapter E1** (Environmental management measures), measures will be investigated to retain the mature trees of high retention value adjacent to the light rail corridor at the corner of The Crescent and City West Link, and to provide screening vegetation alongside the retaining wall edge of the light rail corridor, to minimise landscape and visual impacts.

### Impact to views from Easton Park

The visual impact assessment identified the potential for high visual impacts for the view looking south from Easton Park to the project for recreational users of the park.

The ventilation facility (primarily the ventilation outlets as part of the facility at the Rozelle Rail Yards) from this view would be of a high to moderate level of contrast with that of the existing view, notwithstanding that much of this would comprise new open space. The new open space would be an improvement to this component of the view, which currently consists of a light industrial area. Vegetation within the new open space created by the Rozelle interchange would eventually screen some of this view.

While the architecture and design of the ventilation facility would be well considered for the surrounding area, the structure may nonetheless be perceived as a low quality visual element given its purpose, bulk and scale in an open area and subsequent visual prominence. The final architecture and design of the facility would be subject to the UDLP for the Rozelle Rail Yards. Development of the UDLP would include consideration of the key ventilation facility design principles identified in Annexure 2 of Appendix L (Technical working paper: Urban design) of the EIS. Measures would be investigated during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle and provide materials/finishes that reduce impacts to sensitive visual receiver locations.

For receiver locations around the Rozelle interchange, the ventilation outlets as part of the ventilation facility would be viewed within the context of other proximate, large infrastructure elements in the skyline, such as the White Bay Power Station chimney stacks, the Glebe Island grain silos, and Anzac Bridge.

## Impacts to views around Rozelle Bay

Impacts to views around Rozelle Bay were considered for the view looking north from Glebe Foreshore parklands to the project. Impacts to this view for passive recreational users were assessed as being Moderate-low and impacts to the view for active recreational users were assessed as being low.

The ventilation outlets in particular would be visually prominent from this location, particularly given the limited height of tree planting between the proposed ventilation outlets and nearby receivers. These elements would comprise visually contrasting elements in the skyline within the immediate vicinity of the project. However, within the larger setting as viewed from this receiver location, these new elements would be broadly congruent with other proximate, large infrastructure elements in the skyline, such as the White Bay Power Station chimney stacks, the Glebe Island grain silos, and Anzac Bridge. The project would, however, seek to integrate the potentially visually prominent elements together with the improved setting afforded by the new open space. The final architecture and design of the facility would be subject to the UDLP for the Rozelle Rail Yards.

Development of the UDLP would include consideration of the key ventilation facility design principles identified in Annexure 2 of Appendix L (Technical working paper: Urban design) of the EIS. Measures would be investigated during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle and provide materials/finishes that reduce impacts to sensitive visual receiver locations.

## Impacts to the visual amenity of The Bays Precinct

The project was developed with consideration of *The Bays Precinct, Transformation Plan* (UrbanGrowth NSW 2015b) which establishes the strategy for how The Bays Precinct would be developed over 20 years for residential, employment, entertainment and open space uses. The cumulative impacts of the M4-M5 Link and The Bays Precinct project could result in a considerable shift in land use, built form and landscape character in The Bays Precinct.

With the intended future growth in the area (particularly with regard to The Bays Precinct), the M4-M5 Link aims to deliver much needed quality open space and passive recreational space. This open space could be further developed in the future (by others) to optimise compatibility between the projects.

There is opportunity for integration between the M4-M5 Link project and The Bays Precinct project to optimise a balanced outcome from a visual amenity perspective. Roads and Maritime has been working with UrbanGrowth NSW to ensure their early plans for The Bays Precinct have been considered in relation to the design of the Rozelle interchange. The project would provide a path that connects to the existing Anzac Bridge shared path by travelling underneath the Victoria Road/City West Link intersection. This active transport connection would provide future possibilities for connections into The Bays Precinct and contribute to visual connectivity.

## Operational infrastructure at the Rozelle Rail Yards

The need for two separate motorway operations complexes within the Rozelle Rail Yards is primarily due to the requirement to locate the ventilation supply and outlet facilities as close to the associated ventilation supply and exhaust tunnels as possible. It should be noted that the concept design incorporates the roof space of some of operational buildings as part of the overall open space landscape. By doing so, operational infrastructure would be integrated into the landscape design at this location.

Opportunities to co-locate the motorway operations complexes within the Rozelle Rail Yards would be investigated during detailed design. As identified in Appendix O (Technical working paper: Landscape and visual impact) of the EIS and **Chapter E1** (Environmental management measures), the new open space at Rozelle would be integrated with the Lilyfield Road streetscape through considered street tree planting see LV13 and associated landscape works to ensure areas of land are not visually isolated.

The final design of the constructed wetland at the Rozelle interchange would be developed through the preparation of the UDLP for the Rozelle Rail Yards. An example of constructed wetlands from other projects is provided in section 5.5.6 of Appendix L (Technical working paper: Urban design) of the EIS. Wetlands and other water sensitive urban design features would be designed to be functional and visually appealing areas (the wetland at Sydney Park is an example of this).

## Measures to manage visual impacts

Visual impacts of the project would be minimised through considered development and implementation of the urban design and landscaping features in accordance with UDLPs that would be developed for the project. The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community. Urban design and landscape works would include the provision of landscape planting along and around key visible infrastructure such as ventilation facilities and motorway operations complexes. Over time and as this vegetation matures, the benefits provided by landscape planting will improve.

Mitigation and design measures proposed for the project to minimise identified visual impacts are outlined in **Chapter E1** (Environmental management measures) and include investigating measures during detailed design to reduce the height, bulk and scale of ventilation outlets at the Rozelle Rail Yards subject to achieving desired ventilation outcomes, and in accordance with the design principles detailed in the M4-M5 Link Urban design report.

### C13.4.4 Visual impacts around the Iron Cove Link

Submitters raised concern about visual impacts from the project around the Iron Cove Link. Concerns included:

- The bulk and scale of the Iron Cove Link motorway operations complex (MOC4) including the ventilation outlet is not consistent with the local streetscape of Rozelle and Balmain
- Visual impacts from the ventilation facilities near Springside Street, Callan Street, Victoria Road and Terry Street, Rozelle
- The condition of approval to include a requirement for measures to minimise the visual impact of ventilation facilities, especially on Victoria Road near Terry Street
- The ventilation facility near Iron Cove should be located below ground level or on the foreshore below Iron Cove Bridge to reduce visual impact on Victoria Road.

## Response

The EIS describes the Iron Cove Link ventilation facility as being located between Springside and Callan streets at Rozelle and comprising a ventilation outlet, ventilation building (including the jet fans) and an electrical substation. The ventilation outlet would be located within the centre of Victoria Road near Terry Street while the ventilation building and substation would be located on the southern side of Victoria Road.

An assessment of the visual impact of operational infrastructure at the Iron Cove Link was provided in section 13.5.4 of the EIS. General impacts associated with the ventilation outlets at the Iron Cove Link and measures to manage these visual impacts are discussed in **section C13.4.1**. Impacts to specific views around the Iron Cove Link identified by submitters are discussed below.

Options for the relocation of operational infrastructure for the Iron Cove Link are discussed in **section C4.11**.

### Impacts to residential receivers at Springside Street, Rozelle

The visual impact assessment identified the potential for Moderate visual impacts for residents and pedestrians for the view looking north along Springside Street towards Victoria Road. In this location, the ventilation outlet building would be moderately visually prominent from much of the eastern side of Springside Street, including being seen against the skyline, an effect that would increase when moving north up the hill from this location. The scale, form and visual mass of the building would be moderately incongruent with the existing streetscape, particularly at the northern end of the street when viewed from a closer proximity.

However, there are no visually significant elements being obstructed from this receptor location. The duration of viewing of the outlet from this location is likely to be low, with most people generally exposed to the view when entering and leaving their residences, with the exception being views from back garden areas within proximity of the project, where the ventilation building would have the potential to be visually prominent. Visual impacts are anticipated to be similar for the nearby Callan Street.

## Impacts to residential receivers at Terry Street, Rozelle

The visual impact assessment identified the potential for High visual impacts for residents on the west side of Terry Street for the view looking south along Terry Street towards the project. The sensitivity of the residents of the three storey apartments on the west side of Terry Street was considered to be high as the apartments look out onto a well-considered, almost entirely residential streetscape of high visual quality.

The magnitude of the change for residents on the west side of Terry Street was also considered to be high given that the view of the ventilation outlet (as part of the Iron Cove Link motorway operations complex (MOC4)) would comprise a substantial, highly contrasting element within the context of a well-articulated and substantially detailed residential development within this part of the street, and the revealed, small scale, period housing profiles on the opposite side of Victoria Road.

However, the removal of residential and commercial development fronting onto Victoria Road, and replacement with well setback, lower scale existing period housing profiles and streetscape improvements, in addition to centre median planting with substantial tree cover, would improve the visual character of this central part of the view. High visual impacts are not anticipated for the other viewpoints identified around the Iron Cove Link.

## Measures to manage visual impacts

The detailed design and construction of the M4-M5 Link project would be managed to ensure that, as far as possible, the identified landscape and visual impacts are minimised by implementation of a range of general and specific measures.

Visual impacts of the project would be minimised through considered development and implementation of the urban design and landscaping features in accordance with UDLPs that would be developed for the project. The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community. Urban design and landscape works would include the provision of landscape planting along and around key visible infrastructure such as ventilation facilities and motorway operations complexes. Over time and as this vegetation matures, the benefits provided by landscape planting will improve.

Mitigation and design measures that are proposed for the project to minimise identified visual impacts are outlined in **Chapter E1** (Environmental management measures) and include investigating measures during detailed design to reduce the height, bulk and scale of ventilation outlets at Iron Cove subject to achieving desired ventilation outcomes, and in accordance with the design principles detailed in the M4-M5 Link Urban design report.

### C13.4.5 Visual Impacts from directional and variable signage

A submitter raised concern about the visual impacts from the new directional and variable signage. In particular the submitter was concerned with the directional and variable messaging signs being unsuitable for residential locations and they suggested that measures should be implemented to ensure visual impact from these signs is minimised.

## Response

Wayfinding signage for the road infrastructure will be developed to the satisfaction of Roads and Maritime. Consultation will occur with the relevant local council regarding road signs for council roads. Signage for road infrastructure will be installed prior to the commencement of operation.

Traffic, locational, directional, warning and variable message signs would be incorporated within the tunnels and on surface roads at approaches to the tunnels. Variable message signs would be located within or directly adjacent to areas of operational infrastructure for the project and the existing adjacent arterial road network. Directional signage would be installed in accordance with the Austroads and Roads and Maritime standards, with a focus on providing clear and unambiguous direction to motorists.

All signage within the tunnels will be backlit and located to provide clear, highly visible, progressive and instructive decision-making information for motorists while minimising light spill and other visual impacts to visual receivers including nearby residential receivers. Variable message signs within busy road corridors are inherently consistent with the landscape character of such areas.

## **C13.5 Urban design and landscaping at Wattle Street at Haberfield**

Two submitters raised concerns about the urban design and landscaping at Wattle Street at Haberfield. Refer to section 13.5 of the EIS for details of potential operational urban design and visual amenity impacts of the project.

### **C13.5.1 Urban design and landscaping at the Wattle Street interchange**

A submitter was concerned that the EIS did not contain measures regarding the urban design at Haberfield. A submitter suggested that 'greening' the facade of the ventilation facility at Haberfield will make its appearance more sympathetic to the local area.

#### **Response**

The design of the Wattle Street interchange has been developed and assessed as part of the M4 East EIS. The urban design and landscaping approach for the Wattle Street interchange is detailed in the Draft M4 East UDLP which was publicly exhibited in late 2016. An addendum to the UDLP containing plans for the M4 East eastern and western ventilation facilities was on public exhibition in early 2017. Community submissions were reviewed following exhibition and would be addressed in the next revision of the plan. This UDLP includes the M4-M5 Link entry and exit ramps and tunnel portals (which are being built as part of the M4-M5 Link).

Once construction of the M4 East and M4-M5 Link projects is completed, remaining project land not required for operational infrastructure or subject to landscape works as part of the M4 East project would be rehabilitated and would be subject to the M4 East project's RLMP, UDLPs and/or the M4 East Legacy Project. These plans are currently being prepared by the M4 East project team and will be subject to the consultation requirements and timeframes set out in the M4 East project conditions of approval. The M4-M5 Link would not alter the final urban design and landscape outcomes for the M4 East, but may impact the timing of implementation of certain aspects.

## **C13.6 Urban design and landscaping at Rozelle interchange**

12 submitters raised concerns about the urban design and landscaping at the Rozelle interchange. Refer to section 13.5 of the EIS for details of potential operational urban design and visual amenity impacts of the project.

### **C13.6.1 Urban design around Rozelle interchange and surrounding surface work**

Submitters raised queries and concerns around the details of urban design and landscaping around the permanent operational infrastructure proposed at Rozelle interchange. Specific concerns include:

- The Rozelle Rail Yards park does not address key urban design objectives as the vision and primary function of the park is dominated by and structured around above ground operational infrastructure
- The ventilation facilities at the Rozelle Rail Yards should be consistent with the surrounding landscape
- The urban design for the Rozelle Rail Yards should be consistent with the heritage of the area
- There should be an increase in vegetation and landscaping around proposed works at Rozelle
- The ventilation supply, water treatment facilities and wetland at the Rozelle Rail Yards will remove the available area for potential open space and should be relocated or moved underground to provide more open space
- The noise wall in the Rozelle interchange parklands will visually separate the open space from residents
- Noise walls for the project should be 'green' walls
- The open space at the Rozelle Rail Yards will be divided by the new drainage channel



- Day to day maintenance of the Rozelle open space should be done by the Inner West Council.
- Landscaping should connect and be consistent with existing open space networks in Sydney such as the Green Grid and GreenWay
- Water sensitive urban design should be implemented at the Rozelle Rail Yards
- Concern that urban design and landscaping works will be delayed by the proposed future Western Harbour Tunnel project.

## Response

The project would deliver up to 10 hectares of new open space and active transport links for the community at the Rozelle Rail Yards as committed to by the NSW Government (announced in July 2016). A review of the Rozelle interchange against urban design principles for the project is presented in Table 13-23 of the EIS.

The works that would be carried out at the Rozelle interchange would include (but not be limited to):

- Detailed review and finalisation of the architectural treatment of the motorway operational infrastructure
- Reshaping of the landform at the site around the motorway operational infrastructure
- Provision of pedestrian and cyclist paths and bridges
- Provision of new open space within the Rozelle Rail Yards, including landscape works
- Revegetation and planting, including tree planting, at key locations including:
  - Around motorway operational infrastructure such as the ventilation facility
  - Around the constructed wetland, bioretention swale and the drainage channels
  - Adjacent to pedestrian and cyclist paths
  - Around the perimeter of the Rozelle Rail Yards.

A concept design for these works has been prepared, included in Appendix L (Technical working paper: Urban design) of the EIS. The concept design would be refined during the development of UDLPs, which will be prepared based on the detailed design and in accordance with relevant commitments in the EIS. The UDLPs would be prepared in consultation with relevant councils, stakeholders and the community.

## Above ground motorway structures

The three ventilation outlets at the Rozelle ventilation facility would be up to 35 metres in height (above existing ground level) and would be located near the intersection of City West Link and The Crescent. Their design, including material and colour choice, would respond to the local character, which includes the White Bay Power Station chimneys and Anzac Bridge pylons.

The air intake facility, water treatment facility and electricity substation within the Rozelle interchange would be designed in a manner that allows them to become recessive elements within the overall park design. This would be achieved by incorporating the roof of operational buildings within the overall landscape, while still allowing for appropriate access. Elements such as the water treatment facility and ventilation facilities would be co-located within the landscape to offer more functional space to the community. A discussion regarding options to relocate operational infrastructure at the Rozelle Rail Yards is provided in **section C4.9**.

Options to relocate the ventilation facility are discussed in **section C4.16.1**. Justification for the height of ventilation facilities is provided in **section C5.5.1**. For the ventilation outlets proposed for the M4-M5 Link, including the outlets at Rozelle and Iron Cove, the height, diameter and number of the outlets was primarily determined by the volume of air to be expelled (which is calculated based on tunnel width and length) and project air quality objectives. The height of the outlets was optimised by testing the effect of different outlet heights on the ground level concentrations of pollutants. See **section C5.5.1** for further information regarding ventilation outlet heights.

Measures will be investigated during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle, Iron Cove and St Peters, and provide materials/finishes that reduce impacts to sensitive visual receiver locations.

Noise walls are not proposed in the concept design for the Rozelle interchange. Noise walls may be required along/within the vicinity of the southern side of the widened Victoria Road at the Iron Cove Link. The noise walls are one of a number of noise mitigation options being investigated for the project and were therefore not included in the concept design for the project. If noise walls are deemed necessary, their location, form and function and potential visual impacts will be considered and assessed during detailed design. The design and treatment of permanent built works will be described in the relevant UDLPs for the project (see environmental management measure UD1 in **Chapter E1** (Environmental management measures)). Consultation will be undertaken with local residents in the event that noise walls are required for the project.

An Interpretation Strategy will be developed and implemented to identify and interpret the key heritage values and stories of the heritage areas affected by the project and inform the development of the UDLPs for the project (including at Rozelle interchange), in accordance with the *Interpreting Heritage Places and Items Guideline* (NSW Heritage Office 2005). The Interpretation Strategy will:

- Build on themes, stories and initiatives proposed as part of other stages of WestConnex to ensure a consistent approach to heritage interpretation for the project
- Include themes and stories including the Rozelle railways historic functions, trains and trams transport, industrialisation and the Rozelle-Darling Harbour Goods Line
- Identify how the rail related infrastructure salvaged from the Rozelle Rail Yards will be reused.

### **Recreational open space**

New, passive open space would be provided within the Rozelle Rail Yards, which were previously disused and inaccessible to the public. While some areas at the Rozelle Rail Yards would be required for above ground motorway structures, the project would deliver an increase to open space in this area.

No active recreational facilities form part of the scope for the project. The open space could be further developed in the future (by others) for specific active recreational purposes. Significant tree planting along the perimeter of the site would continue the canopy of surrounding areas. Large grassed areas would be complemented by tree planting and garden beds to create a series of spaces that could accommodate a range of future uses according to community needs.

Active transport links provided within and around open space and operational motorway infrastructure would ensure adequate north-south and east-west connectivity over the proposed drainage channel at the Rozelle Rail Yards so as to not isolate areas of open space.

The northern drainage channel is aligned to most efficiently convey drainage flows between the upstream (near Lilyfield Road) and downstream connection points (to Rozelle Bay), which are fixed.

Responsibility for the maintenance of the open space at the Rozelle Rail Yards would be subject to an agreement between Roads and Maritime and relevant stakeholders, including Inner West Council.

The open space the Rozelle Rail Yards would be consistent with the Sydney Green Grid by expanding Sydney's strategic open space network. The project would not directly connect with the Cooks River to Iron Cove Greenway, however Inner West Council (which is responsible for the GreenWay along with Canterbury Bankstown Council) would be consulted with during the development of the UDLP for the Rozelle Rail Yards. Future expansions of the GreenWay would be subject to the decisions of Inner West Council and the City of Canterbury Bankstown.

Water sensitive urban design (WSUD) would be considered in the detailed design of the project during the development of UDLPs. Refer to section 5.5.6 of Appendix L (Technical working paper: Urban design) of the EIS for further detail regarding the considerations that would be included in the detailed design of the project in relation to WSUD.

### **Proposed future Western Harbour Tunnel project**

A section of the Rozelle Rail Yards around the proposed future Western Harbour Tunnel entry and exit ramps would be kept as an area of hardstand in anticipation of it being used to support construction of the proposed future Western Harbour Tunnel project. As part of the project, this area would be physically separated from the remainder of the interchange to restrict access. The possible future use of this area would mean that landscaping and revegetation works may need to be staged.



## C13.7 Urban design around the Iron Cove Link and surrounds

Four submitters raised concerns about the urban design and landscaping for Iron Cove Link. Refer to section 13.5 of the EIS for details of potential operational urban design and visual amenity impacts of the project.

### C13.7.1 Urban design and landscaping around Iron Cove Link

Submitters raised queries and concerns around the details of urban design and landscaping around the permanent operational infrastructure proposed at Iron Cove Link. Specific concerns include:

- Suggest that street trees removed from Victoria Road near the Iron Cove Link be replanted
- Requests a reduction in the ventilation outlet height on Victoria Road and enhancement with urban design, or moved to an alternative location if possible
- Requests that the land between Springside Street and Byrnes Street be developed for active recreation for the community and include plenty of trees
- There should be 'no visually offensive concrete walls' close to Iron Cove Bridge at Rozelle.

### Response

As part of the project, urban design and landscape works would be carried out adjacent to disturbed areas associated with the Iron Cove Link surface works. The urban design and landscape works that would be conducted as part of the Iron Cove Link surface works would include (but not be limited to):

- Detailed review and finalisation of the architectural treatment of the motorway operational infrastructure
- Reshaping of the landform around the motorway operational infrastructure
- Reinstatement of an improved pedestrian and cyclist path along the southern side of Victoria Road, that would connect to the Bay Run, Iron Cove Bridge and local streets
- Provision of new open space, including landscape works
- Revegetation, including tree planting, at key locations including:
  - Around permanent operational infrastructure such as the ventilation facility
  - Adjacent to pedestrian and cyclist paths
  - Along the southern boundary of the land subject to the UDLP near Byrnes Street, Clubb Street and Toelle Street.

A concept design for these urban design and landscape works has been prepared having regard to the urban design objectives and principles. The concept design is included in Appendix L (Technical working paper: Urban design) of the EIS and includes identification of potential future uses of land around the Iron Cove Link surface works that could be delivered as part of the urban design and landscape works, including the provision of social and community facilities.

The design would be refined during the development of UDLPs for the project, which would be prepared based on a detailed design and in accordance with relevant commitments in the EIS, and in consultation with relevant councils, stakeholders and the community.

Opportunities to retain high retention value trees will be explored where practical during detailed design. Environmental management measure B6 (see **Chapter E1** (Environmental management measures)) for the project identifies that as many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the UDLPs to be developed and implemented for the project. Replacement trees will be planted within, or close to, the project footprint or other locations, in consultation with the relevant councils.

The project would also assist in future urban renewal along sections of Victoria Road. The forecast reduction in traffic along sections of Victoria Road, resulting from the Iron Cove Link, presents a number of opportunities, including a revitalised 'street' for businesses, locals and visitors. The future renewal of Victoria Road, however, is out of the current scope of this project.

Options to relocate the ventilation facility are discussed in **section C4.16.1**. Justification for the height of ventilation facilities is provided in **section C5.5.1**. For the ventilation outlets proposed for the M4-M5 Link, including the outlets at Rozelle and Iron Cove, the height, diameter and number of the outlets was primarily determined by the volume of air to be expelled (which is calculated based on tunnel width and length) and project air quality objectives. The height of the outlets was optimised by testing the effect of different outlet heights on the ground level concentrations of pollutants. See **section C5.5.1** for further information regarding ventilation outlet heights.

Measures will be investigated during detailed design to reduce the height, bulk and scale of ventilation outlets at Rozelle, Iron Cove and St Peters, and provide materials/finishes that reduce impacts to sensitive visual receiver locations.

## C13.8 Urban design and landscaping impacts - general

35 submitters raised concerns about the urban design and landscaping impacts of the project. Refer to section 13.5 of the EIS for the landscape and visual impact assessment.

### C13.8.1 General urban design considerations

Submitters raised concerns that the urban design considerations do not integrate with the surrounding areas. Specific concerns include:

- Suggest that more trees be planted than what is proposed in the EIS and that these include trees with dense canopies to provide visual screening
- SMC should capitalise on opportunities to obtain mature plantings of trees at risk from other infrastructure works in the Greater Sydney area
- Suggest an increase in vegetation and landscaping around proposed works at Rozelle and Lilyfield
- If trees are to be removed from the site, they must be replaced with mature trees as soon as the remediation of the site commences
- Rehabilitation should be undertaken where trees and vegetation is removed
- The project should be updated to include adequate vegetation and open space areas near roads and ventilation shafts
- Submitter is disappointed that the administrative buildings and ventilation facilities are designed without architectural innovation
- The tunnels and streetscape would look very different to what is presented in the artistic impressions
- Suggest that art be included throughout the project and that an artist be employed for the WestConnex program of works
- All landscaping, paths and other community infrastructure should be delivered to Inner West Council fully constructed and all buildings (if any) renovated before handover
- The visual amenity of tunnel portals should be improved by design treatments.

### Response

The urban design principles and objectives described in section 13.2 of the EIS form the basis for the development of detailed plans that would identify the form and typology of landscaping that would be carried out as part of the project. These include creating a sustainable and enduring design and integrating the motorway into the landscape. The project has committed to delivering new open space at the Rozelle Rail Yards, which are currently disused and inaccessible to the public.

The project would provide street tree planting for screening and shade, and mixed sizing of planting where stratification of the canopy is desired. Planting of mature and semi-mature trees will be considered for the project. Not all species of trees are conducive to transplanting, and this will be considered when developing plans to provide street trees as part of landscaping works. The project will aim to use tree species that will eventually provide appropriate levels of screening. It is unlikely that trees removed from other infrastructure projects would be used for planting as it is unlikely that the removal of trees for other infrastructure projects will align with the timing of tree planting for the M4-M5 Link.

As identified in Appendix S (Technical working paper: Biodiversity) of the EIS, opportunities to retain high retention value trees will be explored, where practicable, during detailed design and tree sensitive construction techniques will be considered. Environmental management measure B6 (see **Chapter E1** (Environmental management measures)) for the project identifies that as many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the UDLPs to be developed and implemented for the project. Replacement trees will be planted within, or close to, the project footprint or other locations, in consultation with the relevant councils and in accordance with Austroads guidelines.

Revegetation and planting, including tree planting, would be undertaken at key locations as part of urban design and landscape works including around key motorway operational infrastructure such as ventilation facilities.

The artist's impressions included in the EIS have been included to visually represent the bulk and scale of motorway operational infrastructure and do not incorporate architectural design treatments. A detailed review and finalisation of architectural treatment of the project operational infrastructure, including ventilation facilities, would be undertaken during detailed design. The architectural treatment of these facilities would be guided by ventilation facility performance requirements, the outcomes of community consultation and the urban design principles identified in section 13.2.2 of the EIS.

Section 5.5.7 of Appendix L (Technical working paper: Urban design) of the EIS identifies the mechanism for the inclusion of public art in the project through the development of UDLPs. The Urban Design Review Panel established by Roads and Maritime would provide advice regarding the development of UDLPs and would make recommendations in relation to artistic aspects of the project.

Responsibility for the maintenance of the open space delivered by the project would be subject to an agreement between Roads and Maritime and relevant stakeholders, including Inner West Council. Construction of relevant components of the project would be completed prior to the finalisation of such an agreement.

Annexure 1 of Appendix L (Technical working paper: Urban design) of the EIS includes a portal design review. The design review considers national and international approaches to portal design and identifies strategies to be considered during the detail design of the operational infrastructure.

Strategies identified for portal design include:

- The design should consider different user experience, balancing the experience of motorists who would often only view the portal for a matter of seconds, with the slower, pedestrian scale of the experience for surrounding communities
- The architectural approach should mark the portals in the landscape with a design that is considerate of the local context.

The final urban design (including architectural treatments) and landscape works that would be carried out by the project will be documented in UDLPs. UDLPs will be prepared in consultation with stakeholders and the community prior to the commencement of permanent built surface works and/or landscape works and will present an integrated urban design for the project (see environmental management measure UD1 in **Chapter E1** (Environmental management measures)). The concepts and principles outlined in the UDLPs will be developed into a detailed design for operational project infrastructure.

## C13.9 Safety and crime prevention through design

169 submitters raised concerns about safety and crime prevention through design. Refer to section 13.5 the EIS for details of crime prevention through environmental design of the project.

### C13.9.1 Safety and crime prevention through design

Submitters raised concerns on how the project design would reduce potential crime or antisocial behaviour and increase safety. Submitters' specific concerns include:

- Street trees should be introduced or retained as they are important safety mechanisms
- The Darley Road motorway operations complex (MOC1) will prevent safe and direct pedestrian access to the light rail stop, with users required to walk down a dark and winding path
- Pedestrian and bike routes through the open space should be equipped with appropriate lighting to improve safety during late hours
- The ventilation and other facilities at the Rozelle interchange could have safety issues due to distance between the operational infrastructure and the large open space to the east and low passive surveillance from nearby residential buildings and passers-by
- Parklands are visually isolated from residents north of Lilyfield and the proposed noise wall will increase safety issues
- The pedestrian bridge needs to include high quality lighting to offset the security risk of an underpass
- A crime prevention audit of the current design concepts should be undertaken
- Concerned about the safety of children at the Rozelle Rail Yards wetlands
- Objection to the proposed east-west pedestrian/cyclist underpass to replace the existing bridge over Victoria Road at Lilyfield as people feel safer on a bridge in public view and people walking to the buses will not feel safe using the underpass at night.

### Response

Principles of crime prevention through environmental design (CPTED) would be considered and incorporated into the UDLPs for the project. As part of that process, the guidance provided by the Safer By Design program managed by the NSW Police Force Crime Prevention and the Assessment of Development Applications (Department of Urban Affairs and Planning 2001) would be taken into account. In addition, the design guidelines *Designing to Minimise Vandalism* (Final Draft) (NSW Roads and Traffic Authority 2008a) and *WestConnex Urban Design Corridor Framework* would also be taken into account to minimise anti-social behaviour and improve safe public use of amenities.

Key CPTED principles that would be considered for incorporation into the project include:

- Vulnerability:
  - The public domain would be designed and managed to reduce or limit risk from assault by providing well-lit, visible places and pedestrian and cyclist systems and routes to important places
  - The design and management of places would avoid creating or maintaining hidden spaces close to pedestrian/cyclist travel routes in the public domain, in ways that remain consistent with the purpose of the place
  - The design and management of the public domain would provide a variety of available routes
  - The pursuit of safety would be delivered in ways consistent with the purpose of the place
- Legibility: the public domain would be designed, detailed and managed to make them easy to navigate and understand for users, especially pedestrians and cyclists, without losing the capacity for variety and interest
- Territoriality: security would be supported by designing and managing spaces and buildings to define clearly legitimate boundaries between private, semi-private, community group and public space

- Ownership of the outcomes: a feeling of individual and community ownership of the public domain and associated built environments would be promoted to encourage a level of shared responsibility for their security
- Management: the public domain would be designed and detailed to minimise damage and the need for undue maintenance, without undermining the aesthetic and functional qualities that make the places attractive to the community. Systems of both regular and reactive maintenance and repair would be implemented to maintain the quality of the places. A regular auditing system of CPTED issues in the public domain would be implemented
- Surveillance: the public domain and buildings would be designed and managed to maximise the potential for passive surveillance.

During detailed design, specific design measures would be developed for surface operational infrastructure to limit the potential for antisocial behaviour and maximise safety for the public and site workers.

The detailed design for the project would also include a detailed lighting concept that would be applied to all pedestrian paths and bridges which would be developed in accordance with AS/NZS 1158 Lighting for roads and public spaces, AS 4282 Control of the obtrusive effects of outdoor lighting, AS 4282 Control of the obtrusive effects of outdoor lighting, and AS/NZS 60598 – Series Luminaires. The principles that would inform the detailed design are detailed in section 5.5.5 of Appendix L (Technical working paper: Urban design) of the EIS and include a principle to promote safety.

The constructed wetland would be designed to appropriately mitigate safety risks for children.

The underpass at Victoria Road would be designed in accordance with the relevant principles of CPTED. The extent of the underpass under the Victoria Road bridge structure would be limited to a distance of around 50 metres. The underpass would be a relatively open space with a generous clearance height to the underside of the bridge structure and a generous width between the bridge pylons. It would also be relatively straight with a clear line of sight provided between the entry and exit points. Adequate lighting and surveillance would be provided in and around the underpass for safety and security.

The underpass would follow the grade of the finished ground level at this location and would connect to the active transport links which run:

- To the west through the new open space area at the Rozelle Rail Yards
- To the east to connect with Anzac Bridge, the opposite (east) side of Victoria Road and with potential for a future connection into The Bays Precinct area.

The underpass is considered to be a more effective and user friendly option for crossing Victoria Road by comparison to the existing elevated overpass.

## C13.10 Active transport connectivity

202 submitters raised concerns about active transport connectivity for the project. Refer to section 13.5.3 and section 13.5.4 of the EIS and Appendix N (Technical working paper: Active transport network) for details of active transport for the project.

### C13.10.1 Active transport connectivity

Submitters raised concerns that the urban design consideration does not provide active transport connectivity while other submitters supported the active transport opportunities that would be provided by the project. Specific issues include:

- The project does not adequately cater to the needs of cyclists
- The project should maximise connectivity
- The project should provide greater pedestrian and cyclist access across Victoria Road, City West Link and into the open space at the Rozelle Rail Yards
- The project should include better separated and more efficient active transport links at Rozelle and Annandale given the upgrades to The Crescent and City West Link for residents of Rozelle and Annandale



- The construction of this motorway will affect the pedestrian links between adjoining suburbs
- The alternative route proposed during construction along Bayview Street to Johnston Street is very steep
- Concern over the removal of the pedestrian and cycle bridge (also referred to as the 'Beatrice Bush Bridge') over Victoria Road/City West Link and associated removal of pedestrian access to Anzac Bridge and Glebe
- The removal of Buruwan Park will impact on cyclists, as there is a major cycle route through the park. Buruwan Park also lies on a major cycle route from Railway Parade through to Anzac Bridge and the Sydney central business district (CBD). The alternative route being suggested is poor and inadequate
- Objects to proposed overpass on Victoria Road
- The project will impact pedestrian connectivity and access to bus stops on Victoria Road, between Balmain and Rozelle, by the removal of the two footbridges from Victoria Road to The Crescent
- Additional footbridges or underpasses across Victoria Road to Darling Street are required
- Removing the traffic lights currently linking Victoria Road to the Western Distributor would impact on pedestrians accessing buses into the city and cyclists heading into the city, as well as to Glebe and beyond
- The EIS provides no assurances that current pedestrian crossings across Victoria Road between Toelle Street/Terry Street and Moodie Street/Wellington Street would be preserved
- The removal of the pedestrian bridge over Victoria Road would negatively affect cyclists, pedestrians and disabled people, who currently use it to access the bus stops (including the bus stop opposite Hornsey Street) and the city and Glebe
- The underpass beneath Victoria Road would require a considerable diversion and would involve climbing down and up either stairs or a long bike ramp compared to the existing overpass
- Request for details of the pedestrian access impacts to King George Park and The Bay Run
- The project will remove the pedestrian crossing in front of the Darley Road site
- The project will limit access to light rail at Darley Road for pedestrians including people with disabilities
- How does the project propose to maintain and enhance the links between the communities on either side of the interchanges for the project
- The project has not provided adequate active transport infrastructure around the Haberfield/Ashfield/Five Dock area
- Suggests a direct pedestrian link between Gordon Street and the Rozelle Bay light rail stop.

## Response

An active transport strategy has been developed for the project and is provided in full in Appendix N (Technical working paper: Active transport strategy) of the EIS. The active transport strategy was developed in consultation with stakeholders and through analysis of current and proposed active transport routes and relevant active transport policies and guidelines. The project provides an opportunity to address poor active transport connectivity in the study area, including along Victoria Road and the Rozelle Rail Yards at Rozelle. In addition, the diverting of through traffic from local roads onto roads upgraded as part of the project around the interchanges and into the WestConnex tunnels would improve pedestrian and cyclist safety.

Key north-south connectivity would be established via the two new pedestrian and cyclist bridges over City West Link. These links would greatly improve accessibility between Glebe/Annandale and Rozelle/Lilyfield. They would also provide connectivity between Rozelle Bay and Iron Cove, through key green spaces of Bicentennial Park, open space at the Rozelle Rail Yards, Easton Park and Callan Park.

East–west connectivity would be provided through the site connecting to the Lilyfield Road cycleway adjacent to the CBD and South East Light Rail (CSELR) Rozelle maintenance depot at the western end of the Rozelle Rail Yards. A path would be provided that connects to the existing Anzac Bridge shared path by travelling underneath the Victoria Road/The Crescent intersection. This connection would provide future possibilities for connections into The Bays Precinct.

The project would improve connectivity and safety for pedestrians and cyclists, and would contribute to the active transport network in the region. Cyclist and pedestrian paths delivered by the project would create safe links that have reasonable grades and are separated from vehicular traffic. The final gradients of cyclist and pedestrian paths would be subject to detailed design.

Indicative active transport being delivered as part of the project is listed in **Table C13-5**. The active transport links would maintain and enhance the links between communities on either side of the interchanges for the project. Active transport being delivered as part of the project would be complemented by other active transport projects being delivered separately by others as summarised in Table 7-1 of Appendix N (Technical working paper: Active transport strategy) of the EIS.

**Table C13-5 Indicative active transport links being delivered as part of the project**

Route	Benefits	Type	Approximate length
<b>Rozelle Rail Yards Link</b> Links the Bay Run, The Bays Precinct and the GreenWay in the west to Anzac Bridge and the Sydney CBD in the east	Links Anzac Bridge through The Bays Precinct to Lilyfield Road at the western end of the Rozelle Rail Yards <sup>1</sup>	Separated cycle path	250 metres
	Provides the junction connecting Rozelle Rail Yards and Victoria Road to The Bays Precinct	Underpass	150 metres
	Provides the link between Victoria Road and the CSELR Rozelle maintenance depot	Separated cycle path	1,000 metres
<b>Victoria Road – Iron Cove Link</b> Links the northern suburbs of Drummoyne and Russel Lea and Chiswick to The Bays Precinct and the Sydney CBD	Connecting the eastern side of the Rozelle Rail Yards along Victoria Road to the intersection of Robert Street	Separated cycle path	250 metres
	Linking the intersection of Springside Street to Iron Cove Bridge and the Bay Run	Separated cycle path	450 metres
	Connecting Victoria Road to The Crescent over the Rozelle Rail Yards	Bridge	200 metres
	Connecting Victoria Road to The Crescent	Shared path	400 metres
	Connecting The Crescent to James Craig Road existing active transport network	Shared path	500 metres
<b>Whites Creek Link</b> Links Parramatta Road to the Rozelle Yards and onto Callan Park	Linking the intersection of Brennan Street and Railway Parade over City West Link connecting to the Rozelle Rail Yards Link	Bridge	200 metres



Route	Benefits	Type	Approximate length
<b>Johnston Creek Valley link</b> Extends the existing Johnston Creek pathway to connect Glebe Foreshore to Parramatta Road	Connecting Easton Park to The Crescent through the Rozelle Rail Yards	Bridge/shared path	300 metres
	Providing a suitable cycling space for the connection along The Crescent, into Jubilee Park and linking the existing Glebe Foreshore	Shared path	500 metres

Note:

1 This component would be delivered by the M4-M5 Link and UrbanGrowth NSW.

Existing active transport connections around the Rozelle Rail Yards are shown in **Figure C13-1**. Proposed temporary changes to active transport connections around the Rozelle Rail Yards during the construction of the project are shown in **Figure C13-2**. Active transport connections around the Rozelle Rail Yards for the operation of the project are shown in **Figure C13-3**.

The final design of the active transport links to be delivered by the project would be subject to detailed design and in accordance with UDLPs that would be prepared for the project. UDLPs would be prepared in consultation with stakeholders and the community and would be exhibited for public comment prior to the commencement of permanent built surface works and/or landscape works. The aim of the UDLPs is to present an integrated urban design for the project.

An Active Transport Network Implementation Strategy will be prepared for the project (see **Chapter E1** (Environmental management measures)). The strategy will be consistent with the Active transport strategy in Appendix N of the EIS. The strategy will be prepared in consultation with relevant councils and Bicycle NSW and implemented prior to the commencement of project operations or as otherwise agreed to by the Secretary of DP&E.

### Active transport at The Crescent

There is an existing active transport connection at Buruwan Park which links Railway Parade to The Crescent under the Inner West light rail line bridge (see **Figure C13-1**). This connection would be temporarily removed during construction. Refer to Table 6-20 of the EIS and **Figure C13-2** for proposed modification to active transport connections during construction.

For the operation of the project, the connection under the Inner West Light Rail line bridge would be reinstated. This would connect Railway Parade to the realigned The Crescent and to the proposed pedestrian and cyclist bridge linking The Crescent and the Rozelle Bay Light Rail stop with the Rozelle Rail Yards over City West Link (see **Figure 13-3**).

The existing pedestrian bridge over Victoria Road east of the intersection of Victoria Road and The Crescent (identified as 'Beatrice Bush Bridge' by some submitters) would also be removed for widening and adjustments of Victoria Road between The Crescent and Anzac Bridge as part of the Rozelle surface works. Alternative routes for when the bridge is removed during construction are described in Chapter 8 (Traffic and transport) of the EIS and would be established before closure of the bridge. Refer to Table 6-20 of the EIS and **Figure C13-2** for proposed modification to active transport connections during construction.

The existing pedestrian bridge provides pedestrian and cyclist connectivity between Railway Parade/Bayview Crescent and The Crescent through to Lilyfield Road (via a separate pedestrian overpass to the north) and Anzac Bridge over Victoria Road from the shared path located to the south of City West Link towards The Crescent. These connections would be replaced by:

- A new east-west pedestrian and cyclist underpass below Victoria Road to connect Lilyfield Road with the opposite side of Victoria Road, Anzac Bridge and The Bays Precinct. This new link would offer improved visual amenity and safety and would remove the existing bridge structure over Victoria Road in the vicinity of White Bay Power Station

- North-south pedestrian and cyclist connections over City West Link via a new pedestrian and cyclist bridge over City West Link connecting Lilyfield Road and Easton Park with Brenan Street at Lilyfield
- North-south pedestrian and cyclist connections over City West Link via a new pedestrian and cyclist bridge over City West Link connecting Lilyfield Road and Easton Park with The Crescent at Annandale. The bridge would connect to the eastern side of The Crescent providing connectivity to the Glebe Foreshore and the western side of The Crescent providing connectivity through to the Rozelle Bay light rail stop.

Active transport connections around the Rozelle Rail Yards for the operation of the project are shown in **Figure C13-3**. The active transport connection through Rozelle Rail Yards would connect to the pedestrian and cycle underpass below Victoria Road. This link would connect with the existing shared path located to the north of Victoria Road towards Anzac Bridge.

While the proposed active transport connection at Rozelle would involve a slightly increased distance for pedestrians and cyclists travelling between Railway Parade and Anzac Bridge to bus stops on Victoria Road or other destinations, the connection would be associated with improved amenity through the open space at the Rozelle Rail Yards and would avoid two at-grade crossings at The Crescent and James Craig Road. Connection to the Glebe Foreshore during operation would be provided through the new bridge between Rozelle Rail Yards and The Crescent and shared path along The Crescent as well as at the existing at-grade pedestrian crossing at the corner of Johnston Street. The shared path would provide a suitable cycling space for the connection along The Crescent into Jubilee Park and linking to the existing Glebe Foreshore.

### Active transport at Victoria Road

All existing signalised crossings on Victoria Road between Anzac Bridge and Iron Cove Bridge will be maintained. The design of the Iron Cove Link provides improved pedestrian and cyclist accessibility between Toelle Street and Terry Street, connecting Rozelle and Balmain. The portals have been located to allow a direct link between these streets that would provide a crossing over Victoria Road, with a pedestrian refuge in the centre of the road above the portals. The project is predicted to significantly reduce traffic volumes along Victoria Road south of Iron Cove which should facilitate improved pedestrian movements across this corridor and between Rozelle and Balmain.

An overpass would not be constructed over Victoria Road for the project. The existing overpass at Victoria Road near Lilyfield Road is required to be removed to widen Victoria Road in this location. An underpass is proposed beneath Victoria Road to replace the overpass as outlined in **Table C13-5**. Residents southwest of Victoria Road would access the bus stop opposite Hornsey Street via the new underpass. The underpass would be designed in accordance with relevant safety and accessibility requirements. Crossing Victoria Road via the underpass would involve generally the same time and distance compared to crossing the road via the existing overpass. The existing overpass at Victoria Road requires pedestrians and cyclists to climb stairs or use the ramp before and after crossing via the overpass before crossing over the road. The underpass would require generally the same movements. Pedestrian access to The Bay Run and King George Park would not change for the operation of the project. The Bay Run would be temporarily realigned during construction (refer to **Chapter D3** (Relocation of the bioretention facility at Rozelle) for further information).

### Active transport at Darley Road

The existing access to the Leichhardt North light rail stop would be maintained for the project. Operational project infrastructure at Darley Road has been designed to reduce land-take and leave the central/eastern portion of the site, which is closer to the Leichhardt North light rail stop, to ensure access to the Rozelle Bay light rail stop is maintained and to provide for potential future development. The project would not impact the existing access in a way that would make the access noncompliant with the *Disability Discrimination Act 1992* (Commonwealth).

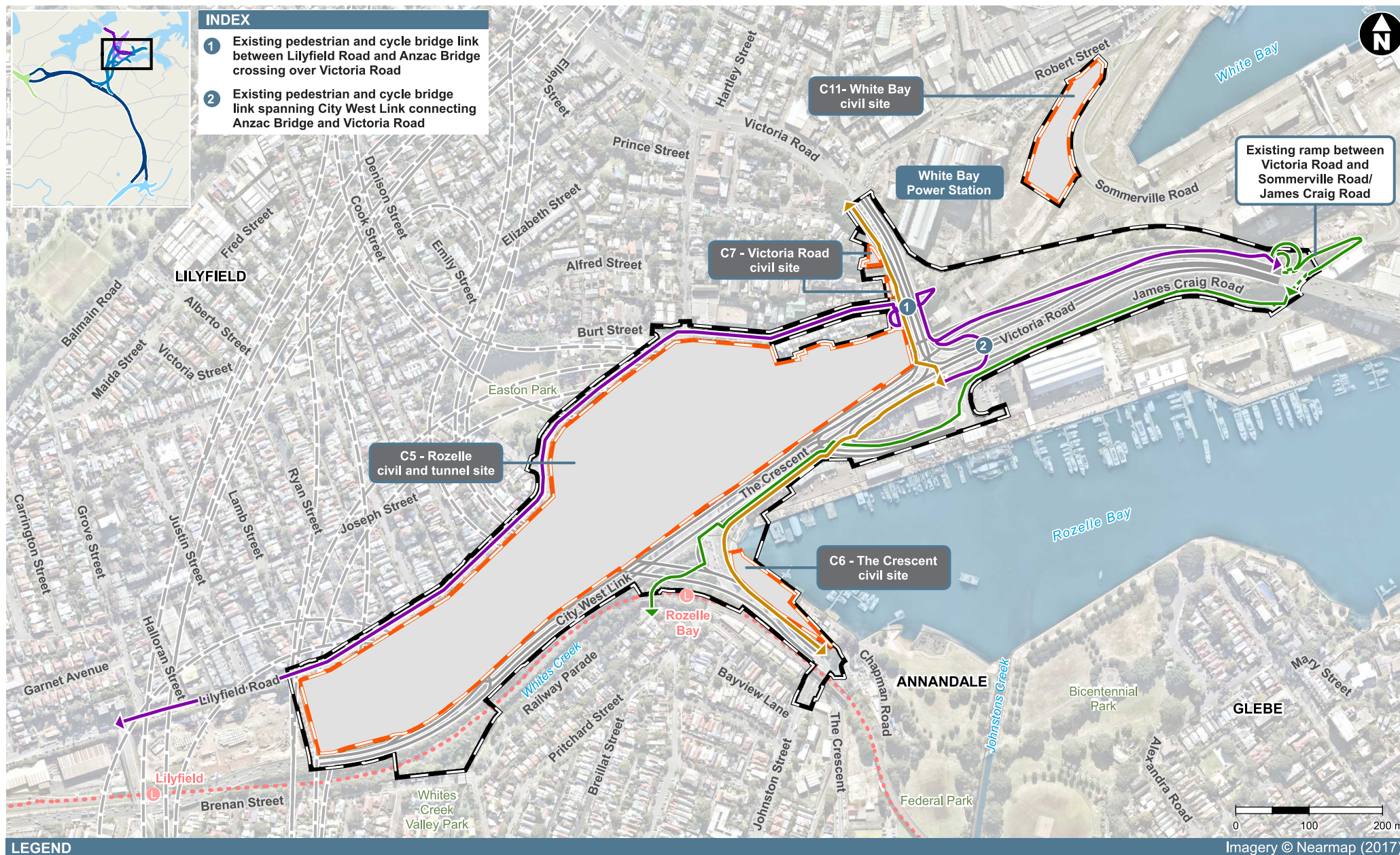
The pedestrian crossing on the northern side of Darley Road would be maintained for the project.

The support for the project is noted.

### Active transport at Haberfield

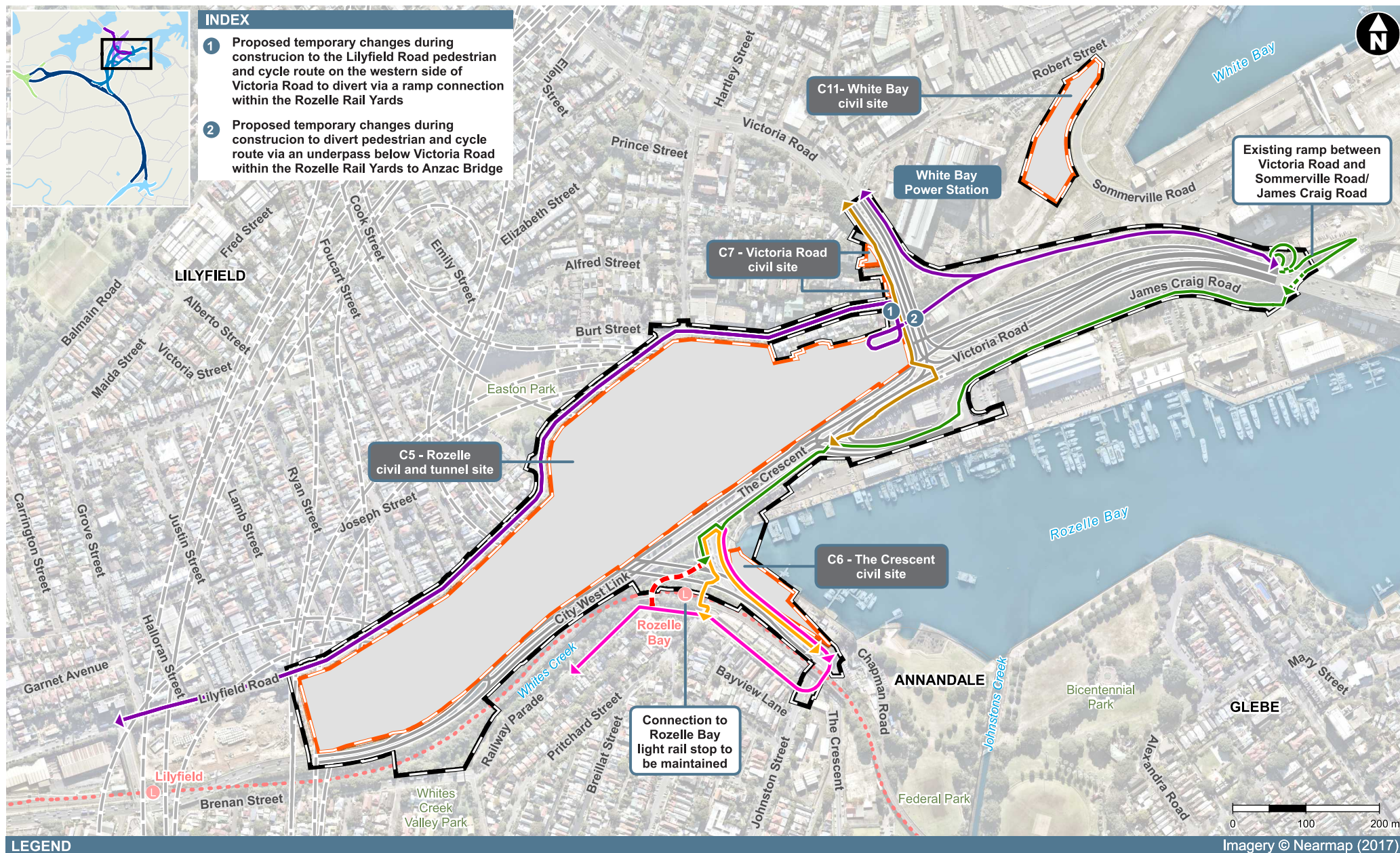
The draft M4 East UDLP outlines the active transport links to be provided at Haberfield by the M4 East project.





**Figure C13-1** Existing active transport connections around the Rozelle Rail Yards





**Figure C13-2** Proposed temporary changes to active transport connections around the Rozelle Rail Yards during the construction of the project



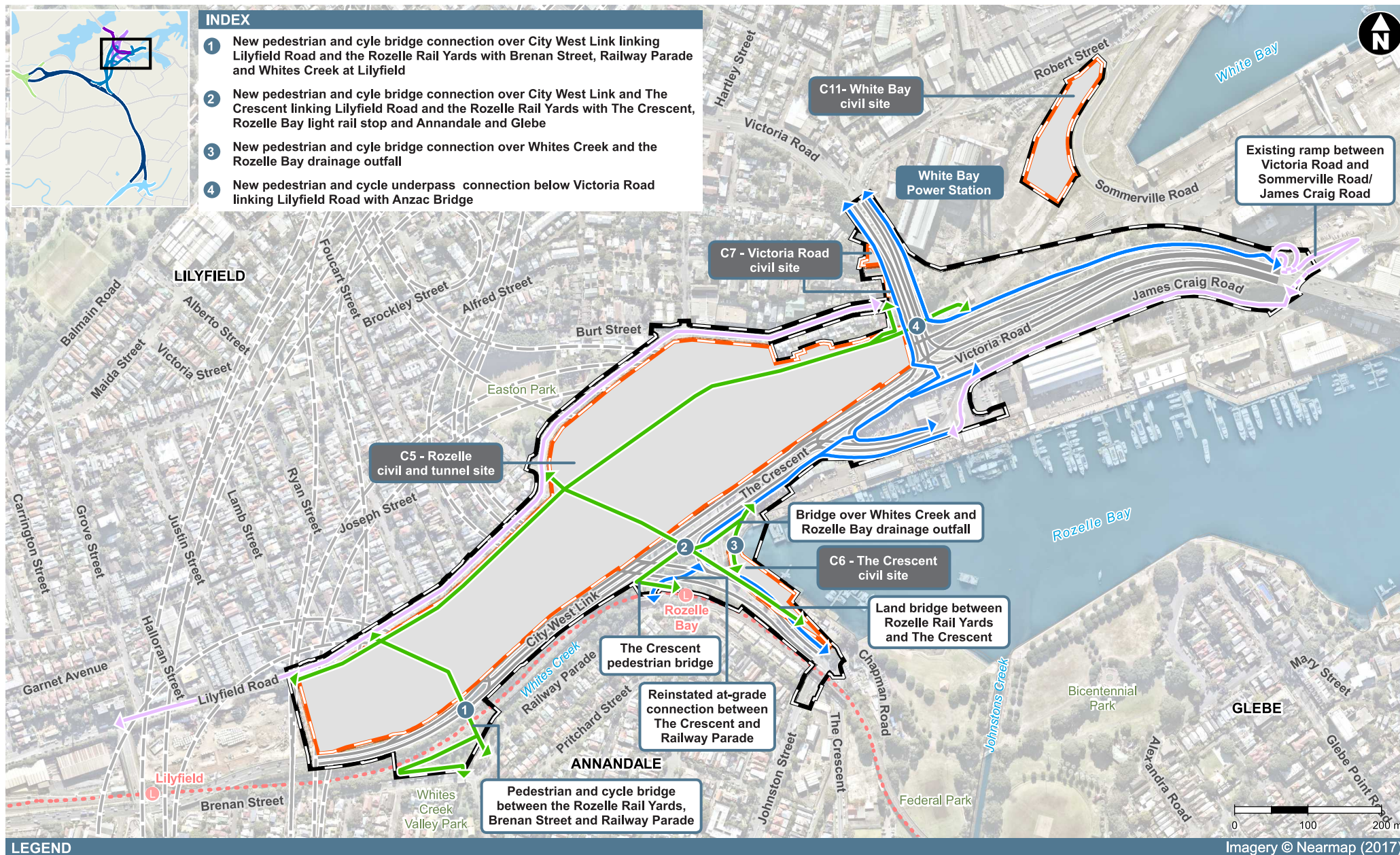


Figure C13-3 Active transport connections around the Rozelle Rail Yards for the operation of the project

## C13.11 Cumulative urban design and visual amenity

Two submitters raised concerns about cumulative urban design and visual amenity impacts. Refer to section 26.4.5 of the EIS for details of cumulative urban design and visual amenity impacts .

### C13.11.1 Removal of trees from multiple projects

Submitters were concerned that a large number of trees have already been removed for WestConnex and that more are going to be removed in Foucart Street and Cecily Street, Rozelle and in Lilyfield and Haberfield.

#### Response

The impacts of the WestConnex program of works and other related projects have been assessed for impacts to vegetation loss and consistent management measures have been identified. No native vegetation is to be removed as part of the M4-M5 Link project. The removal of trees would contribute to cumulative visual impacts to residents and motorists at Haberfield and Ashfield for the M4 East project and at St Peters for the New M5 project as, outlined in section 26.4.5 of the EIS.

As for the M4-M5 Link project, the UDLPs prepared for the interfacing areas at the Wattle Street interchange for the M4 East and St Peters interchange for the New M5 would include landscape works including revegetation and planting at key locations. As many trees as possible will be retained during the construction of the project. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the relevant UDLP.

## C13.12 Urban design and visual amenity environmental management measures

242 submitters raised concerns about the urban design and visual amenity environmental management measures for the project. Refer to section 13.6 of the EIS for details of urban design and visual amenity environmental management measures for the project

### C13.12.1 Urban design and visual amenity environmental management measures

Submitters raised concerns about urban design and visual amenity environmental management measures during the project. Concerns relate to:

- The EIS does not address the impacts of the project and there is a need to propose walls, plant and perimeter treatments and other measures at appropriate locations to lessen the impact on visual amenity
- All trees should not be removed unless sufficient investigations have been conducted. If trees are removed following investigation considerations then an approval needs to specify that all trees are replaced with mature native trees
- The proposed replacement trees are too small and are inadequate to compensate for the removal of the original trees
- What mitigation measures will be used to control light impacts at the Pymont Bridge Road tunnel site (C9) as the site will be active 24/7.

One submitter supported the commitment in the EIS that lighting during construction would adhere to established guidelines.



## Response

The detailed design and construction of the M4-M5 Link project would be managed to ensure the identified landscape and visual impacts are minimised by implementation of a range of general and specific measures which are outlined in **Chapter E1** (Environmental management measures).

A range of urban design and landscape works are proposed for the project which are outlined in Chapter 13 (Urban design and visual amenity) of the EIS. The urban design and landscape works that would be carried out by the project would be documented in UDLPs. UDLPs would be prepared in consultation with stakeholders and the community prior to the commencement of permanent built surface works and/or landscape works and would present an integrated urban design for the project.

The concepts and principles outlined in the UDLPs would be developed into a detailed design for operational project infrastructure. The detailed design will be consistent with the project urban design principles (see section 13.2.2 of the EIS) and would include:

- Final land use for UDLP land
- Final design and material composition for built form structures
- Final landscape design
- Final heritage interpretation plan
- CPTED review of design.

## Mitigation of impacts to trees

The detailed design and construction of the M4-M5 Link project would be managed to ensure that, as far as possible, the identified landscape and visual impacts related to the removal of trees are minimised and amenity is improved once the project is complete. This would be achieved through the implementation of a range of general and specific measures, including the implementation of urban design and landscape works as part of UDLPs (urban design and landscape works are summarised in section 13.5 of the EIS and throughout this chapter).

The arboricultural assessment at Annexure G of Appendix S (Technical working paper: Biodiversity) of the EIS provided a number of recommendations for tree protection to ensure that impacts of the project on trees are minimised following the hierarchy of avoid, minimise and mitigate as follows:

- A CFFMP will be developed and implemented during construction. The CFFMP will include measures to manage potential impacts to trees, including
  - The establishment of TPZs
  - Ground protection measures for trees to be retained
- As many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the UDLP to be developed and implemented for the project.
- The CFFMP will include tree management protocols and provision for the development of tree management plans (in accordance with the requirements of AS 4970-2009) where required for specific trees. Protection of trees on development sites will be carried out in consultation with an arborist with a minimum AQF Level 5 qualification in arboriculture for each tree proposed for retention where works associated with the project have the potential to impact on the tree root zone.
- Pruning and maintenance work will be carried out by an arborist with a minimum AQF Level 3 qualification in accordance with *AS 4373-2007 Pruning of Amenity Trees* and the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998) and advice provided by an arborist with a minimum AQF Level 5 qualification in Arboriculture (or equivalent).

The size and species of replacement trees would be identified during the development UDLPs for the project and would be consistent with project urban design principles. Planting of mature and semi-mature trees will be considered for the project. Not all species of trees are conducive to transplanting, and this will be considered when developing plans to provide street trees as part of landscaping works. The project will aim to use tree species that will eventually provide appropriate levels of screening.

### **Mitigation of night lighting impacts**

Site lighting at the Pymont Bridge Road tunnel site (C9) would be designed to minimise glare issues and light spillage at neighbouring properties and would be generally consistent with the requirements of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting.

The support for the commitment of the project to adherence to relevant lighting guidelines is noted.

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## C14.1 Level and quality of assessment

1,025 submitters raised concerns about the quality of the social and economic assessment. Refer to section 14.1 of the EIS and Appendix P (Technical working paper: Social and economic) of the EIS for details of the social and economic assessment methodology.

### C14.1.1 Adequacy of the social and economic assessment

Submitters raised concerns about the adequacy and independence of the social and economic impact assessment stating that there was inadequate information provided to gauge the real impact to residents and communities caused by the project. Submitters also believed that a social and economic assessment had not been conducted. Specific concerns include:

- The EIS is based on a concept design and therefore the assessment does not appropriately identify affected residents
- The company that conducted the social and economic impact assessment has a conflict of interest due to their involvement in property valuation and development in affected areas, and their involvement in the two preceding stages of WestConnex
- Table 5-27 in Appendix P details the preferred modes of travel to work in the Leichhardt-Glebe precinct. However, these numbers are from 2011 and are outdated, particularly in regards to the figures for rail
- Labelling of people affected by the project as 'receivers' dehumanises those affected
- The EIS does not assess the social disruption in communities in relation to property acquisitions, specifically the impact on communities from the acquisition of local shops, in Haberfield and Ashfield
- The social and economic assessment does not include the difficulties that residents or other property owners could face in relation to redress for property damage from vibration
- The EIS is misleading because it discusses the number of jobs created for construction works while omitting the number of jobs that would be lost due to acquisition of businesses
- The assessment methodology for identifying impacts to businesses during construction is not adequate, including the level of transparency in this assessment
- The assessment did not consider impacts between 2023 and 2033 (during operation)
- The impact of traffic exiting the mainline tunnels and entering local roads throughout the inner west (including Haberfield, Ashfield, Newtown, Enmore and Alexandria) has not been adequately assessed
- The EIS ignores amenity impacts on the community, including at St Peters interchange
- The EIS does not adequately explain or address the social cumulative impacts of the broader WestConnex program of works. No research was conducted on the current experiences of residents living with impacts from construction, particularly construction impacts to residents at Haberfield and St Peters as a result of the M4 East and New M5 projects. Without this data, the EIS makes incomplete and inadequate predictions of social and economic impacts
- Concern regarding the lack of reference made to M4 East and New M5 construction impacts for the social and economic impact study. The only reference made is to construction fatigue, which is not adequate enough for the impacts on health, noise and the destruction of relationships
- What evidence is there that business impact surveys were conducted at Ashfield and Haberfield?
- The study refers to the overall construction impact on the Inner West LGA as 'moderate' but makes no attempt to quantify this negative impact either in terms of the costs to households or lost productivity
- The EIS does not evaluate what the cumulative social and economic impacts of a hybrid option for construction sites at Haberfield and Ashfield are on the community
- The impact of the project on liveability has not been addressed

- This EIS has not properly analysed the social and economic impacts of the whole project on residents and businesses which will be forced to leave their current locations, or the impact on those who will be left on the perimeters of the proposed toll road on roads including King Street at Newtown or The Crescent at Annandale.

## Response

### Preparation of EIS and social and economic impact assessment

The EIS was prepared by a team of qualified professionals and presents a balanced, merit-based environmental impact assessment in accordance with the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and applicable NSW assessment policies. The EIS included the preparation of a range of comprehensive technical studies including the social and economic impact assessment (SEIA). These technical studies were prepared in accordance with the key issues identified in the Secretary's Environmental Assessment Requirements (SEARs), which included requirements issued by key government agencies as well as industry standards and guidelines. The EIS, including detailed technical studies, was reviewed by the NSW Department of Planning and Environment (DP&E) and key NSW Government agencies to confirm that it addressed the SEARs prior to being finalised and placed on public exhibition.

The SEIA was also undertaken in accordance with the Roads and Maritime *Environmental Impact Assessment Practice Note: Social and economic assessment* (Roads and Maritime 2013), as required by the SEARs. The practice note provides a framework for assessing social and economic impacts to ensure these assessments are carried out consistently, to a high standard, and are properly integrated with other environmental assessments, design development and management processes.

The assessment of a concept design in an EIS is a common approach and has been applied to other recent major infrastructure projects in NSW including Sydney Metro City and Southwest and Central Business District (CBD) and South East Light Rail. While the SEIA is based on a concept design, the study area for the assessment is broader than the project footprint, thereby capturing a larger number of potentially affected people, communities and businesses. The study area for SEIA is shown in Figure 14-1 of Chapter 14 (Social and economic) of the EIS.

Should the final tunnel alignments and project sites developed during detailed design identify potential receivers that were not assessed in the EIS, further separate environmental assessment would be undertaken, if required, under the EP&A Act. Further information on the preparation of the EIS based on a concept design is included in **Chapter C2** (Assessment process).

This SEIA was undertaken by the planning team of HillPDA however, HillPDA was not involved in preparation of the SEIAs for the New M5 or M4 East EISs. While HillPDA has a property valuation capability, the valuation team within HillPDA was not involved in, and has not influenced in any way the preparation of Appendix P (Technical working paper: Social and economic) of the EIS.

See **section C14.4.2** for a response to the issue regarding the potential loss of jobs as a result of the acquisition of businesses.

### Language and data used in the SEIA

The journey to work data from 2011 included in Table 5-27 of Appendix P (Technical working paper: Social and economic) of the EIS represents the most current data available at the time of writing the EIS. The data is informed by the 2011 Census from the Australian Bureau of Statistics. A complete set of the data from the 2016 Census had not been published at the time of writing the EIS, and only a summary was available.

The use of 'receivers' is standard terminology in environmental impact assessment in NSW. The use of this term is not intended to distance the project from affected people, businesses and/or communities, but to ensure the consistent use of terminology throughout separate sections of the assessment. The term is also used in the SEARs for the project as issued by DP&E.

### Construction impact assessment

The social and economic impacts arising from property acquisition are described in section 7.3 of Appendix P (Technical working paper: Social and economic) of the EIS. The EIS recognises that there would be major impacts on individuals, businesses and social infrastructure as a result of property acquisition; although it also recognises that the number of acquisitions is low for an infrastructure project of this scale. The project has been designed to minimise the need for property acquisition and the number of property acquisitions around Haberfield are limited.



All property acquisition undertaken by the NSW Government is in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) and the reforms announced in October 2016 (NSW Government 2016b). Information about the property acquisition process and the reforms can be viewed online<sup>1</sup>.

The reforms were implemented as a result of a review of the existing acquisition process, which demonstrated that although the legislative framework for land acquisitions was sound, there was more work to be done to ensure that a stressful and complex situation is made as easy as possible. The new approach has a greater focus on providing support to affected residents and business owners with their relocation. Each property owner or tenant is now assigned a Personal Manager as a consistent point of contact throughout the acquisition process and to provide relocation assistance. Property owners must now be given at least six months to reach a compensation agreement before the compulsory acquisition process can start.

The overall impact of property acquisition on the social and economic environment was considered to be a minor negative impact given the relatively low number of acquisitions, noting that the impact on individual affected residents and businesses would be major, however, somewhat mitigated by the implementation of the reforms described above and the environmental management measures PL1, and SE2 to SE6 in **Chapter E1** (Environmental management measures). Impacts on other social and economic elements of the community such as community cohesion, community safety and health, demographics, local amenity and community identity and character, were also assessed and are not expected to be substantially affected by the project based on the relatively low number of acquisitions.

St Peters was included in the technical working papers prepared to support the EIS. Potential impacts to the amenity of St Peters were assessed with regard to traffic, air quality, noise and vibration, human health, visual and social and economic impacts with an assessment against both construction and operation of the project, in section 7.2 and section 8.2 of Appendix P (Technical working paper: Social and economic) of the EIS respectively.

Regarding potential impacts to businesses from property acquisitions, the EIS acknowledges the potential for job losses associated with property acquisition (refer to section 7.3.2 of Appendix P (Technical working paper: Social and economic)), however the EIS does not state the number of jobs potentially affected by these acquisitions as these changes are generally very difficult to accurately predict. The acquisition of a business property does not directly correlate to job losses as some businesses may relocate or transform their services. The degree of impact upon any particular business would be highly variable according to the business type, industry, location, customer base, size and connectivity with other outlets. In addition, the personality and nature of particular business operators may mean that certain businesses are more flexible than others in dealing with disruptions, further complicating the potential for accurate prediction of specific impacts such as job losses.

The SEIA was prepared in accordance with *Environmental Impact Assessment Practice Note - Socio-economic assessment* (EIA-N05), which provides guidance on the steps to be undertaken when assessing potential impacts to businesses, including passing trade, parking, servicing and deliveries, employment and recruitment, business access, connectivity and amenity. Around 29,000 businesses were identified in the social and economic study area with the Alexandria and Erskineville precincts containing the largest number of businesses and being the largest employment precincts (refer to Figure 14-1 of Chapter 14 (Social and economic) of the EIS)).

Business surveys were conducted within 400 metres of construction ancillary facility sites at Rozelle and Lilyfield over a two-week period in November 2016 (refer to Annexure A of Appendix P (Technical working paper: Social and economic) of the EIS). The survey provided businesses the opportunity to raise concerns related to the project. Around 100 businesses participated in the survey, comprising local retailers, commercial operators and other businesses. Businesses around the construction ancillary facility sites at Haberfield and St Peters were not included within the survey as perceptions and concerns were collected during the M4 East and New M5 projects.

The sensitivity of business clusters and vulnerability of businesses to potential impacts includes consideration of (refer to section 7.9 of Appendix P (Technical working paper: Social and economic) of the EIS):

- Passing trade
- Employee and customer access and travel time

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<sup>1</sup> [www.propertyacquisition.nsw.gov.au](http://www.propertyacquisition.nsw.gov.au)

- Customer and employee parking accessibility
- Servicing and deliveries
- Ambience
- Employee productivity and communication capacity
- Business visibility
- Demand for services.

A Business Management Plan would be prepared and would identify businesses that have the potential to be adversely affected by construction activities that would occur as part of the project and management measures that would manage these potential impacts. These would be determined in consultation with the owners of the identified businesses.

During construction, vibration effects on local amenity would be intermittent in nature and short-term at any particular receiver. An assessment of the potential social and economic impacts of property damage from vibration is specifically addressed in section 7.2.1 and section 8.2.2 of Appendix P (Technical working paper: Social and economic) of the EIS. Measures to avoid, and where the impact cannot be avoided, to manage potential damage to property and measures to rectify property damage caused by the project, are provided in full in **Chapter E1** (Environmental management measures) and summarised in **Chapter C12** (Land use and property). These measures include preparation and implementation of a Construction Noise and Vibration Management Plan (CNVMP) for the project, vibration monitoring and further location and activity specific noise and vibration assessment.

The minimisation and rectification of incidental damage to property during the construction of the project due to general construction activities such as the movement of mobile plant or heavy construction vehicles would be the responsibility of the design and construction contractor(s) for the project.

### Operational impact assessment

For operational impacts, the SEIA has assessed the impacts of an operational project scenario at opening in 2023 and at ten years after opening in 2033, based on the outcomes of the traffic modelling undertaken for the EIS. The year 2033 was selected as representative of a future scenario based on the Roads and Maritime *Traffic Modelling Guidelines 2013*. A 10 year assessment of operation of the project (year of opening plus 10 years) is standard assessment approach for major road infrastructure projects and is consistent with the assessment approach adopted in the M4 East EIS and New M5 EIS.

The EIS considered the social and economic impacts arising from operational changes to traffic on local roads throughout the inner west (including Haberfield, Ashfield, Newtown, Enmore and Alexandria) (refer to sections 7.1.1 and 8.1.1 of Appendix P (Technical working paper: Social and economic) of the EIS). The assessment concluded that this impact would have a minor negative impact on the surrounding community. These impacts would be offset by the improved connectivity, reduced travel times, increased reliability and safety, and reductions in traffic on some parallel routes once the project is operational.

### Cumulative impact assessment

Cumulative social and economic impacts of the WestConnex program of works are summarised in Chapter 26 (Cumulative impacts) of the EIS. The SEIA addressed potential cumulative effects including construction fatigue, particularly in areas subject to construction impacts from the M4-M5 Link project and other WestConnex component projects, such as the M4 East and New M5 projects at Haberfield/Ashfield and St Peters respectively. Feedback from other Sydney Motorway Corporation (SMC) project teams, design and construction contractors and DP&E was sought on the M4 East and New M5 construction phases to identify lessons learnt and areas for improvements to work processes and mitigation measures to assist in addressing potential cumulative impacts. Further information regarding the assessment of cumulative impacts at Haberfield and St Peters is included in the response in **section C14.12.1**.

Multiple community and stakeholder consultation sessions were held for the M4-M5 Link project prior to and during preparation of the concept design report and EIS, and throughout the submissions report process for the project. This included hosting sessions in Haberfield and St Peters, where communities currently being affected by the M4 East and New M5 construction works were able to provide feedback to the project team. A detailed summary of community and stakeholder consultation undertaken for the project is included in Chapter 7 (Consultation) of the EIS. Future consultation for the project is discussed in **section A2.5**.

### C14.1.2 Assessment of social and economic impacts of tolling

Submitters were concerned that the social and economic assessment did not adequately assess the impacts of tolling or toll avoidance (and its link to cost of living pressure) on the community. Other concerns raised by the community included:

- There is no analysis of equity impacts of the infrastructure investment and the tolling regime, given the lower social and economic status of many areas of western Sydney, and the requirement for potential users of WestConnex to own or pay for access to a private vehicle to be able to use it
- The EIS does not accurately reflect evidence of the impact of tolls on less advantaged communities, although it does acknowledge it as a problem, it makes no attempt to consider the long-term impacts on the cost of living for drivers of decades of escalating tolls
- The investigation and analysis of the impact of tolls is not adequate and underestimates the social, economic and health burden it would place on residents for decades to come.

### Response

The SEARs require the traffic assessment for the project to forecast travel demand and traffic volumes with consideration of toll avoidance. The value of travel time savings to different vehicle users, in terms of their willingness to pay tolls, is factored into the WestConnex Road Traffic Model (WRTM) that informed the traffic and transport assessment for the project (as described in section 9.8 of Appendix H (Technical working paper: Traffic and transport) of the EIS). The SEIA is informed by the traffic and transport assessment and therefore considers toll avoidance.

To assess the values that differing vehicle users place on travel time savings, a project specific survey was designed and conducted in Sydney in 2013 asking road users questions about their willingness to pay tolls. Independent specialist peer reviewers provided oversight throughout the design and analysis of the survey. The survey yielded a distribution of estimates of the value that Sydney drivers are willing to pay in terms of tolls to reduce their travel time. These values were benchmarked against values from other studies in Australia and internationally. The survey results are used within the WRTM's route choice algorithm to represent the influence of a toll.

The SEIA does indicate that lower income households in western Sydney may not be able to afford the tolls for the M4-M5 Link (\$6.50 in 2017 dollars). However, the WestConnex program of works, which includes the project, would provide good value for commuters from western Sydney to the Sydney CBD as it would be capped at \$8.60 (2017 dollars) for cars and light commercial vehicles, once all WestConnex component projects are operational (by 2022). The cap would come into effect after at least 16 kilometres of travel on the motorway. A cap on the toll provides certainty to users about the costs and improves the overall value for money to the community. On this basis the EIS considered the overall social and economic impact to be moderate positive.

Free, alternative traffic routes, such as Parramatta Road, City West Link, King Georges Road, the Hume Highway, Stanmore Road, Sydenham Road and the Princes Highway, would remain available to those who choose not to use the tolled motorway. Motorists who choose to use the existing surface road network would still benefit as the capacity on these alternative routes is forecast to improve (as freight and commercial vehicles are expected to use the motorway tunnels). Individuals will have to weigh up the benefits of using the motorway, which includes travel time savings, a safer option with lower potential for traffic accidents and reduced vehicle operation and maintenance costs, with the financial cost of using the motorway. Further information regarding the potential impacts associated with tolling is included in **section C14.9.2** including the announcement of a vehicle registration cashback scheme for motorists who spend more than \$25 on average a week over a 12 month period on tolls in NSW to claim free vehicle registration by the NSW Premier.

### C14.1.3 Assessment of social infrastructure

Submitters raised concerns with the assessment of impacts on social infrastructure. The following concerns were raised:

- The Minister of Education was not consulted
- Impacts to schools have not been adequately assessed
- Impacts associated with loss of amenity from reduced access to open space should have been accounted for.

#### Response

As outlined in Chapter 7 (Consultation) of the EIS, the Department of Education was consulted during the development of the EIS.

The SEIA provided an assessment of impacts on community facilities resulting from the construction and operation of the project. A comprehensive list of community facilities identified within the SEIA study area was provided in the EIS (refer to section 5.2 of Appendix P (Technical working paper: Social and economic)). The study area contained a wide range of educational facilities, including 50 primary schools and 15 secondary schools. Potential impacts to educational facilities in the vicinity of the project footprint, such as Rozelle Public school, Haberfield Public School and the Bridge Road School have been assessed in Chapter 7 of Appendix P (Technical working paper: Social and economic) of the EIS.

To minimise the consequence and likelihood of impacts on social infrastructure, a Social Infrastructure Plan and Community Communication Strategy would be prepared and implemented to avoid, minimise and manage avoid potential construction effects. See **Chapter E1** (Environmental management measures) for further information regarding measures to manage potential social and economic impacts.

Further concerns raised by submitters regarding potential impacts to social infrastructure including schools are responded to in **section C14.3.2**. See **section C14.3.1** for a response regarding the loss of open space at Buruwan Park and a small part of King George Park, and how this would be offset by new open space at Rozelle. Issues with access and connectivity are discussed in **section C14.2.2**.

## C14.2 Community impacts during construction

1,876 submitters raised concerns about changes in the community as a result of construction of the project. Refer to section 14.3 of the EIS and Appendix P (Technical working paper: Social and economic) of the EIS for details of potential changes to the community as a result of construction of the project.

### C14.2.1 Community values

Submitters raised concerns that tunnelling, pollution and disruption during long-term construction of the project would result in general impacts to local communities including impacts on culture, local character, liveability, quality of life, lifestyle and sense of worth of community.

Specific concerns mentioned in submissions include:

- Community cohesion, liveability and residents' quality of life would be affected by construction
- Long term construction timelines would cause a disruption and inconvenience to people's lives
- General concerns regarding impacts to communities.

Specific areas mentioned included the areas around the Option A and B sites at Haberfield and Ashfield, Pyrmont Bridge Road tunnel site (C9) site, the inner west and the suburbs of Annandale, Ashfield, Haberfield, Leichhardt, Lilyfield, Rozelle, St Peters and surroundings suburbs.

## Response

Given the project's size, duration and complexity, construction would generate a range of social and economic impacts. In response to community concerns and design constraints identified during the preparation of the EIS, a number of substantial changes have been made to the project design (refer to Chapter 4 (Project development and alternatives) of the EIS). Project design alterations to reduce potential social and economic construction impacts include:

- Adjustment of the project footprint to avoid using Easton Park at Rozelle during construction and to minimise impact on Lilyfield Road and the heritage listed Sydney Water sewerage pumping station
- Adjustment of the project footprint to avoid using areas around Blackmore Park, Leichhardt during construction
- Removal of a potential construction site in Derbyshire Road, Leichhardt, adjacent to Sydney Secondary College (Leichhardt Campus) to prevent amenity, traffic and heritage impacts
- As a result of the deletion of the Camperdown interchange, adjustment of the mainline tunnel alignment further to the west which has avoided construction impacts on the Royal Prince Alfred Hospital and the University of Sydney
- The selection of spoil haulage routes to primarily follow the arterial road network and avoid local roads
- The restriction of hours for spoil haulage from the Darley Road civil and tunnel site (C4) to standard construction hours to avoid noise, traffic and amenity impacts on local residents.

The SEIA acknowledges and assesses the potential construction impacts of the project. Where possible, these issues have been minimised by adopting the design alterations outlined above, or appropriate management measures have been identified to reduce the impacts during construction. The design and proposed management measures have also been informed by lessons learnt from the implementation of preceding WestConnex component projects that are currently operational or under construction, to ensure that impacts are thoroughly considered and management measures are feasible and reasonable.

The key impacts to community values identified in the SEIA as a result of construction include property acquisition and changes to neighbourhood identity and character, community safety and health, and community cohesion. The SEIA has assessed these impacts with consideration of the overall duration of construction for the M4-M5 Link project. The property acquisition impacts from the project are reduced by comparison to the M4 East and New M5 projects, being largely confined to NSW Government owned land and land within footprint of the M4 East and New M5 projects which has minimised the need for property acquisition.

With respect to community identity and character, construction impacts for the M4-M5 Link project would be mainly contained in proximity to the proposed construction ancillary facilities. Areas further afield such as the Sydney CBD and other areas of the inner west (such as those to the east of Haberfield/Ashfield), are unlikely to be substantially affected by the construction of the project.

Key features of community character that would be affected by the project include:

- Vegetation – Trees contribute to the identity of a neighbourhood, provide protection from the elements and provide intermittent or consistent screening and privacy. The vegetation to be removed by the project is modified and disturbed and comprises exotic species, weeds and planted species. The Urban Design and Landscape Plans (UDLPs) that would be prepared and implemented for the project would guide the compensatory planting for trees removed by the project. New open space provided at Rozelle would also be vegetated and provide a new open space for the communities in and Rozelle and Lilyfield and surrounds
- Public art and monuments – Two items are located in the project footprint; the statues of soldiers on the approaches of Anzac Bridge and the mural along The Crescent between City West Link and Johnston Street. These items of public art would be retained and protected during construction of the project
- Heritage places – Heritage impacts include the demolition of three statutory heritage items of local significance (with one item being partly demolished), a minor encroachment into the State Heritage Register listed White Bay Power Station curtilage (with no direct impact on the associated buildings) and the demolition of some items considered to be potential heritage items.



These impacts would be managed via archival recording, salvage of heritage items and the implementation of a heritage interpretation strategy.

To further manage the impacts associated with longer duration construction impacts from the concurrent construction of the WestConnex component projects in these areas and to respond to issues raised during the construction of other WestConnex component projects and in submissions on the M4-M5 Link EIS, the following strategies are proposed:

- Provision of additional off-street car parking for the construction workforce at Rozelle, with the use of the White Bay civil site which would provide around 50 parking spaces. This site is further described in **Chapter D2** (White Bay civil site (C11))
- Using the Northcote Street civil site (C3a) for construction workforce car parking and laydown. Currently this site is used as the main tunnelling site for the eastern end of the M4 East project
- Reducing the surface construction footprint of the Wattle Street civil and tunnel site (C1a) to limit surface construction activities to the Wattle Street entry and exit ramps. Compared to the indicative layout presented in Chapter 6 (Construction work) of the EIS for this site, this would reduce potential construction impacts such as noise and vibration and dust during construction of the M4-M5 Link project and would also allow for realisation of the M4 East urban design and landscaping outcome for this area at the completion of the M4 East project
- Provision of a heavy vehicle truck marshalling facility at the White Bay civil site at Rozelle, which would cater for around 40 heavy vehicles and stage the release of trucks to the tunnelling sites to manage the arrival of trucks to construction ancillary facilities (see **Part D** (Preferred infrastructure report)). Provision of a truck marshalling facility and additional construction workforce parking would result in several benefits for the community and the project, including:
  - Reducing potential queuing, idling, circling and congestion on local roads surrounding the project and associated construction ancillary facilities
  - Providing additional construction workforce parking spaces, which would minimise construction workers parking on local roads
  - Minimising disruptions to the road network around construction ancillary facilities and noise and other disturbance to the local community including residential, business and commercial properties
  - Improving safety for construction workers, motorists and the general public by providing a controlled area from which project traffic schedulers can manage trucks and direct truck drivers to the construction sites at an appropriate time
- Development of a car parking strategy that will quantify construction workforce parking demand, identify public transport options (and measures such as carpooling and shuttle-buses) and identify all locations that will be used for construction workforce parking (see environmental management measure TT04 in **Chapter E1** (Environmental management measures))
- Development and implementation of a truck management strategy that will identify potential truck marshalling areas that will be used for the project and describe management measures for project-related heavy vehicles to avoid queuing and site-circling in adjacent streets and other potential traffic and access disruptions (see environmental management measure TT16 in **Chapter E1** (Environmental management measures))
- Designing acoustic sheds with consideration of the activities that will occur within them and the relevant noise management levels in adjacent areas. Monitoring will be carried out to confirm that the actual acoustic performance of the sheds is consistent with predicted acoustic performance (see environmental management measure NV7 in **Chapter E1** (Environmental management measures))
- The appointment of a suitably qualified and experienced acoustics advisor, who is independent of the design and construction personnel, and who will be engaged for the duration of construction of the project (see environmental management measure NV1 in **Chapter E1** (Environmental management measures))
- Use of the M4 East and New M5 tunnels for spoil haulage when they become available and where practicable, to minimise heavy vehicle movements on the surface road network
- Consideration of receivers that qualify for assessment for at-receiver treatment due to predicted operational road traffic noise that are also predicted to experience exceedances of noise



management levels during construction for at-receiver treatments as a priority (see environmental management measure NV9 in **Chapter E1** (Environmental management measures)).

Specific management and mitigation will be documented in relevant construction environmental management sub-plans such as the Ancillary Facilities Management Plan and the Construction Traffic and Access Management Plan (CTAMP). This will include detailed consideration of the types of activities that would be most likely to cause longer duration impacts during construction of the project, the types of impacts already experienced by these communities as a result of M4 East and New M5 construction, and subsequent development and implementation of location and activity specific mitigation that considers the consecutive nature of construction at these locations.

See **section C14.12** for a response to the issue of longer duration construction impacts from multiple projects.

### **C14.2.2 Access, connectivity and community cohesion**

Submitters raised concerns that construction of the project would impact on community cohesion through changes to access and connectivity, specifically in the Inner West. Submitters raised concerns that the project would result in segmentation of communities. Specific concerns included:

- Plans for family members to move closer to their family residing in areas affected by construction, such as Haberfield, would no longer be viable due to construction
- How students from Rozelle Public School would be able to walk to school, and participate in important school events such as the cross country and athletics carnival, held at King George Park, and the school swimming carnival at Drummoyne Pool
- Active travel would be impacted by construction at Rozelle and Annandale, particularly for residents who have reduced mobility
- The project will impair community links within Haberfield, between Haberfield and Ashfield and between Haberfield and Five Dock, through increased traffic volumes during construction
- The project will impede access from Haberfield Public School to Timbrell Park
- The project would geographically divide Rozelle even more
- The additional volume of trucks from the Rozelle civil and tunnel site (C5), The Crescent civil site (C6) and the Pyrmont Bridge Road tunnel site (C9) is going to lead to congestion on Johnston Street and The Crescent towards Ross Street which would impact access for residents to their local area
- Closure of the Victoria Road pedestrian bridge and the closure/relocation of the nearby bus stops for significant periods of time would impact resident's access to the CBD via active or public transport
- The project would divide communities at Parramatta Road and Wattle Street
- Temporary changes to vital cycling/pedestrian routes would be for four years at Annandale and Rozelle that would make cycling and walking more difficult, especially for residents with reduced mobility
- Construction works at Callan Street, Springside Street and McCleer Street would impact access to homes and King George Park.

### **Response**

A number of the larger arterial roads, including City West Link, Victoria Road, Parramatta Road and the Princes Highway currently operate as physical and psychological barriers between communities in the Inner West. These roads carry large volumes of traffic, with motor vehicles generally prioritised over pedestrian and cyclist connections. Rozelle Rail Yards, City West Link, the light rail corridor and Whites Creek act as a substantial physical barrier between the communities of Annandale, Rozelle and Lilyfield. The Rozelle Rail Yards also currently acts as a significant physical barrier between the communities of Annandale, Rozelle and Lilyfield.

The SEIA recognises that during construction, temporary changes to the road and active transport network, particularly along City West Link, Victoria Road, The Crescent, and Lilyfield Road may contribute to community severance and disconnection.

The additional volume of heavy vehicles on Parramatta Road and Wattle Street during construction is not anticipated to significantly impact on mid-block level of service (LoS) and intersection LoS. Heavy vehicles will have the opportunity to use the M4 east tunnels on Wattle Street and Parramatta Road once they are open to reduce impacts to the surface road network. All existing signalised pedestrian crossings of these roads will be maintained and no permanent infrastructure is proposed at Haberfield or Ashfield as part of M4-M5 Link project that would impact on connectivity.

**Chapter D2** (White Bay civil site (C11)) describes an additional ancillary facility at Rozelle that would be used primarily to support truck marshalling for spoil haulage vehicles and construction workforce parking for construction of the project. **Appendix A** (Traffic and transport impact assessment) assesses the potential impacts of this site and includes an additional heavy vehicle access route for heavy vehicles accessing the Pyrmont Bridge Road tunnel site (C9) from the White Bay civil site (C11) along Johnston Street. The assessment determined that the additional volume of heavy vehicles on Johnston Street during construction would have a negligible impact on the roadway LoS when compared to the 'Without construction' scenario. The assessment of intersection operational performance showed negligible change, except in the PM peak for The Crescent/Johnston Street/Chapman Road intersection, showing a change in LoS (from LoS C to LoS D).

Changes to existing pedestrian and cycling facilities are detailed in section 6.6.2 of the EIS. Students of Rozelle Public School would be able to access King George Park by crossing Victoria Road, either at Wellington Street or Terry Street and using local streets, or by crossing under Iron Cove Bridge (via the existing pedestrian path). Drummoyne Pool would also be accessible by travelling along the northern side of Victoria Road and across Iron Cove Bridge on either the north or south side of the bridge. A temporary diversion would be established for pedestrians and/or cyclists wishing to travel along the southern side of Victoria Road during construction, with access being maintained.

The Bay Run connection between King George Park and Iron Cove Bridge would be maintained during construction, with temporary diversions around the construction area within King George Park provided. This would include a temporary connection between King George Park and the shared path on Iron Cove Bridge. Following the completion of construction, the connection between the Bay Run and Victoria Road and Iron Cove Bridge would be reinstated in generally the same arrangement as existing.

Any changes to pedestrian and cyclist routes would ensure safety and maintenance of existing routes and ease of access for all levels of mobility, while minimising detour distances. In addition, all efforts would be made to minimise disruption to pedestrian and cyclists and to maintain network legibility by transferring from the existing infrastructure to the new infrastructure as soon as possible.

To reduce the impact on pedestrian and cyclist connections, a strategy for the maintenance of pedestrian and cyclist access during construction, and information regarding alternative travel routes, would be prepared during detailed design. These measures would form part of the CTAMP and would include:

- Specifications around the standards of pedestrian and cyclist environments (around construction sites and on alternative routes)
- Provisions that ensure the maintenance of access for all levels of mobility
- Information regarding alternative travel routes including the difficulty of terrain, the additional distances and the duration of detours
- Construction signage clearly identifying the detour routes and locations for alternative crossings.

See **Chapter E1** (Environmental management measures) for a full list of management measures to mitigate impacts to community cohesion.

Once construction is completed, parts of the Rozelle Rail Yards would be redeveloped as public open space. This additional open space area would provide the communities in Rozelle, Annandale and Lilyfield with increased access to active and passive recreation facilities and would substantially increase connectivity. This would include a pedestrian and cyclist 'land bridge' that would provide a north-south connection between Bicentennial Park, the Rozelle Rail Yards and beyond to Easton Park, as well as connecting to the Rozelle Bay light rail stop, thereby improving public transport options for the residents of Lilyfield and Rozelle. This would provide significant opportunities for the connection of these communities, which have been separated by the rail yards for over 100 years. In addition, the project would provide another north-south active transport link further west of the 'land bridge' that would link Lilyfield Road to the Whites Creek corridor.

The existing pedestrian and cyclist overpass over Victoria Road, near Lilyfield Road, would be removed during construction. Prior to the removal of this bridge, alternative east-west access for pedestrians and cyclists would be provided below Victoria Road via an underpass. This underpass would connect Lilyfield Road and the western side of Victoria Road to the existing pedestrian and cyclist path that continues over the Anzac Bridge, as well as to the eastern side of Victoria Road. This underpass would be subsequently adapted to form the new permanent east-west connection below Lilyfield Road.

As outlined in **Chapter D3** (Relocation of the bioretention facility at Rozelle), it is proposed to relocate the bioretention facility at Rozelle around 150 metres north of the location presented in the EIS, to an area adjacent to Victoria Road at the eastern abutment of Iron Cove Bridge and within King George Park (see **Figure D3-1**). Further information is provided in **Chapter D3** (Relocation of the bioretention facility at Rozelle). Relocating the bioretention facility would mean that local roads would not be used to access the previous location proposed for the facility adjacent to Manning Street. Access to the relocated facility would be via Victoria Road or the Iron Cove Link civil site (C8). Where feasible, trucks would not use adjacent local roads including Byrnes, Clubb, Toelle, Callan and Manning streets, for site access. This would minimise impacts to parking and access along these streets. Access to residential properties along these local roads and to King George Park may be temporarily disrupted during construction; however access would be maintained.

### C14.2.3 Reduced amenity

Submitters raised concerns about general loss of amenity and inconvenience during construction, including disruption and disturbance to residents near construction sites. Amenity impacts were raised in regards to general pollution, noise, vibration, dust, soil, night works, utility works, construction parking and increased traffic. Areas mentioned in submissions included:

- Residents living in the inner west (including Rozelle, Leichhardt, Annandale and Haberfield, Newtown and Green Square)
- Areas around the Rozelle and St Peters interchanges, and the Iron Cove Link tunnel portals, including Wellington Street and Victoria Road)
- Areas near construction sites in general
- Family and Community Services properties
- Areas around Edna and Paling streets in Lilyfield
- Areas around Alt Street, Ilford Avenue and Bland Street in Haberfield and Ashfield
- Parramatta Road, City West Link, Wattle Street, The Crescent (in relation to heavy vehicle movements).

Specific concerns included:

- Impacts to outdoor spaces, swimming pools, private gardens and backyards
- Construction noise and traffic impacting:
  - The ability of children to learn and/or study
  - The ability of children to sleep
  - The ability of residents and employees to work, including shift workers
- Impacts to the way in which people can use space
- Affect people's ability to communicate and the way in which individuals undertake ordinary daily routines, such as gardening
- An increase in pollution, including dust, dirt, soil and grit, particularly around Darley Road
- Construction dust impacting swimming pool filtration systems.

In regards to the Darley Road civil and tunnel site (C4), submitters were also concerned that residents would endure years of intrusive construction impacts and would not benefit from the project and suggest that to limit impacts, the works on the Darley Road site should be restricted to a three-year program.

## Response

### General community amenity

Construction of a transport infrastructure project within an established urban area would inevitably generate a range of localised impacts. The benefits of the project must be balanced against these impacts, and the project must be able to demonstrate an overall net community benefit. The benefits and impacts of the project are comprehensively assessed in the EIS and associated technical papers, and management measures are proposed to minimise impacts. Construction related amenity impacts are discussed in some detail in the following sections of the EIS:

- Traffic and access impacts – Chapter 8 (Traffic and transport) and Appendix H (Technical working paper: Traffic and transport) of the EIS
- Air quality impacts – Chapter 9 (Air quality) and Appendix I (Technical working paper: Air quality) of the EIS
- Noise and vibration impacts – Chapter 10 (Noise and vibration) and Appendix J (Technical working paper: Noise and vibration) of the EIS
- Human health impacts – Chapter 11 (Human health risk) and Appendix K (Technical working paper: Human health risk assessment) of the EIS
- Visual impacts and urban design – Chapter 13 (Urban design and visual amenity) and Appendix O (Technical working paper: Landscape and visual impact) and Appendix L (Technical working paper: Urban design) of the EIS.

Changes in amenity can affect how users interact with or enjoy an environment or their ability to participate in activities or concentrate. Changes in access to public open space can also affect the operation and function of these areas. Reduced access and poor amenity may deter the community from using these spaces, which could have an indirect impact on community cohesion and interaction.

The sensitivity of an individual resident to amenity impacts would vary depending on their physical or psychological attributes, their living situation, or how they use their place of residence or neighbouring areas. For instance, some individuals are light sleepers and may have difficulty sleeping if noise impacts occur during the evening. Alternatively, a person may work or study at home, which would expose them to a longer duration of construction impacts compared to a person that is employed elsewhere.

Key changes in amenity during construction identified in section 7.2 of Appendix P (Technical working paper: Social and economic) of the EIS were influenced by noise and vibration, changes to visual amenity and changes to air quality. These issues were also regularly raised during public consultation activities undertaken during the preparation of the EIS. Family and community services properties are assessed in 7.10 of Appendix P (Technical working paper: Social and economic) of the EIS.

### Construction noise and vibration

The majority of construction noise exceedances would occur in close proximity to construction ancillary facilities. The largest impacts generally occur around the Haberfield/Ashfield, Iron Cove Link, Rozelle and Darley Road construction ancillary facilities in both daytime and night-time. This would affect the way that people enjoy outdoor spaces within their property or in the local community and disturbances to sleep.

Noise impacts around Darley Road would be heavily reduced under the new site access arrangement for the site, whereby spoil haulage vehicle movements on Darley Road would be reduced (see **Chapter C8** (Traffic and transport) and **Appendix A** (Traffic and transport impact assessment) for further information on the haulage routes. Spoil haulage at the Darley Road civil and tunnel site (C4) would occur during standard construction hours only.

Construction noise may disrupt sleep for shift workers who rest during the day. Such an impact is generally not avoidable during the development of a large infrastructure project such as the M4-M5 Link. In certain cases, however, properties housing shift works may qualify for additional noise mitigation measures. In such cases the project would seek to implement these measures early in the construction process so as to provide an additional degree of mitigation during this period. Further discussion of night-time noise impacts is provided in section 7.2.1 of Appendix P (Technical working paper: Social and economic) of the EIS.

Potentially noisy work on some local streets outside the project footprint would be required for utility works. The location of these works would be confirmed during detailed design. Further detail of the proposed utility works and management of impacts associated with them is provided in Appendix F (Utilities Management Strategy) of the EIS.

Areas around Edna and Paling streets at Lilyfield are above the mainline tunnel alignment, where tunnels depths would be around 35 to 50 metres deep. Predicted settlement is within the accepted criteria at this depth (refer to section 12.3.4 of EIS).

Mitigation measures for daytime and night-time noise impacts would include the use of construction hoarding, acoustic sheds, sensitive scheduling of works, the use of low noise generating equipment, additional noise and vibration monitoring, community notification protocols and respite periods. Despite this, the SEIA recognises that these impacts would be a moderate negative impact upon local residents in the above-mentioned areas. See **Chapter E1** (Environmental management measures).

### **Construction dust**

Construction activities such as demolition, earthworks, tunnelling, stockpiling and spoil haulage have the capacity to increase dust which has the potential to affect local amenity. This includes the impact of dust as both a nuisance (cleanliness of the environment) as well as potential health impacts (respiratory issues). The human health risk assessment prepared to inform the EIS (refer to Chapter 11 (Human health risk) determined that the potential for such impacts would be low, although it is recognised that certain events such as stormy weather may still lead to some dust soiling impacts.

Section 7.2.3 of Appendix P (Technical working paper: Social and economic) of the EIS identifies that construction activities at the Darley Road civil and tunnel site (C4) would potentially generate dust soiling and human health effects during demolition and dust soiling during construction vehicle movements.

Mitigation measures would be implemented to minimise the effects of construction dust on surrounding receivers, including minimising drop heights from machinery, using fine water sprays on dust generating equipment and for dust suppression, covering vehicle loads transport and stabilising exposed soils to prevent dust generation. Regular site inspections would also be conducted to monitor for potential dust issues.

Potential dust impacts would also be mitigated through the use of acoustic sheds around tunnelling sites, such as at Darley Road. These sheds, whilst primarily designed for acoustic shielding purposes, would also reduce air movement around stockpiles and would therefore reduce dust generation and release into nearby residential areas. In addition to this, the tracking of soil onto driveways and local roads would be monitored, with water spraying used to reduce the potential for dust generation.

These measures are described in full in **Chapter E1** (Environmental management measures) and would be outlined in the Construction Air Quality Management Plan (CAQMP). Considering this, the residual impact of dust on local receivers is considered to be low (refer to Chapter 9 (Air quality) of the EIS).

On the basis of the above, the general level of dust settlement in residential pools is not expected to substantially increase to the point that filtration systems would become overloaded or inoperable.

### **Ongoing construction impacts**

Environmental management measures proposed to minimise the impacts associated with longer duration construction impacts from the concurrent construction of the WestConnex component projects are outlined in **section C14.2.1**.



## C14.3 Social infrastructure impacts during construction

535 submitters raised concerns about the impacts on social infrastructure during construction. Refer to section 14.3 of the EIS and Appendix P (Technical working paper: Social and economic) of the EIS for details of impacts on social infrastructure during construction.

### C14.3.1 Loss of open space/recreation facilities and amenity impacts to open space

Submitters expressed concern with construction impacts such as noise, diesel exhausts, congestion, dust and debris on public open space used for recreation. Concern was raised for the loss of public parkland during construction, leading to segregation from spaces. Specific areas of concern included:

- Partial loss of King George Park, including play areas and disruption to users, such as schools and sports clubs
- Impacts to active transport links around Iron Cove (the Bay Run)
- The loss of Buruwan Park would remove green space and an active transport link that provides access to Anzac Bridge and the Sydney CBD
- Loss of community open space areas
- Impacts to Blackmore Park, Easton Park, Moore Park and Sydney Park.

### Response

#### Loss of open space

The project would require the removal of Buruwan Park at Annandale and would impact on a section of King George Park south of Victoria Road. The potential impacts associated with loss of open space at Buruwan Park and King George Park as a result of the project are assessed in section 7.3.3 and 8.3.2 of Appendix (Technical working paper: Social and economic) of the EIS.

The project has been designed to minimise the need for acquisition of public land, including areas of public open space. However, given the limited availability of vacant land in and around the project footprint and the objective of minimising acquisition of private property, some public land, including public recreation areas, would be temporarily or permanently acquired. In response to community concerns and design constraints, a number of substantial changes have been made to the project design (refer to Chapter 4 (Project development and alternatives) of the EIS) to minimise the loss of open space, including:

- Adjustment of the project footprint to avoid using Easton Park at Rozelle during construction and to minimise impact on Lilyfield Road and the heritage listed Sydney Water sewerage pumping station
- Adjustment of the project footprint to avoid using areas around Blackmore Park, Leichhardt during construction.

#### Buruwan Park

Permanent acquisition of Buruwan Park is required to facilitate the new alignment of The Crescent. This would be a direct loss of about 0.3 hectares of public open space at Annandale. Buruwan Park is a passive open space area that is predominantly used by pedestrians and cyclists as an active transport link through from Brennan Street and Railway Parade to Rozelle Bay and for access to the Rozelle Bay light rail stop. The park also provides a visual landscaped buffer to the elevated light rail line and the residential area of Annandale to the southwest. The park currently has poor surveillance with evidence of anti-social behaviour in the form of graffiti, with no formalised outdoor furniture and limited grassed area. The amenity of the park is compromised by its proximity to City West Link and The Crescent, which are both heavily trafficked arterial roads.

Due to the presence of more substantial parks nearby (Federal Park, Bicentennial Park and Whites Creek corridor) and the creation of the new open space at Rozelle Rail Yards, there remains, and would exist in the future, other options for the community in terms of open space if the park is removed.



Upon opening, the active transport route through this area would include a grade-separated crossing of both The Crescent and City West Link. This would provide cyclists and pedestrians arriving on Railway Parade fully segregated access to Anzac Bridge, substantially improving the safety of this route.

### King George Park

The project would require the permanent acquisition of a small portion of King George Park to facilitate the construction and operation of the Iron Cove Link portals (including carriageways and footpath and cycle paths). This portion of land includes a section of the Bay Run shared path. The loss of this small portion of King George Park has been assessed in Chapter 14 (Social and economic) of the EIS as having a negligible impact on the social and economic environment. The Bay Run would be subject to a minor permanent diversion at this location, though would remain open throughout construction and operation.

Since the exhibition of the EIS, it is proposed to relocate the bioretention facility from within the informal car park within King George Park at Rozelle (adjacent to Manning Street) to the eastern abutment of Iron Cove Bridge, adjacent to Victoria Road and within King George Park. Works within King George Park would be undertaken in an area that is used as a landscaped area adjacent to the bridge which is not actively used for open space (see **Chapter D3** (Relocation of the bioretention facility at Rozelle) for further detail regarding the relocation of the bioretention facility).

Land at the eastern abutment of Iron Cove Bridge, where the bioretention facility would be located, contains primarily passive open space and landscaping areas. There are no active open space areas or playground facilities which would be impacted (other than the Bay Run, of which a small section would be diverted during the construction of the project and reinstated on completion of construction).

Upon opening, the project would provide an improved active transport link and landscaped area along the southern side of Victoria Road, which would connect to the Bay Run and King George Park.

### Provision of open space

As part of the project, parts of the Rozelle Rail Yards would be developed as open space, including a constructed wetland and pedestrian and cyclist infrastructure. Open space created at the Rozelle Rail Yards would be developed and implemented in accordance with the UDLPs for the project. This new open space would provide the community at Rozelle, Annandale and other surrounding suburbs with increased opportunities for active and passive recreational activities. In the area around Wattle Street and Campbell Road, the project would include new open space areas in line with the M4 East and New M5 UDLPs. This new open space would provide a compensatory offset to the open space affected at Buruwan Park and King George Park.

No direct impacts are proposed to other parks in the vicinity, including Easton Park, Blackmore Park or Federal Park.

### Reduced amenity

Construction of the project may affect the amenity of nearby open space, resulting in increased noise, dust and construction traffic, or changes in visual amenity (ie presence of construction machinery or clearing of vegetation). Changes in amenity can affect how users interact with or enjoy an environment or their ability to participate in activities and or concentrate. Changes in access to public open space can also affect the operation and function of these areas. Reduced access and poor amenity may deter the community from using these spaces, which could have an indirect impact on community cohesion and interaction.

Pedestrian and cyclist connections in these open space areas would be maintained or redirected during construction. All redirections would seek to minimise the length of the detour and to maintain the existing grade, wherever possible. Active transport links providing access to Sydney Park are being delivered as part of the New M5 project and would be provided on commencement of operation of that project. The M4-M5 Link would not impact on the implementation of these plans.

The relocation of the bioretention facility to the eastern abutment of Iron Cove Bridge would require a small additional area of King George Park. This is described further in **Chapter D3** (Relocation of the bioretention facility at Rozelle). This area contains primarily passive open space and landscaping areas and no active open space areas or playground facilities would be impacted (other than the Bay Run, which would be slightly realigned). The bioretention facility would not diminish the recreational use of King George Park.

The project has been designed to minimise construction impacts on King George Park through the considered location and placement of construction ancillary facilities and infrastructure.

Construction related amenity impacts are discussed in some detail in the following sections of the EIS:

- Traffic and access impacts - Chapter 8 (Traffic and transport) and Appendix H (Technical working paper: Traffic and transport) of the EIS
- Air quality impacts – Chapter 9 (Air quality) and Appendix I (Technical working paper: Air quality) of the EIS
- Noise and vibration impacts – Chapter 10 (Noise and vibration) and Appendix J (Technical working paper: Noise and vibration) of the EIS
- Human health impacts – Chapter 11 (Human health risk) and Appendix K (Technical working paper: Human health risk assessment) of the EIS
- Visual impacts and urban design – Chapter 13 (Urban design and visual amenity) and Appendix O (Technical working paper: Landscape and visual impact) and Appendix L (Technical working paper: Urban design) of the EIS.

Following completion of construction works it is proposed that parts of the Rozelle Rail Yards be developed as open space, including a constructed wetland and pedestrian and cyclist infrastructure. Open space created at the Rozelle Rail Yards would be developed and implemented in accordance with the UDLPs for the project. This new open space would provide the community at Rozelle, Annandale and other surrounding suburbs with increased opportunities for active and passive recreational activities. In the area around Wattle Street and Campbell Road, the project would include new open space in line with the M4 East and New M5 UDLPs.

Moore Park is located over three kilometres to the northeast of the Campbell Road civil and tunnel site. Given this distance, and that no spoil haulage routes are proposed in the areas surrounding the park, construction is unlikely to affect the park, or use of the park by recreational users.

### **C14.3.2 Social infrastructure amenity impacts**

Submitters raised concerns about general loss of amenity and disruption for receivers using social infrastructure, particularly from traffic, noise, vibration, air quality and dust. Specific areas and/or facilities mentioned in submissions included:

- The Only About Children (OAC) Leichhardt Elswick Street Campus (preschool) and St Columba's Catholic Primary School near the William Street and Elswick Street intersection in Leichhardt
- The ability of children to learn at Rozelle Public School
- The ability of children to learn and play, and for teachers to teach, at Haberfield Public School
- The Crescent Early Learning Centre at Annandale
- General concern for elderly occupants at Smith's Hall at Rozelle
- Childcare Explore and Develop on Norton Street at Lilyfield
- Billy Kids Learning on Charles Street at Lilyfield
- Rosebud Cottage Child Care Centre on Quirk Street at Rozelle
- Bridge Road School on Parramatta Road at Camperdown
- General concern for social infrastructure on the Balmain peninsula
- School children's access to King George Park and Drummoyne Pool
- General concern that public housing would be removed during construction
- St Thomas Child Care Centre at Rozelle
- General concern that medical and mental health services would be put under pressure from increased need of their services, and individuals' medical bills would increase.

## Response

Section 5.2 of Appendix P (Technical working paper: Social and economic) of the EIS identified existing social infrastructure facilities including:

- Child care and education facilities
- Community facilities, libraries and places of worship
- Health and emergency facilities
- Sport, recreation and leisure facilities.

Section 7.10 of Appendix P (Technical working paper: Social and economic) of the EIS assess the impact of construction of the project on social infrastructure, including schools, aged care facilities, child care facilities and medical centres. The assessment identified 17 social infrastructure facilities as having a higher likelihood of experiencing multiple effects of construction amenity impacts, including seven childcare centres and four educational facilities.

Potential construction impacts to these facilities include changes to local amenity such as access and parking, as well as impacts upon individuals such as disruptions to concentration capacity or sleep. In addition to these locations, other social infrastructure facilities are also likely to be affected to a lesser degree by isolated impacts such as changes to local air quality, noise and vibration or the visual landscape (refer to Table 7.5 of Appendix P (Technical working paper: Social and economic) of the EIS).

To minimise the consequence and likelihood of impacts on social infrastructure, a Social Infrastructure Plan would be implemented to manage, minimise and avoid potential construction effects. This plan would:

- Identify social infrastructure that has the potential to be adversely affected by construction activities
- Develop, in consultation with the owners of the identified social infrastructure, measures that could be implemented to maintain appropriate vehicular and pedestrian access, management measures for noise exceedances and safety measures, particularly around areas where children are present.

The project is not expected to strain the capacity of medical and mental health services, nor affect their current ability to deliver services to the community. Refer to **section C14.5.3** for a response regarding the health related impacts as a result of construction of the project.

## Camperdown

The Bridge Road School is included in Table 5-48 of Appendix P (Technical working paper: Social and economic) of the EIS as an identified education facility within close proximity to construction ancillary facilities. Potential impacts upon community facilities, including schools, were assessed in the EIS. The Bridge Road School at Camperdown would be affected during construction of the project associated with the use of the Pymont Bridge Road tunnel site (C9). These potential impacts include:

- Daytime noise exceedances (more than 11 dBA)
- Construction dust
- Increased construction vehicles
- Vibration effects
- Arterial road alterations.

These potential impacts would have the following effects on the school:

- Road safety for students
- Access delays, particularly at school pick-up time
- Competition for parking
- Reduced amenity during outdoor play
- Student concentration capacity and productivity.

To minimise the consequence and likelihood of impacts on social infrastructure, a Social Infrastructure Plan and Community Communication Strategy would be prepared and implemented to manage, minimise and avoid potential construction effects. See **Chapter E1** (Environmental management measures) for further information regarding measures to manage potential social and economic impacts.

### **Annandale**

The Crescent Early Learning Centre at 7 Chapman Road, Annandale is located more than 300 metres from The Crescent civil site (C6) and was not identified as having a higher likelihood of experiencing multiple effects of construction activity. There are no spoil haulage routes proposed in this area and no noise exceedances are predicted. Potential impacts to this facility would be managed consistently with the measures identified in **Chapter E1** (Environmental management measures).

Childcare Explore and Develop at 372 Norton Street, Lilyfield was assessed in section 7.10 and Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS. The childcare centre is located around 100 metres from the Darley Road civil and tunnel site (C4) and is predicted to experience some day-time noise exceedances (more than 11 dBA) which would reduce amenity during outdoor play and sleep times. Heavy vehicles would not use Norton Street. Potential impacts to this facility would be managed consistently with the measures identified in **Chapter E1** (Environmental management measures).

### **Leichhardt**

The OAC Leichhardt Elswick Street Campus (preschool) and St Columba's Catholic Primary School are around 300 metres from the Darley Road civil and tunnel site (C4). Given this distance from the Darley Road civil and tunnel site, these facilities weren't identified in Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS. Construction traffic would enter and exit the Darley Road site from the City West Link direction and would not travel on William Street or Elswick Street. No use of local roads for heavy vehicles is proposed. These facilities are not predicted to experience noise exceedances, or be affected by ground-borne noise or settlement from tunnelling.

Work on some local streets would be required for utility works to provide construction power to the Darley Road civil and tunnel site (C4) and the location of these works would be confirmed during detailed design. Further detail of the proposed utility works and management of impacts associated with them is provided in Appendix F (Utilities Management Strategy) of the EIS.

### **Rozelle**

The Rozelle Public School was assessed in section 7.10 and Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS. The Iron Cove Link civil site (C8) is located around 140 metres from the nearest boundary of Rozelle Public School. The project footprint however, extends along Victoria Road to Wellington Street which is closer to the school. Construction works in this location would comprise surface works which may include utility treatments, traffic management and establishment of environmental controls (such as pedestrian diversions and erosion controls). Major construction activities such as the widening of Victoria Road and construction of the ventilation facility, outlet and tunnel ramps are located further to the west along Victoria Road and away from the school.

This Iron Cove civil site (C8) would be located on the southern side of Victoria Road and would have 'left in, left out' entry restrictions. As a result, construction traffic would generally only pass in a westbound direction past the school, providing some separation between this traffic and the school (the school is adjacent to the eastbound carriageway). Construction traffic is not proposed to use Darling Street or Wellington Street onto which Rozelle Public School faces.

During construction of higher noise generating activities such as roadworks, it is predicted that the Rozelle Public School would be subject to exceedances of the noise management level (NML) by up to 20 dBA. Generally the NML exceedances arising in this area would be temporary and attributable to the intermittent use of noisy plant items such as concrete saws and rockbreakers. These items would not operate continuously through the construction period, with most operation being early in the construction program, where the removal of existing concrete or excavation of rock is required. The project would seek to minimise this impact through the use of construction hoarding and other appropriate mitigation measures which would be confirmed during detailed design. Works along Victoria Road would generally be undertaken during the evening or night to avoid significant traffic impacts on this arterial route. Evening and night works on Victoria Road would be carried out between 6.00 pm and 7.00 am and as such, noise impacts from these activities would not affect the school's daytime operations.

During the construction of the Iron Cove Link ventilation facility, noise impacts are not predicted to exceed the NML for education facilities, or any of the 'other sensitive receiver' categories. This includes the nearby Rozelle Public School.

During construction it is predicted that Rozelle Public School would exceed cumulative noise limits during pavement and infrastructure works. As such, the school would be eligible for consideration of additional noise mitigation measures such as at-property treatments. Should this be confirmed during detailed design, these measures would be considered for installation early in the construction program to provide a degree of mitigation from both construction and operational noise impacts.

Smith's Hall at 56 Burt Street, Rozelle would experience a minor impact from settlement (within the accepted criteria) and is predicted to exceed the night-time ground-borne noise criteria by 2 dBA, which means that occupants may be affected by ground-borne noise at night. Based on a progression rate of around 20 metres per week, the most affected receivers in this area are likely to experience noise levels above the night-time criterion for up to around 16 days for each roadheader. Measures to manage potential ground-borne noise are provided in full in **Chapter E1** (Environmental management measures).

Billy Kids Learning at 64 Charles Street, Lilyfield was assessed in section 7.10 and Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS and is located around 100 metres from the Darley Road civil and tunnel site. This facility is predicted to experience some day-time noise exceedances (more than 11 dBA) which would reduce amenity during outdoor play and sleep times. Heavy vehicles would not use Charles Street. Potential impacts to this facility would be managed consistently with the measures identified in **Chapter E1** (Environmental management measures).

Rosebud Cottage Child Care Centre at 5 Quirk Street, Rozelle was assessed in section 7.10 and Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS and is located around 100 metres from the Victoria Road civil site. This facility would be impacted by daytime noise exceedances (more than 11 dBA), changes in local road access, road safety for, access delays, particularly during the afternoon pick-up time, competition for parking and reduced amenity during outdoor play and sleep times. Heavy vehicles would not use Quirk Street. Potential impacts to this facility would be managed consistently with the measures identified in **Chapter E1** (Environmental management measures).

St Thomas Child Care Centre is located around 300 metres southwest of the Iron Cove civil site and is unlikely to be impacted by construction. This facility would already be subject to impacts from elevated traffic and associated noise and emissions from vehicle movements along Victoria Road.

## Balmain

While noise impacts may extend a short distance north of the Iron Cove Link civil site (C8), the majority of the Balmain peninsula would not experience any changes to existing background noise levels. The same would apply to other amenity impacts including air quality, traffic and visual impacts. No construction traffic is proposed to use the road network in Balmain, other than along Victoria Road. Subsequently, schools, childcare facilities, medical facilities, shops and other social infrastructure on the Balmain peninsula would be largely unaffected by construction.



## Haberfield

Haberfield Public School was assessed in section 7.10 and Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS and is located around 100 metres from the Parramatta Road East civil site (C3b) and would potentially be impacted by a general increase in construction vehicles in the area. This could affect road safety for students, competition for parking and delays in access, particularly during the afternoon school pick-up time. Light vehicles may use Bland Street, however were possible, light vehicle would exit the Parramatta Road East civil site via left turn onto Parramatta Road, avoiding travelling along Bland Street past the school. Under Option B, heavy vehicles would use the Parramatta Road West civil and tunnel site, on the opposite side of Parramatta Road from the school, and not use Bland Street. No noise exceedances are predicted for the school. Potential settlement is also within the acceptable criteria.

A CTAMP would be prepared to manage potential construction traffic impacts for the project. Measures included in the CTAMP would include (but not be limited to):

- Develop construction methodologies so that interaction with existing road users is minimised thereby creating a safer work and road user environment
- Minimise the number of changes to the road users' travel paths and, where changes are required, develop and implement an effective community communication strategy, coupled with temporary wayfinding signage to warn, inform and guide. This will aim to minimise confusion by providing clear and concise traffic management schemes
- Describe a car parking strategy for construction staff at the various worksites and ancillary facilities.

During construction, measures to manage the impacts on social infrastructure, including Haberfield Public School, would be included in a Social Infrastructure Plan. These measures are outlined in **Chapter E1** (Environmental management measures).

## C14.4 Business impacts during construction

510 submitters raised concerns about impacts on businesses and industry during construction. Refer to section 14.3 of the EIS and Appendix P (Technical working paper: Social and economic) of the EIS for details of impacts on businesses and industry during construction.

### C14.4.1 Impacts on business during construction

Submitters raised concerns that local businesses, landlords and employees would be affected by road closures, congestion, reduced amenity and reduced patronage during construction of the project. Specific areas of concern included:

- The inner west in general
- Retail outlets, weekend markets and cafes along Rozelle High Street [Darling Street] at Rozelle
- The Canal Road Film Centre at Leichhardt
- Businesses operating in the light industrial zone between Pyrmont Bridge Road and Mallet Street
- Small businesses on King Street, Newtown
- Liverpool Road/Hume Highway (spoil routes along these roads would congest the shopping precinct)
- Tramsheds commercial area at Forest Lodge (access would be impacted by the Whites Creek bridge widening)
- Employment centres in general (construction would impede access)
- Australian Film Industry (which would be negatively impacted by traffic impacts from the Darley Road civil and tunnel site (C4))
- Pyrmont Bridge Road tunnel site (C9) would have negative impacts on the commercial viability of surrounding businesses, specifically Malt Shovel Brewery [James Squire Brewery]



- Access to business will be disrupted by trucks which may not be able to completely cross the Parramatta Road and Pyrmont Bridge Road intersection resulting in gridlock. Traffic disruptions on local and arterial roads surrounding construction sites would affect freight and commercial vehicle transport and would result in people shopping less at local businesses resulting in forced closures.

## Response

Potential construction related business impacts are assessed in detail in section 7.9 of Appendix P (Technical working paper: Social and economic) of the EIS. These impacts include changes to access and visibility (passing trade) as well as amenity impacts such as increased noise and vibration, changes to the visual landscape and impacts on traffic and parking.

The business impact surveys that were undertaken indicated a broad range of responses from local businesses in relation to potential project impacts on amenity, access and trade. This is reflective of the diverse range of businesses in and around the study area, including a number of industrial and specialist commercial businesses that rely less on passing trade or local amenity. Such businesses generally indicated that construction of the project would not substantially alter their existing trade.

The physical extent of the project's construction is relatively localised and as such, impacts would generally be of a local scale. Impacts on Darling Street at Rozelle are likely to be limited to noise and vibration from construction activities at the Iron Cove Link civil site (C8) along Victoria Road. Generally the exceedances of NMLs during standard construction hours along Darling Street, Rozelle would be temporary and attributable to the intermittent use of noisy plant items such as concrete saws and rockbreakers.

These items would not operate continuously through the construction period, with most operation being early in the overall program where the removal of existing concrete or excavation of rock is required. As such impacts on the amenity of this precinct are expected to be relatively short term. It should also be noted that this precinct is likely to benefit once the project is operational and the corresponding section of Victoria Road experiences a reduction in overall traffic volumes. This is likely to permanently enhance the amenity and attractiveness of this precinct and would be expected to have flow on benefits for businesses.

Section 7.9 of Appendix P (Technical working paper: Social and economic) of the EIS outlines that businesses may be temporarily affected due to delayed or hindered access to workplaces or servicing areas owing to local traffic construction constraints and congestion. Road network performance is expected to be affected during construction with a number of temporary road closures, increased construction traffic and an expected worsening of intersection performance at some intersections. These changes may have a discernible effect on employee and customer travel time and the efficiency of servicing and deliveries (refer to section 7.1.3 of Appendix P (Technical working paper: Social and economic) of the EIS).

The CTAMP would provide measures to manage and mitigate major road network impacts. The effective implementation of these measures, including the implementation of a Community Communication Strategy aims to ensure all affected and interested parties are informed, to assist in reducing the extent of impacts on the social and economic environment. The overall impact on the social and economic environment would be a moderate negative.

In response to the specific businesses raised in the submissions:

- Access to the Canal Road Film Centre via James Street would not be impacted by the project
- Construction vehicle access arrangements at the Darley Road civil and tunnel site (C4) have been refined since the exhibition of the EIS. Alternative access arrangements to the Darley Road civil and tunnel site via westbound carriageway of City West Link and Canal Road were investigated and it was determined that this arrangement was not feasible for a range of reasons, including potential impacts to traffic using Charles Street or Canal Road. As a result, this alternative arrangement is not being pursued and heavy vehicles would not use Charles Street or Canal Road. A description of the revised access arrangements at the Darley Road civil and tunnel site is included in **section C4.17.1**.
- The Pyrmont Bridge Road tunnel site is expected to impact the surrounding environment, including the Malt Shovel Brewery, through day-time noise exceedances (more than 11 dBA), construction dust, increased construction vehicles, vibration and arterial road alterations

- King Street in Newtown (and adjoining businesses) would not be affected by construction traffic from the project.

As outlined above, the degree of impact upon individual businesses would be dependent upon the nature of the business and its specific location. The project would seek to manage these impacts through the implementation of a detailed construction car parking strategy as part of the CTAMP and as well as through the implementation of a Business Management Plan that would include:

- Identification of businesses that have the potential to be adversely affected by construction activities that would occur as part of the project
- Management measures that would be implemented to maintain appropriate vehicular and pedestrian access during business hours and visibility of the business to potential customers during construction, including alternative arrangements for times when existing access and visibility cannot be maintained. These measures would be determined in consultation with the owners of the identified businesses.

A Community Communication Strategy will also be prepared for the project including procedures and mechanisms that would be used to engage with affected business owners and tenants to identify potential access, parking, business visibility and other impacts and to develop measures to address potential impacts on a case by case basis.

Construction of the project would inject economic stimulus benefits into the local, regional and state economies. There would likely be flow-on benefits to job generation through the raw material supply chain and jobs created as a result of construction of new infrastructure. The WestConnex program of works also aims to deliver 500 apprenticeships/traineeships during the life of the project, a portion of which would be trained on the M4-M5 Link project. The WestConnex Sustainability Strategy also incorporates initiatives to improve Aboriginal and Torres Strait Islander participation in construction and provide opportunities to Aboriginal and Torres Strait Islander enterprises.

Overall, construction of the project would produce medium-long to long-term job opportunities, skill development and economic benefit to the region. There is a high likelihood of these benefits occurring with potential major consequence on the social and economic environment. As such, the overall impact of construction on the economy would be major positive.

#### **C14.4.2 Loss of jobs due to property acquisition**

The EIS is misleading because it discusses the creation of 14,350 direct jobs during construction; however it omits the fact that jobs have also been lost because of acquisition of businesses.

#### **Response**

The project has been designed to minimise the need for land acquisition, where feasible and reasonable. However, given the limited availability of land in the area identified for the project and the desire to minimise acquisition of private property, some commercial properties would be required to facilitate construction of the project, resulting in the temporary occupation or permanent acquisition of private land.

The project would result in 48 businesses being required to be removed from their existing premises and potentially choose to relocate. This includes both commercial and industrial properties that are likely to trade in a local to district catchment. Impacts of acquisition and the associated relocation of businesses can result in:

- Disruptions to business operation
- Loss of revenue
- Relocation and re-establishment costs
- Employee training expenses for new employees
- Trade catchment alterations
- Business closure.

Businesses required to close or that choose to relocate due to the project are predominantly light industrial or speciality services. These businesses would service a wider area and would likely employ a small number of workers. Due to business types and the fixed supply of alternative industrial zoned land in the surrounding area, it is likely that these businesses would relocate to another trade catchment. This would result in relocation and establishment costs with potential loss in trade and revenue during this time for individual businesses.

The relocation or closure of businesses due to property acquisition or lease cessation would also disrupt the character of business areas and affect the productivity of local economies. The impact upon the character of these areas may be partially returned should some businesses be able to re-establish in the same location post-construction. There is some potential for this to occur at the Darley Road, Pyrmont Bridge Road and Parramatta Road construction ancillary facilities, which would retain future opportunities for the land to be redeveloped, post-construction and consistent with the current land zoning.

All property acquisition undertaken by the NSW Government is in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) and the reforms announced in October 2016 (NSW Government 2016b) (see **section 12.2.1** for further information). Consultation with affected property owners would continue during detailed design and through to construction. Future consultation arrangements are discussed in **Chapter A2** (Community and stakeholder involvement).

An exact number of potential jobs lost due to acquisitions associated with the project has not been included in the EIS given the large number of variables. It is extremely difficult to anticipate the number of businesses that may relocate, alterations in demand for business/services, viability of businesses, ability to absorb relocation costs and employment opportunities in competing businesses. Job losses are influenced by broader macroeconomic considerations (eg strength of the economy, outlook for economic growth, interest rate levels, availability of finance, unemployment levels and competition). As such, a reliable assessment of job losses due to business acquisition cannot be made with any certainty. Even allowing for some potential job losses associated with acquisition of businesses, the project would support a significant net increase in employment during the construction phase

While the EIS acknowledged the potential for adverse impacts associated with the displacement of businesses, the project would also result in a number of positive impacts for businesses including:

- Ease congestion on surface roads by providing an underground motorway alternative and allowing for increased use of surface roads by pedestrians and cyclists and for public transport
- Reduce through traffic on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, King Georges Road and Sydenham Road, facilitating urban renewal opportunities to be realised along parts of the Parramatta Road and Victoria Road corridors
- Reduce travel times on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct and between the main centres on the Global Economic Corridor, including Sydney CBD, Sydney Olympic Park and Parramatta CBD

The EIS discusses the various business impacts associated with the property acquisition process in section 7.3.2 of Appendix P (Technical working paper: Social and economic) of the EIS. Due to the nature of current business activity in the areas surrounding the commercial properties to be acquired, it is not anticipated that the viability of adjacent or surrounding businesses would be affected by land acquisition. Businesses in these locations do not generally provide complementary or supplementary goods or services that would be affected by the loss of other business activity in the vicinity of their operations.

## C14.5 Economic impacts during construction

28 submitters raised concerns about economic impacts during construction of the project. Refer to section 14.3 of the EIS and section 7.6 of Appendix P (Technical working paper: Social and economic) of the EIS for details of economic impacts during construction.

### C14.5.1 Expenditure and employment

Submitters raised concerns regarding expenditure and employment impacts for the project. Specific concerns included:

- Construction phase would negatively impact the economy of local communities in the vicinity of construction work
- Construction will create congestion that will negatively impact access and connectivity around employment centres
- Construction traffic disruption and congestion could influence productivity, negatively impacting the inner west local economy, causing delays, lack of parking and increased travel times
- Emissions from construction traffic may impact health, which in turn create lost work and education time impacts
- Traffic congestion reduces businesses' access to human capital and goods and services, in turn reducing economic activity
- Construction will create congestion that will negatively impact access and connectivity around employment centres.

### Response

Section 7.9 of Appendix P (Technical working paper: Social and economic) of the EIS acknowledges that businesses across the study area may experience impacts from construction, such as reduced efficiency of the road network, loss of parking and changes to delivery arrangements. These impacts would be an inconvenience for businesses affected, although they would be temporary in nature. The extent of impact on individual businesses would vary depending on the proximity to construction works and the duration of construction activities.

As part of the business surveys carried out to inform the SEIA, when asked about how construction may affect their overall trade and revenue, 49 per cent of respondents anticipated that there would be no obvious change in trade as a result of construction activities. Twenty per cent of respondents believed that they would experience a loss in trade, and 12 per cent believed they would experience a significant loss in trade. Potential impacts are further assessed in section 7.9 of Appendix P (Technical working paper: Social and economic) of the EIS.

Construction of the project would directly benefit the economy, injecting economic stimulus benefits into the local, regional and State economies. The economic benefit of construction is multi-dimensional, including increased expenditure at local and regional businesses through purchases by construction workers, direct employment through on-site construction activities, direct expenditure associated with on-site construction activities and indirect employment and expenditure through the provision of goods and services required for construction.

During the construction of the project, the local economy may experience a boost due to construction expenditure in the region. Based on a five-year construction period, 14,378 direct job years would be created from 2018 to 2023, which is equivalent to 2,876 jobs a year. Furthermore, around 42,351 indirect (off-site) job years would be generated, equivalent to 8,470 jobs a year based on a similar project period. Construction of the project would significantly increase the employment opportunities across the study area, and is considered to have a major positive impact on the social and economic environment.

The economic multipliers also estimate that construction would generate a further \$5.8 billion of activity in production induced effects and \$7.7 billion in consumption induced effects. Total economic activity generated by the construction of the project would be around \$19.6 billion.

As a commitment of the WestConnex program of works, the WestConnex Training Academy was established. As outlined in the WestConnex Sustainability Strategy, the WestConnex program of work aims to deliver 500 apprenticeships and traineeships during the life of the WestConnex program of works. A portion of this number would be trained on the M4-M5 Link project. In addition to offering new opportunities for employment, the WestConnex Training Academy is providing training in tunnelling to people who have transferrable skills from other industries, like the natural resources sector. This would allow people with experience from other sectors, like mining and heavy industry, to join the workforce. The WestConnex Sustainability Strategy also incorporates initiatives to improve Aboriginal and Torres Strait Islander participation in construction and provides opportunities to Aboriginal and Torres Strait Islander enterprises.

### **C14.5.2 Property values**

Submitters raised concern that construction activities would affect the property values of properties surrounding the construction ancillary facilities and adjacent to acquired properties. Concerns were also raised regarding:

- It would be more difficult to sell or rent property during this period, leading to loss of potential income
- The project would negatively impact investments
- Construction of the Rozelle interchange would affect property values
- The visual impact of additional power lines in Hubert Street for the Darley Road civil and tunnel site (C4) will de-value properties.

#### **Response**

Property values are driven by a range of factors. For example, business property values are generally driven by factors such as access or proximity to markets and products, customer access, and visibility while residential property values are more heavily influenced by liveability as reflected by local amenity and accessibility to employment, transport and social infrastructure.

The general presence of construction and related activities associated with the project would reduce the overall amenity of affected areas, which has the potential to impact property values during construction. However, improved traffic connectivity and provision of new open space and active transport links that would result from the project would likely be a positive influence on the property values of surrounding communities.

Future movements in the value of a property are also difficult to forecast as they are subject to many variables, including specific attributes of the property, capital improvements, demand and supply factors and other changes in the wider property market.

### **C14.5.3 Health-related costs**

Submitters raised concerns that the construction works would lead to an increase in medical costs to families as a result of health impacts due to construction.

#### **Response**

The human health risks and costs associated with construction of the project, including those associated with air quality, noise and vibration, and social impacts were considered in sections 6 and 10 of Appendix K (Technical working paper: Human health risk assessment) of the EIS.

Changes in the urban environment associated with the project have the potential to result in a range of both positive and negative impacts on health and wellbeing of the community. Positive impacts include economic benefits, changes in traffic levels in some areas and increased public open space in areas such as the Rozelle Rail Yards. Negative impacts may occur as a result of traffic changes during construction and operation, property acquisitions, visual changes, noise impacts and changes in access/cohesion of local areas. These impacts may affect human health, resulting in disturbance of sleep, reduced capacity for concentration, interference with speech and other activities, potential effects on cardiovascular health, annoyance and increased stress levels and impacts on mental health. In many cases, these impacts are temporary and for the duration of construction only, and/or able to be managed with the management measures to mitigate health-related impacts.



The management and mitigation measures outlined in **Chapter E1** (Environmental management measures) including the CNVMP, CTAMP, CAQMP, as well as the management of the acquisition process, would be essential to reducing potential stress levels and to managing the subsequent health effects in local communities. Despite these measures, a small number of people may still experience adverse health impacts from these project-related sources.

## C14.6 Operational impacts on the community

501 submitters raised concerns about changes in the community as a result of operation of the project. Refer to section 14.4 and Appendix P (Technical working paper: Social and economic) of the EIS for details of the operational impacts of the project on communities.

### C14.6.1 Community values

Submitters raised concerns that the project would result in general impacts to social and community values including local character, liveability and quality of life.

Specific concerns mentioned in submissions include:

- The project would result in negative socio-economic impacts to communities including the inner west
- The project creates intergenerational inequality in the community
- Families may move away from the affected areas
- The project would create gentrification in Alexandria, pushing out long term residents
- Annandale residents would experience significant detrimental impacts to quality of life through impacts on the use of public space by other members of the community
- The project would lead to social inequality
- The character of suburbs such as Alexandria, Newtown, Stanmore, Enmore and Erskineville would be negatively impacted
- The project will impact the local sense of place of Rozelle
- Residents' quality of life would be affected by traffic from the Iron Cove Link, and the Rozelle and St Peters interchanges
- Residents in proximity to Johnston Street would experience a diminished quality of life due to increased traffic
- Street life in St Peters and Newtown would be impacted due to increased traffic as traffic will be diverted towards Euston Road and King Street
- Ventilation outlets would have a negative social and public health effect on the surrounding areas
- The project will lead to crime
- Increased traffic on local roads will affect the quality of life for children.

Submitters have also voiced general support for the project, stating the positive impact the project will have on safety, the social and cultural environment, amenity and economic benefits.

## Response

### What the project would deliver

General support for the project is noted.

Due to its size and complexity, the project would have an impact on local culture, character, liveability, quality of life and lifestyle in surrounding communities.

The environmental issues associated with these impacts are assessed within the relevant chapters of the EIS, including Chapter 8 (Traffic and transport), Chapter 9 (Air quality), Chapter 10 (Noise and vibration), Chapter 12 (Land use and property) and Chapter 13 (Urban design and visual amenity). The social impacts of the project are considered more broadly in Chapter 14 (Social and economic) and Appendix P (Technical working paper: Social and economic) of the EIS.



Overall, the SEIA identified that the project would result in a range of positive and negative social and economic impacts on residents, businesses and social infrastructure. The impacts would vary in their distribution across the study area.

Upon operation, the project is likely to result in an overall major positive impact within the study area and broader region. This would result from an enhanced network capacity and connectivity between the Sydney CBD, inner west, south, south-western and western Sydney. The positive impact of the operation of the project would benefit future generations. Providing an underground motorway alternative would reduce congestion on the surface road network, allowing for increased use of surface roads by pedestrians and cyclists and for public transport. This would also improve the safety conditions along the majority of local roads surrounding the project.

Impacts to amenity during operation are described in section 14.4.3 of Appendix P (Technical working paper: Social and economic) of the EIS, including those related to noise and vibration, air quality and visual amenity for suburbs in the inner west. The project would improve general amenity within the study area by reducing the volume of traffic on some surface roads, which would be displaced into the mainline tunnels. This would subsequently reduce current levels of noise and vibration, air pollution from vehicle emissions, traffic movements and congestion. In addition, the project provides opportunities for:

- Creation of open space at Rozelle Rail Yards and Iron Cove for community and recreational use
- New and improved active transport links at Rozelle, connecting currently disconnected communities and improving community cohesion
- Potential future urban revitalisation and public transport improvements along existing arterial roads, particularly along Victoria Road at Rozelle and Parramatta Road east of Haberfield as a result of reductions in surface traffic volumes.

Given the operation of the project is likely to result in an overall major positive impact within the study area and broader region it is considered unlikely that the project would cause families within the study area to relocate to a different area.

Gentrification (the process of improving deteriorated neighbourhoods) is a broader phenomenon which is influenced by a number of different variables. As a result it is considered to be beyond the scope of the project.

The delivery of open space and active transport links at the Rozelle Rail Yards is considered to provide a range of socio-economic benefits (refer to section 8.3.2 of Appendix P (Technical working paper: Social and economic) of the EIS). Open space in areas may also present some hazards, such as attracting antisocial behaviours (particularly in isolated areas). However, these may be mitigated through Crime Prevention Through Environmental Design (CPTED) principles (refer below for further information).

The project is not anticipated to disproportionately impact a particular demographic of the community within the study area. Concerns raised regarding tolling and related potential impacts to social inequality are discussed in **section C14.9.2**.

Concerns related to the loss of character within suburbs, including around Alexandria are addressed in **section C14.6.3** for impacts related to amenity and **section C13.3** for impacts related to urban design and landscape character. See **Chapter C20** (Non-Aboriginal heritage) for refer a description of heritage impacts in respect to loss of character.

### Impacts associated with traffic from the project

Appendix H (Technical working paper: Traffic and transport) of the EIS forecasts that the project would improve network productivity across the Greater Sydney network. This means that more trips are expected to be made or longer distances travelled in the network, in a shorter time. This would also support the long-term economic growth of Sydney through improved motorway access and connections, linking Sydney's international gateways to key places of business. This would result in direct and indirect socio-economic benefits for a large number of residents, businesses and social infrastructure facilities and users across the Greater Sydney region. Reduced vehicle traffic volumes on the surface road network tend to:

- Make walking and cycling safer, more comfortable and more convenient. Improved walking and cycling conditions are particularly important for people with disabilities, the elderly, and children, who are more dependent on non-motorised travel, and often have difficulty crossing busy roads

- Improve safety and reduce the severity of vehicle crashes, particularly those involving pedestrians and cyclists
- Increase the attractiveness and amenity of an environment
- Reduce business visibility to passing traffic, which may impact business revenue
- Improve connectivity which increases neighbourhood interaction and improves social cohesion.

There are significant reductions in forecast daily traffic volumes along Victoria Road (south of the proposed Iron Cove Link), King Georges Road, Stanmore Road, Addison Road, Sydenham Road, City West Link, Parramatta Road, King Street and Lyons Road, compared to the 'Without project' scenario. A decrease in the daily volume of heavy vehicles on surface roads is also forecast, as heavy vehicles shift onto the M4-M5 Link. Daily heavy vehicle volumes on Parramatta Road and City West Link are forecast to drop by around 40 to 50 per cent, and roads in the inner west, such as Stanmore Road, Sydenham Road, Marrickville Road and King Street, are forecast to drop by 20 to 50 per cent. Further information is provided in the heavy vehicle screenline analysis in Annexure D of Appendix H (Technical working paper: Traffic and transport) of the EIS. These changes would improve the safety, amenity and liveability of these roads and their surrounding areas.

While the overall network is expected to improve, the project may negatively affect the amenity and accessibility of a number of residential properties, businesses and social infrastructure facilities in locations where traffic volumes are predicted to increase, such as within Annandale (Johnston and Catherine streets), Camperdown (Ross Street), north of Iron Cove Bridge (Victoria Road/Gladesville Bridge) and Anzac Bridge.

The movement of traffic between the surface road network and new road links at the Rozelle interchange is forecast to result in an increase in traffic on some roads including Johnston Street when comparing the 'With project' and 'Cumulative' scenarios to the 'Without project' scenario. Two-way average weekday traffic (AWT) along Johnston Street is forecast to increase by 14 per cent in 2023 and by eight per cent in 2033 in the 'With project' scenario, and 15 percent in 2023 and 12 per cent in 2033 in the 'Cumulative scenario (refer to section 9.4.1 of Appendix H (Technical working paper: Traffic and transport) of the EIS).

There would be commensurate increases in traffic noise associated with this forecast increase in two-way AWT volumes.

Johnston Street is a State road, which provides an important link between Parramatta Road and The Crescent. There is an area of alfresco dining near the intersection with Booth Street, though the street is largely residential. No street markets are known to take place on or near Johnston Street and only one playground, Hinsby Park, is located along the street. Annandale Public School, Annandale North Public School, TAFE NSW Petersham College, a church and an aged-care facility are located along Johnston Street.

Despite overall network improvements, St Peters interchange and surrounds are forecast to experience increased congestion and delays during the PM peak in 2023 and 2033. The forecast in traffic growth for the St Peters interchange and surrounds is expected to cause delays and increase congestion for users. Negative socio-economic impacts associated with delays and congestion includes increased travel time, health impacts and community severance, and reduced safety, and amenity. Active transport will be provided around the St Peters interchange in accordance with the New M5 project conditions of approval and New M5 UDLPs. Pedestrian connectivity in the area surrounding the St Peters interchange would improve once the New M5 project is completed, providing connections along Campbell Road, across Campbell Road to Sydney Park and through the St Peters interchange.

Euston Road would be subject to minor increases in traffic (about 100 vehicles (two-way) in each of the AM and PM peak) which may affect competition for parking for people using Sydney Park or adjacent businesses. This minor increase is small compared to the more significant increases in traffic associated with the New M5 project.

Key observations comparing the 2023 'Without project' and 'With project' scenarios also show significant forecast reductions on King Street, where two-way AWT traffic decreases by just under 4,000 vehicles daily (a drop of 19 per cent). A similar reduction is forecast under the 2023 'With project' scenario. This forecast reduction in AWT traffic volumes would improve the amenity of King Street and is not expected to detrimentally affect the business amenity and street life along King Street.

As with the M4 East and New M5 projects, Roads and Maritime would undertake a Road Network Performance Review, in consultation with Transport for NSW and relevant councils. This would confirm the operational traffic impacts of the M4-M5 Link on surrounding arterial roads and major intersections at both 12 months and five years after opening of the project. The assessment would be based on future updated traffic surveys taken during operation utilising an appropriate methodology following the relevant and industry accepted guidelines current at the time. Regardless, those areas that have been identified as being potentially impacted by the project have been identified in Appendix H (Technical working paper: Traffic and transport) of the EIS and would be addressed prior to these operational reviews, or as needed.

The network performance review would focus on the areas forecast as being potentially impacted by the project including roads in the vicinity of each of the three interchanges. In regards to the Balmain peninsula the review would include key connecting roads such as Victoria Road, The Crescent (including around Johnston Street), City West Link and the resulting impacts on Anzac Bridge. Following the review of network operations specific measures will be investigated and identified to manage the road network performance to mitigate impacts to performance. The implementation of these measures would be subject to separate environmental assessment and approval and are outside the scope of the project. See **Chapter E1** (Environmental management measures) for further information.

### **Impacts associated with operational infrastructure**

The project includes the operation of four ventilation facilities at Haberfield, in Rozelle near the eastern abutment of Iron Cove Bridge, the Rozelle Rail Yards and St Peters interchange. The changes to local air quality and visual amenity were assessed in Chapter 9 (Air quality) and Chapter 13 (Urban design and visual amenity) of the EIS respectively. The human health risk assessment summarised in Chapter 11 (Human health risk) of the EIS concluded that no acute or chronic health risks to local communities would arise due to the project. Conversely, the project would be expected to result in a decrease in total pollutant levels within the study area due to the redistribution of vehicle emissions as a result of traffic moving from surface roads into the motorway tunnels. For much of the community this would result in no change or a small improvement to the existing amenity in these areas.

Under forecast traffic conditions with the project, the contribution of tunnel ventilation outlets to air pollutant concentrations was negligible. Predicted changes in pollutant concentration were driven by changes in traffic volumes on the modelled surface road network, not by the tunnel ventilation outlets.

In terms of visual impact, the project would result in potential changes to some important views for some receptors, generally as a result of the presence of permanent operational infrastructure at Darley Road, Rozelle, Iron Cove and St Peters, particularly, ventilation facilities and outlets. The operation of the project would result in potential alterations to and partial loss of views to the city skyline from Rozelle Bay and/or Glebe Point. These alterations to views may have direct impacts on the amenity of the location and quality of life. However, new open space and active transport links at Rozelle would improve views from nearby properties that overlook this area and also create new views for users of this open space and active transport links.

The existing visual character comprises established urban development with major road corridors and supporting infrastructure. Changes to views may have direct impacts on the amenity of the location and quality of life generally. Properties in Lilyfield who presently overlook the industrial buildings and infrastructure at the Rozelle Rail Yards would experience improved views of new open space and active transport links at Rozelle.

The assessment of operational noise generated by fixed facilities, such as ventilation facilities and water treatment plants, identified a noise exceedance in only one noise catchment area (NCA) at Iron Cove (NCA33). Noise impacts at this location are expected to be reduced through the selection of low noise equipment and other mitigation applied at the detailed design stage. Visual and air quality impacts associated with non-ventilation fixed facilities are expected to be negligible.

Principles of CPTED would be considered and incorporated into the urban design through the preparation of the UDLPs for the project to reduce opportunities for crime around operational infrastructure. See section 13.5.8 of Chapter 13 (Urban design and visual amenity) of the EIS for further information regarding the incorporation of principles of CPTED into the UDLPs for the project.

### **C14.6.2 Access, connectivity and community cohesion**

Submitters raised concerns that operation of the project would affect the community through changes to access, would result in severance of communities and affect community connectivity and cohesion. Specific concerns included:

- The walkability of Rozelle village and the suburb of St Peters would be affected
- Social isolation of people who do not drive will become more severe in car-dependent suburbs
- Without an overpass or underpass, separation between the communities of Rozelle and Balmain will be exacerbated
- Pedestrian amenity around the Victoria Road/The Crescent/City West Link intersection would be affected with the removal of two footbridges, which currently provide safe and convenient access to public bus transport
- Increased traffic around St Peters interchange would impact pedestrian and car movements to and around parks, shops, bus stops and train stations
- The project will divide and isolate neighbourhoods by affecting the local road and active transport network
- Large development projects like WestConnex are anti-urban and destructive to inner-city spaces, permanently disrupting communities
- Families would be displaced, leading to the break-up of communities
- Lilyfield and Leichhardt would be bisected by the project, isolating pockets of the community
- The Rozelle village community would be geographically divided, giving traffic higher priority than residents
- Plans for family members to move closer to their family residing in areas affected by the project in Haberfield would no longer be viable
- Community links between Haberfield and Ashfield and Haberfield and Five Dock would be impaired by the project
- Suggestion of an active transport link for pedestrians and cyclists at Terry Street across Victoria Road that would connect the communities of Rozelle and Balmain.

### **Response**

The project has been designed to minimise potential community isolation, segmentation and/or severance. This is primarily achieved through the adoption of a tunnel concept for the new motorway, which runs underground for most of its length (refer to Chapter 4 (Project development and alternatives) of the EIS). As a result, the project design significantly reduces the requirement for surface land acquisition and consequential impacts on local connectivity when compared to a surface motorway concept.

The project would generally improve intersection performance, reduce travel times and increase average speeds across the Sydney metropolitan road network. The traffic modelling indicates that by 2033, there would be an overall increase of 498,000 kilometres travelled and a reduction of 46,000 vehicle hours travelled (VHT) on the network. This increase is largely due to the redirection of vehicles (in particular heavy vehicles) from existing surface roads to the new, faster M4-M5 Link. By reducing congestion, the project would enhance both local and regional connectivity and encourage greater participation in active transport across several suburbs of the inner west. These improvements would also help to connect residential communities around the project, potentially improving community cohesion generally in the inner west.

Around Lilyfield and Leichhardt, existing infrastructure, including the Rozelle Rail Yards, City West Link and the light rail line currently operate as physical and psychological barriers between communities. Two pedestrian and cyclist bridges over City West Link leading into the new public open space at the Rozelle Rail Yards would provide substantially improved north-south connections between Annandale, Rozelle, Lilyfield and beyond, including connections between the Glebe Foreshore parklands and Easton Park, as well as connecting to Rozelle Bay light rail stop. This would directly benefit the communities of Annandale, Glebe, Lilyfield and Rozelle.

As described in Table 6-20 of the EIS, the removal of two active transport bridges at Rozelle (east-west over Victoria Road and north-south over The Crescent (City West Link)) would occur during construction. In recognition of the importance of these connections for active transport users, these active transport bridges would not be removed until equivalent connections are established. The proposed equivalent connections are described in section 7.4.7 of Appendix H (Technical working paper: Traffic and transport) of the EIS.

The project would provide pedestrian and cyclist bridges that would increase the opportunities for communities to connect and interact, contributing to community and social cohesion. A new pedestrian footpath and separated cycleway would be provided between Springside Street and the Bay Run at Byrnes Street on the western side of Victoria Road, improving the quality of local active transport links.

The Rozelle village community is currently divided by Victoria Road. During operation, traffic volumes on Victoria Road are predicted to significantly reduce, and the existing pedestrian connectivity across Victoria Road would be retained.

The existing at-grade pedestrian connections across Victoria Road at Rozelle (at Terry Street and Wellington Street) would be retained. The pedestrian connection under Victoria Road beneath Iron Cove Bridge would also be retained. Whilst it is not proposed to convert these into grade separated active transport connections, it is expected that the vast majority of traffic in this area would use the toll-free Iron Cove Link, significantly reducing both the amount of surface traffic and the subsequent physical and psychological barrier effects of Victoria Road east of the tunnel portals.

While Victoria Road would be widened around the Iron Cove link portals at Rozelle, the reduction in operational surface traffic would allow for potential improvements in community connectivity north-south across Victoria Road. The predicted reduction in traffic along this section of Victoria Road may allow pedestrian and cyclist signals to be given greater priority (eg greater crossing frequency and duration). This is demonstrated by the forecast intersection LoS at the Victoria Road/Darling Street and Victoria Road /Wellington Street intersections, which are generally forecast to improve (refer to section 10.4.3 of Appendix H (Technical working paper: Traffic and transport) of the EIS.

At Haberfield, the physical changes that may affect community cohesion include the widening of Parramatta Road and Wattle Street; however these would occur as part of the M4 East project. No further changes to these roads are proposed by the M4-M5 Link project. The project would not change pedestrian crossings (either existing or being constructed as part of the M4 East project) and no permanent operational infrastructure would be constructed as part of the project at Haberfield that would impact on community cohesion.

Impacts on community cohesion at Haberfield and Ashfield during operation of the M4 East project are described in Chapter 14 of the M4 East EIS.

Campbell Road at St Peters is currently used as a local route by cyclists due to low traffic volumes. The New M5 project would upgrade Campbell Road, with a forecast increase in traffic volumes. Delivery of the New M5 project would also include construction of a separated cycle path along Campbell Road (forming part of the Bourke Street Link), connecting Newtown to the Bourke Street Cycleway, Green Square and the Sydney CBD.

The project delivers on the NSW Government's plans to deliver an integrated transport solution, comprising roads and public transport, to address congestion on Sydney's roads. This is discussed further in Chapter 3 (Strategic context and project need) of the EIS. The project, as part of the WestConnex program of works, would act as a catalyst for urban renewal along parts of Parramatta Road and Victoria Road which may facilitate future public transport improvements along these key transport corridors.

### **C14.6.3 Reduced amenity for residents**

Submitters raised concern about impacts to the amenity of residential and tourist areas as a result of the project, including from increased noise, air pollution (including from placement and no filtering of ventilation outlets), traffic and congestion. Specific areas of concern include:

- The inner west generally
- St Peters, including around the St Peters interchange
- Commuters in the Alexandria area
- Around the Rozelle interchange and Callan Street at Rozelle



- Around the Iron Cove Link
- Bridge Road at Forest Lodge
- Wattle Street at Haberfield
- The Western Distributor
- Streets in Alexandria, including Euston Road, McEvoy, Botany, Bourke, Lachlan and Wyndham streets
- Around the Darley Road motorway operations complex, substation and water treatment plant at Leichhardt
- Streets in Glebe, including The Crescent, Minogue Crescent, Ross, Mount Vernon, Catherine, Ross and Arundel streets
- Concerns were also raised indicating that reduced amenity may stop people from going outside.

Submitters noted that the M4-M5 Link and other WestConnex projects would improve public amenity at the surface.

## Response

The comments received from the community stating that the M4-M5 Link and other WestConnex projects would improve public amenity at the surface is noted.

Potential impacts to residential amenity during the operation of the project may occur as a result of:

- Changes in visual amenity due to permanent operational facilities
- Changes to traffic and public and active transport
- Changes to noise levels relating to traffic and operational facilities
- Changes in the quality and amount of public open space
- Changes to air quality.

The environmental issues associated with quality of life and amenity are identified and assessed within the relevant chapters of the EIS, including Chapter 8 (Traffic and transport), Chapter 9 (Air quality), Chapter 10 (Noise and vibration), Chapter 12 (Land use and property) and Chapter 13 (Urban design and visual amenity).

During operation, traffic related noise in the study area is generally expected to decrease as a result of traffic being displaced from surface roads into the tunnels. This would have a moderate positive impact, resulting in a noticeable and substantial positive change in the existing environment. This impact would be long-term and would affect a large number of people.

Reductions in noise are identified along sections of Victoria Road at Rozelle where the project is forecast to reduce traffic numbers. This would be a positive effect, likely to include increased amenity and ambience for residents living near these locations.

Increases in noise are identified in areas such as along parts of Johnston Street where traffic volumes are expected to increase, and in Iron Cove to the south of Victoria Road (Byrnes, Clubb, Toelle, Callan and Springside streets) where noise shielding from the front row of buildings would be removed due to property acquisitions and subsequent demolition. Residents at these locations would be more susceptible to health impacts associated with increased noise, such as general annoyance (eg having to keep windows closed), sleep disturbance and interference with household activities (eg eating outdoors).

Mitigation measures, such as noise barriers or architectural treatments, would be provided as part of the project, which would reduce noise impacts. Appendix J (Technical working paper: Noise and vibration) of the EIS has identified potential noise barrier locations, located to the south of Iron Cove and on the western side of Victoria Road, near Lilyfield and Rozelle, which may reduce noise for triggered receivers. These noise barriers would be subject to detailed design and engagement with the community. In addition, at-receiver acoustic treatment would be considered for eligible properties where noise exceedances were still predicted.



The project is expected to result in an overall reduction in total air pollutant levels in the community and a redistribution of emissions to the tunnels as there would be less vehicles using surface roads. For much of the community this would result in no change or a small improvement to existing conditions, resulting in a negligible impact. Changes in air quality related health incidents are expected to be negligible.

The built form components of the project would result in alterations to existing views for a number of residential properties. Some of these views would be altered due to the addition of project elements such as ventilation facilities and outlets, water treatment plants, electricity substations, air intake facilities and tunnel portals.

The operation of the project would result in changed views for receivers at Darley Road, Rozelle, Iron Cove and St Peters, generally from the operation of permanent operational infrastructure such as ventilation facilities and outlets. These changes may have direct impacts on the amenity of the location and quality of life. However, new open space and active transport links would improve views for numerous receivers in particular at Rozelle, improving the surrounding amenity. The potential visual impacts during operation of the project are assessed in section 13.5 of Chapter 13 (Urban design and visual amenity) of the EIS.

Design options have been considered to minimise the visual impacts of prominent infrastructure to surrounding residential areas. This would include:

- Street tree planting for screening, shade and canopy
- High quality finishes to buildings and ventilation facilities to facilitate long term durability and minimal maintenance and create a positive urban design outcome.

During detailed design, measures to reduce the height, bulk, scale and enhance the landscape setting of the ventilation outlets will be investigated, subject to achieving desired ventilation outcomes, and in accordance with the design principles detailed in Appendix L (Technical working paper: Urban design) of the EIS. In addition, the following management measures are proposed (see **Chapter E1** (Environmental management measures)):

- Environmental management measure LV16 - develop a design that aims to incorporate the ventilation outlets at the Rozelle Rail Yards as an integral component of the larger open space composition, with reference and consideration to the Ventilation Facility Design Review (Annexure 2 of Appendix L (Technical working paper: Urban design))
- Environmental management measure LV19 - investigate vegetative and other screening measures along Victoria Road to improve the visual amenity of the streetscape and reduce impacts associated with the ventilation outlet and increased glare from the portals to residential dwellings to the north of Victoria Road. Reasonable and feasible landscaping measures will be included in the relevant UDLP
- Environmental management measure LV22 - investigate measures during detailed design to reduce the height, bulk, scale and enhance the landscape setting of the ventilation outlets, subject to achieving desired ventilation outcomes, and in accordance with the design principles detailed in Appendix L (Technical working paper: Urban design) of the EIS.

Following an assessment of traffic, environmental and community impacts, the Camperdown interchange was removed from the project. The Camperdown interchange was intended to provide entry and exit ramps connecting to Parramatta Road for drivers travelling to and from the Sydney CBD. The benefits of removing the Camperdown interchange from the project are outlined in Chapter 4 (Project development and alternatives) of the EIS. As a result of the removal of the Camperdown interchange, amenity impacts from changes in traffic throughout Glebe, including along The Crescent, Minogue Crescent, Mount Vernon, Catherine, Ross and Arundel streets would be minimised.

## C14.7 Operational impacts on social infrastructure

316 submitters raised concerns about the impacts on social infrastructure during operation. Refer to section 14.4 and Appendix P (Technical working paper: Social and economic) of the EIS for details of impacts on social infrastructure during operation.

### C14.7.1 Impacts to public open space

Submitters expressed concern that the project would impact the usability of open space. Specific areas of concern include:

- The Iron Cove Link ventilation facility will impact the use of King George Park, including the children's playground and the Bay Run
- Impacts to Sydney Park, including that access may be compromised
- Loss of green space after construction
- Impacts to Easton Park.

### Response

Appendix I (Technical working paper: Air quality) of the EIS indicates that potential air quality impacts to King George Park from the Iron Cove Link ventilation outlet, including the Bay Run, would be limited. Emissions from the ventilation facility in this location are not expected to result in acute or chronic health effects to local communities or recreational users. Air quality in this area is expected to improve, due to the redistribution of vehicle emissions, specifically in relation to emissions derived from vehicles currently using surface roads that would be directed into the Iron Cove Link. Operational noise from the operation of the ventilation facility would be reduced through the selection of low noise equipment and other mitigation applied at the detailed design stage.

Visual and air quality impacts associated with the ventilation facility are expected to be negligible. The overall impact to the amenity of King George Park, including the children's playgrounds and the Bay Run in the vicinity of the Iron Cove Link ventilation facility is expected to be minimal.

As outlined in **Chapter D3** (Relocation of the bioretention facility at Rozelle), it is proposed to relocate the bioretention facility at Rozelle around 150 metres north of the location presented in the EIS, to an area adjacent to Victoria Road at the eastern abutment of Iron Cove Bridge and within King George Park (see **Figure D3-1**). Further information is provided in **Chapter D3** (Relocation of the bioretention facility at Rozelle). Works within King George Park would be undertaken in an area that is used as a landscaped area adjacent to the Iron Cove Bridge which is not actively used for open space.

Upon opening, the project would provide an improved active transport link and landscaped area along the southern side of Victoria Road, which would connect to the Bay Run and King George Park.

As part of the project, parts of the Rozelle Rail Yards would be developed as open space, including a constructed wetland and pedestrian and cyclist infrastructure. Open space created at the Rozelle Rail Yards would be developed and implemented in accordance with the UDLPs for the project. This new open space would provide the community at Rozelle, Annandale and other surrounding suburbs with increased opportunities for active and passive recreational activities. In the area around Wattle Street and Campbell Road, the project would include new open space areas in line with the M4 East and New M5 UDLPs. This new open space would provide a compensatory offset to the open space affected at Buruwan Park and King George Park.

Active transport links providing access to Sydney Park are being delivered as part of the New M5 project and would be provided on operation of that project. The M4-M5 Link would not impact on the implementation of these plans.

The permanent loss of open space, including at Buruwan Park and King George Park, and the loss of green space is discussed in **section C14.3.1**.

The project footprint was adjusted to avoid using Easton Park at Rozelle during construction and the park would not be directly impacted during operation of the project. Connection to Easton Park will be improved by the new open space area at Rozelle and the north-south active transport link to be delivered by the project.

### C14.7.2 Impacts to social infrastructure

Submitters raised concerns that the operation of the project would impact on and strain community facilities, including local schools and in particular the following:

- Concern regarding the impact of the project on schools in proximity to the project area, including the Rozelle Public School
- Concern that the project would cause strain and financial problems on the public hospital systems and individuals' medical bills as a result of increased health impacts due to air pollution
- Impacts to Smith's Hall at Rozelle should be avoided
- Stormwater discharged to Hawthorne Canal and Iron Cove from the Darley Road water treatment plant would affect recreational activities in those waterways
- Permanent impacts to social infrastructure facilities, including impacts to active transport links around Iron Cove that provide access to recreational areas of King George Park and Drummoyne Pool.

### Response

Appendix P (Technical working paper: Social and economic) of the EIS provides an assessment of impacts on community facilities resulting from the project. The focus of the assessment was mainly on directly affected properties, but also considered those in the vicinity of the project if potential indirect impacts were anticipated. A comprehensive list of community facilities within the study area, including Rozelle Public School, is provided in section 5.2 of Appendix P (Technical working paper: Social and economic) of the EIS.

Rozelle Public School is located within close proximity of Victoria Road, which is a heavily trafficked arterial road subject to existing traffic noise and air pollution from vehicle emissions. With the project, traffic noise is predicted to decrease and air quality is predicted to improve at Rozelle Public School with surface road traffic being removed from Victoria Road and diverted onto the Iron Cove Link.

The human health risk assessment undertaken for the project assessed the overall impact to community health arising from the project, with specific reference to air quality impacts. Potential health impacts associated with changes in air quality (specifically nitrogen dioxide and particulates) within the local community have been assessed and are considered to be acceptable in relation to the applicable standards. As such the project is unlikely to affect community health to such a degree that any local health facilities are placed under strain. See **section C14.9.4** for a response regarding the health-related costs as a result of the project.

Further information regarding the concern raised regarding stormwater discharge into receiving waterways is provided in the response in **section C15.3** and **C15.6**.

The intersection performance at Victoria Road/Darling Street and Victoria Road/Wellington Street generally improves with the project.

Smith's Hall at 56 Burt Street, Rozelle is around 300 metres from the Rozelle ventilation outlets and the facility would benefit from the improved active transport links and access to open space proposed at Rozelle, and associated improved views.

## C14.8 Operational impacts on businesses and industry

94 submitters raised concerns about impacts on businesses and industry during operation. Refer to section 14.4 and Appendix P (Technical working paper: Social and economic) of the EIS for details of impacts on businesses and industry during operation.

### C14.8.1 Impacts on businesses

Submitters raised general concerns that the project would affect businesses in suburbs of the inner west, including St Peters and Newtown, for a number of reasons, including:

- Reduced parking availability, increased traffic and the introduction of clearways on High Street at Newtown will affect business operations
- Increase traffic on Euston Road and King Street, and through St Peters generally, would disrupt businesses

- Businesses along Victoria Road at Gladesville will be negatively impacted by increased congestion
- Reduced amenity for businesses, including changes to noise and air quality
- Reduced access to local businesses through undesirable pedestrian access routes
- Positive impacts on existing business are reliant on the construction of other major transport projects including the proposed future Western Harbour Tunnel, Sydney Gateway and F6 Extension.

## Response

Impacts from operation of the project on surrounding businesses including impacts on business amenity (noise and air quality) and accessibility (traffic and parking) have been assessed in chapter 8 of Appendix P (Technical working paper: Social and economic) of the EIS. The EIS demonstrated that these impacts could be managed within acceptable limits with the implementation of environmental management measures (see **Chapter E1** (Environmental management measures)).

Overall, the road, active transport and public transport networks would improve during operation of the project. Increased accessibility and connectivity has the potential to reduce delivery time, increase delivery reliability and reduce transport costs to local businesses. A reduction in traffic is expected along Victoria Road, east of Iron Cove Bridge, which would potentially benefit businesses along Victoria Road and Darling Street through general improved amenity and improved access. The reduction in traffic may activate the commercial areas by improving the amenity along this heavily trafficked and degraded road corridor, however this may also reduce passing vehicular trade for those businesses that rely on it. There are no permanent impacts on on-street parking near business and commercial areas as part of the project.

No clearways are proposed on King Street or High Street at Newtown, or on any other roads as part of the project. Traffic along King Street is predicted to reduce as a result of the project, which would improve the amenity for street fronting businesses. Only a small increase in traffic is predicted on Euston Road as a result of the project. Euston Road is being upgraded as part of New M5 project.

There is predicted to be an increase in traffic on Victoria Road through Drummoyne and Gladesville, which may have some limited impact on access to businesses in these areas. No changes to on-street parking restrictions along these roads are proposed as part of the project.

There are a number of other major roads, including Parramatta Road, Lyons Road and Addison Road, where traffic volumes are predicted to reduce as a result of the project. Businesses along these roads would benefit from the improved amenity and access as a result.

Once operational the project is predicted to result in a reduction in noise levels for around 60 per cent of the receivers within the study area. The reduced noise levels would likely improve the ambience of the outdoor and indoor environment, therefore potentially increasing the number of visitors and passing trade for businesses. Less than one per cent of receivers in the study area are predicted to experience traffic noise increases of more than 2 dBA.

The project provides an opportunity to address poor active transport connectivity in the study area, including along Victoria Road and the Rozelle Rail Yards at Rozelle. In addition, the diverting of through traffic from local roads onto roads upgraded as part of the project around the interchanges and into the WestConnex tunnels would improve pedestrian and cyclist safety. This would provide increased access to local businesses for pedestrians and cyclists. Refer to Chapter 13 (Urban design and visual amenity) of the EIS for further information regarding active transport connectivity for the operation of the project.

The NSW Government has committed to the delivery of the proposed future Western Harbour Tunnel, Sydney Gateway and F6 Extension which are subject to separate environmental assessment and approval. The traffic assessment included assumptions about the timing of the construction and operation of the proposed future Western Harbour Tunnel, Sydney Gateway and F6 Extension projects for the operational 'Cumulative 2023' and 'Cumulative 2033' scenarios. In the event of unforeseen delays to these projects this may impact on the traffic forecasts for the cumulative scenarios in the EIS. These projects are in the design development stage and would be subject to their own approval process. Potential associated cumulative impacts would be assessed in the respective project EISs.

## C14.8.2 Impacts on industry

Submitters raised general concerns regarding the potential impacts of the project on industry, including:

- Increased traffic would negatively impact productivity due to impeded public and active transport networks. This in turn reduces access to employment centres
- The project would cause long-term economic impacts on industry, due to the decentralisation of commercial investments.

### Response

Potential impacts to industry and employment connectivity are described in section 14.4 of Chapter 14 (Social and economic) of the EIS. By providing a motorway link between the M4 East at Haberfield and the New M5 at St Peters, the project would help to connect major employment centres, which are critical in supporting the creation of jobs and businesses. This would include centres within the 'global economic corridor', which includes the Sydney Airport and Port Botany precinct, Parramatta CBD, Sydney CBD as well as Sydney Olympic Park. The project would also support the Western Sydney Employment Area, which is outside the global economic corridor.

The benefits provided by the project as part of the WestConnex program of works include:

- Ease congestion on surface roads by providing an underground motorway alternative and allowing for increased use of surface roads by pedestrians and cyclists and for public transport
- Reduce through traffic on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, King Georges Road and Sydenham Road, facilitating urban renewal opportunities to be realised along parts of the Parramatta Road and Victoria Road corridors
- Improve network productivity on the metropolitan network, with more trips forecast to be made or longer distances travelled on the network in a shorter time. The forecast increase in vehicle kilometres travelled and reduction in vehicle hours travelled is mainly due to traffic using the new motorway, with reductions in daily vehicle kilometres travelled (VKT) and reduction in vehicle hours travelled also forecast on non-motorway roads
- Reduce travel times on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct and between the main centres on the global economic corridor, including Sydney CBD, Sydney Olympic Park and the Parramatta CBD
- Facilitate future growth in Sydney's transport network by allowing for connections to the proposed future Western Harbour Tunnel and Beaches Link, and Sydney Gateway projects.

Investment in the M4-M5 Link, together with the other WestConnex component projects, would assist in facilitating the delivery of other major city-shaping improvements, such as outlined in the *Parramatta Road Corridor Urban Transformation Strategy* and *The Bays Precinct Transformation Plan*, which would all contribute to delivering economic growth. As part of the broader WestConnex program of works, the project would support NSW's major sources of economic activity and provide a strategic response to the future transport demands on the already congested road network, which includes the A3 corridor.

An assessment of the impact of the project on public transport services in the Rozelle interchange study area is provided in section 10.4 of the Appendix H (Technical working paper: Traffic and transport) of the EIS. The results show longer city inbound bus journey times in the AM peak, due to the congested traffic conditions on Western Distributor and Anzac Bridge combined with the increased demands to Bathurst Street and Sydney Harbour Bridge, compared to the 'Without project' case.

In the outbound direction, the Iron Cove Link significantly improves the congestion over Anzac Bridge. As a result, bus journey times reduce in the 'With project' scenario. The forecast reduction in general traffic demand on Victoria Road between Iron Cove Link and Anzac Bridge would provide the opportunity to investigate improving public transport operations, such as extending the existing bus lanes on Victoria Road.

Roads and Maritime will develop a strategy to ensure appropriate network integration in areas surrounding the Rozelle interchange, including Anzac Bridge, Western Distributor and Victoria Road, which will include a review of capacity improvements (see environmental management measure OpTT3 in **Chapter E1** (Environmental management measures)), which is expected to have benefits for all road users, including public transport services.



As with the M4 East and New M5 projects, Roads and Maritime would undertake a Road Network Performance Review, in consultation with Transport for NSW and relevant councils. This would confirm the operational traffic impacts of the M4-M5 Link on surrounding arterial roads and major intersections at both 12 months and five years after opening of the project. The assessment would be based on future updated traffic surveys taken during operation utilising an appropriate methodology following the relevant and industry accepted guidelines current at the time (see environmental management measure OpTT1 in **Chapter E1** (Environmental management measures)). Regardless, those areas that have been identified as being potentially impacted by the project have been identified in Appendix H (Technical working paper: Traffic and transport) of the EIS and would be addressed prior to these operational reviews, or as needed.

In addition to these measures, the forecast reduction in general traffic demand on Victoria Road between Iron Cove Link and Anzac Bridge would provide the opportunity to investigate improving public transport operations along the Victoria Road corridor, such as extending the existing bus lanes on Victoria Road. These improvements do not form part of the project and would be the responsibility of Transport for NSW. The *Draft Greater Sydney Services and Infrastructure Plan* identifies Victoria Road transport improvements as initiatives for investigation within a 10 year horizon (to 2026).

The project would deliver around 3.8 kilometres of new and upgraded pedestrian and cycling infrastructure. Much of this infrastructure would be physically separated from the road network to minimise the interface between pedestrians, cyclists and motor vehicles. This enhancement is considered a major positive impact, as it would result in a significant, long-term change to the social and economic environment, benefiting a large number of people.

## C14.9 Economic impacts during operation

498 submitters raised concerns about economic impacts during operation of the project. Refer to section 14.4 and Appendix P (Technical working paper: Social and economic) of the EIS for details of economic impacts during operation.

### C14.9.1 Changes to the local economy

Submitters raised concerns that the project would impact the economy of local communities and the economic efficiency of the Sydney CBD through increased traffic, such as on Anzac Bridge. Specific issues raised include:

- Increased traffic entering the Sydney CBD will reduce the economic efficiency of Sydney
- Businesses would have reduced access to human capital and goods and services, which would have a detrimental impact to economic activity and output
- The project would increase inflation, lead to a higher cost of living and a poorer state
- Tolls may deter tourists, negatively impacting the tourism economy
- Tolling costs passed on by businesses through goods and services will have a negative impact on the economy
- The project (through increased traffic) would reduce access to jobs over large areas of the city, undermine the attractiveness of central Sydney to internationally competitive, high productivity firms and their potential employees and therefore adversely affect overall productivity
- The project would cause a loss of trade and measures should be put in place to ensure that acquisition and traffic changes do not unnecessarily reduce trade in Glebe and Forest Lodge.

## Response

### Economic impact of congestion

The EIS acknowledges that during operation, additional congestion is forecast on Anzac Bridge. However, from a network wide productivity perspective, the addition of the M4-M5 Link would provide a significant overall benefit. An overall increase of 499,000 daily VKT and a reduction of 46,000 daily VHT on the road network are forecast. The economic impacts of this include allowing more trips to be made on the network in a shorter time and motorists to reach their destination in less time, further improving congestion. There would also be substantial overall benefits for freight and commercial vehicle movements from travel time savings due to the operation of the M4-M5 Link project. The subsequent effects of the operation of the M4-M5 Link on business productivity include:

- Reduced cost for commercial and freight movements
- Increased productivity from reduced congestion and travel times for commercial and freight movements
- Increased economic output as a result of increased efficiency in freight and commercial vehicle movements.

Due to the small forecast change in the Sydney CBD with the project and the complexity of the CBD traffic operations, it was not considered appropriate to model the operation of intersections internal to the CBD. The forecast daily traffic demand changes can be seen in Figure 10.1 and 10.2 of Appendix H (Technical working paper: Traffic and transport) of the EIS and the forecast AM and PM peak hour traffic demand changes can be seen in Figure 3 and Figure 4 of Annexure B (Justification of modelled areas) of Appendix H (Technical working paper: Traffic and transport) of the EIS. These figures illustrate that the main changes are focused on the Western Distributor/Sydney Harbour Bridge and Sydney Harbour Tunnel/Eastern Distributor, with minimal changes forecast within the CBD (refer to **section B10.8.6** for further information). The economic impacts of these traffic changes would therefore also be minimal.

Management measures associated with road network performance constraints as a result of the project have been identified, including the development of a strategy by Roads and Maritime to ensure appropriate network integration in the areas surrounding the Rozelle interchange, including Anzac Bridge. The strategy will include a review of capacity improvement measures, project staging options and demand management measures (see environmental management measure OpTT3 in **Chapter E1** (Environmental management measures)).

For freight road users, the project would improve the existing network conditions which would beneficially affect a large number of businesses within the region. Effects would be long-term, and benefit the Greater Sydney Region, as well as the Sydney CBD. The WestConnex program of works is expected to deliver the following benefits to freight vehicle users (in discounted terms), including:

- Reliability benefits valued at over \$633 million
- Vehicle operating cost benefits valued at over \$2.9 billion
- Travel time savings valued at over \$5.9 billion.<sup>2</sup>

Tolls would escalate up to a maximum of four per cent or the consumer price index (CPI) per year (whichever is greater) until 2040. After that, CPI only would apply. Inflation is influenced by broad national economic trends and is regulated in part by the Reserve Bank of Australia. It is not considered that the project would have a significant impact on inflation.

For commuters accessing major employment centres, the project would lead to a more reliable road network, reducing commuting time and lowering vehicle operating costs. For the residents of western Sydney, in particular, this would result in a major positive impact on the social and economic environment.

### Business amenity

Reductions in freight or heavy vehicle traffic movements along surface roads in the study area, particularly Parramatta Road, City West Link, Victoria Road, King Georges Road and the existing M5 East Motorway, have the potential to improve the amenity of the environment, which in turn benefits residential communities, visitors and businesses.

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<sup>2</sup> Sydney Motorway Corporation 2015, WestConnex Updated Strategic Business Case

Improved road and active transport networks during operation of the project would generally increase the ability for customers to access local businesses. The reduction in traffic may activate the commercial areas by allowing more passing trade and foot traffic, however this may also reduce passing vehicular trade. There would be no permanent impacts on on-street parking near business and commercial areas proposed as part of the project.

For businesses, operation of the project would lead to a more reliable road network, reducing commuting time and lowering vehicle operating costs. Effects would be long term, and benefit the Greater Sydney Region, particularly residents and businesses in western Sydney. This would result in a major improvement in regional connectivity as a result of the project.

## **Tolling**

A more detailed response to tolling impacts is provided in **section C14.9.2**. As a free surface road alternative remains available to all motorists, the tolled motorway is not expected to impact on tourists or the contribution of tourism to the local economy.

Further, tolls charged to commercial and freight operators would not necessarily be passed on to communities. Although tolls would be an added cost to businesses, the benefits of using the tolled motorway, such as increased accessibility and connectivity, has the potential to generally reduce delivery times, increase delivery reliability and as a result reduce overall transport costs. Businesses would also have the choice of using the free surface road network.

### **C14.9.2 Cost of tolling on businesses and individuals**

Submitters raised issues regarding the cost associated with WestConnex and M4-M5 Link tolls on individuals and communities including:

- General concerns over the affordability of tolls and increasing tolls in the future, including increases above the inflation rate
- The burden of the tolls will be on the residents of western Sydney, where the project is not needed or wanted and where people have generally lower incomes than people living in inner-city suburbs
- The cost of tolls is projected to increase by four per cent per year, which is higher than CPI and wages will not keep up with the increasing toll prices, exacerbating affordability issues
- The project discriminates against commuters, such as young people, who cannot afford to pay tolls, do not have access to public transport alternatives, and will be forced to travel on slower congested routes
- Motorists would be reluctant to use tolled tunnels due to costs, and tolls should be removed or charged at minimal fee to encourage usage
- A toll would impose an adverse financial burden on residents of the Illawarra, including Wollongong and Shellharbour, who are dependent on the M1 to travel north
- Toll would impact on cost of living and result in an economic burden
- Increased toll costs would have a negative financial impact on businesses who will be required to use the toll roads daily
- The project would result in decades of expensive tolls.

## **Response**

The SEIA discusses the potential for impacts upon communities and social equity generally arising from the imposition of tolls on the project. Despite the potential cost to individuals, overall, the benefits of decreased travel times and freight efficiency were assessed as providing a positive benefit for the Greater Sydney Region. A free alternative route is always available for those who choose not to use the tolled motorway.

A tolled motorway applies a 'user-pays' principle to the provision of the faster alternative route compared to existing routes. This principle aims to fund the improved infrastructure through contributions from those who would benefit the most, rather than paying for the project out of general government revenue which is raised from tax payers across NSW, not just those in Sydney that would benefit. This model is considered fair by Transport for NSW as the NSW Government alone cannot fund all infrastructure investment required in NSW. This model also accords with the Australian Government's *National Public Private Partnership Guidelines* (2015), which sets out the basic case for user charging, noting that this allows infrastructure investment to be brought forward. This in turn provides for improved economic growth and efficiencies, providing benefits across the state in both the short and long term.

Key considerations in the approach to tolling are outlined in the *WestConnex Updated Strategic Business Case* and include such elements as: distance based tolling, higher tolls for heavy vehicles and minimum and maximum charges. In setting the toll for the project the NSW Government's tolling principles have been applied, which are:

- 1) New tolls are applied only where users receive a direct benefit
- 2) Tolls can continue while they provide broader network benefits or fund ongoing costs
- 3) Distance-based tolling for all new motorways
- 4) Tolls charged for both directions of travel on all motorways
- 5) Tolls charged reflect the cost of delivering the motorway network
- 6) Tolls take account of increases in expenses, income and comparable toll roads
- 7) Tolls will be applied consistently across different motorways, to the extent practicable, taking into account existing concessions and tolls
- 8) Truck tolls at least three times higher than car tolls
- 9) Regulations could be used so trucks use new motorway segments
- 10) Untolled alternative arterial roads remain available for customers.

Section 8.6.3 of Appendix P (Technical working paper: Social and economic) of the EIS indicates that lower income households in western Sydney may not be able to afford the tolls for the M4-M5 Link. The broader WestConnex toll charges and cap of \$8.60 in 2017 dollars for cars and light commercial vehicles is considered to represent good value based upon the substantial time savings offered for commuters travelling from western Sydney to the Sydney CBD. Tolls would be charged on all users, including heavy vehicles, and would apply in both directions. As such the toll would be incurred by motorists from a broad geographical cross section of Sydney, as well as by heavy vehicles travelling further afield within NSW and interstate, including those travelling to and from Sydney Airport and Port Botany.

Free, alternative traffic routes, such as Parramatta Road, City West Link, King Georges Road, the Hume Highway, Stanmore Road, Sydenham Road and the Princes Highway, would remain available to those who choose not to use the tolled motorway. Motorists who choose to use the existing surface road network would still benefit as the capacity on these alternative routes is forecast to improve (as freight and commercial vehicles are expected to use the motorway tunnels). Individuals will have to weigh up the benefits of using the motorway, which includes travel time savings, a safer option with lower potential for traffic accidents and reduced vehicle operation and maintenance costs, with the financial cost of using the motorway.

This is consistent with the NSW Government's tolling principles. Free, alternative routes, such as Parramatta Road, would remain available to those who choose not to or cannot afford to use the tolled motorway. The use of toll roads is therefore an individual choice.

The project would not affect existing tolls on the M1 (Eastern Distributor) and would not introduce tolls on any section of the M1 north or south of Sydney. As such there would be no change for residents of the Illawarra travelling into or beyond Sydney. Traffic on Southern Cross Drive is predicted to reduce slightly as a result of the project.

In November 2017 (after exhibition of the EIS), the NSW Premier announced<sup>3</sup> a vehicle registration cashback scheme for motorists who spend more than \$25 on average per week over a 12 month period on tolls in NSW to claim free vehicle registration. This was in acknowledgement of the cost of living pressures identified by communities. The scheme will be available for standard privately registered cars, utes, four-wheel-drives and motorcycles from 1 July 2018 and be backdated to July 2017. The scheme will not include trucks or other vehicles weighing more than 2,795 kilograms. This is expected to save the majority of motorists who apply to the scheme around \$358 a year on registration costs, and some up to \$715.

Although road tolling would be a cost to businesses, increased accessibility and connectivity has the potential to generally reduce delivery time, increase delivery reliability and as a result reduce overall transport costs. Businesses would also have the choice of using the free surface road network.

### **C14.9.3 Property values**

Submitters raised concern that operational project elements, including ventilation facilities and new road infrastructure would impact surrounding property values and make it difficult to sell or rent property. Specific areas of concern included:

- Operational infrastructure at Iron Cove Link motorway operations complex (MOC4) impacting property values on Springside Street
- Property values at Haberfield will decrease
- Increased traffic on Gardeners Road will prompt land use planning changes, affecting property values
- The permanent motorway operations complex at Darley Road will reduce property values in the area.

### **Response**

As outlined in section 6.2 of Appendix P (Technical working paper: Social and economic) of the EIS, an assessment of the impact of the project on residential and commercial property prices has not been included in the EIS given the large number of factors that influence the value of a property. It is extremely difficult to anticipate market perceptions, particularly as these in turn are influenced by broader macroeconomic considerations (eg strength of the economy, outlook for economic growth, interest rate levels, availability of finance, unemployment levels). As such, a reliable assessment of the interaction between the project and the property market cannot be made with any certainty.

### **C14.9.4 Health-related costs**

Submitters raised concerns regarding health-related costs as a result of future traffic congestion and particulate pollution from the ventilation facilities.

### **Response**

The EIS considers potential health risks associated with:

- Noise and vibration
- Air quality
- Traffic congestion.

Environmental management measures have been identified to mitigate impacts from the construction and operation of the project such that health impacts are minimised.

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<sup>3</sup>[http://www.abc.net.au/news/2017-11-20/nsw-government-announces-free-car-rego-for-toll-road-users/9168264?\\_sm\\_au\\_=iVVBJBrjPNIfQRJq](http://www.abc.net.au/news/2017-11-20/nsw-government-announces-free-car-rego-for-toll-road-users/9168264?_sm_au_=iVVBJBrjPNIfQRJq)



Overall, Appendix K (Technical working paper: Human health risk assessment) of the EIS found that the project is expected to result in a decrease in total pollutant levels in the community. The project is expected to result in a redistribution of impacts associated with vehicle emissions, specifically in relation to emissions derived from vehicles using surface roads. For much of the community this would result in no change or a small improvement (ie decreased pollutant concentrations and associated health impacts), however for some areas located near key surface roads, a small increase in pollutant concentration may occur. Potential health impacts associated with changes in air quality (specifically nitrogen dioxide and particulates) within the local community have been assessed and are considered to be acceptable.

On this basis it is not expected that health-related costs would increase as a result of the project.

## C14.10 Displacement

109 submitters raised concerns about displacement of businesses and residents as a result of the project. Refer to section 14.4 and Appendix P (Technical working paper: Social and economic) of the EIS for details of displacement.

### C14.10.1 Community impacts from property acquisition

Submitters have raised concerns regarding the community impacts of displacement, caused by residential property acquisitions, and people leaving local areas to avoid project impacts.

#### Response

The project has been designed and developed to minimise the need for surface property acquisition by:

- Locating large sections of the project, including the Rozelle interchange, below ground
- Utilising areas that are within the project footprint of the M4 East and New M5 projects, where possible
- Utilising government owned properties where possible, such as at the Rozelle Rail Yards and Darley Road civil and tunnel site (C4).

Surface property acquisition is required for the project for the following reasons:

- The project is located in a developed, urban environment and there is limited nearby land that is undeveloped and suitable for the project
- Land is required for mid-tunnel sites (such as Darley Road civil and tunnel site (C4) and Pymont Bridge Road tunnel site (C9)) to expedite tunnelling and shorten the construction period for the project
- The increased capacity of surface roads and the construction of new interchanges require road widening and associated acquisition of land adjacent to the road corridor.

The need to reduce surface property acquisitions has been balanced with maximising opportunities for beneficial re-use of the areas required for construction that would be surplus to the operational needs of the project. Notwithstanding this design intent, construction and operation of the project would result in temporary and permanent impacts on property.

All acquisition required for the project would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), the *Land Acquisition Information Guide* (NSW Government 2014) and the land acquisition reforms announced by the NSW Government in 2016, available online<sup>4</sup>.

Overall, 26 residential properties are proposed to be acquired for the project and 48 businesses are being required to be removed from their existing premises. It is acknowledged that acquisition of property may cause social impacts such as stress associated with household relocation, difficulty in obtaining similar housing in the same area at a comparable cost, altered access to social infrastructure, loss of community cohesion and impact on family and social networks.

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<sup>4</sup> <http://www.propertyacquisition.nsw.gov.au/>

A Community Communication Strategy will be prepared and would detail the property acquisition support services that would be provided to affected residents. In addition:

- Affected households will continue to have access to a counselling service that assists people through the property acquisition process
- An independent service will continue to be provided to vulnerable households (eg elderly, those suffering an illness) to assist with relocation. Assistance could include finding a suitable house for relocation, arranging removalists, disconnecting services and attending appointments with solicitors or other representatives
- A community relations support toll-free telephone line will be operated to respond to any community concerns or requests for translation services.

## C14.11 Compensation

511 submitters raised concerns regarding the compensation process during construction and operation of the project.

### C14.11.1 Compensation for impacted receivers

Submitters have raised concerns that homeowners and tenants were not being adequately compensated during construction and operation of the project. Specific concerns and requests raised include:

- There is no clear compensation process outlined in the EIS
- Request for compensation due to the following impacts:
  - Loss of value to property or rental loss
  - Health impacts such as anxiety and stress
  - Pollution
  - Disruption to lives
  - Noise and vibration
  - Property damage
  - Inconvenience
  - Loss of wellbeing and quality of life
- Residents and schools should be compensated for implementing measures to manage impacts
- Concern that large corporations will refuse to compensate property owners
- What the timeframe for cut-off of compensation claims would be
- Whether residents would be required to go to court to claim compensation
- Request assurance that should the project propose any danger or increased risk to public safety or health, that the project will fully compensate and make acceptable improvements and changes that address the problems
- Cinema tickets are a poor compensation offer for 24 hours, seven days a week disruption to the community
- Objection to the process for compensating damage to properties caused by tunnelling
- The proponent should pay a pre-determined amount ex gratia payment to residents for each night of disturbance
- SMC should pay for the clean-up of all areas affected by construction, for example, houses soiled by dust
- Request that the government should implement a remediation scheme for houses damaged during construction

- Who would be responsible for compensation from cumulative impacts from other tunnelling projects?
- The EIS is vague on compensation
- Concern about the likely amounts of compensation coming from state budgets as a result of property acquisitions and the compensation already being paid to existing tollway businesses
- A compensation fund should be established to protect and repair homes and schools from damage caused by construction and to address health impacts and illnesses caused by construction and the operation of the tunnel in Rozelle, Lilyfield, Balmain and Drummoyne
- Alternative living arrangements and compensation will need to be considered if this construction goes ahead at the Pyrmont Bridge Road tunnel site (C9).

## Response

Roads and Maritime acknowledge that the project will result in a number of impacts and the EIS indicates that the project will result in a number of impacts to local communities, particularly during the construction phase. Management measures to minimise and mitigate disruptions and other impacts related to construction and operation of the project are summarised in **Chapter E1** (Environmental management measures).

All compulsory acquisition required for the project would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), the *Land Acquisition Information Guide* (NSW Government 2014) and the land acquisition reforms announced by the NSW Government in 2016 (NSW Government 2016). Relocation and some other categories of expenses could be claimable under this Act and related policies. However, it is NSW Government policy that monetary compensation not be paid for construction related impacts as these are temporary and need to be managed in accordance with the management measures identified for the individual projects. Roads and Maritime acknowledge that while construction is temporary, construction activities can occur over a long duration. Construction impacts need to be weighed against the longer term benefits of the project, once operational.

Roads and Maritime follow a process for determining compensation which includes consultation with the affected party, property damage surveys and determination of remedial actions. These measures are outlined in **Chapter E1** (Environmental management measures).

For businesses the project's compensation process has been designed in accordance with the *Determination of compensation following the acquisition of a business guideline* (NSW Government date unknown). This guideline provides direction to all NSW acquiring authorities in determining compensation for a business conducted on land that is acquired in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW). It is acknowledged in the guide that each case for business interest compensation should be considered on its individual merits. The business interest may be in the same ownership as the "land" or may be a non-related party.

Building condition surveys will be offered to property owners within the zone of influence of tunnel settlement (50 metres from the outer edge of the tunnels and within 50 metres of surface works) or as otherwise directed by the Independent Property Impact Assessment Panel (see environmental management measure PL11 in **Chapter E1** (Environmental management measures)). Building condition surveys of properties will be carried out prior to the commencement of any project works in the vicinity that have the potential to result in damage to the properties, as identified by the contractor and confirmed by the Independent Property Impact Assessment Panel. Building condition surveys will be carried out by a structural engineer.

In the event that damage occurs to a property as a result of the construction of the project, the damage will be appropriately rectified. Any disputes between a property or infrastructure owners regarding damage and rectification will be referred to the Independent Property Impact Assessment Panel (see environmental management measure PL11 in **Chapter E1** (Environmental management measures)) for resolution. All works would be undertaken at no cost to the affected property owner.

The project would not provide financial compensation for the cost associated with loss of rental income or changes to property values. The project instead proposes to manage the potential impacts associated with construction through the implementation of the measures summarised in **Chapter E1** (Environmental management measures). Residents and schools would not be required to implement environmental management measures at their own expense. This would be the responsibility of Roads and Maritime.

Cumulative impacts of settlement are discussed in **section C12.11**.

## C14.12 Cumulative social and economic impacts

1,749 submitters raised concerns about longer duration construction impacts on communities at Haberfield and St Peters. Refer to section 26.4 and Appendix P (Technical working paper: Social and economic) of the EIS for an assessment of cumulative social and economic impacts.

### C14.12.1 Longer duration construction impacts at Haberfield/Ashfield and St Peters/Newtown

Submitters raised concern regarding construction fatigue affecting the local communities impacted by construction from several consecutive or concurrent projects for five or more years. Specific concerns include:

- Residents would have prolonged period of exposure to more than one project due to overlaps in the construction periods of the WestConnex program of works and that this has been described as a temporary impact in the EIS
- Disruption of communities, children in schools, inconvenience and general health and wellbeing impacts
- Residents will be exposed to prolonged periods of noise and sleep disturbance from construction which they have already been experiencing for years
- No additional mitigation or any compensation is offered for residents for these periods
- Neither Option A nor Option B minimise impacts on Haberfield, but extend, by four or more years, the impacts of WestConnex construction upon residents, services and businesses
- Impacts on businesses and residents at King Street at Newtown from WestConnex.

Submitters were also concerned about commitments made for the M4 East project that were not a part of the M4-M5 Link project. Specific concerns included:

- The EIS does not include or analyse the promised option made during consultation for M4 East, that there would be no additional above ground sites required for the M4-M5 Link. The M4-M5 Link project should use the new portals built for the M4-M5 Link at Wattle Street. Submitter requested that the proposed option of no additional surface sites in Haberfield/Ashfield for the M4-M5 Link be incorporated into the EIS to minimise surface impacts of construction on residents
- References to signage indicates that commitments of streets being returned to residents is false
- The works in Haberfield would continue until 2022, which is a breach of the assurances given to community's that works would be completed in 2019.

### Response

Longer duration construction impacts are expected where the project connects to the M4 East and New M5 projects at Haberfield/Ashfield and St Peters respectively. Chapter 26 (Cumulative impacts) of the EIS comprises a detailed cumulative impact assessment. Furthermore, respective technical working papers including traffic and transport (Appendix H (Technical working paper: Traffic and transport), noise and vibration (Appendix J (Technical working paper: Noise and vibration) and air quality (Appendix I (Technical working paper: Air quality) of the EIS include consideration of consecutive and concurrent (cumulative) impacts during construction and operation of the project. The outcomes of the respective assessments of cumulative impacts were then used to inform the development of management and mitigation measures (see **Chapter E1** (Environmental management measures)).

Roads and Maritime acknowledge that the impacts from construction of the WestConnex program of works at Haberfield/Ashfield and St Peters are not short term, as the consecutive construction of components of the WestConnex projects would extend the duration of impacts to a period of up to seven years for some receivers in these areas. The range and intensity of impacts have and would continue to vary during these periods as construction progresses, with the majority of impacts occurring or expected to occur as a result of certain construction activities and during certain times of the day (for example outside standard daytime construction hours).

Key impacts resulting from longer duration construction in these areas may include noise and vibration, including ground-borne noise from tunnelling, construction traffic including spoil haulage, dust, visual impacts and impacts on parking on local streets around construction sites. Construction activities most likely to result in longer duration impacts as a result of 24 hours a day, seven days a week operation or over an extended period of time include surface road works, utility works, tunnelling and tunnelling support (such as spoil handling and transport).

The majority of intensive utility and civil construction works (including surface road works) around Haberfield/Ashfield and St Peters will be completed as part of the M4 East and New M5 projects respectively. In addition, in many instances, M4 East and New M5 construction will transition to less intensive works as the respective construction programs progress towards their conclusion and tunnelling is completed. These less intensive activities include mechanical and electrical fitout, pavement and linemarking works and landscaping, which would occur prior to or at the same time as M4-M5 Link site establishment works commence.

This means that construction activities that overlap or occur consecutively from these projects and the M4-M5 Link would generally be less intensive and cause less disturbance to nearby communities. In addition, these works would typically be expected to require less road occupations (except for line marking and pavement works) and therefore would be more likely to occur during standard construction hours. In addition, at the completion of construction of the M4 East and New M5 projects, permanent noise treatments would be established and/or installed as required by the conditions of approval for these respective projects. This would include (where required by the conditions) the installation of at-receiver treatments and the establishment of permanent noise barriers. The noise modelling that has informed these at-receiver treatments is based on a cumulative scenario that includes the additional traffic forecast for the M4-M5 Link project. These treatments would assist in ameliorating construction noise impacts on these receivers.

Around Haberfield and Ashfield, the majority of the above-ground infrastructure required for the M4-M5 Link project is currently being built by the M4 East project. The large civil construction works such as the construction of the Wattle Street and Parramatta Road entry and exit ramps and associated civil construction works on Wattle Street and Parramatta Road, as well as the Parramatta Road ventilation facility (including the outlet for the M4-M5 Link project) will be complete or nearing completion before construction of the M4-M5 Link commences. This includes the construction of the M4-M5 Link entry and exit ramps along Wattle Street, including the dive and cut-and-cover structure.

Around St Peters, clean-up of the Alexandria Landfill site, construction of the St Peters interchange as well as construction of a component of the above ground infrastructure required for the M4-M5 Link project is being carried out by the New M5 project. This includes construction of the M4-M5 Link entry and exit ramps, upgrades of the local roads (including Campbell Road) and the provision of a construction hardstand area and construction access driveway that will be reused for the Campbell Road civil and tunnel site (C10).

The M4-M5 Link project will need to carry out some civil construction works (including construction of the Campbell Road ventilation facility) and civil finishing works for infrastructure at Haberfield and St Peters. However, construction of surface infrastructure at both locations as part of the M4-M5 Link project has been minimised as much as practicable.

To further manage the impacts associated with longer duration construction impacts from the concurrent construction of the WestConnex component projects in these areas and to respond to issues raised during the construction of other WestConnex projects and in submissions on the M4-M5 Link EIS, the following strategies are proposed:

- Provision of additional off-street car parking for the construction workforce at Rozelle, with the use of the White Bay civil site which would provide around 50 parking spaces. This site is further described in **Chapter D2** (White Bay civil site (C11))
- Using the Northcote Street civil site (C3a) for construction workforce car parking and laydown. Currently this site is used as the main tunnelling site for the eastern end of the M4 East project
- Reducing the surface construction footprint of the Wattle Street civil and tunnel site (C1a) to limit surface construction activities to the Wattle Street entry and exit ramps. Compared to the indicative layout presented in Chapter 6 (Construction work) of the EIS for this site, this would reduce potential construction impacts such as noise and vibration and dust during construction of the M4-M5 Link project and would also allow for realisation of the M4 East urban design and landscaping outcome for this area at the completion of the M4 East project



- Provision of a heavy vehicle truck marshalling facility at the White Bay civil site (C11) at Rozelle, which would cater for around 40 heavy vehicles and stage the release of trucks to the tunnelling sites to manage the arrival of trucks to construction ancillary facilities (see **Part D** (Preferred infrastructure report)). Provision of a truck marshalling facility and additional construction workforce parking would result in several benefits for the community and the project, including:
  - Reducing potential queuing and circling on local roads surrounding the project and associated construction ancillary facilities
  - Providing additional construction workforce parking spaces which would minimise the need for construction workers parking on local roads
  - Minimising disruptions to the road network around construction ancillary facilities and noise and other disturbance to the local community including residential, business and commercial properties
  - Improving safety for construction workers, motorists and the general public by providing a controlled area from which project traffic schedulers can manage trucks and direct truck drivers to the construction ancillary facilities as required
- Development of a car parking strategy that will quantify construction workforce parking demand, identify public transport options (and measures such as carpooling and shuttle-buses) and identify all locations that will be used for construction workforce parking (see environmental management measure TT04 in **Chapter E1** (Environmental management measures))
- Development and implementation of a truck management strategy that will identify potential truck marshalling areas that will be used for the project and describe management measures for project-related heavy vehicles to avoid queuing and site-circling in adjacent streets and other potential traffic and access disruptions (see environmental management measure TT16 in **Chapter E1** (Environmental management measures))
- Designing acoustic sheds with consideration of the activities that will occur within them and the relevant noise management levels in adjacent areas. Monitoring will be carried out to confirm that the actual acoustic performance of the sheds is consistent with predicted acoustic performance (see environmental management measure NV7 in **Chapter E1** (Environmental management measures))
- The appointment of a suitably qualified and experienced acoustics advisor, who is independent of the design and construction personnel, and who will be engaged for the duration of construction of the project (see environmental management measure NV1 in **Chapter E1** (Environmental management measures))
- Use of the M4 East and New M5 tunnels for spoil haulage when they become available and where practicable, to minimise heavy vehicle movements on the surface road network
- Consideration of receivers that qualify for assessment for at-receiver treatment due to predicted operational road traffic noise that are also predicted to experience exceedances of noise management levels during construction for at-receiver treatments as a priority (see environmental management measure NV9 in **Chapter E1** (Environmental management measures)).

Specific management and mitigation will be documented in relevant construction environmental management sub-plans such as the Ancillary Facilities Management Plan and the Construction Traffic and Access Management Plan. This will include detailed consideration of the types of activities that would be most likely to cause longer duration impacts during construction of the project, the types of impacts already experienced by these communities as a result of M4 East and New M5 construction, and subsequent development and implementation of location and activity specific mitigation that considers the consecutive nature of construction at these locations.

A response to the concern raised regarding compensation for affected receivers is included in **section C14.11.1**.

The non-Aboriginal heritage assessment for the M4 East project determined that given the major adverse impact of the project on the Haberfield HCA, further works within the Haberfield HCA should be avoided. The EIS for the M4-M5 Link project does not propose any additional construction compounds that are located within the Haberfield HCA. The proposed construction sites on the eastern and western side of Parramatta Road are outside the boundary of the Haberfield HCA, on land owned by Roads and maritime, and have historically been used for commercial purposes. Justification for the proposed use of these construction sites is discussed in **section C6.3**.

Based on community feedback and concerns raised in submissions on the EIS, a number of refinements to the construction ancillary facilities at Haberfield and Ashfield have been made to further minimise impacts on the community and sensitive receivers. This includes:

- Wattle Street civil and tunnel site – no surface components (no car park area, laydown area or site offices). All work would be undertaken below ground with access via the Wattle Street ramps constructed by M4 East project
- Haberfield civil site – footprint reduced and site to be used as a civil site only as per the arrangement for the Haberfield civil site (C2b). The C2a option would therefore not be used for the construction of the project. No tunnelling from this site is proposed. This would allow the M4 East UDLP and Residual Land Management Plan in the area around Wattle Street and Walker Avenue at Haberfield to be completed earlier.

The appointed design and construction contractor(s) may choose to use all or some of the construction ancillary facilities identified in the EIS, including any combination of the Option A and Option B facilities at Haberfield/Ashfield. The construction ancillary facilities proposed to be used by the contractor will be documented in an Ancillary Facility Management Plan which would be approved by the Secretary of DP&E.

Additional ancillary facilities may be proposed by the design and construction contractor(s). Prior to the establishment of ancillary facilities that are not approved, the contractor would need to comply with any relevant conditions of approval. Additional sites may be subject to separate environmental assessment and approval, subject to the extent of environmental and social impacts. Approval pathways are described further in Chapter 2 (Assessment process) of the EIS.

Wayfinding signage for the road infrastructure will be developed to the satisfaction of Roads and Maritime. Consultation will occur with the relevant local council regarding road signs for council roads. Signage for road infrastructure will be installed prior to the commencement of operation.

Traffic, locational, directional, warning and variable message signs would be incorporated within the tunnels and on surface roads at approaches to the tunnels. Variable message signs would be located within or directly adjacent to areas of operational infrastructure for the project and the existing adjacent arterial road network. Directional signage would be installed in accordance with the Austroads and Roads and Maritime standards, with a focus on providing clear and unambiguous direction to motorists.

The M4 East EIS acknowledges that the construction of the multiple stages of WestConnex would be staggered and would therefore result in extended construction periods for some residents in the vicinity of the project. This includes where consecutive construction periods would occur, particularly at Haberfield for works associated with the M4-M5 Link project. Construction for the M4 East project is expected to be completed in 2019.

### **C14.12.2 Longer duration construction impacts at Rozelle**

Submitters raised concern regarding construction of the M4-M5 Link project overlapping with the Western Harbour Tunnel and Beaches Link program of works and impacting the sensitive receptors and local communities at Rozelle for many years.

#### **Response**

At Rozelle, the Rozelle Rail Yards site management works have commenced and will occur over a period of 12 months and would be completed by mid-2018, prior to the start of construction works for the M4-M5 Link project. The CBD and South East Light Rail maintenance depot adjoining the proposed Rozelle civil and tunnel site (C5) to the west is expected to be completed by early 2018, also prior to start of construction works for the M4-M5 Link project.

The potential long term duration social and economic impacts associated with consecutive use of the Rozelle Rail Yards for construction of the M4-M5 Link and the future proposed Western Harbour Tunnel is assessed in section 9.3 of Appendix P (Technical working paper: Social and economic) of the EIS.

Details regarding construction of the proposed future Western Harbour Tunnel project, including proposed timeframes for construction, are not available at this time as the project is in the early stages of design development. For the purposes of the cumulative assessment for the M4-M5 Link project, it was assumed that there would be a construction site for the proposed future Western Harbour Tunnel within the central portion of the Rozelle Rail Yards site, and construction work would commence at the end of 2019 and continue through until around 2025. Table 9-5 in Appendix P (Technical working paper: Social and economic) shows indicative construction timeframes at Rozelle from 2018 to 2020. This is an error and the table should include the years 2021, 2022 and 2023 to show the overlap between construction at the Rozelle Rail Yards for the M4-M5 Link and proposed future Western Harbour Tunnel. This clarification is also provided in **section A4.2.9**.

Roads and Maritime acknowledge that the impacts from construction of these two projects at Rozelle would not be short term, as the consecutive construction of these projects would potentially extend the duration of impacts to a period of up to seven years for some receivers in this area. The range and intensity of impacts have and would continue to vary during these periods as construction progresses, with the majority of impacts occurring or expected to occur as a result of certain construction activities and during certain times of the day (for example outside standard daytime construction hours).

The SEIA acknowledges that during construction, the presence of heavy vehicles would affect access and general amenity for road users, residents, business owners, social infrastructure users and visitors, including around the Rozelle civil and tunnel site. Around 520 daily heavy vehicles (one way) are forecast during construction to service the Rozelle civil and tunnel site (C5) (refer to Table 7-15 in Appendix H (Technical working paper: Traffic and transport) of the EIS). To reduce traffic and amenity impacts on local roads, spoil haulage routes would operate mainly on arterial roads including City West Link and The Crescent at Rozelle (refer to Figure 6-29 of the EIS). The indicative spoil haulage route may vary based on the final construction methodology and program.

*The Bays Precinct Urban Transformation Plan* provides a strategy for redevelopment of The Bays Precinct over a period of 20-25 years. Planning for The Bays Precinct is still in early stages and as such it is not possible to accurately assess the cumulative construction impacts that may arise. There are presently no construction details available for these future projects and any potential consecutive impacts would be required to be assessed and managed as outlined in the environmental assessment for these projects.

Upon operation, the project would deliver an integrated motorway and local road network that would provide substantial benefits to communities in Sydney's inner west by improving community connectivity on local roads through transferring traffic and heavy vehicles from surface roads, to underground.

## C14.13 Social and economic environmental management measures

834 submitters raised concerns about the environmental management measures for social and economic impacts. See **Chapter E1** (Environmental management measures) for further details on the social and economic environmental management measures.

### C14.13.1 Environmental management measures

Submitters raised concerns regarding the lack of additional mitigation for residents in regards to the cumulative impacts of construction from the overlapping construction period with the M4 East and New M5 projects. Concern has also been raised regarding the validity and effectiveness of social and economic mitigation measures due to disappointment with preceding WestConnex stages. Specific concerns include:

- Lessons learnt from Stages 1 and 2 of WestConnex should be included in the social and economic mitigation measures for Stage 3 [the M4-M5 Link]
- Mitigation for residents experiencing construction fatigue is inadequate

- Adequate notice should be provided to potentially affected businesses of staging of construction works. This could be included in a stakeholder communication plan
- Mitigation for the Pymont Bridge Road tunnel site impacts on Bridge Road School should be provided.

Submitters recommended the following measures be put in place to manage impacts on residents around the Haberfield/Ashfield construction sites:

- Establish a curfew for project work after 11.00 pm
- Urgent night-time road work or road utility access should be permitted by Roads and Maritime/Traffic Management Centre to commence from 7.00 pm and to cease by 11.00 pm
- Effective and widespread mitigation measures to ensure our children's health, safety and learning is not adversely affected are implemented
- A process be implemented before construction begins, for Haberfield Public School to report disruptions to children's learning, health or safety and receive instant action to end the disruption.

## Response

The SEIA addressed potential cumulative effects from longer term construction impacts (ie construction fatigue), particularly in areas subject to construction impacts from the M4-M5 Link project and other WestConnex component projects, such as the M4 East and New M5 projects at Haberfield/Ashfield and St Peters respectively. Feedback from other SMC project teams, design and construction contractor(s) and DP&E was sought on the M4 East and New M5 construction phases to identify lessons learnt and areas for improvement to work processes and mitigation measures to assist in addressing potential cumulative impacts.

Multiple community and stakeholder consultation sessions were held for the M4-M5 Link project prior to and during preparation of the concept design report and EIS, and throughout the Submissions and preferred infrastructure report process for the project. This included hosting sessions at Haberfield and Newtown, where communities currently being affected by the M4 East and New M5 construction works were able to provide feedback to the project team. A detailed summary of community and stakeholder consultation undertaken for the project is included in Chapter 7 (Consultation) of the EIS.

See **section C14.12** for further discussion regarding the potential cumulative impacts that would be experienced at Haberfield and St Peters, and how these would be managed. A full list of environmental management measures to manage potential social and economic impacts from the project are summarised in **Chapter E1** (Environmental management measures).

Other social and economic mitigation measures related to business impacts and impacts on social infrastructure (such as schools) are discussed below.

A Business Management Plan will be prepared and will include:

- Identification of businesses that have the potential to be adversely affected by construction activities that will occur as part of the project
- Management measures that will be implemented to maintain appropriate vehicular and pedestrian access during business hours and visibility of the business to potential customers during construction, including alternative arrangements for times when access and visibility cannot be maintained. These will be determined in consultation with the owners of the identified businesses.

A Community Communication Strategy will also be prepared that details:

- Procedures and mechanisms that will be implemented in response to the key social impacts identified for the project
- Property acquisition support services that will be provided
- Procedures and mechanisms to communicate to project stakeholders (including affected communities), the access and connectivity enhancements and new community and social facilities that will be delivered as part of the project through the Social Infrastructure Plan and to update stakeholders on delivery progress
- Procedures and mechanisms that will be used to engage with affected business owners to identify potential access, parking, business visibility and other impacts to develop measures to address potential impacts on a case by case basis.

Potential impacts to Bridge Road School during construction are identified in Table 7-5 of Appendix P (Technical working paper: Social and economic) of the EIS. Proximity of the school to Parramatta Road, which is a heavily trafficked arterial road, already compromises the amenity of the school. An acoustic shed would enclose tunnelling activities (including spoil handling) at the Pyrmont Bridge Road tunnel site (C9), which would minimise noise and dust generation. All heavy vehicle access would be via Parramatta Road and Pyrmont Bridge Road. Provision for truck marshalling and construction workforce parking would also be provided at the White Bay civil site (C11) which would also minimise the impacts of traffic and parking on the school. The White Bay civil site is an additional construction ancillary site for the project at Rozelle and is described and assessed in **Chapter D2** (White Bay Civil Site (C11)).

Haberfield Public School would likely be impacted during construction from increased construction vehicle movements along Bland Street due to the proximity of the school and the Parramatta Road East civil site (C3b). Increases in traffic may reduce roadside safety, particularly in areas heavily frequented by pedestrian and cyclists, such as near Haberfield Public School.

Environmental management measures to manage potential impacts to Bridge Road School and Haberfield Public School would be included as part of the Social Infrastructure Plan for the project. The Social Infrastructure Plan is proposed to manage, minimise and avoid potential construction impacts. The Plan will be prepared before construction with the following provisions proposed for inclusion:

- Identify social infrastructure that has the potential to be adversely affected by construction activities
- Develop, in consultation with the owners of the identified social infrastructure, measures that could be implemented to maintain appropriate vehicular and pedestrian access, management measures for noise exceedances and safety measures, particularly around areas where children are present.

The Social Infrastructure Plan is proposed to be prepared by a suitably qualified and experienced person in consultation with the community and relevant councils and implemented as part of the project.

In developing construction methodologies and a construction program for the project, the aim has been to minimise the duration of the construction period, while maintaining an acceptable and manageable amenity outcome for surrounding receivers. This has required a balance between the speed of construction activities and the ability to reasonably and feasibly manage potential impacts within acceptable limits.

Tunnelling and associated tunnelling support construction activities (including spoil haulage) would occur 24 hours per day, seven days per week. The exception to this would be at the Darley Road civil and tunnel site (C4), where tunnelling, along with spoil management within an acoustic shed, would occur 24 hours per day, seven days per week. However, spoil haulage would occur during standard construction hours only.

The majority of above ground construction activities would be carried out during standard construction hours wherever practicable. However, some construction activities are required to be carried out outside of standard construction hours. The justification for these out-of-hours works is included in section 6.7.2 of the EIS and includes:

- To ensure public and construction worker safety
- To minimise impacts on the function and safety of the road network, including along key arterial routes such as Parramatta Road, Wattle Street, City West Link and Victoria Road, which is a key construction objective for the project
- To allow for spoil haulage to occur outside of the AM and PM peak periods where practicable, reducing the impact of these vehicles on the operability of the surface road network
- To carry out utility works, including works that require temporary disruption to services, at times of the day which would cause the least inconvenience.

Construction outside standard construction hours in certain circumstances (included those listed above) is standard practice for major infrastructure projects in NSW. In addition, the majority of the works which are being undertaken outside standard construction hours are located below ground (ie tunnelling). Opportunities to further reduce construction timeframes while protecting local amenity would be considered during detailed design and construction planning.



Further, an out-of-hours works protocol will be developed for the construction of the project. The protocol will include:

- Details of works required outside standard construction hours, including justification of why the activities are required outside standard construction hours
- Measures that will be implemented to manage potential impacts associated with works outside standard construction hours
- Location and activity specific noise and vibration impact assessment process(es) that will be followed to identify potentially affected receivers, clarify potential impacts and select appropriate management measures
- Details of the approval process (internal and external) for works proposed outside standard construction hours.

## C14.14 General

128 submitters raised concerns about general social and economic impacts.

### C14.14.1 General social and economic impacts

Submitters raised concerns regarding the general adverse impacts of the project and WestConnex on the community. Concerns raised include:

- General disruption to communities
- Impacts caused by increased traffic, pollution and noise
- Community angst due to the uncertainty of the project
- General impacts to the intrinsic value of local areas.

Areas of concern included Haberfield, Ashfield and Five Dock.

Submitters have also voiced general support for the project, stating the positive impact the project will have on safety, the social and cultural environment, amenity and economic benefits.

### Response

See **section C14.2** to **section C14.14** for response on specific social and economic impact issues related to construction and operation raised in submissions. In particular see **section C14.2** and **section C14.6** for responses relating to community amenity impacts. See **section C11.16.2** for a response to concerns regarding stress and anxiety due to uncertainty regarding construction activities.

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## C15 Soil and water quality

This chapter addresses issues raised in community submissions associated with the soil and water quality assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 15 (Soil and water quality) and Appendix Q (Technical working paper: Surface water and flooding) of the EIS for further detail on the soil and water quality assessment.

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## C15.1 Level and quality of soil and water quality assessment

95 submitters raised concerns about the soil and water quality assessment. Refer to section 15.1 of the EIS, Appendix Q (Technical working paper: Surface water and flooding) of the EIS and Appendix R (Technical working paper: Contamination) of the EIS for details of the soil and water quality assessment methodology.

### C15.1.1 Concern regarding methodology and adequacy of assessment of soil and water quality

Submitters raised concern about the adequacy and independence of the soil and water quality impact assessment in the EIS. Specific concerns included:

- The environmental impact of discharging water from the tunnels into the stormwater canal near Blackmore Park (ie into Hawthorne Canal) has not been adequately assessed in the EIS
- Concern over the adequacy of the geological assessment. It presents an oversimplified and possibly incorrect model which ignores a number of dykes present at Rozelle and other geological formations and does not reference a number of important reference papers
- The EIS does not identify the risk of water pollution from heavy rain events for sites that are immediately adjacent to waterways. Sediment ponds may not have sufficient capacity or become compromised by physical constraints to be effective in heavy rain events. The EIS has not considered this as it is based off ideal conditions rather than practical experience
- In relation to water quality, the EIS does not accurately assess risks due to spillages, excess discharges, overflows and flood events
- The EIS does not identify the impact of the project on the Iron Cove Creek
- Details of the geotechnical assessment should be released to the public
- Inadequate surface water and groundwater details are contained within the EIS to assess whether a NSW Environment Protection Authority (NSW EPA) licence would be required
- The EIS contains limited information on performance specifications of each groundwater treatment plant. The EIS is also not adequate to determine the ability of the water treatment plants to treat a range of pollutants and saline water
- The EIS has not assessed the contaminated water and the chemicals from the discharge of treated water into Whites Creek and Rozelle Bay adequately and does not disclose any water quality management measures
- Concern that no geotechnical tests have been carried out in the Lilyfield area (previously a quarry site in the 19<sup>th</sup> century), tests were carried out in some areas but not all. Further concerned that future geotechnical tests are left to the decision of contractors by the EIS
- Concern that surface and ground water details in the EIS are not adequate in determining what is the necessary design of the treatment plant to satisfy section 120 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act)
- Concern the EIS does not provide specific discharge or performance criteria and hence unable to determine if the proposed system is appropriate
- Concerns regarding the contamination to waterways strategy that the EIS has in place for Darley Road which involves 'treated' water being discharged into stormwater. They believe this would not only impact the waterways but also the area for recreational activities affecting amenity and possibly health.

### Response

The assessment of potential soil and water quality impacts was undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the NSW Department of Planning and the Environment (DP&E) and associated performance measures related to soil and water quality for the project, as well as relevant legislation and government policies and guidelines.

The surface water assessment comprised both a desktop assessment which involved a review of the existing surface water environment across the study area and a field assessment which comprised a baseline surface water monitoring program. The baseline surface water monitoring program was used to establish existing surface water quality conditions and to provide a baseline for assessment of water quality during and after construction of the project.

The assessment of potential impacts of the project on soils and groundwater included a review of the geological context, soil landscapes, and acid sulfate soils within the project footprint. It also included a review of the geotechnical investigations carried out for the project. A combined hydrogeological and geotechnical field investigation was undertaken which included the excavation of over 200 geotechnical boreholes to identify the geology, and the construction of 58 monitoring wells (refer to Chapter 19 (Groundwater) of the EIS). During the drilling program, samples were collected and submitted to a laboratory for analysis.

The ground conditions at the proposed Rozelle interchange (located at Lilyfield and Rozelle) have been assessed and are predominately good quality Hawkesbury Sandstone beneath the residential area of Rozelle. The geology beneath the adjacent Rozelle Rail Yards is complex as it is underlain by a deep palaeochannel sequence that is composed of saturated sand, silts and clay. Several basalt dykes trending to the north-west have been mapped cross-cutting the sandstone and outcropping in the sandstone cutting north of the Rozelle Rail Yards. These features have been considered and the horizontal and vertical tunnel alignments of the tunnels have responded to the geological conditions. Several previous investigations have been carried out at the Rozelle Rail Yards at Lilyfield and Rozelle, including fill, natural soil and groundwater samples collected as part of a site investigation undertaken in 2016 to identify potential contamination in the area.

The assessment of water quality in the EIS was informed by Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling to assess the performance of the operational water quality treatment measures against pollutant reduction targets. It also allowed for a qualitative assessment of the risk posed by discharged treated water from the mainline tunnels to ambient water quality in Rozelle Bay and Hawthorne Canal.

Potential construction and operation impacts of the project on water quality are discussed in sections 15.3.2 and 15.4.2 of the EIS. This includes the production of wastewater from tunnelling works, mobilisation of pollutants, spills or leaks of fuels and/or oils and increased stormwater runoff. The indicative discharge points to be used during construction for construction wastewater were identified for each construction ancillary facility. Wastewater will either be reused onsite, transported to a liquid waste facility or discharged to the existing stormwater system after being treated. Discharge points connect to waterways including Dobroyd Canal (also known as Iron Cove Creek), Hawthorne Canal and Whites Creek, which ultimately discharge into Iron Cove and Rozelle Bay. Potential impacts to Iron Cove Creek (Dobroyd Canal) are assessed in section 6.3, section 7.2 and section 8.1.2 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS.

The EIS recognised that during operation, there is potential for surface water quality to be impacted due to spills and leaks of fuels and/or oils and mobilisation of contaminated sediments. The MUSIC modelling assessed the performance of the proposed water quality treatment measures against pollutant reduction targets. Stormwater runoff from the project would be controlled by a stormwater quality treatment system, designed in accordance Sydney Harbour and Parramatta River catchment water quality objectives (Department of Environment, Climate Change and Water (DECCW) 2006).

The tunnels would include drainage infrastructure to capture groundwater and stormwater ingress, spills, maintenance wastewater, fire suppressant deluge and other potential water sources. Two tunnel drainage streams, one to collect groundwater inflows and the other to capture tunnel wastewater, are expected to produce flows containing a variety of pollutants that require slightly different discharge and disposal options. Collected groundwater would be pumped to water treatment facilities for treatment prior to discharge to receiving waterways. Other sources of water captured by the tunnel drainage system (ie washdown or a spill) would be collected in tunnel sumps, assessed to determine the source, tested, and either pumped to the surface for treatment prior to discharge or disposal (if treatment is not appropriate), or removed directly from the sump by tanker for treatment and disposal elsewhere.



Tunnel wastewater from the mainline tunnels during operation would be pumped to a water treatment facility at the Darley Road motorway operations complex (MOC1) at Leichhardt and treated water would either be discharged into Hawthorne Canal, or disposed directly into the sewer system in accordance with a Trade Waste Agreement with Sydney Water. The preferred option will be confirmed during detailed design (refer to section 19.4.4 of the EIS). Tunnel drainage for the Rozelle interchange and the Iron Cove Link tunnels would be pumped to a water treatment plant at the Rozelle East motorway operations complex (MOC3), with treated flows discharged to a constructed wetland within the Rozelle Rail Yards. This would provide some 'polishing' of the effluent, helping to remove residual dissolved constituents such as nitrogen and phosphorus not removed by the water treatment plant. Treated flows would ultimately flow to Rozelle Bay, via the northern drainage channel and the culvert to be installed below City West Link (refer to sections 15.4.2 of the EIS).

Water quality monitoring would be implemented to monitor impacts on ambient water quality within the receiving waterways. With consideration of groundwater quality, proposed treatment and receiving water quality, residual impacts associated with treated tunnel water discharges to ambient water quality are likely to be negligible.

Consideration of high rainfall events and impacts associated with flooding and excess discharges were assessed in section 17.3 and 17.4 of the EIS (see **Chapter C17** (Flooding and drainage) for further responses to flooding and drainage submissions).

Temporary construction water treatment plants and operational water treatment facilities will be designed and managed so that treated water would be of suitable quality for discharge to the receiving environment. Discharge criteria would be developed in accordance with ANZECC (2000) and with consideration of the relevant NSW Water Quality Objectives (WQOs) and POEO Act. For construction, an ANZECC (2000) species protection level of 90 per cent is considered appropriate for adoption as discharge criteria for toxicants where practical and feasible. The discharge criteria for the treatment facilities will be included in a Construction Soil and Water Management Plan (CSWMP).

For operation, the ANZECC (2000) 'marine' default trigger values for 95 per cent level of species protection are considered an appropriate protection level for the recovery waterways. Discharge criteria has been set for iron (0.3 milligrams per litre) and manganese (1.9 milligrams per litre) and further criteria for the treatment facilities will be included in an Operation Environmental Management Plan (OEMP). Discharge criteria for operation will be developed during detailed design in consultation with relevant stakeholders (such as the NSW EPA, NSW Department of Primary Industry – Water and the relevant local councils). Therefore, discharge criteria has been considered in the EIS in order to assess likely impacts. The final discharge criteria will, however, be developed during detailed design.

Opportunities to incorporate other forms of nutrient treatment within the plant at Darley Road will be investigated during detailed design.

A CSWMP will be prepared for the project. During construction, soil erosion would be managed in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2* (NSW Department of Environment and Climate Change 2008a), commonly referred to as the 'Blue Book'. The number, location and size of sediment basins would be confirmed during detailed design. The Blue Book recommends that where receiving waters are sensitive, sediment basins should be sized for an 80th percentile or 85th percentile five-day rainfall depth for disturbance periods of less than or greater than six months respectively. Discharges from any sediment basins installed during construction would be regulated by the NSW EPA through the project's Environment Protection Licence (EPL).

Erosion and Sediment Control Plans (ESCPs) will be prepared for all work sites in accordance with the Blue Book. ESCPs will be implemented progressively with site disturbance and will be updated as required as the work progresses and the sites change. The extent of ground disturbance and exposed soil will be minimised to the greatest extent practicable to minimise the potential for erosion. See **Chapter E1** (Environmental management measures) for further information regarding the management of potential soil and water quality impacts. Measures to manage water levels in sediment basins to minimise the potential for overtopping during high rainfall events would be considered for inclusion in the CSWMP.

## C15.2 Soil impacts during construction

Eight submitters raised concerns about the soil impacts during construction. Refer to section 15.3 of the EIS, Appendix Q (Technical working paper: Surface water and flooding) of the EIS and Appendix R (Contamination) of the EIS for details of potential soil impacts during construction.

### C15.2.1 Soil impacts from construction

Submitters raised concerns regarding soil impacts during construction. Specific issues included:

- General concern about the impact of excavation and construction on soil, specifically at the Rozelle interchange
- Concern that toxic pollutants may be leached from the project to soil. Excavation associated with the project construction might also contaminate soil
- Construction at St Peters could have a negative impact on soil quality
- Disturbance of actual or potential acid sulfate soils at the western end of the Darley Road civil site could impact local soil quality
- Concern that the identified high contamination risk at the proposed civil and tunnel sites at Rozelle and Annandale could impact on local soil quality.

### Response

The potential impacts on soil during the construction phase would be from erosion of exposed soils and contamination from project activities. The construction of the project would also have the potential to mobilise soil and groundwater contamination. These risks are present during surface works at all construction ancillary facilities, including the Campbell Road civil and tunnel site (C10) at St Peters, and would be managed through implementation of standard construction site mitigation measures including stabilising disturbed ground and exposed soils, stormwater management to reduce erosion, dust suppression and appropriate storage with secure bunding for chemicals and fuels.

There is a risk that any erosion and/or runoff within the Rozelle Rail Yards could be contaminated. To avoid and minimise these potential impacts, a soil conservation consultant would be engaged to provide input during construction, to ensure that stormwater within the Rozelle Rail Yards is appropriately managed to prevent contamination impacts.

Potentially contaminated areas directly affected by the project will be investigated and managed in accordance with the requirements of guidance endorsed under section 105 of the *Contaminated Land Management Act 1997* (NSW) (CLM Act). This includes further investigations in areas of potential contamination identified in the project footprint. If contamination posing a risk to human or ecological receptors is identified, a Remediation Action Plan (RAP) will be prepared (see environmental management measure in CM01 in **Chapter E1** (Environmental management measures)).

Areas of the Rozelle civil and tunnel site (C5) at Rozelle and The Crescent civil site (C6) at Annandale have been identified in the EIS as likely to contain acid sulfate soils and as having a high risk for contamination. Further soil testing in areas identified as a high risk of containing acid sulfate soils will be carried out prior to construction. The Darley Road civil and tunnel site (C4) was not identified as an area of high risk. Procedures, prepared in accordance with the requirements of the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee 1998), will be included in a CSWMP and implemented in the event that acid sulfate soils are encountered during construction of the project. Therefore, impacts on local soil quality as a result of acid sulfate soils are not expected.

Leaching of contaminants as a result the project could occur from accidental spills and leaks from the use of plant and machinery at the construction ancillary facilities. Management measures to avoid soil contamination from construction activities at all construction ancillary sites include:

- The development and implementation of a CSWMP including procedures to manage potentially contaminated stormwater runoff (see environmental management measure SW01 and CM07 in **Chapter E1** (Environmental management measures))
- Appropriately storing contaminated materials and materials with the potential to cause contamination to reduce the potential for environmental contamination due to spills and leaks (see environmental management measure CM08)

- Storage of dangerous goods and hazardous materials will occur in accordance with suppliers' instructions and relevant Australian Standards and legislation including the:
  - *Work Health and Safety Act 2011* (NSW)
  - Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW 2005)
  - Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (NSW EPA 1997).

Storage methods may include bulk storage tanks, chemical storage cabinets/containers or impervious bunds (see environmental management measure HR1)

- Secure, bunded areas will be provided around storage areas for oils, fuels and other hazardous liquids. Impervious bunds will be of sufficient capacity to contain at least 110 per cent of the volume of the largest stored container (see environmental management measure HR2)
- Management measures to reduce the potential for spills, reduce potential spill volumes and prevent any contamination will be developed and implemented for activities such as vehicle refuelling, servicing, maintenance, washdown, where there is a potential for spills and contamination (see environmental management measure HR3).

See **Chapter E1** (Environmental management measures) for these and other environmental management measures.

## C15.3 Water quality and discharge impacts during construction

397 submitters raised concerns about water quality and discharge impacts during construction. Refer to section 15.3 of the EIS, Appendix Q (Technical working paper: Surface water and flooding) of the EIS and Appendix R (Contamination) of the EIS for further details of potential water quality impacts during construction.

### C15.3.1 Water quality impact due to construction activities

Submitters have raised concerns regarding potential water quality impacts from construction of the project, including:

- Concern about the risk of waterway contamination from the construction of the Iron Cove Link tunnel, which is near Iron Cove Bridge
- Concern about the impact of excavation and construction on waterways
- Concern about contaminated water being discharged into Rozelle Bay and Alexandra Canal
- Construction of the mainline M4-M5 Link tunnel and construction sites at Camperdown and The Crescent will adversely impact on water quality of local waterways and Rozelle Bay
- Construction at St Peters could have negative impacts on water quality
- Concern about the water contamination risk as a result of construction activities at the Pyrmont Bridge Road tunnel site (C9)
- Disturbance of actual or potential acid sulfate soils at the western end of the Darley Road civil site could impact local water quality
- Concerns that construction will pollute water in the harbour
- Construction will impact various projects which focus on the naturalisation of Whites Creek, Johnstons Creek and Iron Cove Creek
- Concern with the reuse of contaminated water for dust suppression and wheel washing without any environmental assessment to assess potential impacts
- Concern about the impacts of discharging treated water into the waterways near recreational facilities like the rowing clubs in Leichhardt. Concern with the discharge of polluted water during construction into the environment in regards to:
  - Different treatment systems given in the EIS do not reflect the terms of section 120 of the POEO Act that the proponent, as the polluter, must pay and treat polluted water

- The groundwater treatment objectives have no resemblance to the requirements of the POEO Act.

## Response

The potential impacts on surface water quality during the construction phase would be from erosion of exposed soils and associated sedimentation in waterways, contaminated stormwater runoff and discharge of poorly treated groundwater. Exposure of potential acid sulfate soils may result in generation of sulfuric acid and subsequent acidification of waterways and mobilisation of heavy metals into the environment, if poorly managed. Potential impacts on receiving waterways have been considered, including the Sydney Harbour, Rozelle Bay, Iron Cove and Alexandra Canal.

These potential impacts will be managed through implementation of a CSWMP which will include standard construction site mitigation measures such as stabilising disturbed ground and exposed soils, installation of sediment traps and basins, stormwater controls, dust suppression, implementing secure bunding for storage of chemicals and fuels and monitoring and managing surface water quality. Erosion and Sediment Control Plans will also be prepared and implemented for all work sites (see **Chapter E1** (Environmental management measures)). These measures will be implemented in order to protect nearby waterways at all construction ancillary facilities where surface works would be carried out. Discharges from the project during construction will be regulated by the NSW EPA through the project's EPL.

During construction, the construction water and groundwater collected in the tunnel would be tested and treated at temporary construction water treatment facilities prior to reuse or discharge. The type, arrangement and performance of construction water treatment facilities would be further refined during detailed design. Temporary construction water treatment plants will be designed and managed so that treated water would be of suitable quality for discharge to the receiving environment. An ANZECC (2000) species protection level of 90 per cent is considered appropriate for adoption as discharge criteria for toxicants where feasible and reasonable. The discharge criteria for the treatment facilities will be included in the CSWMP. The proponent will be responsible for ensuring controls are implemented so that the project would not significantly impact on water quality during construction consistent with the requirements of section 120 of the POEO Act and therefore would not adversely impact the water quality of local waterways, including near recreational facilities such as rowing clubs.

Mapped acid sulfate soils at and around the Darley Road civil and tunnel site (C4) are shown in Figure 4-14 of Appendix R (Technical working paper: Contamination) of the EIS. Land at the site is mapped as Soil Class 5 (No known occurrence of acid sulfate soils) and land located to the west is mapped as Soil Class 2. The Darley Road civil and tunnel site (C4) was not identified as an area of high risk of acid sulfate soils. Procedures, prepared in accordance with the requirements of the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee 1998), will be included in a CSWMP and implemented in the event that acid sulfate soils are encountered during construction of the project. Therefore, impacts on local water quality as a result of acid sulfate soils are not expected. See **section C15.2.1** for measures to manage acid sulfate soils. A program to monitor potential surface water quality impacts during construction will also be developed and would commence prior to ground disturbance (see SW02 in **Chapter E1** (Environmental management measures)).

The project includes some waterway naturalisation works, such as the reshaping and naturalisation of a section of Whites Creek from The Crescent back to Railway Parade. Sydney Water is currently investigating potential opportunities for naturalisation within sections of Johnstons Creek and Whites Creek at Annandale and Iron Cove Creek at Haberfield. A concept design has been developed for the Whites Creek naturalisation project which includes the replacement of deteriorating concrete banks and low flow channel with a combination of rocks, native plants and sandstone blocks or concrete. Treated water from construction sites at Haberfield/Ashfield and Annandale would be discharged to Dobroyd Canal (Iron Cove Creek) and Johnstons Creek, however the project is not proposing any physical works which would directly impact on the naturalisation works proposed for these two creeks. These projects are discussed further in section **C15.6.1**. The project is proposing to upgrade a section of Whites Creek between the Inner West Light Rail corridor and Rozelle Bay (refer to section 5.9.2 of the EIS).

The Sydney Water naturalisation works at Whites Creek would be located adjacent to Railway Parade and Hutchinson Street to the south of the Rozelle interchange, and are scheduled for construction in the 2017 financial year.

The design of the project naturalisation works on Whites Creek would be finalised during detailed design but are likely to adopt a similar philosophy regarding surface treatments to integrate with Sydney Water's naturalisation works. Sydney Water would be consulted during the development of the detailed design in relation to the timing of the works and the compatibility of the proposed design.

### **C15.3.2 Water quality impact due to construction activities at Rozelle ancillary facilities and the Rozelle Rail Yards**

Submitters raised concerns about impacts of contaminated soil at the Rozelle Rail Yards on water quality. Specific concerns included:

- Construction of the Rozelle interchange will impact the nearby waterways in this area. Construction can cause disturbance of toxic industrial pollutants at Rozelle which can spread into waterways
- The Rozelle Rail Yards is of great concern as the site is highly contaminated and the construction work that will be carried out will cause disturbance of contaminated soils that will impact nearby waterways, particularly Easton Park drain, Whites Creek and Rozelle Bay. Acid sulfate soils have been identified and could impact local water quality
- Contamination risk for nearby waterways from vehicles transporting spoil on adjacent roads and through stormwater
- Concern that there is a risk of leakage/spills of hydrocarbons and other chemicals from machinery into waterways
- Water from plant washing, concrete slurries and tunnelling activity will introduce contaminants to waterways
- Water from tunnelling activity and other works will introduce contaminants to nearby waterways
- Concern that the identified high contamination risk at the proposed civil and tunnel sites at Rozelle and Annandale could impact on local water quality.

### **Response**

Extensive soil and groundwater investigations have been carried out at the Rozelle Rail Yards and the contamination in the area has been well considered (refer to Chapter 16 (Contamination) of the EIS). Contaminated areas will be managed in accordance with the requirements of guidance endorsed under Section 105 of the *Contaminated Land Management Act 1997* (NSW) and in potentially contaminated areas such as the Rozelle Rail Yards, further investigations will be carried out and if contamination posing a risk to human or ecological receptors is identified, a RAP will be prepared. The RAP will be prepared having regard to the proposed future land use which at the Rozelle Rail Yards which is open space. A CSWMP will also be prepared for the project including procedures to manage potentially contaminated soils and stormwater runoff and acid sulfate soils (see **Chapter E1** (Environmental management measures)).

NSW Roads and Maritime Services (Roads and Maritime) is carrying out a suite of site management works on part of the Rozelle Rail Yards, which will be undertaken prior to the commencement of the M4-M5 Link project. The project would remove rail and rail related infrastructure from the site and allow existing issues such as waste and noxious weeds to be appropriately managed. This project has been assessed separately through *The Rozelle Rail Yards – Site Management Works Review of Environmental Factors* (Roads and Maritime 2016). After completion of the works, the 'finished site' would be managed and maintained to ensure that the surface cover and stormwater controls are operating effectively until commencement of the construction of the M4-M5 Link project. The site management works are to be completed during 2018.

Potential water quality impacts during construction of the project are regularly encountered on major construction projects, are well understood and management measures are well developed and consistently applied to minimise impacts. During construction, soil erosion would be managed in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004) and the 'Blue Book'. The number, location and size of sediment basins would be confirmed during detailed design. Temporary construction water treatment plants will be designed and managed so that treated water would be of suitable quality for discharge to the receiving environment (ie Rozelle Bay). These water treatment plants would treat wastewater collected in the tunnels prior to reuse or discharge. An ANZECC (2000) species protection level of 90 per cent is considered appropriate for adoption as discharge criteria for toxicants where practical and feasible. The discharge criteria for the treatment



facilities will be included in the CSWMP. Discharges from any sediment basins installed during construction would be regulated by the NSW EPA through the project's EPL.

Areas of the Rozelle civil and tunnel site (C5) at Rozelle and The Crescent civil site (C6) at Annandale have been identified in the EIS as likely to contain acid sulfate soils and as having a high risk for contamination. Further soil testing in areas identified as a high risk of containing acid sulfate soils will be carried out prior to construction. A Construction Soil and Water Management Plan will be prepared for the project including procedures to minimise the interaction of stormwater with contaminated land, including acid sulfate soils, and manage potentially contaminated stormwater runoff, as described in Chapter 15 (Soil and water quality) of the EIS.

Management measures will be implemented to avoid impacts from spills and leaks including appropriate storage and transport of contaminated and hazardous materials and procedures for vehicle refuelling, servicing, maintenance and washdown (refer to Chapter 25 (Hazard and risk) of the EIS).

Chapter 23 (Resource use and waste minimisation) of the EIS discusses spoil management for the project. Contaminated material would be segregated from uncontaminated material on site to prevent cross-contamination during the storage and handling of spoil. A Construction Waste Management Plan will be prepared for the project, which will include procedures for handling, storing and transporting potentially contaminated substances (see **Chapter E1** (Environmental management measures)). Spoil would be classified in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (NSW EPA 2014), and depending on the extent of the contamination, disposed of lawfully at an appropriately licensed facility.

Environmental management measures for the project to manage potential impacts associated with the transportation of spoil include:

- All loaded spoil haulage trucks and other project-related heavy vehicles carrying materials with the potential to result in dust generation will be covered to prevent dust emissions during transport in accordance with relevant road regulations (see environmental management measure AQ15 in **Chapter E1** (Environmental management measures))
- All sealed surfaces within sites and site accesses will be managed to reduce dust generation and sediment tracking onto roads (see environmental management measure AQ24 in **Chapter E1** (Environmental management measures))
- At the commencement of establishment of project ancillary facilities, controls such as wheel washing systems and rumble grids will be installed at all site exits to prevent deposition of loose material on sealed surfaces outside project sites to reduce potential dust generation (see environmental management measure AQ25 in **Chapter E1** (Environmental management measures)).

## C15.4 Soil impacts during operation

Two submitters raised concerns about soil impacts during operation of the project. Refer to section 15.4 of the EIS for further details of potential soil impacts during operation of the project.

### C15.4.1 Contamination of soils

Submitters raised concerns that toxic pollutants may be leached from the project to local soils.

#### Response

Minimal substances are required during operation that have the potential to result in contamination. Surfaces would be sealed and stormwater runoff from the project would be controlled by a stormwater quality treatment system. Therefore, there would be limited pathways for potentially contaminated substances to reach soils during operation.

## C15.5 Water quality, treatment and discharge impacts during operation

614 submitters raised concerns about water quality, treatment and discharge during operation. Refer to section 15.4 of the EIS and Appendix Q (Technical working paper: Surface water and flooding) of the EIS for further details of water quality impacts during operation.

### C15.5.1 General water quality, treatment and discharge impacts during operation

Submitters raised concerns about water quality during operation. Specific concerns included:

- Concern about contaminated water being discharged into Rozelle Bay and Alexandra Canal
- Concern regarding the contamination of waterways with increased road runoff
- Concern with the discharge of polluted water into the environment during operation in regards to:
  - Different treatment systems given in the EIS do not reflect the terms of section 120 of the POEO Act that the proponent, as the polluter, must pay and treat polluted water
  - The groundwater treatment objectives have no resemblance to the requirements of the POEO Act
- Concern about overland flow and stormwater runoff that could affect water quality of Easton Park drain, Whites Creek and Rozelle Bay. Acid sulfate soils have been identified in the area
- Discharge of contaminated surface water to the stormwater system and ultimately Hawthorne Canal and Iron Cove
- Concern regarding the contamination of waterways from 'treated' water being discharged into stormwater, specifically from the Darley Road facility. Submitter believes this would not only impact the waterways but also the area for recreational activities, affecting amenity and possibly health
- Concern that the wetlands at the Rozelle Rail Yards will contain contaminated water. The EIS states that the wetland will treat and polish phosphorous and nitrogen from the exhaust fumes and the soil beneath it which is already contaminated
- Submitter believes the proposed Eastern Drainage Channel at Rozelle is a sensible piece of infrastructure, but believes it would be beneficial to discharge into White Bay rather than Rozelle Bay as there is a greater exchange of water in White Bay and less sediment would flow into Rozelle Bay.

### Response

Potential operational impacts on water quality include:

- Increased stormwater runoff and associated increases in pollutant loading from roads
- Spills or leaks of fuels and/or oils from vehicle accidents or from operational plant and equipment
- Discharges of contaminated tunnel wastewater (eg groundwater ingress, stormwater ingress, tunnel washdown water)
- Erosion of soft landscaped areas during the vegetation establishment period
- Scour/mobilisation of contaminated sediments at potential new outlet locations (ie Rozelle Bay and Iron Cove) and increased flow to existing locations (ie Alexandra Canal).

Rates of generation of pollutants in the stormwater runoff from surface roads were estimated using MUSIC modelling. Stormwater pollutant loads generated by the project would be controlled by a stormwater quality treatment system, designed in accordance with the project stormwater quality objectives developed with consideration of the Sydney Harbour and Parramatta River catchment water quality objectives. MUSIC modelling was undertaken to assess the impact of the project and performance of the stormwater quality treatment measures. The modelling results for the main locations where water would be discharged (Rozelle Bay, Iron Cove, White Bay and Whites Creek) and for the project as a whole indicate that the project would generally reduce the mean annual stormwater pollutant loads being discharged to the five receiving waterways, when compared to the existing conditions.

Wastewater from the tunnels will be treated prior to discharge to receiving waters. Treated flows from the Rozelle plant would drain via a constructed wetland to Rozelle Bay. The operational water treatment facilities would be designed such that effluent would be of suitable quality for discharge to the receiving environment and developed in accordance with ANZECC (2000) and relevant NSW WQOs. The proposed constructed wetland at Rozelle will provide 'polishing' treatment to the treated groundwater flows removing a proportion of the nutrient (forms of nitrogen and phosphorus) and metal load. With consideration of groundwater quality and proposed treatment, the concentration of the key constituents in the treated discharge to Rozelle Bay and Hawthorne Canal are unlikely to result in significant changes in water quality in the receiving waterways. Due to the mixing and dilution effect which would occur at the outlet to the receiving waters, impacts to ambient water quality are likely to be negligible and localised to near the outlet. The assessment in the EIS demonstrates that discharges from the operational water treatment plants are unlikely to result in a material change in the receiving waters, consistent with the requirements of section 120 of the POEO Act.

The proposed wetland at the Rozelle interchange would be lined to avoid interaction with the underlying soil and groundwater. During construction of this wetland, any existing soil contamination will be managed in accordance with the management measures discussed in Chapter 16 (Contamination) of the EIS so there will be no ongoing contamination impacts.

The stormwater runoff from the catchment that the Eastern Drainage Channel will convey currently discharges to Rozelle Bay. Discharging runoff to White Bay would involve a significant extension of the drain to the east potentially impacting on the proposed open space area and land under the control of the Ports Authority of NSW. Extension of the drain to White Bay may also potentially limit redevelopment opportunities identified in *The Bays Precinct Urban Transformation Plan*.

### **C15.5.2 Water treatment plant and tunnel discharge at Darley Road motorway operations complex (Leichhardt)**

Submitters raised concerns about water discharge from the Darley Road operational facility (substation and water treatment plant) being contaminated. Specific concerns included:

- The permanent substation and water treatment plant proposed at Darley Road may negatively impact the waterways at the point where the Blackmore Park stormwater channel joins the bay
- It is proposed that the 'treated' water from the tunnel will be directly discharged into the stormwater drain at Blackmore Park which would compromise the integrity of the waterway and bay, which is also used for recreational activities
- The discharge from the proposed water treatment plant at the Darley Road site (which potentially contains asbestos contaminated water and the water from the tunnel) directly into the Dobroyd Canal, Hawthorne Canal and waterways, would cause a permanent impact.

### **Response**

The proposed water treatment plant at the Darley Road motorway operations complex (MOC1) would treat groundwater collected within the project tunnels prior to discharge. Tunnel drainage infrastructure would be designed to accommodate a combination of water ingress events including groundwater ingress, stormwater ingress at portals, tunnel washdown water, fire suppressant deluge or fire main rupture and spillage of flammable and other hazardous materials. During operation, tunnel drainage would be pumped via rising mains to the water treatment plant.

The proposed water treatment plant at the Darley Road motorway operations complex (MOC1) would not be discharged to Dobroyd Canal (Iron Cove Creek). The treated water would be discharged into either Hawthorne Canal or into the sewer system. Water collected within the tunnels not suitable for treatment would be discharged to the local sewer system or disposed of at an appropriate licensed waste facility. This will be confirmed during the detailed design stage.

The operational water treatment facilities will be designed such that effluent will be of suitable quality for discharge to the receiving environment. Due to the mixing and dilution effect which would occur at the outlet to the receiving waters, impacts to ambient water quality are likely to be negligible and localised to near the outlet. Discharge criteria will be developed in accordance with ANZECC (2000), with consideration of the species protection levels for slightly to moderately disturbed marine waters and relevant NSW WQOs and will be included in the OEMP prepared for the project (see environmental management measure OSW16 in **Chapter E1** (Environmental management measures)). Consultation on the final discharge criteria will be undertaken with relevant stakeholders.

### C15.5.3 Bioretention at King George Park

A submitter raised concerns about the proposed bioretention facility at King George Park regarding whether this facility is to be permanent and if the water being pumped from the facility into Iron Cove will be filtered.

#### Response

The bioretention facility will treat stormwater runoff from a portion of Iron Cove Link including a portion of Victoria Road northbound and southbound, and the new portals. It will mimic natural processes by filtering stormwater runoff through vegetation and soils to remove pollutants. Therefore, water runoff from the Iron Cove Link will be treated prior to entering Iron Cove. This is proposed to be a permanent facility.

It is proposed to relocate the bioretention facility to the north of the location presented in the EIS, to an area adjacent to Victoria Road at the eastern abutment of Iron Cove Bridge and within King George Park (see **Chapter D3** (Relocation of the bioretention facility at Rozelle) for further information).

## C15.6 Cumulative soil and water quality impacts

Two submitters raised concerns about cumulative soil and water quality impacts of the project. Refer to section 26.4 of the EIS for an assessment of cumulative soil and water quality impacts.

### C15.6.1 General cumulative soil and water impacts

Submitters raised concerns regarding:

- The cumulative impacts of WestConnex on soil contamination and negative effects on gardening and growing vegetables
- Table 1-2 of Appendix C of the EIS. This includes that the Iron Cove Link naturalisation works were not included in the cumulative impact assessment in the EIS. The submitter also requests that the project not impact on the Johnston's Creek and Iron Cove Link naturalisation works.

#### Response

Cumulative contamination impacts are discussed in Chapter 7 of Appendix R (Technical working paper: Contamination) of the EIS. With consideration of the management measures proposed to be implemented as part of the M4-M5 Link project (see **Chapter E1** (Environmental management measures)), there are minimal adverse cumulative contamination impacts anticipated to occur as part of the construction or operation of the project.

The construction and operation of the WestConnex program of works is not anticipated to create additional soil or groundwater contamination to that already identified within the project footprint as a result of historical land use activities. Additionally, the appropriate management of contamination and waste materials disturbed during the construction phase of the respective projects would likely result in an overall improvement in the condition of the land in relation to contamination at project completion compared with identified contamination conditions at the time of acquisition. Therefore, it is not considered that the WestConnex projects will have negative effects on gardening and growing vegetables due to soil contamination.

As described in section 7.2.4 of Appendix R (Technical working paper: Contamination) of the EIS, the cumulative disturbance and management of contaminated soil, fill, sediment, surface water and groundwater as a result of construction and operational activities are unlikely to have a more significant impact on ecological and human health receptors or sensitive environments than they would if undertaken as discrete projects, provided the proposed management and mitigation measures documented in the respective EISs are implemented, maintained and monitored.

The Johnstons Creek naturalisation works do not interact directly with the M4-M5 project footprint. The naturalisation works were considered but not assessed in the cumulative impact assessment as the design was in the early stages and there was insufficient public information available.

The Sydney Water Iron Cove Creek (Dobroyd Canal) naturalisation works would extend between Ramsay Road and Waratah Street at Haberfield. The project does not interact directly with the Iron Cove Creek naturalisation works which are located approximately 150 metres from the mainline tunnel connection with the Wattle Street interchange (which is currently being constructed as part of the M4 East project). The naturalisation works were not identified in the cumulative impact assessment as the works had not been identified in discussions with Sydney Water during the course of the EIS.

## C15.7 Soil and water quality environmental management measures

347 submitters raised concerns about the environmental management measures for soil and water quality impacts. The environmental management measures are summarised in **Chapter E1** (Environmental management measures).

### C15.7.1 Soil and water quality environmental management measures

Submitters questioned what level of pollution controls will be undertaken to ensure that contaminated water and chemicals are not released into Whites Creek, Rozelle Bay and Alexandra Canal and what management procedures would be made publically available regarding management of soils and waterways. Submitters don't believe that Sydney Motorway Corporation can be trusted to mitigate these risks.

Additional concerns and requests regarding mitigation measures for soil and water quality impacts included:

- Mitigation measures need to be specific, not general
- The approach to develop pollution controls for surface water and groundwater pollution in the future, is unacceptable
- With no specific discharge criteria nominated, the likelihood the treatment plants will deliver the necessary standard of treatment is speculative. In addition, the suggestion of using wetland reeds at Rozelle is unacceptable as the performance of reeds is very limited
- Submitters were concerned with the treatment of discharge water because past history has shown the St Peters leachate treatment plant was not designed with sufficient capacity
- Submitters are concerned there will be no sediment and pollutant management controls at Iron Cove Creek
- Measures to ensure that benzene and other aromatic dangerous compounds are not discharged to the constructed wetland within the Rozelle Rail Yards, from the Rozelle East motorway operations complex (MOC3), are not specified within the EIS. Submitters were also concerned there will be no mitigation measures against the potential for low-level contamination to build up over time
- Provision of water sensitive urban design at redevelopment sites like the Rozelle Rail Yards recreation area should be a priority, to help manage and mitigate stormwater pollution into Blackwattle Bay
- Submitter suggests that environmental management measures for the tunnel drainage treatment for the Rozelle and Iron Cove Link tunnels should include measures to ensure dangerous compounds are not discharged into wetlands. Submitter further suggests that these measures will reduce the cumulative impacts of low level contamination as it will not build up over time



- Concerns were raised regarding the absent detail on measures to ensure that waterways are not polluted during construction, particularly when handling contaminated soils.

## Response

The EIS identifies several management measures to minimise risks to receiving waterways and soils, which will be implemented throughout the project footprint, including:

- A CSWMP will be prepared for the project. The plan will include the measures that will be implemented to manage and monitor potential surface water quality impacts and acid sulfate soils during construction. The CSWMP will be developed in accordance with the principles and requirements in *Managing Urban Stormwater – Soils and Construction, Volume 1* (Landcom 2004) and Volume 2D (DECCW 2008), commonly referred to as the 'Blue Book' (see environmental management measure SW01 in **Chapter E1** (Environmental management measures))
- A program to monitor potential surface water quality impacts due to the project will be developed and included in the CSWMP. The program will include the water quality monitoring parameters and the monitoring locations identified in Annexure E of Appendix Q (Technical working paper: Surface water and flooding) of the EIS where appropriate. The monitoring program will commence prior to any ground disturbance to establish appropriate baseline conditions and continue for the duration of construction and until the affected waterways are rehabilitated to an acceptable condition as certified by a suitably qualified and experienced independent expert (or as otherwise required by any project conditions of approval). Further details to be included in the program are outlined in Appendix Q (Technical working paper: Surface water and flooding) of the EIS (see environmental management measure SW02 in **Chapter E1** (Environmental management measures))
- Erosion and Sediment Control Plans (ESCPs) will be prepared for all work sites in accordance with the Blue Book. ESCPs will be implemented in advance of site disturbance and will be updated as required as the work progresses and the sites change (see environmental management measure SW03 in Chapter E1 (Environmental management measures))
- Temporary construction water treatment plants will be designed and managed so that treated water would be of suitable quality for discharge to the receiving environment. An ANZECC (2000) species protection level of 90 per cent is considered appropriate for adoption as discharge criteria for toxicants where practical and feasible. The discharge criteria for the treatment facilities will be included in the CSWMP (see environmental management measure SW10 in **Chapter E1** (Environmental management measures))
- The operational water treatment facilities will be designed and managed such that effluent will be of suitable quality for discharge to the receiving environment. Opportunities to incorporate nutrient treatment within the plant at Darley Road will be investigated during detailed design. Discharge criteria will be developed in accordance with ANZECC (2000), with consideration of the species protection levels for slightly to moderately disturbed marine waters and relevant NSW WQOs. The discharge criteria for the treatment facilities will be nominated during detailed design in consultation with relevant stakeholders and included in the OEMP (see environmental management measure OSW16 in **Chapter E1** (Environmental management measures))
- Spill containment will be provided on the motorway. Spill management and emergency response procedures will be documented in the OEMP and/or Emergency Response Plan (see environmental management measure OSW14 in **Chapter E1** (Environmental management measures)).

The measures outlined above will be implemented at Dobroyd Canal (Iron Cove Creek) as required.

Two operational water treatment plants will be designed to treat tunnel flows to a suitable quality for discharge to the receiving environment. The operational water treatment plants would be designed to predominantly treat groundwater inflows to the tunnels, but may also treat other tunnel waste water such as stormwater ingress ground portals, tunnel wash down water and fire suppressant deluge water (subject to appropriate water quality testing). Treated flows from the Rozelle water treatment plant will be discharged to a wetland providing additional 'polishing' treatment prior to discharge. Therefore the objective of using the wetland is to provide for additional polishing after treatment at the water treatment plant to remove a proportion of the nutrient (forms of nitrogen and phosphorous) and metal load. Opportunities to incorporate other forms of nutrient treatment within the treatment plant at Darley Road will be investigated during detailed design.

In the highly constrained areas good practice stormwater treatment techniques such as inline pollution control measures would be deployed where feasible and practical. Where space is available, bioretention systems or constructed wetlands would be considered. Where space is not available, other smaller devices, such as proprietary stormwater treatment devices, will be installed. The final design of treatments will be supported by MUSIC modelling and water sensitive urban design principles (see environmental management measure OSW12 in **Chapter E1** (Environmental management measures)). The design of such stormwater quality treatment measures, including their ongoing maintenance, would be undertaken and finalised during detailed design.

These proposed measures to address tunnel water discharges and stormwater discharges will minimise risks of dangerous compounds being discharged into the receiving waterways and mitigate stormwater pollution to receiving waterways, such as Rozelle Bay (which connects to Blackwattle Bay). The CSWMP will also include procedures to manage potentially contaminated stormwater runoff and measures will be implemented to appropriately store dangerous goods and reduce the potential for contamination build up over time due to spills and leaks. Measures to appropriately handle contamination in areas such as Rozelle are further discussed in **Chapter C16** (Contamination) and **Chapter E1** (Environmental management measures). Cumulative impacts are discussed in **section C15.6.1**.

As the EIS is based on a concept design, it is considered appropriate for detailed measures and plans to be developed at the detailed design stage in order to ensure all potential impacts are thoroughly addressed. Should the project be approved, the design and construction contractor(s) will be required to implement the environmental management measures for the project and comply with any conditions of approval that are issued for the project.

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## C16 Contamination

This chapter addresses issues raised in community submissions associated with the contamination assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 16 (Contamination) of the EIS for the further detail on the contamination assessment.

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## C16.1 Level and quality of contamination assessment

30 submitters raised concerns about the quality of the contamination assessment. Refer to section 16.1 of the EIS and section 3 of Appendix R (Technical working paper: Contamination) for details of the contamination assessment methodology.

### C16.1.1 General contamination concern

Submitters had concerns about contamination in the project footprint and how this would be managed. Specific concerns included:

- The level and quality of contamination assessment at O'Dea Reserve was not adequate as the current status of the soil and groundwater quality at this site was not assessed. The EIS states that the site was a former clay pit which was then used for uncontrolled filling but this was not shown in the geological long sections in Appendix E of the EIS. Contaminated groundwater and landfill gas at the site can pose a risk to the workers and environment
- No lead measurements in the soil along Victoria Road between Iron Cove Bridge and Anzac Bridge have been investigated as part of the contamination assessment. The EIS makes no reference to expected or measured lead contaminants from previous vehicle use. The potential health risk of this oversight is large given the disturbance of potentially lead contaminated soil from the construction work planned and the number of children in the area. Submitter wants an independent study to be made into this before approval of the EIS
- The EIS presents an optimistic analysis of potential site contamination and waste management. Failure of action plans is possible as this has happened on preceding WestConnex stages
- Concern the contamination assessment was inadequate in regards to asbestos. No independent testing of toxic materials and/or dust was undertaken by SafeWork NSW
- The EIS identifies contamination risks. Chapter 16 and technical reports show that medium and high risks impact the environment and human health. There are no detailed statements about how these contamination risks will be handled which does not meet the Secretary's Environmental Assessment Requirements (SEARs)
- Submission is concerned that the Proponent's assessment of potential contamination impacts at the Darley Road civil and tunnel site is defective as it fails to identify the risk to surrounding residents of airborne soil containing contaminants and asbestos from construction activities. There is concern that the assessment is defective because having identified the presence of asbestos on site, it fails to specifically identify the potential for inhalation of asbestos either by workers or residents.

### Response

The assessment undertaken in the EIS to address the SEARs for contamination of soils included:

- A review of relevant data and background information including to evaluate whether historical land uses were likely to have caused contamination of soil and groundwater within the study area
- A preliminary assessment of the nature and location of infrastructure, hazardous materials and other features located within the study area, both current and historical
- A review of available published geological and hydrogeological information for the construction ancillary facilities and study area
- Completion of site inspections to assist with the identification of potential on and off-site sources of contamination and to understand the existing condition of the construction ancillary facilities, construction sites and surrounding area
- Assessment of intrusive investigations completed within the project footprint and review of previous reports prepared, to identify the areas and contaminants of concern.

This information has informed the assessment in the EIS and determined the risk of contamination at each of the construction ancillary facilities and along the tunnel alignment. Further investigations will be carried out on the detailed design to inform the preparation of plans containing detailed management measures, prior to construction.



The assessment in the EIS recognises that O'Dea Reserve may contain contaminated soil and groundwater due to the former uncontrolled landfill that was located in the area. O'Dea Reserve is located in Salisbury Lane at Camperdown and is situated above the proposed tunnel alignment at Camperdown. The depth of the tunnel in this location would be around 40 metres below ground level. During tunnel construction, groundwater inflows to the tunnel excavation would require treatment and disposal. The tunnel inflow water would either be:

- Treated on-site and then discharged to stormwater under an Environment Protection Licence (EPL) or to sewer under a Trade Waste Agreement with Sydney Water
- Transported to a liquid waste facility.

During operation, a range of techniques may be used to limit groundwater ingress to the tunnels such as grout injection, pressure cementing and tunnel linings. Groundwater seepage would be required to be extracted from the tunnels, treated and discharged to the receiving water bodies. To manage potential contamination impacts, separate water collection systems would be installed within the tunnel to collect groundwater ingress and other potential water sources. The tunnel water drainage streams from the mainline tunnels would be pumped to a water treatment facility proposed to be located at Darley Road, Leichhardt, with treated flows either discharged to Hawthorne Canal, the existing stormwater pipework or into the sewer system in accordance with a Trade Waste Agreement with Sydney Water. The preferred option would be confirmed during detailed design.

Section 16.3.1 of the EIS identifies the potential impacts at each construction ancillary facility. Potential impacts at the Darley Road civil and tunnel site (C4) are discussed in **section C16.2.3**. Potential impacts on workers include exposure to extracted contaminated groundwater from either direct contact or inhalation of vapours or vapours encountered during tunnelling, which would be managed in accordance with protocols outlined in a site specific Work Health and Safety Plan.

The study area for the contamination assessment is the same as the project footprint, which comprises the location of all operational infrastructure and areas where construction activities would occur. This includes the areas along Victoria Road where the surface works are proposed to occur for the Iron Cove Link at Rozelle and the section of the proposed tunnel alignment from Rozelle to Iron Cove. Lead has been identified as a contaminant of potential concern for areas between Iron Cove Bridge and Anzac Bridge at The Crescent Civil site (C6), Victoria Road civil site (C7) and Iron Cove Link civil site (C8). This was based on an assessment of the previous land uses in the area, previous geotechnical investigations carried out and the analysis of soil samples collected. It is considered that this assessment is adequate to determine the contaminants of potential concern in the study area. Further targeted investigations in areas that have been identified as medium or high risk of contamination presence will be carried out prior to construction. This includes the Rozelle civil and tunnel site (C5), The Crescent civil site (C6) and the Iron Cove Link civil site (C8).

Potentially contaminated areas directly affected by the project will be investigated and managed in accordance with the requirements of guidance endorsed under section 105 of the *Contaminated Land Management Act 1997* (NSW) (CLM Act). If contamination posing a risk to human or ecological receptors is identified, a Remediation Action Plan (RAP) will be prepared. Should no risk be identified during further targeted investigations, the Construction Environment Management Plan (CEMP) prepared for the project will ensure any potential impacts will be managed during construction, including procedures to handle the discovery of previously unidentified contaminated material.

Waste management procedures will be stipulated in the CEMP to manage potential impacts during construction. In addition, a Construction Soil and Water Management Plan (CSWMP) will be prepared and implemented that will include procedures for handling and storing potentially contaminated substances and a Construction Air Quality Management Plan will be developed and implemented to monitor and manage potential air quality impacts (see environmental management measures CM07 and AQ1 in **Chapter E1** (Environmental management measures). Stockpile management procedures will also be implemented to control dust, odour and cross contamination. Furthermore, section 23.3.2 of the EIS discusses how management, transportation and disposal of waste would be based on classification of waste material in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (NSW Environment Protection Authority (NSW EPA) 2014). Therefore, any identified contaminants of potential concern will be quantified early in the construction process and appropriate mitigation measures will be implemented, as required.

Asbestos was considered to be present at a number of the construction locations through the assessment of the previous and current land uses. A hazardous materials assessment will be carried out prior to and during the demolition of buildings and that demolition works will be undertaken in accordance with the relevant Australian Standards and relevant NSW WorkCover Codes of Practice, including the Work Health and Safety Regulation 2011 (NSW) (see environmental management measure CM03 in **Chapter E1** (Environmental management measures)). Site specific Asbestos Management Plans will be developed in consultation with relevant stakeholders (government agencies and local councils), where known or suspected asbestos is present, prior to construction. The plans will be prepared to satisfy the SafeWork Australia *Asbestos Codes of Practice and Guidance Notes*, NSW legislative requirements and relevant Australian and New Zealand Standards. The Asbestos Management Plans will include procedures for managing potential dust generation, air monitoring and clearance inspections and reports.

Several management measures are identified in the EIS to manage impacts on the environment and human health. These are discussed further in **section C16.4.3** and are provided in full in **Chapter E1** (Environmental management measures).

## C16.2 Impacts occurring on existing contaminated land

661 submitters raised concerns about impacts occurring on existing contaminated land. Refer to section 16.2 of the EIS for existing environment information for various areas within the project footprint.

### C16.2.1 Disturbance of contaminated land at the Rozelle construction ancillary facilities and the Rozelle Rail Yards

Submitters had concerns about disturbance and dispersal of contamination at Rozelle. Specific concerns include:

- Construction and tunnelling may spread contaminated dust around the neighbourhood at the Rozelle Rail Yards
- Dust management, emission of toxic gasses and handling of toxic materials during the construction of the project at the Rozelle Rail Yards. Investigation should be made to minimise these impacts before the work proceeds so the community have the opportunity to comment on the methodology
- Given the proximity of the Rozelle Rail Yards to the coal fired power station at White Bay, there is a potential for boiler ash to be present
- Concern that the soil at the Rozelle civil and tunnel site is contaminated and construction on this soil could impact the community at various stages during construction
- Concern that construction work at the Rozelle Rail Yards will disturb the existing contamination, especially as a result of the removal of vegetation, ballast stockpile and excavated soil
- The EIS identified a high risk of contamination issues at the Rozelle civil and tunnel site and The Crescent site at Annandale; however leaves the supply of detailed information to a post -approval stage which is considered to be irresponsible
- There is no provision for the safe removal of toxic substances at the Rozelle Rail Yards (based on previous experiences at St Peters).

A submitter supports the proposed contamination management of the Rozelle Rail Yards.

### Response

Existing railway tracks, rail related infrastructure (including rail ballast), surface wastes/stockpiles, noxious weeds and vegetation are being removed from the Rozelle Rail Yards as part of site management works which were assessed separately in the *Rozelle Rail Yards Site Management Works Review of Environmental Factors* (REF) (Roads and Maritime Services 2016). The site management works are not being assessed as part of the EIS and will be completed as a separate project prior to construction of the M4-M5 Link project commencing.

The site management works involve limited excavation other than what is necessary remove the rail ballast across the site to a depth of around 500 millimetres. The site boundary for these works does not extend to include the industrial/commercial properties along the south side of Lilyfield Road which form part of the M4-M5 Link project footprint. The site management works will be undertaken in accordance with the environmental management measures required as part of that approval. More information about the site management works can be found on Roads and Maritime's website.<sup>1</sup>

The extent of contamination in soil and groundwater within the study area at Rozelle has been investigated as part of the EIS. Previous reports for soil and groundwater investigations undertaken at the Rozelle Rail Yards and surrounding areas were reviewed as part of the contamination technical assessment (refer to Appendix R (Technical working paper: Contamination) of the EIS).

As discussed in section 16.3.1 of the EIS, potential contamination impacts from the Rozelle civil and tunnel site (C5) during the construction phase have been assessed as high risk. This was due to contamination being known to be present at concentrations above the relevant assessment criteria, and widespread. Also, exposure pathways to human or ecological receptors are likely to be present now and during or after construction (without implementation of appropriate controls).

Previous investigations at the Rozelle civil and tunnel site (C5) have identified metals (lead, arsenic, cadmium and zinc) and Polycyclic aromatic hydrocarbons (PAHs) in soil exceeding the land use criteria for open space and commercial/industrial. In addition, asbestos was detected in soil and petroleum sourced light non-aqueous phase liquid was detected in groundwater.

The Crescent civil site (C6) during the construction phase has also been assessed as high risk due to contamination being known to be present at concentrations above the relevant assessment criteria and widespread. Also, exposure pathways to human or ecological receptors are likely to be present now and during or post construction (without implementation of appropriate controls).

Previous investigations at the site have identified metals (lead), selected PAHs, per and poly-fluoroalkyl substances (PFAS), selected phthalates, tributyltin and asbestos in soil and/or sediment and/or groundwater. A Site Access and Management Procedure (SAMP) prepared by Jacobs (2015) currently exists for part of The Crescent civil site (C6) – Lot 21 and Lot 22 in Deposited Plan (DP) 1151746.

Potential construction impacts for both sites have been assessed in Chapter 5 of Appendix R (Technical working paper: Contamination) of the EIS.

Several management measures will be implemented at these sites to minimise the impacts presented during construction. These measures are consistent with those to be implemented at other sites, as discussed in **section C16.4.3**.

Construction activities will be managed to minimise impacts from the mobilisation of contaminated soil, sediment, surface water and groundwater (including contaminated vapours) and the generation of dust. It is therefore expected that management measures would be adequate to minimise risks of disturbance of contaminated soil and water impacting on the local community. Further targeted investigations will be carried out prior to construction. If contamination posing a risk to human or ecological receptors is identified, a RAP will be prepared (see environmental management measure CM01 in **Chapter E1** (Environmental management measures)). Therefore, the assessment of potential contamination impacts at Rozelle has been based on detailed information and it is considered that further investigations on the detailed design will dictate management measures that are specific to the site and prevent impacts.

Contaminated groundwater is discussed in Chapter 19 (Groundwater) of the EIS. Previous groundwater investigations have been reviewed and monitoring carried out as part of the groundwater technical assessment (refer to Appendix T (Technical working paper: Groundwater) of the EIS). These investigations identified some areas where contaminated groundwater may occur, including sections of tunnel within the vicinity of the Rozelle Rail Yards. To avoid impacts from altering flow paths, tunnel sections through the alluvium at Rozelle would be constructed as undrained (tanked) and cut-off walls would be installed to reduce the ingress of groundwater from the palaeochannels, minimising potential contaminated groundwater migration. Shallow groundwater is likely to be encountered during ground excavation works and will require management during the construction of the tunnel access decline.

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<sup>1</sup> <http://www.rms.nsw.gov.au/projects/sydney-inner/rozelle-rail-yard-site-management/index.html>

Temporary construction water treatment plants will be designed with consideration of the known and likely contaminants present in the groundwater and managed so that treated water would be of suitable quality for discharge to the receiving environment. The discharge criteria for the treatment facilities will be included in the CSWMP. Groundwater extracted from tunnelling and discharged to stormwater would occur in accordance with an EPL granted by the NSW EPA and a groundwater monitoring program will be prepared and implemented to monitor groundwater quality (see environmental management measures OGW9 and OGW10 in **Chapter E1** (Environmental management measures)).

The former White Bay Power Station is located to the east of the Rozelle civil and tunnel site (C5). As discussed above, further site investigations will be undertaken to investigate identified areas of concern prior to construction. If contamination (including that from boiler ash) posing a risk to human or ecological receptors is identified, a RAP will be prepared.

The design and construction contractor(s) would be required to consult and communicate with stakeholders and the community during construction, including delivering a Community Communication Strategy to distribute information and receive feedback.

The Alexandria Landfill at St Peters interchange is managed as a licensed landfill under the *Protection of the Environment Operations Act 1997* (NSW) and is being remediated in accordance with the requirements of the Landfill Closure Management Plan and in compliance with an EPL. The landfill odours that have been experienced at St Peters are due to the construction works within the licensed landfill. These conditions do not exist at Rozelle and therefore potential odours associated with the disturbance of contaminated soil or groundwater at Rozelle are not considered likely. In the unlikely event that odours did occur they would be managed in accordance with the CSWMP or the Unexpected Discovery of Contaminated Lands Procedure (Roads and Maritime 2013f).

The support for the proposed contamination management at the Rozelle Rail Yards is noted.

### **C16.2.2 Disturbance of contaminated land at Iron Cove**

Submitters had concerns about the disturbance of contaminated land at Iron Cove. Specific concerns include:

- Given the proximity of the Iron Cove Link civil site to the former coal fired power station at Balmain, there is a potential risk of boiler ash dumping in this area
- The disturbance and dispersal during construction of lead, arsenic, cadmium, zinc and other toxic industrial pollutants that are known to be distributed in the soil in the Rozelle area will be spread throughout the surrounding area, including the Rozelle Public School, by the known underground spring at this location, impacting soil and water quality
- Construction work will expose contaminated soil directly adjacent to Victoria Road in the works area from Springside Street to Iron Cove Bridge. This will have significant impact on the community and students.

### **Response**

As discussed in section 16.2.11 of the EIS, the former Balmain Power Station was located directly north and adjacent to the Iron Cove Link civil site (C8). The power station site has been remediated and developed for high density residential and recreational open space land use.

Rozelle Primary School was identified in the assessment as being located around 140 metres topographically up-gradient from the Iron Cove civil site. As discussed in section **C16.2.1**, potential impacts to site workers and the neighbourhood of Rozelle from the mobilisation of contaminated soil and groundwater have been assessed in the EIS. This includes consideration of the surrounding land use, including schools, parks, residential and commercial properties.

The areas and contaminants of concern due to previous land uses identified within the Iron Cove Link civil site (C8) are discussed in section 4.11.7 of Appendix R (Technical working paper: Contamination) the EIS. The site was assessed as a medium contamination risk, with the following potential impacts identified:

- Direct contact, inhalation and ingestion risk to site workers from contaminated soil or hazardous building materials via dust
- Discharge of contaminated surface water to the stormwater system and ultimately Iron Cove

- Disturbance of actual or potential acid sulfate soils at the northeast corner of the site and within the area of the proposed bioretention facility located within King George Park, adjacent to Manning Street at Rozelle (note the revised location of this facility as described in **Chapter D2** (Relocation of the bioretention facility at Rozelle))
- Potential for leaks or spills from equipment and plant used during construction.

Several management measures will be implemented at the Iron Cove Link civil site (C8) to minimise the impacts presented during construction. These measures are consistent with those to be implemented at other sites, as discussed in **section C16.4.3**. Targeted site investigations would be undertaken within the project footprint to investigate identified areas of concern. If contamination (including from boiler ash), posing a risk to human or ecological receptors is identified, a Remediation Action Plan (RAP) will be prepared.

### C16.2.3 Disturbance of contaminated land at Leichhardt

Submitters had concerns about the disturbance of contaminated land at Leichhardt. Specific concerns include:

- Concern regarding the impacts on health and property caused from the disturbance of contaminants at the Darley Road civil and tunnel site at Leichhardt. This will pose a risk to the community associated with spoil removal, transfer and handling
- That the Darley Road civil and tunnel site is contaminated by metals, polycyclic aromatic hydrocarbons, total recoverable hydrocarbons, asbestos, lead and volatile organic hydrocarbons (VOCs). The spread of these contaminants to properties and gardens of nearby residents is of major concern
- The assessment risk rating of medium for contamination at the Darley Road civil and tunnel site is of concern considering previous experience with other WestConnex projects
- The risk of health impacts to the local community in the vicinity of the Darley Road civil and tunnel site from the inhalation of asbestos is not stated in the EIS and should be as it is a part of the SEARs
- There is a risk for site workers due to direct contact, inhalation and ingestion of contaminated soil and hazardous building materials via dust
- Concern that disturbance of the contaminated Darley Road civil and tunnel site will impact nearby waterways
- Disturbance of contamination, such as asbestos, during construction of the site and associated discharge of water from the construction water treatment plant.

## Response

The EIS recognises that various contaminants of concern may potentially be present at the Darley Road civil and tunnel site (C4) due to former and current land uses. Potential contamination impacts at the Darley Road civil and tunnel site (C4) including to site workers and residents are summarised in Table 16-23 of the EIS through potential contact with contaminants released during demolition and ground disturbance works. This includes the inhalation/ingestion of contaminated dust from demolition of hazardous building materials including asbestos. Potential discharge of contaminated surface water to stormwater and ultimately Hawthorne Canal and Iron Cove has also been assessed as a risk. The site has been assessed as an overall medium contamination risk during construction due to known soil or groundwater concentrations present above the relevant assessment criteria and exposure pathways for human or ecological receptors potentially being present. The risk assessment methodology is discussed in section 3.2.3 of Appendix R (Technical working paper: Contamination) of the EIS.

Several management measures will be implemented at the Darley Road civil and tunnel site (C4) to minimise the impacts presented during construction, including the preparation of site specific management plans. These measures are consistent with those to be implemented at other sites, as discussed in **section C16.4.3**. Furthermore, targeted investigations in areas identified as a medium or high risk of containing contamination will be carried out prior to construction and appropriate management strategies will be developed based on the actual contamination present, including the preparation of a RAP, if required.



Chapter 23 (Resource use and waste minimisation) of the EIS discusses spoil (excavated soil and rock) management for the project. Further soil testing would be required to determine suitable reuse or disposal options for excavated materials. Contaminated material would be segregated from uncontaminated material on site to prevent cross-contamination during the storage and handling of spoil. A Construction Waste Management Plan (CWMP) will be prepared for the project, which will include procedures for handling, storing and transporting potentially contaminated substances (see environmental management measure CM04 in **Chapter E1** (Environmental management measures)). Potential or known contaminated soil would be handled in accordance with the *Protection of the Environment Operations Act 1997* (NSW). Therefore, appropriate management measures will be implemented to avoid impacts on the health of local residents and the spread of any contaminants to local properties, gardens or waterways.

#### **C16.2.4 Disturbance of contaminated land at Haberfield and Ashfield**

Submitters had concerns about the disturbance of contaminated land at the Haberfield and Ashfield construction sites, including the Parramatta Road West and East sites due to the historical land use of the sites, including the former use as a car yard. Submitters were concerned that there is a possibility of potentially dangerous contaminants such as asbestos, lead, metals, benzene and pesticides being disturbed during construction and impacting on the nearby community, including schools (such as Haberfield Public School).

##### **Response**

The EIS recognises that various contaminants of concern may potentially be present at the Parramatta Road West civil and tunnel site (C1b) and Parramatta Road East civil site (C3b) due to former and current land uses. These sites have been assessed in the EIS as a medium contamination risk due to soil and groundwater contamination potentially present at concentrations above the relevant assessment criteria. Contaminants of potential concern that have been identified in these areas include metals, lead, asbestos, benzene and pesticides.

Potential impacts associated with mobilisation of contaminants through demolition activities have been discussed in section 16.3.1 of the EIS, including inhalation or ingestion exposure risks from demolition of hazardous building materials via dust. Potential construction impacts would be managed by the development and implementation of a CEMP (including sub-plans) and other relevant plans, which would include mitigation measures for the management of contaminated dust and spoil and encountering unexpected contamination. These measures are consistent with those to be implemented at other sites, discussed in **section C16.4.3**.

Further investigations in areas identified as a medium or high risk of containing contamination will be carried out prior to construction and appropriate management strategies will be developed based on the actual contamination present, including the preparation of a RAP, if required. Therefore, all works will be managed to minimise impacts on the local community.

The design and construction contractor(s) would be required to consult and communicate with stakeholders and the community during construction, including preparing and implementing a Community Communication Strategy.

#### **C16.2.5 Disturbance of contaminated land at St Peters**

Submitters had concerns about the disturbance of contaminated land at St Peters. Specific concerns include the risk of further contamination and release of landfill gas and leachate that has been identified at the Campbell Road civil and tunnel site (C10).

##### **Response**

The EIS recognises that there is known soil and groundwater contamination and potential for landfill gas and leachate at the Campbell Road civil and tunnel site (C10) at St Peters and therefore has assessed the risk of contamination as high. Potential impacts were assessed and the remediation and management of the site is being undertaken as part of the construction of the St Peters interchange for the New M5 project. Ongoing groundwater, leachate and landfill gas monitoring would be undertaken by the New M5 project for the former Alexandria Landfill during the construction and operation of the New M5 project in accordance with the approved Landfill Closure Plan. If required, characterisation of soil and fill materials and preparation of a RAP will be undertaken by the M4-M5 Link design and construction contractor(s) to supplement the existing data and assess the land suitability for the future open space land use.

### C16.2.6 Disturbance of contaminated land at Camperdown

Submitters had concerns about the disturbance of contaminated land at Camperdown. Specific concerns include safety breaches at the Pyrmont Bridge Road tunnel site related to asbestos or other hazardous materials emanating from the site affecting the Malt Shovel Brewery's patrons and workers.

#### Response

The EIS recognises that contaminants are likely to be present at the Pyrmont Bridge Road tunnel site (C9) and it has been identified as a medium contamination risk. Potential contaminants of concern include:

- Asbestos
- Metals (including lead)
- Total Recoverable Hydrocarbons
- Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
- Polycyclic Aromatic Hydrocarbons
- Volatile Organic Compounds
- Polychlorinated Biphenyls.

Further soil testing would be required to determine suitable reuse or disposal options for excavated materials and any contamination identified will be managed in accordance with the protocols established in the CEMP and associated sub-plans.

Safety risks to the local community will be managed through the implementation of a number of environmental management measures, discussed in **section C16.4.3**. A hazardous materials assessment will be carried out prior to and during the demolition of buildings. Demolition works, including asbestos removal, will be undertaken in accordance with the relevant Australian Standards and relevant NSW WorkCover Codes of Practice, including the Work Health and Safety Regulation 2011 (NSW).

### C16.3 Contamination of land due to construction

One submitter raised concerns about contamination of land due to construction. Refer to section 16.3 of the EIS for details of potential contamination impacts during construction.

#### C16.3.1 Contamination of land due to spills

A submitter had general concerns about spills of toxic water from the project.

#### Response

Potential contamination impacts on land as a result of the project include accidental leaks and spills from the use of plant and equipment at the construction ancillary sites. As discussed in Chapter 25 (Hazard and risk) of the EIS, management measures to reduce potential spill volumes and prevent any contamination will be developed and implemented for activities such as vehicle refuelling, servicing, maintenance and washdown, where there is a potential for spills and contamination.

The management of contaminated groundwater is discussed in **section C19.3**.

## C16.4 Contamination environmental management measures

417 submitters raised concerns about the environmental management measures for contamination impacts. See **Chapter E1** (Environmental management measures) for further details on the contamination environmental management measures.

### C16.4.1 Mitigation measures for the Option B construction ancillary facilities

A submitter requested that every measure be taken to limit the possibility of children being exposed to contaminants from the Option B construction ancillary facilities (in particular the Parramatta Road West (C1b) and Parramatta Road East (C3b) sites) such as asbestos, lead, metals, benzene and pesticides. The submitter calls for a ban on any decontamination activity during school hours.

#### Response

The management measures that would be implemented at the Haberfield/Ashfield construction ancillary facilities to avoid impacts on the local community from contamination are consistent with those that would be implemented at other project sites, as discussed in **section C16.4.3** and in **Chapter E1** (Environmental management measures). Further site investigations will be undertaken and, if required, a RAP will be prepared and implemented to make the land suitable for future land use. Potential construction impacts would be managed through the development and implementation of a CEMP which would include mitigation measures for encountering unexpected contamination and management of dust and spoil. Should the project be approved, the design and construction contractor(s) would be required to implement the management measures outlined in **Chapter E1** (Environmental management measures).

The timing of construction is outlined in Chapter 6 (Construction work) of the EIS. If remediation works are required, these would be carried out during standard construction hours. Hours of construction have been developed based on a balanced consideration of reducing the overall length of the construction program and the need to minimise related impacts. Due to the investigations carried out and strict management of contamination to be implemented during construction to avoid any impacts, it is not considered necessary to limit any site decontamination activities to certain times of the day. Further investigations will be carried out during detailed design, in order to inform the preparation of management plans. The design and construction contractor(s) would be required to consult and communicate with stakeholders and the community during construction, including delivering a Community Communication Strategy to distribute information and receive feedback.

### C16.4.2 Mitigation measures for the Rozelle construction ancillary facilities and the Rozelle Rail Yards

Submitters had concerns about the management of contamination at Rozelle. Specific concerns include:

- Rozelle has been an industrial and power generating area for generations and is well known to be contaminated. Concern that a RAP is required for this area
- The EIS does not give satisfactory safeguards or plans on how the contamination at Rozelle will be managed
- How will the contamination management measures at Rozelle be different from the current practices at the Haberfield and St Peters construction site, where there are significant amounts of airborne materials and particles
- Request for details of the protection measures to be implemented to manage the lead pollution levels in soil around the Rozelle area
- Request for plans of routes and timings for movement of contaminated soil and protection measures to mitigate the impacts on residents
- The Rozelle Rail Yards might be contaminated with toxic contaminants such as lead and asbestos and no provision has been made for safe removal of these toxic substances. These measures should be considered
- The Rozelle site is very close to a major waterway and measures should be put in place to make sure the water during construction is not contaminated. The details of how the water will be treated should be provided in the EIS

- The Rozelle Rail Yards are highly contaminated land and currently the EIS gives no specific details on how the contaminated land will be managed
- The EIS provides inadequate detail on how contaminated dust at the Rozelle Rail Yards during construction will be securely managed. It is unacceptable for contamination management to be finalised after construction contracts have been issued and the community will not have an opportunity to comment on the prescribed management measures
- Submitters request the tunnel drainage treatment for the Rozelle interchange and Iron Cove Link tunnels should include environmental management measures to ensure dangerous compounds are not discharged. These measures would reduce the cumulative impact of low level contamination building up over time
- Submitter requests that the Rozelle Rail Yards be handed to the Inner West Council by project contractors in a non-contaminated state that is safe for surrounding communities
- Concern that there is no detail in the EIS about how lead contaminated soil, asbestos, dioxins and other toxins and spoil will be safely removed without airborne particles being emitted during demolition, excavation and construction at Rozelle
- Concern that the removal of buildings at Rozelle would increase winds and this will bring asbestos to homes during remediation and construction at the Rozelle Rail Yards. A full plan of how the site will be remediated and the contaminants removed must be presented to local residents before the remediation begins
- While the environmental management of existing contamination and future potential contamination is considered in the EIS, it is not clear how the potential impacts on the surrounding schools would be identified and managed (mainly concerned with existing soil contamination throughout Rozelle).

## Response

The risks to human or ecological receptors associated with known contamination at the Rozelle civil and tunnel site (C5) have been acknowledged in Table 16-23 of the EIS. As this site has been assessed as a high contamination risk, further investigation will be undertaken prior to construction. Based on the investigations, a RAP will be developed, if required. The RAP would be prepared by a suitably qualified and experienced contaminated lands consultant and independently audited by a NSW EPA accredited site auditor. The RAP would consider the intended future use of the land, a large portion of which will be for public open space, and will ensure that the area is left in a state that is safe for surrounding communities.

The management measures that will be implemented for handling of contaminated soil and water are discussed in **section C16.4.3**, including various management and monitoring measures to control the mobilisation of dust, asbestos and other contaminated material. Contaminated material would be segregated from uncontaminated material on site to prevent cross-contamination during the storage and handling of spoil. The treatment of contaminated water to ensure dangerous compounds are not discharged is discussed in section 15.3.2 of the EIS. During construction, temporary water treatment plants would be constructed at each construction ancillary facility where groundwater is extracted during dewatering and tunnelling to mitigate adverse water quality impacts arising from the discharge of untreated construction water. During operation, treated flows from the Rozelle operational treatment facility would drain via a constructed wetland to Rozelle Bay. The operational water treatment facilities would be designed such that effluent would be of suitable quality for discharge to the receiving environment and all potentially contaminated areas directly will be managed in accordance with the requirements of guidance endorsed under section 105 of the CLM Act. See **sections C15.3** and **C15.6** for further information on water treatment.

The mobilisation of contaminants such as asbestos and lead via dust from demolition of hazardous materials will be managed through a hazardous material assessment, and implementation of an Asbestos Management Plan and air quality will be managed and monitored through a Construction Air Quality Management Plan. This is further discussed in **section C16.4.3**.

As discussed in **section C16.2.1**, management measures have been informed by the assessment in the EIS, which includes consideration of the surrounding land use in close proximity to the Rozelle Rail Yards, including schools, parks, residential and commercial properties.

Management of contamination for previously approved WestConnex projects is discussed in **section C16.4.3**. The design and construction contractor(s) would be required to consult and communicate with stakeholders and the community during construction, including developing and implementing a Community Communication Strategy.

### C16.4.3 General mitigation measures

Submitters had concerns about the mitigation measures for the management of contamination. Specific concerns include:

- Objection to the NSW EPA granting a licence for this project on the basis that there were no clear plans on how contamination would be controlled
- Based on experiences at St Peters and Haberfield, the project would not manage contamination impacts (including asbestos) appropriately in all contaminated areas and specifically at Rozelle Bay and Alexandra Canal. More detailed mitigation measures are required before proceeding with the M4-M5 Link
- Concern with the management of dust, emission of toxic gasses and handling of toxic materials during the construction of preceding WestConnex projects, suggesting an investigation to mitigate these concerns
- According to the previous experience at St Peters and contractor failure in handling contamination, explicit measures should be put in place for any contamination issue. Collected samples and analytical results should be published within 24 hours of sample collection and sample analysis
- Concern with the use of open storage of contaminated wastes, including asbestos and acid sulfate soils. Submitter believes it would be more appropriate to store contaminated wastes in storage sheds until off-site disposal was arranged
- Measures should be put in place to make sure the water during construction is not contaminated where it might be in contact with contaminated soils
- The contamination mitigation will be managed by an unknown contractor
- Concern regarding the failure to comply with NSW EPA licence due to the SMC's mismanagement of contamination during preceding WestConnex stages. This impacted St Peters residents who now have little confidence in SMC to fully comply with an NSW EPA EPL if approval is granted
- Request that contact details and protocols be provided to local residents and businesses, including the Malt Shovel Brewery, to advise on all potential safety incidents
- Confirmation of asbestos removal, by SafeWork NSW, has not been provided to the public for preceding WestConnex component projects.

### Response

Previous WestConnex component projects (M4 East and New M5) were approved with the condition that measures to monitor and manage dust and contaminated materials were developed and implemented through a CEMP. Measures implemented to control impacts at the M4 East and New M5 construction ancillary facilities include dampening work areas, covering inactive areas, monitoring weather conditions and regular inspections. Air quality monitoring is carried out to identify any airborne particulate matter and asbestos fibres.

Several management measures have been identified to specifically address the potential contamination risks from the M4-M5 Link project. These measures include commitments for the development of plans and procedures to control the management of contamination, including asbestos and acid sulfate soils. Should the project be approved, the design and construction contractor(s) will be required to implement these management measures. Specific measures include:

- Further targeted investigations in areas of identified medium and high risk contamination in the project footprint and the preparation of a RAP, if necessary
- A hazardous materials assessment will be carried out prior to and during the demolition of buildings. Demolition would be undertaken in accordance with the relevant Australian Standards and SafeWork NSW codes of practice



- A CWMP will be prepared that will include procedures for handling and storing potentially contaminated substances
- Stockpile management procedures will be implemented to control dust, odour and cross contamination
- Asbestos handling and management will be undertaken in accordance with an Asbestos Management Plan. Plans for asbestos would be site specific, developed to satisfy the SafeWork Australia *Asbestos Code of Practice and Guidance Notes*, NSW legislative requirements and relevant Australian and New Zealand Standards. They would include procedures for air monitoring, clearance inspections and reporting
- A CSWMP will be prepared for the project including procedures to manage potentially contaminated stormwater runoff and acid sulfate soils
- Erosion and Sediment Control Plans will be prepared for all work sites
- Temporary construction water treatment plants will be designed and managed so that treated water would be of suitable quality for discharge to the receiving environment
- The operational water treatment plants will be designed such that effluent will be of suitable quality for discharge to the receiving environment
- Discharge criteria for operational water treatment plants will be developed in accordance with the ANZECC (2000) and relevant NSW Water Quality Objectives
- A Construction Air Quality Management Plan will be developed and implemented to monitor and manage potential air quality impacts associated with the construction for the project. The management plan will include controls required to reduce the emission of dust out of the door of acoustic sheds
- Measures to reduce potential dust generation, such as the use of water carts, sprinklers, dust screens and surface treatments, will be implemented within project sites, as required
- At the commencement of establishment of project ancillary facilities, controls such as wheel washing systems and rumble grids will be installed at all site exits to prevent deposition of loose material on sealed surfaces outside project sites to reduce potential dust generation
- Areas of soil exposed during construction will be minimised at all times to reduce the potential for dust generation
- Exposed soils will be temporarily stabilised during weather conditions conducive to dust generation and prior to extended periods of inactivity to minimise dust generation  
Exposed soils will be permanently stabilised as soon as practicable following disturbance to minimise the potential for ongoing dust generation
- Regular site inspections will be conducted to monitor for potential dust issues. The site inspection, and issues arising, will be recorded.

The design and construction contractor(s) will be required to implement the management measures for the project (see **Chapter E1** (Environmental management measures)) and any conditions of approval. The design and construction contractor(s) will be required to consult and communicate with stakeholders and the community during detailed design and construction, the details of which will be included in a Community Communication Strategy to be developed for the project.

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## C17 Flooding and drainage

This chapter addresses issues raised in community submissions associated with the flooding and drainage assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 17 (Flooding and drainage) and Appendix Q (Technical working paper: Surface water and flooding) of the EIS for further detail on the flooding and drainage assessment.

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## C17.1 Level and quality of flooding and drainage assessment

274 submitters raised concerns about the flooding and drainage assessment. Refer to section 17.1 of the EIS and Chapter 3 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS for details of the flooding and drainage assessment methodology.

### C17.1.1 Methodology and adequacy of assessment of flooding and drainage

Submitters expressed concern about the adequacy and independence of the flooding and drainage impact assessment. Specific concerns included:

- That the EIS contains uncertainties and little information on the risk of flooding and it does not meet the standards of an EIS
- That the existing flood depth at the western end of Bignell Lane near Pyrmont Bridge Road is predicted to be up to one metre in a 100 year average recurrence interval (ARI) event and that this location is identified by the NSW Government Floodplain Development Manual (2005) as a high flood hazard area
- Lack of recognition of the impacts of pavement drainage at Haberfield/Ashfield
- The EIS does not adequately take into account historic drainage works at Newtown and Annandale which occurred in the late 19<sup>th</sup> century and may not be able to cope with the scale of tunnelling works
- There is no detail as to how the issues with flooding at Darley Road would impact on the area.

### Response

The flooding assessment in the EIS was prepared in accordance with the relevant Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the NSW Department of Planning and Environment (DP&E) and the associated desired performance outcomes that relate to flooding.

The assessment of potential flooding impacts of the project on existing flood regimes has been conducted in accordance with the requirements of the *Floodplain Development Manual* (NSW Department of Infrastructure, Planning and Natural Resources (now the NSW Office of Environment and Heritage (OEH) 2005)), which incorporates the NSW Government's Flood Prone Land Policy. Other relevant government policies and guidelines were also considered as part of the assessment of the project's potential flooding and drainage impacts. The floodplain planning provisions of the local environmental plans and development control plans applicable to the Inner West (formerly Ashfield, Leichhardt and Marrickville) and the City of Sydney local government areas (LGAs) have been considered as part of the assessment.

The assessment therefore provides an adequate level of detail as required by the SEARs, relevant legislative requirements and government policies and guidelines. Potential flooding impacts on existing drainage infrastructure and adjoining properties are assessed in section 17.3.1 and section 17.4.4 of the EIS, for construction and operation of the project respectively.

Construction impacts have been considered in the assessment across all areas of the project footprint, including all pavement surfaces associated with construction, both within the ancillary facilities (including those proposed at Haberfield and Ashfield) and surrounding areas. Flooding during construction of the project could potentially impact areas within and near the construction sites, including damage to facilities and infrastructure. Where drainage systems are to be upgraded or replaced during the project, existing systems will be left in place and remain operational during the process wherever possible.

All construction works would have the potential to impact local overland flow paths. Disruption of existing flow paths, both of constructed drainage systems or overland flow paths, could occur as a result of:

- Disruption of existing drainage networks during decommissioning, upgrade or replacement of drainage pits and pipes
- Interruption of overland flow paths by installation of temporary construction ancillary facilities
- Sediment entering drainage assets and causing blockages

- Overloading the capacity of the local drainage system.

These are typical impacts faced on most construction projects and would be addressed by adopting industry standard mitigation measures. Consideration of these impacts would be included during future detailed design and construction planning phases, along with consideration of the typical mitigation measures described in **Chapter E1** (Environmental management measures).

For operation, there is limited existing drainage infrastructure at many of the project sites that would be impacted or need to be modified. For the operational sites, the surface water runoff would be managed to minimise flood impacts on adjoining properties. Where the operational sites propose to connect directly to existing drainage infrastructure, flow rates from the sites would match existing flow rates where possible so as not to overload the existing drainage system or cause adverse flood impacts on adjoining properties. Further hydrological and hydraulic modelling based on the detailed design will be undertaken to determine the ability of the receiving drainage systems to effectively convey operational drainage discharges from the project.

Potential flooding impacts at Bignell Lane (as part of the Pyrmont Bridge Road tunnel site (C9)) and Darley Road have been assessed in section 17.1 of the EIS. Impacts and proposed management measures in these areas are discussed in **section C17.2.4** and **section C17.2.2**.

Potential impacts on existing buildings and infrastructure due to ground settlement from tunnelling works have been assessed in sections 12.3.4 and 19.3.8 of the EIS. See **section C19.1** and **section C12.5** for further details.

### C17.1.2 Concern regarding flooding impacts on the Rozelle interchange

A submitter was concerned that the location of the tunnels at Rozelle is in the vicinity of an old watercourse which aligns with the 100 year ARI.

#### Response

The surface components of Rozelle interchange (including tunnel portals) would be located within the extent of the probable maximum flood (PMF). The Rozelle interchange would be located within and adjacent to the Rozelle Rail Yards, which functions as a floodway and provides a significant amount of storage of floodwater in larger events. The existing flood risks and potential construction and operational impacts of the project have been considered in Chapter 17 (Flooding and drainage) of EIS.

Due to the high risk of flooding at the Rozelle interchange, the proposed layout and design has been influenced by flood risk and drainage considerations. An assessment of potential flood impacts at the proposed Rozelle interchange was undertaken.

Around the Easton Park drain (north of the Rozelle interchange) and along Whites Creek, the installation of more efficient drainage channels as part of the project would reduce flood levels in those watercourses. In the remainder of the Rozelle Rail Yards site, the proposed new buildings and other infrastructure would be raised above ground for flood protection.

To retain the existing function of the site as a flood storage area, minimise impacts in the 100 year ARI event and mitigate the potential increase in flood risk for surrounding properties, the design includes:

- Large transverse conveyance systems for the existing Easton Park drain and the catchment to the west, passing through the interchange under City West Link and discharging into Rozelle Bay
- An increase to the waterway area for the Whites Creek bridge structure under The Crescent.

The flood modelling suggests that this approach, combined with improved local road drainage along Lilyfield Road to convey runoff to the Easton Park drain, is likely to reduce potential impacts to an acceptable level (ie no adverse flood impacts on adjoining properties for the 100 year ARI event).

All entries (portals) into the tunnels will be designed so that they are located above the peak level of the PMF or the 100 year ARI design flood plus 0.5 metres, whichever is greater. The same hydrologic standard will be applied to tunnel ancillary facilities such as tunnel ventilation and emergency response facilities, electrical substations and water treatment plants, where the ingress of floodwaters will also have the potential to flood the tunnel (see **Chapter E1** (Environmental management measures)).

Groundwater inflows within the tunnels will be minimised by designing the final tunnel alignment to minimise intersections with known palaeochannels and alluvium present in the project footprint (such as at Rozelle). This is discussed further in **section C19.1.1**.



### C17.1.3 Assessment of drainage infrastructure impacts

A submitter was concerned with the assessment of drainage impacts and drainage system failure impacts on flooding and suggested that the EIS should not be approved as it has not properly explained or assessed these impacts. In particular, the following concerns were raised:

- The EIS has not assessed how the identified risk to the existing drainage network (disruption or blockage of existing drains) will cause increased risk of flood damage to flood lots. The submitter was particularly concerned with Darley Road and adjacent streets such as Hubert Street
- The EIS fails to take into account the Inner West Council's Leichhardt Floodplain Risk Management Plan which contains recommended flood modification options
- The EIS has not assessed if the project drainage infrastructure will impede the Inner West Council's Leichhardt Floodplain Risk Management Plan option HC\_FM3 to lay additional pipes/culverts from Elswick Street to Hawthorne Canal (via Regent Street and Darley Road)
- The EIS has not assessed if the project drainage infrastructure will impede Inner West Council's Leichhardt Floodplain Risk Management Plan option HC\_FM4 to lay additional pipes/culverts from William Street to Hawthorne Canal via Hubert Street and Darley Road.

### Response

The EIS includes an analysis of existing flood behaviours and drainage infrastructure in order to assess potential construction and operational impacts of the project. The EIS identified the waterways and associated catchments within the study area. Due to the extensive urban nature of the study area, there is a dense network of drainage infrastructure conveying stormwater flows for small storm events. These drainage features are illustrated and discussed in section 17.2.2 of the EIS. Section 17.3.1 of the EIS assesses the potential impacts on flooding and drainage, which includes consideration of the existing flood risk. Damage to facilities, infrastructure, equipment, stockpiles and downstream sensitive areas caused by inundation from floodwaters is considered as a potential impact.

**Section C17.2.2** addresses the potential impacts at the Darley Road civil and tunnel site (C4), including Hubert Street.

Further hydrological and hydraulic modelling based on the detailed design will be undertaken to determine the ability of the receiving drainage systems to effectively convey drainage discharges from the project once operational. The modelling must be undertaken in consultation with the relevant council(s). It will include, but not be limited to:

- Confirming the location, size and capacity of all receiving drainage systems affected by the operation of the project
- Assessing the potential impacts of drainage discharges from the project drainage systems on the receiving drainage systems
- Identifying all feasible and reasonable mitigation measures to be implemented where drainage from the project is predicted to adversely impact on the receiving drainage systems.

Management measures to minimise impacts on stormwater drainage systems will be implemented, and include measures such as:

- Where drainage systems are to be upgraded or replaced during the project, existing systems will be left in place and remain operational during the process wherever possible
- Runoff generated from project construction and operational facilities and discharges from water treatment facilities will be managed to mitigate risk of overloading the receiving drainage system
- Entry points to the stormwater used by or immediately downgradient from the project sites will be inspected regularly for blockages and cleaned as required to maintain performance.

These measures (see environmental management measures FD12 to FD14) are also outlined in **Chapter E1** (Environmental management measures).

Several studies were taken into account in the flooding and drainage assessment, including the Leichhardt Flood Study (Cardno 2014). The updated Leichhardt Floodplain Risk Management Study, published in May 2017 (Cardno 2017) which outlines various flood modification options (involving new or upgraded infrastructure), such as HC\_FM3 and HC\_FM4 mentioned in the submission, was not considered in the flooding and drainage assessment for the project as the document was not publicly available at the time that the EIS was being prepared. The assessment of flood behaviour (existing and future) in the EIS was therefore based on the flood study of 2014.

Consultation with the Inner West Council will be undertaken during future detailed design and construction phase planning to take into consideration specific flood modification options developed as part of the Leichhardt Floodplain Risk Management Study in the vicinity of the project footprint. It is noted that HC\_FM3 is not located in close proximity to the project footprint and therefore this proposed flood modification option is unlikely to be affected by the project.

## C17.2 Hydrology and flooding impacts

248 submitters raised concerns about impacts on hydrology and flooding during construction and operation. Refer to section 17.3 and 17.4 of the EIS and sections 5.2 and 6.2 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS for details of potential hydrology and flooding impacts during construction and operation.

### C17.2.1 General hydrology and flooding impacts

Submitters were concerned about flood impacts as a result of the project in general and in particular a submitter was concerned about the proposed route of WestConnex being through areas which are prone to flooding due to their geographic situation and poor infrastructure.

#### Response

Section 17.2 of the EIS included consideration of the existing project area, including catchments and watercourses, existing drainage and surface water management infrastructure, and existing flood behaviour. Flood modelling was undertaken to inform the development of the concept design and the assessment in the EIS. As part of this assessment, potential operational impacts were identified, including flooding risks in certain areas of the project footprint.

It is recognised that areas such as the Rozelle interchange would be partially located within the PMF flood extent, which has the potential to impact on the interchange and tunnel portals. Therefore, mitigation measures are required to prevent any floodwater ingress to the tunnels during these events. The design of the interchange would prevent flooding of the portals for events up to the PMF or the 100 year ARI event plus 0.5 metres freeboard (whichever is greater). Freeboard is a safety factor for greater protection against different types of flooding and is typically expressed in metres above a flood level for flood protection or control works.

Preventing floodwater ingress has the potential to displace floodwaters where the surface features block existing flow paths, or reduce available floodplain storage. This may result in potential impacts on surrounding properties. This is particularly the case at the Rozelle Rail Yards, as this area functions as a floodway and provides a significant amount of storage of floodwater in larger events such as the 100 year ARI event and PMF. To mitigate the potential flood risk for surrounding properties due to the proposed Rozelle interchange, a number of measures were incorporated into the concept design including:

- Provision of large transverse conveyance systems for the existing Easton Park drain and the catchment to the west passing through the Rozelle Rail Yards and under City West Link and discharging into Rozelle Bay
- Increase of the waterway area for the Whites Creek bridge structure under The Crescent.

Potential impacts at the Rozelle Rail Yards are discussed in **section C17.1.2**, and impacts in specific areas are discussed further in the following sub-sections.

Management measures that will be implemented to minimise risks of flooding are discussed in section **C17.5** and provided in full in **Chapter E1** (Environmental management measures). As part of the Flood Mitigation Strategy that will be prepared, limiting flooding characteristics to the following levels will be considered:

- A maximum increase in inundation time of one hour in a 100 year ARI rainfall event
- No inundation of floor levels which are currently not inundated in a 100 year ARI rainfall event
- A maximum increase of 10 millimetres in inundation at properties where floor levels are currently exceeded in a 100 year ARI rainfall event
- A maximum increase of 50 millimetres in inundation at properties where floor levels will not be exceeded in a 100 year ARI rainfall event

- Or else provide alternative flood mitigation solutions consistent with the intent of these limits.

The design will be developed in accordance with the criteria to minimise the potential for adverse flood level and behaviour changes in adjacent areas, due to water displaced during construction and operation.

A thorough assessment has been undertaken to predict the likely flooding impacts as a result of the project and further assessment will be carried out prior to construction. This is discussed further in **section C17.1.1** and **section C17.5**.

### **C17.2.2 Flooding impacts at Darley Road civil and tunnel site (C4)**

Submitters raised concerns regarding flooding impacts from the project as Darley Road and adjacent streets (such as Hubert Street) are located within a flood zone. Submitters noted that there have been ongoing issues with flooding in this area requiring remedial work. Specific concerns relating to flooding and the Darley Road civil and tunnel site (C4) include:

- The project will worsen the existing flooding risk, including to residents of Hubert Street
- The project creates an unacceptable risk of flooding and associated damage
- A major tunnelling site should not be permitted at the proposed location on Darley Road due to the potential flooding impacts
- The flood impact will be exacerbated by the disruption or blockage of existing drainage networks, which are risks identified in the EIS
- There is no detail as to how the issues and hazards associated with flooding at Darley Road will be managed or the potential impact on the area
- Other alternatives to the Darley Road site are not prone to flooding
- A drainage assessment and significant drainage works would be required to prevent exacerbation of the existing flooding problem in this area, which may be impacted by the proposed kerbside traffic lane on the southern side of Darley Road
- The flooding mitigation measures suggested for the Darley Road civil and tunnel site (C4) are inadequate.

### **Response**

The Darley Road civil and tunnel site (C4) is in the catchment of the Hawthorne Canal, on the fringe of the 100 year ARI flood extent. However, under existing circumstances, most of the site may be inundated in a PMF, particularly the western half, with predicted depths of up to 0.5 metres within the site and up to one metre around the intersection of Darley Road and Charles Street.

The EIS included an assessment of potential flooding impacts during construction at the Darley Road civil and tunnel site (C4) in section 17.3 of the EIS. The likelihood of flooding and a summary of the potential impacts on the Darley Road civil and tunnel site (C4) are provided in **Table C17-1**.

An assessment of potential flood impacts at the Darley Road site for events up to the PMF event was undertaken by assuming bunds/walls around most of the site in order to prevent floodwater ingress to the water treatment plant and substation.

**Table C17-1 Potential flooding impacts at the Darley Road civil and tunnel site (C4)**

Construction ancillary facility (C4) components	Existing flood risk (source, mechanisms)	Potential flood impacts
<ul style="list-style-type: none"> <li>Temporary access tunnel for construction</li> <li>Buildings and laydown area</li> <li>Parking</li> <li>Acoustic shed and spoil handling area</li> <li>Temporary substation</li> </ul>	<p>Hawthorne Canal catchment.</p> <p>Localised shallow flooding from 10 year ARI and 100 year ARI flowpath from the light rail line.</p> <p>Majority of the site may be inundated in a PMF with depths up to 0.5 metres at the western end of the site. (Refer to Hawthorne Canal Flood Study (2013), Leichhardt Flood Study (2014), AECOM flood modelling (2016)).</p>	<p>Potential displacement of water due to bunding of tunnel ramps to prevent floodwater ingress, as well as presence of temporary noise walls, buildings, hoarding, acoustic shed, stockpiles and other structures.</p>

Flood protection for vulnerable infrastructure, such as the Darley Road motorway operations complex (MOC1) need to be set at PMF flood level or 100 year ARI plus 0.5 metres, whichever is the greater. At the Darley Road site, there are locations where the 100 year ARI level plus 0.5 metres is greater than the PMF level.

It was found that the water exclusion strategy for the vulnerable infrastructure on the site (water treatment plant and substation) would lead to localised increases in flood levels on Darley Road and the Inner West Light Rail line in the vicinity of the light rail stop. Surrounding properties would not be adversely impacted in the events up to the 100 year ARI. In the PMF, minor flood impacts of up to 0.3 metres are estimated to the west of the site along Darley Road and Charles Street. Impacts on the Inner West Light Rail line would need to be managed in consultation with Transport for NSW by either providing a managed flow path through the site, while still protecting vulnerable infrastructure, and/or by providing additional piped drainage systems. This strategy would be further developed during detailed design when site layouts are finalised.

Peak flow velocities along Darley Road would be similar to existing conditions at 1.5 metres per second. Provisional flood hazards would also be similar to existing conditions.

Ingress of floodwater into the tunnel shafts or cut-and-cover excavations during construction would pose a risk to personal safety for those working in the tunnel. Where these facilities occur within the floodplain, such as at the Darley Road civil and tunnel site (C4), protection measures such as bunding or floodwater barriers would be provided to ensure floodwaters do not enter shafts or portals.

All construction works would have the potential to impact local flow paths. Potential circumstances leading to the disruption of existing flow paths, both of constructed drainage systems and the overland flow paths, are outlined in **section C17.1.1**. This includes sediment entering into drainage assets and causing blockages. These are typical impacts faced on most construction projects and would be addressed by adopting industry standard mitigation measures (see **Chapter E1** (Environmental management measures)).

Further hydrologic and hydraulic assessments will be carried out for all temporary project components (Darley Road civil and tunnel site (C4)) and permanent design features that have the potential to affect flood levels in the vicinity of the project footprint, such as the water treatment plant, substation and carpark area. The results of the assessment will inform the preparation of the Flood Mitigation Strategy as well as the design development of temporary and permanent works (see environmental management measure FD02 in **Chapter E1** (Environmental management measures)).

The assessment in the EIS determined that the application of mitigation and design measures, including further hydrologic and hydraulic assessment, would be sufficient to mitigate potential flooding impacts during construction at the Darley Road civil and tunnel site (C4). There is a low risk of flood in nearby properties on both Darley Road and Hubert Street due to the small volume of water that would be displaced at the site during construction (refer to section 17.4.1 of the EIS).

Potential flood impacts associated with the proposed operational infrastructure at the Darley Road motorway operations complex (MOC1) was also considered. There would be a low risk of flood impacts to nearby properties and infrastructure as the required overland flow paths and drainage systems can be incorporated into the final site layout during detailed design.

### C17.2.3 Flooding impacts near Whites Creek

A submitter was concerned that part of the project on the shores of Whites Creek would constrain the channel and could cause flooding further upstream in residential areas.

#### Response

The lower reach of Whites Creek is located to the south of the proposed Rozelle interchange and associated road upgrades. Proposed works in this area include the redevelopment of City West Link and The Crescent intersection, raising the level of sections of these roads, the construction of new culverts into Rozelle Bay, in addition to upgrade and widening of the existing bridge structure that crosses Whites Creek at The Crescent. The surface works at Rozelle would include widening and improvement works to the channel and bank of Whites Creek between the light rail bridge and Rozelle Bay at Annandale, to manage flooding and drainage for the surface road network. The Crescent would be realigned to the west of its current alignment, adjacent to the light rail corridor before crossing over Whites Creek.

Potential displacement of water by hoardings, buildings, stockpiles and other structures is recognised as a potential construction impact at The Crescent civil site (C6) where construction of Whites Creek bridge will occur. The need to maintain flood conveyance will be factored into construction planning associated with the new bridge structure over Whites Creek and a Flood Mitigation Strategy will be prepared and implemented considering all flood risks to the project and adjoining areas (see **Chapter E1** (Environmental management measures)).

No adverse operational flood impacts are anticipated along Whites Creek in events up to and including the 100 year ARI event, which is the generally accepted flood planning level. The concept design has been developed to minimise flood impacts up to the 100 year ARI event. In flood events greater than the 100 year ARI, some flood impacts are estimated along Whites Creek (up to 0.4 metres in the PMF). This is a result of the larger footprint of the proposed road embankments and wider bridge structure (compared to existing). Further widening of the Whites Creek channel is constrained by the existing light rail embankment and raising the road levels on City West Link would potentially raise flood levels and lead to greater flood impacts.

It is generally not physically, environmentally or economically feasible to provide measures to mitigate flood impacts in the PMF. It is also noted that under existing conditions significant flooding already occurs along Whites Creek in the PMF, with flood depths of greater than 2.5 metres. Therefore, a risk-based approach is generally adopted for flood events greater than the 100 year ARI. The changes in flood behaviour under PMF conditions would therefore be investigated further during detailed design to confirm potential impacts on critical infrastructure and address changes in flood hazard as a result of the project. Where peak levels in the 100 year ARI design flood are predicted to increase at any residential, commercial and/or industrial buildings due to construction or operation of the project, a floor level survey will be carried out and further refinements will be made to the temporary or permanent designs as required to minimise impacts.

### C17.2.4 Flooding impacts at the Pyrmont Bridge Road tunnel site (C9) at Camperdown

Submitters were concerned with the Pyrmont Bridge Road tunnel site as parts of it are prone to flooding.

#### Response

The existing flood behaviour at the Pyrmont Bridge Road tunnel site (C9) is described in section 17.2.3 of the EIS. The Pyrmont Bridge Road tunnel site (C9) is located near the top of the Johnstons Creek catchment. There is only a small catchment draining to the site, but the dense existing built environment means that a substantial amount of runoff is channelled along Bignell Lane, with water ponding at the low point along this lane. The local drainage system connects to the road drainage system on Pyrmont Bridge Road before draining towards Johnstons Creek.

The Leichhardt Flood Study identified flood depths generally between 0.1 metres and 0.2 metres along Bignell Lane and up to one metre at the low point towards the western end of Bignell Lane in the 100 year ARI event. Given the small catchment size, the relatively high flood depths are a result of the confined overland flow path.



During construction, the existing buildings on the site are proposed to be demolished and replaced with facilities, which would cover a smaller area. This would allow for less concentrated overland flows paths, greater opportunity for infiltration and would also reduce the potential to displace water and impact surrounding properties. With appropriate site drainage to manage runoff at the Pymont Bridge Road tunnel site (C9), the risk of flooding to the site from overland flow is considered to be low. Measures would include a combination of temporary piped drainage, open drains and swales, overland flow paths and sedimentation and erosion control measures.

No permanent operational infrastructure is proposed at the Pymont Bridge Road tunnel site (C9).

## C17.3 Drainage

37 submitters raised concerns about impacts on drainage during construction. Refer to section 17.3 of the EIS and section 5.2 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS for details of potential drainage impacts during construction.

### C17.3.1 Impacts of the project on existing drainage infrastructure

Submitters raised concerns about the impacts on existing drainage infrastructure. Specific concerns related to:

- The project will worsen the condition of the existing stormwater junction at Leichhardt, which has a history of incidents. A submitter requested that in the case of an emergency, a specialist should attend the problem within 24 hours and there should be collaboration with Sydney Water in this regard
- The proposed kerbside traffic lane on the southern side of Darley Road would conflict with the existing stormwater drainage inlet structures
- Impacts from flooding which, amongst other things, may disrupt drainage systems. There is no detail in the EIS as to how these issues will be managed at Darley Road and their potential impact on the area
- Concerns regarding the high flood hazard near Darley Road which could result in disruption to existing drainage. This is not an appropriate dive site and these issues have not been properly assessed
- Impacts of tunnelling on the stormwater drainage pipe underneath Denison Street and Easton Park. Damage to this pipe could cause damage to properties in times of heavy rainfall, resulting in unintended flood damage around Albert, Foucart, Cheltenham and Denison streets
- Historical drainage works (old streams and storm drains) at Newtown and Annandale would not be able to contend with the scale of tunnel works.

### Response

The EIS discusses existing sources of flooding to the west of the Darley Road civil and tunnel site (C4) (the junction of Darley Road and Canal Road/Charles Street) at Leichhardt. Flooding impacts at the Darley Road civil and tunnel site at Leichhardt are considered further in **section C17.2.2**.

Construction would have the potential to impact existing drainage paths and drainage infrastructure. Disruption of existing drainage systems could occur as a result of sediment entering drainage assets and causing blockages, overloading the capacity of the local drainage system due to the generation of additional runoff or interruption of overland flow paths by installation of temporary construction ancillary facilities.

Access into the Darley Road construction ancillary facility (see **section C8.2.2** for updated traffic (including access) impacts regarding the site) is not expected to impact on the existing drain along the south side of Darley Road. This would be confirmed during detailed design.

There is limited existing drainage infrastructure at many of the sites that would be impacted or need to be modified due to the M4-M5 Link project. For the operational sites, the surface water runoff would be managed to minimise flood impacts on adjoining properties. Where the operational sites propose to connect directly into existing drainage infrastructure, flow rates from the sites would match existing flow rates where possible so as not to overload the existing drainage system or cause adverse flood impacts on adjoining properties. The assessment of impacts on drainage infrastructure is discussed further in **section C17.1.1**.

Where drainage systems are to be upgraded or replaced during the project, existing systems will be left in place and remain operational during the process wherever possible, and runoff generated from project construction and operational facilities will be managed to mitigate risk of overloading the receiving drainage system. Further hydrological and hydraulic modelling based on the detailed design will be undertaken to determine the ability of the receiving drainage systems to effectively convey drainage discharges from the project once operational and upgrades made where required.

Easton Park drain conveys runoff from the suburb of Rozelle and runs between Denison Street adjacent to Easton Park and Rozelle Bay. It is proposed to divert the Easton Park drain at Rozelle into a new channel to convey flows through the Rozelle Rail Yards. Once these diversions works are complete, the former Easton Park drain would be decommissioned. The new channel for Easton Park drain and the other proposed channels within the Rozelle Rail Yards will be larger than the current drains and include a 'low-flow' channel to carry flows of around a two year ARI event, with a defined landscaped overland flow path sized to convey larger flows up to the 100 year ARI. Given the artificial nature of the existing waterway, the decommissioning of the existing drain would be unlikely to impact on natural processes. Around the Easton Park drain, the installation of more efficient drainage channels as part of the project would reduce flood levels and reduce inundation times, therefore, it is not expected that any flood impacts in the areas around the Easton Park drain, such as Albert, Foucart, Cheltenham and Denison streets.

Tunnelling in the vicinity of the Easton Park drain is expected to range between approximately 15 and 23 metres in depth (noting that there could be multiple intersecting tunnels associated with proposed future projects). The associated ground movement that would occur due to settlement may pose the potential to affect Easton Park drain. Potential impacts on infrastructure due to ground settlement from tunnelling works have been assessed in sections 19.3.8 and section 12.3.4 of the EIS. See **section C19.1** and **section C12.5** for further details. Interface agreements will be entered into with the owners of infrastructure and utility services likely to be impacted by construction of the project. The agreements will likely identify:

- Minimum separation distances and appropriate settlement criteria for utility infrastructure
- Settlement monitoring requirements during construction
- Contingency actions in the event that settlement limits are exceeded.

A Flood Mitigation Strategy will be prepared by a suitably qualified and experienced person in consultation with relevant agencies, including the State Emergency Services and Sydney Water and local councils. A flood review report will also be prepared after the first defined flood event affecting the project works for any of the following flood magnitudes – the five year ARI event, 20 year ARI event or 100 year ARI event - to assess the actual flood impact against those predicted in the design reports or as otherwise altered by the Flood Mitigation Strategy. See **Chapter E1** (Environmental mitigation measures) for further details of these measures.

## C17.4 Cumulative flooding and drainage impacts

### C17.4.1 Cumulative flooding and drainage impacts

One submitter raised concerns about cumulative flooding and drainage impacts of the project. Refer to section 26.4 of the EIS for an assessment of cumulative flooding and drainage impacts.

A submitter was concerned about the cumulative flooding and drainage impacts of the project. The specific concern was that key issues involving flooding and drainage for the King Street Gateway, Alexandria to Moore Park Connectivity Upgrade, Parramatta Road pinch point project, Parramatta Road bus rapid transit and future light rail, and the Johnstons Creek and Iron Cove Creek naturalisation works, should be assessed in the EIS.

## Response

Cumulative flooding and drainage impacts are addressed in section 26.4.10 of the EIS and Chapter 7 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS. The projects mentioned in the submissions were all considered however were not included in the cumulative impact assessment, as explained in Appendix C (Cumulative impact assessment methodology) of the EIS. Reasons for this include that the design of the projects are at an early stage, there was insufficient public information available and the impacts and timing of the projects were not yet known at the time of the EIS.

An assessment of cumulative impacts associated with other projects in the vicinity of the M4-M5 Link, in particular other WestConnex component projects, such as the M4 East and New M5 projects, has been carried out. The assessment also considered other relevant projects such as the CBD and South East Light Rail maintenance depot at Rozelle and proposed future Western Harbour Tunnel and Beaches Link program of works. The projects currently under construction all incorporate surface water and flood management measures during construction and operation to prevent adverse impacts to the common receiving receptors and adjoining properties.

Other projects that are still in the early planning stages, such as those mentioned in the submission, will be required to undertake their own cumulative impact assessment and likely be required to implement similar mitigation measures in accordance with legislative requirements to prevent adverse cumulative impacts. There is unlikely to be significant impacts on common sensitive receiving environments downstream provided controls are implemented, maintained and monitored.

## C17.5 Flooding and drainage environmental management measures

### C17.5.1 Flooding and drainage environmental management measures

150 submitters raised concerns about the environmental management measures for flooding and drainage impacts. See **Chapter E1** (Environmental management measures) for further details on the flooding and drainage environmental management measures.

Submitters raised concerns about the flooding and drainage environmental management measures. Specific concerns related to:

- The flooding mitigation measures are inadequate
- There are no details of how flooding issues would be managed at Darley Road
- The project should be required to fund Inner West Council's flood mitigation options at Darley Road to compensate for disruption and negative impacts to residents in the area
- Provision of water sensitive urban design at redevelopment sites like the Rozelle Rail Yards recreation area should be a priority, to reduce overland flow and flooding.

A submitter supported the measures to minimise flooding and manage discharge of sediment into Rozelle Bay.

## Response

Several management measures have been developed based on the assessment of potential flooding and drainage impacts assessed in the EIS (see **Chapter E1** (Environmental management measures)). These include prescriptive commitments to inform the detailed design as well as commitments to develop strategies based on further assessment that will be carried out prior to the commencement of construction. These include:

- A Flood Mitigation Strategy will be prepared by a suitably qualified and experienced person in consultation with directly affected landowners, Department of Primary Industries-Water, State Emergency Services (SES), Sydney Water and the relevant local councils (see environmental management measure FD01). As discussed in **section C17.1.3**, consultation with councils will consider council plans such as the flood modification options in the Leichhardt Floodplain Risk Management Study

- Hydrologic and hydraulic assessments will be carried out for all temporary project components (including all ancillary facilities) and permanent design features that have the potential to affect flood levels in the vicinity of the project (see environmental management measure FD02), to inform the development of the Flood Mitigation Strategy
- A flood review report will be prepared after the first defined flood event affecting the project works for any of the following flood magnitudes – the five year ARI event, 20 year ARI event and 100 year ARI event - to assess the actual flood impact against those predicted in the design reports or as otherwise altered by the Flood Mitigation Strategy (see environmental management measure FD17)
- Measures developed to manage potential flood impacts, as identified in the Flood Mitigation Strategy, will be incorporated into the design of temporary and permanent project components and construction and operational management systems as relevant (see environmental management measure FD03)
- Bridge crossings over existing waterways and proposed drainage channels will be designed for the underside of bridge structure to be above the peak 100 year ARI design flood level (see environmental management measure FD05)
- Where peak levels in the 100 year ARI design flood are predicted to increase at any residential, commercial and/or industrial buildings due to construction or operation of the project, a floor level survey will be carried out. If the survey indicates flood impacts in excess of the limits set in FD01, further refinements will be made to the temporary or permanent designs as required to minimise impacts (see environmental management measure FD16).

Consideration would be given to Water Sensitive Urban Design (WSUD) measures such as wetlands, swales and bioretention facilities where feasible (including the proposed constructed wetland and bioretention systems at Rozelle).

For the full list of environmental management measures, see **Chapter E1** (Environment management measures). It is considered that these measures will minimise the risk of impacts on flooding behaviour or drainage systems as a result of the project. These mitigation measures will be funded by the project.

The submission supporting the measures to minimise flooding and manage discharge of sediment is noted.

## C18 Biodiversity

This chapter addresses issues raised in community submissions associated with the biodiversity assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 18 (Biodiversity) and Appendix S (Technical working paper: Biodiversity) of the EIS for further detail on the biodiversity assessment.

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## C18.1 Level and quality of assessment

73 submitters raised concerns about the level and quality of the biodiversity assessment undertaken. Refer to section 18.1 of the EIS and Appendix S (Technical working paper: Biodiversity) for details of the biodiversity assessment undertaken.

### C18.1.1 Level and quality of biodiversity assessment

Submitters have raised concerns regarding the level and quality of the biodiversity impact assessment.

Specific concerns include:

- The EIS did not fulfil its obligations to the Secretary's Environmental Assessment Requirements (SEARs) for assessing the impacts on biodiversity, especially regarding the risk to the vulnerable and threatened species, the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*). Submitter is concerned that the impact assessment of the project on this species was inadequate
- The EIS stated that investigations would be undertaken to confirm whether the Victoria Road bridge is a potential roost site for microbats. The investigation of this issue is critical and should influence the design of the Victoria Road bridge so as to minimise impacts on the microbats
- The EIS made an unsatisfactory assessment of Buruwan Park in regards to its value as a nature corridor for wildlife
- The EIS did not consider the impacts of the project introducing *Phytophthora Cinnamomi* into the study area or how this would be managed

One submitter noted that they were pleased with the arborist assessment.

### Response

The *NSW Biodiversity Offsets Policy for Major Projects* (NSW Biodiversity Offsets Policy) was developed by the NSW Office of Environment and Heritage (OEH) and introduced in 2014. As part of a major project application under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act), a proponent is required to prepare an EIS that addresses the SEARs provided by the NSW Department of Planning and Environment (DP&E) for the project. The SEARs for the biodiversity assessment provided by DP&E have been fully addressed (see discussion below and refer to Appendix B (Secretary's Environmental Assessment Requirements checklist) and section 1.3 of Appendix S (Technical working paper: Biodiversity) of the EIS).

Under the NSW Biodiversity Offsets Policy, the SEARs required the Framework for Biodiversity Assessment (FBA) to be applied to assess impacts on biodiversity in accordance with section 142B(1)(c) of the *Threatened Species Conservation Act 1995* (NSW) (TSC Act). The FBA outlines the assessment methodology to quantify and describe biodiversity values of a development site and the biodiversity offsets required for any unavoidable impacts. The SEARs also required any impacts on biodiversity values not covered by the FBA to be assessed. Impacts on species, populations and ecological communities that require further consideration are identified through consultation with the OEH (none of which were identified). The SEARs required that species specific field surveys be undertaken for those identified species and in accordance with the survey requirements specified by the OEH. In addition, the biodiversity assessment was undertaken in accordance with the survey guidelines specified in the SEARs and other relevant guidelines listed in section 1.4.2 of Appendix S (Technical working paper: Biodiversity) of the EIS.

The key components of the biodiversity assessment included:

- Desktop analysis to describe the existing environment and landscape features of the study area and to identify threatened terrestrial and aquatic values potentially affected by the project
- Field surveys to identify the biodiversity values of the project footprint and to determine the likelihood of threatened species and their habitats occurring in the project footprint or being affected by the project
- Qualitative assessment of potential impacts of the project on biodiversity values, including threatened species
- An aboriginal impact assessment, including a visual tree assessment for trees potentially affected by the project.

The EP&A Act does not require assessments of significance (seven part tests) under the TSC Act to be undertaken to determine if a Species Impact Statement is required because all major projects are automatically subject to comprehensive standardised assessment using the FBA. The *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) requires proponents to determine whether significant impacts are likely on all EPBC listed threatened species and ecological communities in accordance with national guidelines.

The only EPBC listed threatened species considered likely to be impacted by the project is the Grey-headed Flying-fox. An assessment in accordance with the *Commonwealth Significant Impact Guidelines* (Australian Government 2013) was undertaken for the Grey-headed Flying-fox and concluded that a significant impact to the Grey-headed Flying-fox is unlikely to occur as a result of the works as the species is highly mobile (refer to Annexure E of Appendix S (Technical working paper: Biodiversity) of the EIS).

The Eastern Bentwing-bat is not listed under the EPBC Act and therefore an assessment in accordance with the *Commonwealth Significant Impact Guidelines* (Australian Government 2013) was not undertaken. Notwithstanding this, the EIS assessed the potential impacts of the project on the Eastern Bentwing-bat and proposed environmental management measures to manage these impacts (see environmental management measure B2 in **Chapter E1** (Environmental management measures)). The EIS therefore went beyond the requirements of the OEH and the SEARs in its assessment of the Eastern Bentwing-bat. Refer to sections 5 and 9 and Annexure A (Table A.4) of Appendix S (Technical working paper: Biodiversity) of the EIS for the full discussion related to the Eastern Bentwing-bat. A response to concerns regarding the potential impacts of the project on the Eastern Bentwing-bat is provided in **section C18.3.1**.

Buruwan Park was considered in the biodiversity assessment through assessment of urban exotic and native vegetation cover, for which Buruwan Park is mapped (refer to Figure 4.3 in Appendix S (Technical working paper: Biodiversity) of the EIS). While the assessment acknowledges that in some areas the urban exotic and native cover provides feed trees and foraging habitat, the works proposed to be undertaken at Buruwan Park are unlikely to have a significant and long-term impact to wildlife nature corridors (see **section C18.3.1**).

Potential impacts of the project introducing *Phytophthora cinnamomi* (Phytophthora) into the study area was considered in section 9.4.9 of Appendix S (Technical working paper: Biodiversity) of the EIS). Phytophthora is a soil-borne fungus capable of causing tree death (dieback) by attacking the roots of native plants. Spores can be spread over large areas by water, vehicle and machinery movement as well as human and animal movement. 'Dieback caused by Phytophthora' is a listed key threatening process under both the EPBC Act and the TSC Act (OEH 2016d).

No sign of Phytophthora infection was identified during the field survey or literature search undertaken as part of the EIS. In addition, due to the highly urban context of the study area, it is unlikely that Phytophthora is present within the study area (refer to section 9.4.9 of Appendix S (Technical working paper: Biodiversity) of the EIS).

Prior to exhibition of the EIS, the biodiversity assessment was submitted to DP&E and relevant government agencies for an adequacy review and was considered to be adequate in meeting the SEARs.

The submitter's satisfaction with the arboricultural impact assessment is noted.

## C18.2 Terrestrial flora impacts

Eight submitters raised concerns about the potential impacts on terrestrial flora. Refer to section 18.3 of the EIS for details of potential impacts on terrestrial flora.

### C18.2.1 Reduction in existing vegetation

Submitters raised concerns over the loss of vegetation along the route (including trees) affecting biodiversity within the project footprint and leading to terrestrial flora impacts.

## Response

The project is located in a highly urbanised environment and much of the area is entirely modified and disturbed and contains exotic species, weeds and planted native or non-indigenous species. It is characterised by urban parks, landscaped road verges, disused rail infrastructure, compacted soils, introduced fill, existing residential, commercial and light industrial development and other infrastructure. Vegetation in the project footprint is generally considered to be in poor ecological condition, with little ecological value and unlikely to have any native resilience or recovery potential. No native vegetation communities, known as Plant Community Types (as defined by the FBA), threatened ecological communities or threatened flora species have been identified as occurring or having the potential to occur within the project footprint. As such, the project would not involve the removal of any threatened flora species listed under the TSC Act or EPBC Act.

The Rozelle Rail Yards site management works, which is a separate project currently being undertaken by NSW Roads and Maritime Services (Roads and Maritime), involves the removal of all rail and rail related infrastructure, as well as vegetation, buildings and stockpiles from the site, to allow existing issues such as waste and noxious weeds to be appropriately managed. The impacts of these works, including the removal of vegetation from the site, were assessed through a Review of Environmental Factors (REF) under Part 5 of the EP&A Act and EPBC Act. Trees to be removed from the Rozelle Rail Yards as part of the separate M4-M5 Link project are shown in Map 4 and Map 5 of the Arboricultural Impact Assessment report, included as Attachment A of Annexure G of Appendix S (Technical working paper: Biodiversity) of the EIS.

Notwithstanding this, as many trees as possible will be retained during construction. In the event that tree removal cannot be avoided, a tree replacement strategy will be prepared. Replacement trees will be included in the UDLPs to be developed and implemented for the project (see environmental management measures B6 and OB9 in **Chapter E1** (Environmental management measures)). The project would deliver up to 10 hectares of open space at the Rozelle Rail Yards, which would provide a significant opportunity for replacement tree planting.

## C18.3 Terrestrial fauna impacts

227 submitters raised concerns about the potential impacts on terrestrial fauna. Refer to section 18.3 of the EIS for details of potential impacts on terrestrial fauna.

### C18.3.1 Impacts to fauna

Submitters expressed concern that the project would impact on native fauna (not considered threatened). A number of submitters raised particular reference to the following:

- Loss of 'biodiversity hotspots'
- Impacts to wildlife present along Whites Creek and Buruwan Park as a result of loss of trees
- Impact to birds due to loss of trees, particularly the loss of small native bird habitat at the Rozelle Rail Yards including the Superb Fairy-wrens, Tawny Frogmouth, Eastern Yellow Robin and Grey Fantail
- The Rozelle Rail Yards is one of the only areas at Annandale/Glebe that has suitable Superb Fairy-wrens habitat
- Impacts on native fauna from air pollution.

## Response

As described in **section C18.2.1**, the project is located in a highly urbanised and modified environment with the vegetation in the project footprint being of low ecological value. There would be no direct impacts to native vegetation communities (as defined by the FBA) due to the project; therefore potential threatened fauna are limited to those species that utilise urban environments and man-made structures.

The project was designed with the aim of avoiding impacts to potential habitat, where feasible. However, the clearing of exotic and non-native vegetation which could provide potential habitat for some fauna species would be unavoidable due to the required surface footprint of the project. Notwithstanding, given the highly urbanised context and the lack of existing remnant vegetation within the study area, the project is not likely to result in the loss of 'biodiversity hotspots'.

The removal of trees around Buruwan Park and Whites Creeks would not have a significant and long term impact on wildlife, given that:

- Other vegetation within the locality (ie within 10 kilometres) provides foraging habitat and could also provide a nature corridor for wildlife, such as vegetation associated with the Cooks River to Iron Cove GreenWay corridor, drainage lines (eg riparian corridor at Whites Creek), urban parks (eg Easton Park), the light rail corridor, roadside vegetation and vegetated backyards
- The loss of Buruwan Park and trees adjacent to Whites Creek would be offset by the 10 hectares of open space to be created at the Rozelle Rail Yards
- Compensatory planting would be carried out where retention of trees is not possible and would seek to use opportunities presented by the new open space at the Rozelle Rail Yards. A tree replacement strategy and species recommendations for the landscape design, including foraging trees for the Grey-headed Flying-fox, will be included in the relevant Urban Design and Landscape Plans (UDLPs) (see environmental management measure OB9 in **Chapter E1** (Environmental management measures))
- Pre-disturbance inspection requirements to identify features of biodiversity conservation significance at Buruwan Park and adjacent to Whites Creek will be included in the CFFMP, as required by environmental management measure B1 (see **Chapter E1** (Environmental management measures)).

As described in **section C18.2.1**, the majority of vegetation to be removed from the Rozelle Rail Yards will be undertaken as part of the Rozelle Rail Yards site management works. Birds within the study area, including the Superb Fairy-wrens at Rozelle Rail Yards are mobile and have the ability to move on to similar habitat in the locality. In addition, Roads and Maritime is working with Inner West Council to support biodiversity enhancement projects within the local government area as part of the Rozelle Rail Yards site management works, which may compensate for some of the loss of foraging habitat at Rozelle Rail Yards. The UDLPs will guide the compensatory planting for trees to be removed by the project (see environmental management measure OB9 in **Chapter E1** (Environmental management measures)).

As discussed in section 9.7 of the EIS, most of the project footprint would experience no change or a small improvement in air quality as a result of the project. Impacts on native fauna from air pollution are therefore unlikely to result from the project.

### C18.3.2 Impacts to threatened fauna

Submitters raised concerns regarding the potential for the project to impact native terrestrial fauna and/or endangered or threatened species, including the following:

- Microbats (including the Eastern Bentwing-bat and Yellow-bellied Sheath-tail-bat)
- Impact to Koala population from the loss of habitat.

### Response

An assessment of the potential impact to threatened fauna and loss of habitat was undertaken as part of the biodiversity assessment for the EIS (refer to Appendix S (Technical working paper: Biodiversity) of the EIS). The assessment concluded that a significant impact to threatened fauna as a result of the project is unlikely. The area in which the project is located is generally characterised as a highly urbanised environment. No remnant native vegetation occurs within the study area, as such, habitat for native species within the study area is limited to non-remnant native and exotic vegetation (such as planted street trees and exotic species). These landscape and vegetation characteristics generally do not provide preferred habitat for threatened fauna. Further, alternative non-preferred habitats are available in the locality such as cavities under bridges where the Eastern Bentwing-bat can shelter and exotic palm trees which the Grey-headed Flying-fox can feed on.

The Eastern Bentwing-bat was recorded during targeted surveys at the Rozelle Rail Yards and may be using the cavities of the Victoria Road bridge as a potential roosting (non-breeding) site, or as a flyway. However, no bats were observed within the cavities under the bridge during visual inspections carried out to inform the EIS. Section 18.3.1 of the EIS notes that no maternity colonies for the Eastern Bentwing-bat are known within the Sydney Metropolitan Catchment Management Authority area (OEH 2016a). This species breeds at maternal roosting sites within limestone caves in areas such as the Blue Mountains and migrates to Sydney and other areas for winter, returning to maternal roosts in summer.

The Victoria Road bridge is proposed to be replaced as part of the works to enable the M4 East/Iron Cove Link to Anzac Bridge exit ramp and the new east-west pedestrian and cyclist connection to be accommodated beneath (refer to section 5.6.5 of the EIS). If the bridge is being used as a roosting site by the Eastern Bentwing-bat, the roosting habitat would be lost during bridge demolition.

If present, the Eastern Bentwing-bat would be most at risk from indirect impacts associated with noise, vibration, light and dust during construction works for the Rozelle interchange. However, separation distances from these activities to the Victoria Road bridge would minimise these impacts. Further, as the Eastern Bentwing-bat is a highly mobile species, individuals are likely to actively avoid the area during construction and use alternative roosting sites in the locality (when they are not utilising material roosting sites outside of the metropolitan area).

Prior to the commencement of bridge demolition, an additional inspection will be carried out by a suitably qualified and experienced ecologist to confirm the presence of roosting microbats. If roosting microbats are identified, measures to manage potential impacts will be developed in consultation with an appropriate microbat expert and included in the Construction Flora and Fauna Management Plan (CFFMP) prior to the commencement of any work with the potential to disturb the roosting locations (as confirmed by the microbat expert) (see environmental management measure B2 in **Chapter E1** (Environmental management measures)).

Noise, light and/or vibration impacts on the Eastern Bentwing-bat may occur during operation of the new road infrastructure due to increased surface road traffic. However, the Eastern Bentwing-bat is a highly mobile species and the types of indirect impacts anticipated are already widespread within the highly urbanised study area. Given the presence of heavily trafficked roads in the vicinity, the species is likely to be somewhat resilient to noise, light and vibration impacts associated with increased traffic.

The Yellow-bellied Sheath-tail-bat was tentatively recorded (as a possible call) during targeted surveys within the Rozelle Rail Yards. Being a primarily tree dwelling bat, the presence of the Yellow-bellied Sheath-tail-bat in the project footprint is likely limited to foraging habitat. Construction noise, vibration, light and dust are not expected to have a significant impact on the Yellow-bellied Sheath-tail-bat as it is considered likely that this species only visits this area for foraging habitat and does not rely on this area as a roosting site.

Habitat requirements for the Koala includes both wet and dry Eucalypt forest and woodland that contains canopy cover of approximately 10 to 70 per cent, with acceptable Eucalypt food trees. This habitat is absent within the study area and therefore there is no likelihood of occurrence of the Koala within the study area (refer to Annexure A of Appendix S (Technical working paper: Biodiversity) of the EIS).

Notwithstanding the unlikely impact to threatened fauna, environmental management measures have been identified to ensure the project does not impact threatened fauna (see **Chapter E1** (Environmental management measures)). In summary, these include:

- A CFFMP will be developed and implemented during construction (environmental management measure B1). The CFFMP will include the following related to impacts on threatened fauna:
  - Pre-disturbance inspection requirements to identify features of biodiversity conservation significance and select appropriate management measures and environmental controls
  - Management measures and environmental controls to be implemented before and during construction including an unexpected threatened species finds procedure
- Prior to the commencement of any works associated with the modification of the Victoria Road bridge, an inspection will be carried out by a suitably qualified and experienced ecologist to confirm the presence of roosting microbats. If roosting microbats are identified, measures to manage potential impacts will be developed in consultation with an appropriate microbat expert and included in the CFFMP prior to the commencement of any work with the potential to disturb the roosting locations (as confirmed by the microbat expert) (environmental management measure B2)
- The UDLPs will include compensatory planting for trees removed by the project. The plans will include species recommendations for the landscape design to consider, including foraging trees for the Grey-headed Flying-fox (environmental management measure OB9).



## C18.4 Impacts on aquatic biodiversity

Three submitters raised concerns about impacts on aquatic biodiversity. Refer to section 18.3 of the EIS for details on potential loss of aquatic biodiversity.

### C18.4.1 Impacts to aquatic biodiversity

Submitters raised concerns regarding the potential for the project to impact aquatic ecology including impacts to aquatic ecosystems located near the project footprint. In particular, submitters were concerned that tunnelling works near or underneath Whites Creek and Johnstons Creek may have impacts on these creeks and associated aquatic ecosystems, and have flow-on impacts on the biodiversity of Sydney Harbour.

#### Response

An assessment of impacts on aquatic biodiversity resulting from the project was undertaken as part of the EIS (refer to section 9.4.1 of Appendix S (Technical working paper: Biodiversity) of the EIS). The waterways located within the study area are highly modified environments, consisting of concrete lined walls, with limited ecological and aquatic habitat value. Riparian vegetation within the study area largely consists of planted and landscaped native and exotic species that does not contribute significantly to the ecological functioning of the waterways. The project would not directly impact marine vegetation or aquatic habitat of threatened species, communities or populations.

No impacts on aquatic biodiversity due to water quality are likely to occur as a result of the project. Appendix Q (Technical working paper: Surface water and flooding) of the EIS concluded that no adverse surface water quality impacts are anticipated with implementation of appropriate management measures as part of the project and the residual risk to the environment would be low.

There would be no net loss of aquatic habitat in the medium to long term as a result of the project. Accordingly, the project could meet the aquatic ecology conservation requirements of the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005* under the EP&A Act. Riparian vegetation may need to be removed at Whites Creek however new riparian vegetation would be established during the Whites Creek naturalisation works by Sydney Water. No direct impacts would occur to Dobroyd Canal (Iron Cove Creek), Hawthorne Canal, Iron Cove estuary, Johnstons Creek and Alexandra Canal as the surface works either lie outside of the riparian buffer or is on developed land.

In the short term during construction, indirect impacts to waterways and aquatic habitat could occur if adequate controls are not in place, specifically to address ground disturbance and sediment runoff during construction, water discharged from tunnel dewatering and high velocity runoff/discharge. Uncontrolled runoff or discharge can influence the physico-chemical properties of waterways, such as water temperature, turbidity, pH, salinity and alkalinity and concentration of nutrients and toxicants within waterways. However, the receiving waterways are currently highly disturbed ecosystems with limited ecological habitat (due to human impact). Management measures would be implemented to minimise disturbance to waterways and ensure discharges are of suitable quality. Impacts to ambient water quality within Sydney Harbour were assessed to be negligible, with any localised minor impacts occurring within close proximity to the disturbance or discharge point.

During operation, the project would generally reduce the mean annual stormwater pollutant loads being discharged to receiving waterways when compared to the existing conditions.

The mainline tunnel is proposed to be constructed below Whites Creek at Annandale at a depth of around 39 metres below ground level and below Johnstons Creek near Parramatta Road at Stanmore at a depth of around 28 metres below ground level. In both cases the tunnels would be located in competent bedrock (Hawkesbury Sandstone) and predicted ground movement (settlement) is expected to be less than 20 millimetres, which would be consistent with the most stringent maximum settlement criteria proposed for the project (refer to section 12.3.4 of the EIS). Tunnelling beneath these locations is not anticipated to result in significant morphological changes for these watercourses that could impact on water quality and flows.

Both Whites Creek and Johnstons Creek are concrete lined, thereby limiting the hydraulic connection between surface water and groundwater. Seepage to groundwater is limited to water flowing through fractures within the concrete lining, and along unlined stretches or naturalised areas. Therefore the presence of tunnels below the creeks is unlikely to result in any significant changes to flows in these watercourses.

The upgrade of the existing bridge structure over Whites Creek would shade the aquatic habitat within the concrete channel of Whites Creek, creating less favourable conditions for barnacles and oysters attached to the wall. The increased bridge width is unlikely to act as a behavioural barrier to fish passage and is considered to have adequate clearance (about two to three metres above water), depth (about one to two metres) and width (about nine metres) to encourage fish movement.

It is considered unlikely that there would be valuable or specific aquatic habitat for threatened aquatic/estuarine species (including fish, sharks, rays, aquatic mammals and birds), populations or communities listed under the FM Act, TSC Act or EPBC Act present within the study area. As Whites Creek is concrete lined, it is not considered key fish habitat and does not receive a waterway crossing classification for fish passage in accordance with the *Fisheries Policy and Guidelines for Fish Habitat and Conservation Management – update 2013* (Fairfull 2013). It is possible some species may opportunistically pass near the study area at Whites Creek, given the connectivity to the broader harbour and coastal habitats, but those species are unlikely to depend on the habitat within Whites Creek. Similarly, Johnston Creek is concrete lined and does not have any valuable aquatic habitat mapped by DPI-Fisheries and the Sydney Harbour – Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters and Wetlands Protection Map (SHFWDGP).

During construction, the proposed works in Whites Creek, and adjacent to Rozelle Bay, may temporarily obstruct fish passage. This impact would be minimal given the poor creek habitat in Whites Creek and Rozelle Bay intertidal and subtidal area. Fish passage would be restored during operation.

Appropriate fish passage will be provided for crossings of fish habitat streams at Whites Creek. Erosion and sedimentation in adjacent aquatic environments to the project will be minimised through the implementation of site-specific Erosion and Sediment Control Plans (ESCPs) which would contain measures to stabilise all surfaces disturbed as a result of the project (see environmental management measures B4, SW03 and SW06 in **Chapter E1** (Environmental management measures)).

As part of the project, an upgraded culvert would be provided to discharge flows into Rozelle Bay from Easton Park, requiring the removal of about 27 metres of intertidal rock revetment wall. Environmental management measure OSW17 requires that new discharge outlets be designed with appropriate energy dissipation and scour protection measures as required to minimise the potential for sediment disturbance and resuspension in receiving waters (see **Chapter E1** (Environmental management measures)). Therefore, a rock spillway and scour protection rock apron or similar would replace the existing rock wall, providing a similar scale and type of intertidal habitat. This intertidal habitat is in poor condition and its modification would not result in a net loss of key fish habitat. No direct impacts would occur to Johnstons Creek.

#### **C18.4.2 Impacts to ecological health of waterways from contaminated stormwater runoff**

Submitters raised concerns that contaminated stormwater runoff would endanger the ecological health of the Easton Park drain, Whites Creek and ultimately Rozelle Bay.

#### **Response**

An assessment of impacts on aquatic biodiversity resulting from the project was undertaken as part of the EIS (refer to section 9.4.1 of Appendix S (Technical working paper: Biodiversity) of the EIS). As discussed in **section C18.4.1**, the waterways located within the study area are highly modified environments, consisting of concrete lined walls, with limited ecological and aquatic habitat value. An assessment of existing surface water quality indicated water quality issues at Easton Park drain, Whites Creek and Rozelle Bay including elevated levels of metals, and occasional exceedances of pH and turbidity guideline levels (refer to section 4.5 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS).

Potential impacts on receiving waterways such as Rozelle Bay, from contaminated stormwater runoff, have been considered. The potential impacts will be managed through implementation of a Construction Surface Water Management Plan which will consider the potential for contaminated soils and surface water runoff and propose appropriate management measures to minimise the potential water quality impacts in receiving waters such as Rozelle Bay (see environmental management measures SW01 and SW02 in **Chapter E1** (Environmental management measures)). These measures will be implemented to protect nearby waterways at all construction ancillary facilities where surface works would be carried out. Discharges from the project during construction will be regulated by the NSW Environment Protection Authority through the project's Environment Protection Licence.

During operation of the project there is potential for increased stormwater runoff and associated increases in pollutant loading from roads. Rates of generation of pollutants from road surfaces (within above ground areas) were estimated from Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling (refer to section 6.3 of Appendix Q (Technical working paper: Surface water and flooding) of the EIS). Stormwater pollutant loads generated by the project would be controlled by a stormwater quality treatment system, designed in accordance with the project stormwater quality objectives developed with consideration to the Sydney Harbour and Parramatta River catchment water quality objectives. MUSIC modelling was undertaken to assess the impact of the project and performance of the stormwater quality treatment measures. The modelling results for the main locations where water would be discharged (Rozelle Bay, Iron Cove, White Bay and Whites Creek) and for the project as a whole indicate that the project would generally reduce the mean annual stormwater pollutant loads being discharged to the five receiving waterways, when compared to the existing conditions.

## C18.5 Groundwater dependent ecosystems

One submitter raised concerns about groundwater dependent ecosystems. Refer to section 18.3 of the EIS and section 4 of Appendix S (Technical working paper: Biodiversity) for an assessment on groundwater dependent ecosystems.

### C18.5.1 Groundwater drawdown on vegetation

A submitter raised concerns with the impact on the broader ecological footprint, at Rozelle specifically, from the dewatering of the Hawkesbury Sandstone from tunnel excavations. The submitter was specifically concerned that this would result in significant vegetation stress and loss.

#### Response

Impacts of groundwater drawdown are discussed in section 9.4.2 of Appendix S (Technical working paper: Biodiversity) of the EIS. The most likely groundwater dependant ecosystem types in the Sydney region are terrestrial vegetation communities with deep roots that use groundwater, wetlands, and river baseflow systems. A search of the National Atlas of Groundwater Dependand Ecosystems (Bureau of Meteorology, accessed 27 September 2016) indicated that there are no ecosystems within the study area that are likely to be dependent on groundwater.

Long term dewatering caused by tunnel drainage would lower the water table and potentiometric heads within the Hawkesbury Sandstone, and could potentially reduce the amount of groundwater available for non-groundwater dependant shallow rooted plants. Within the Hawkesbury Sandstone across the Rozelle area, the standing water level is variable, ranging from about 0.5 metres to 15 metres below ground level. Consequently flora is unlikely to be completely dependent on groundwater. This would not change following the construction of the tunnels.

The groundwater levels measured within the deep palaeochannel (within the Rozelle Rail Yards) range from 1.11 metres Australian Height Datum (AHD) to 2.04 metres AHD. Groundwater drawdown within the palaeochannels and river alluvium within the project footprint, including beneath Rozelle Rail Yards, would be low because the tunnel sections that intersect the alluvium are to be constructed as undrained (tanked) tunnels. In addition, groundwater levels in this area may be partly maintained by direct hydraulic continuity with surface water.

## C18.6 Cumulative biodiversity impacts

One submitter raised concerns about cumulative biodiversity impacts of the project. Refer to section 26.4 of the EIS for an assessment of cumulative biodiversity impacts.

### C18.6.1 Cumulative biodiversity impacts

A submitter raised concerns regarding the cumulative impacts on biodiversity from various projects working in reasonable proximity to, and with similar timeframes as the M4-M5 Link. These impacts should be assessed in the EIS prior to approval. The projects referenced included:

- King Street Gateway
- Alexandria to Moore Park Connectivity Upgrade

- Parramatta Road bus rapid transit
- Parramatta light rail
- Johnston's Creek and Iron Cove Creek naturalisation
- Parramatta Road and Great North Road at Five Dock proposed intersection upgrade.

## Response

Cumulative impacts on biodiversity from other WestConnex projects and other known or potential projects in the study area (which were selected for the cumulative impact assessment based on the methodology described in Appendix C (Cumulative impact assessment methodology) of the EIS) were assessed in section 9.6 of Appendix S (Technical working paper: Biodiversity) of the EIS. The assessment focused on cumulative biodiversity impacts associated with other WestConnex component projects:

- Rozelle Rail Yards site management works
- CBD and South East Light Rail– Rozelle maintenance depot
- Whites Creek naturalisation.

The assessment concluded that in total around 3.86 hectares of native vegetation would be impacted by the WestConnex program of works, which is not significant in the context of existing native vegetation across the Sydney Basin. A further 50.18 hectares of exotic and planted vegetation (mapped as 'urban exotic and native cover') would be removed and represents potential foraging habitat for the Grey-headed Flying-fox (total 53.49 hectares). Of this, up to 38.67 hectares has been identified as potential foraging habitat for the Eastern Bentwing-bat and Yellow-bellied Sheath-tail-bat. Offset for individual trees would be integrated into the UDLPs for the individual projects, and would provide foraging habitat for species such as the Grey-headed Flying-fox and microbats. Therefore, the cumulative impacts to Grey-headed Flying-fox and the threatened microbats would not result in a significant impact. No camps or breeding sites would be impacted and the removal of potential feed trees and foraging habitat is negligible in the context of existing available foraging habitat for these species.

Table 1-2 in Appendix C (Cumulative impact assessment methodology) of the EIS provides a list of projects that were considered, but not assessed in the cumulative impact assessment and the justification for why they were not included.

The following projects were not assessed in the cumulative impact assessment due to the design of the projects being in early stages, there being insufficient public information available and impacts and the timing of the projects not yet being known:

- King Street Gateway
- Alexandria to Moore Park Connectivity Upgrade
- Parramatta Road bus rapid transit
- Parramatta light rail
- Johnstons Creek naturalisation.

The naturalisation of a section of Iron Cove Creek (also known as Dobroyd Canal) is currently being investigated by Sydney Water, which would involve revegetation within and adjacent to the creek channel. The section of the creek being investigated runs from Ramsay Street to Dobroyd Canal at Five Dock, and is about 90 metres north of the of the Wattle Street tunnel portal works (by M4 East) and Wattle street entry and exit ramp works (by M4-M5 Link). The naturalisation of Iron Cove Creek was not assessed in the cumulative impact assessment because it is still in early design stages and the impacts and timing of the project are not known.

The Parramatta Road and Great North Road intersection upgrade (part of the Roads and Maritime Pinch Points Program) is proposed to be constructed and completed in 2018 (Roads and Maritime 2016f). These works are located about 350 metres northwest of the Wattle Street and Parramatta Road intersection. A REF was undertaken for this intersection upgrade project and concluded that the works are not likely to significantly impact threatened species, populations or ecological communities or their habitats due to the site being highly modified, and no natural habitat or endemic flora being present (Roads and Maritime 2016f). Cumulative impacts on biodiversity from the Parramatta Road pinch point project and the M4-M5 Link are unlikely.

## C18.7 Biodiversity environmental management measures

Three submitters raised concerns about the environmental management measures for biodiversity impacts. Refer to **Chapter E1** (Environmental management measures) for details on the biodiversity environmental management measures.

### C18.7.1 Management measures and offsets

Submitters questioned the nature, adequacy and feasibility of the management measures to manage potential biodiversity impacts, including:

- An expert on the Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*) should carry out further investigations to ascertain the disturbance and threat to their chosen habitat as a result of the construction works at Rozelle
- Recommend a tree inventory that would be accessible to the public to ensure the proposed number of trees are removed only
- Measures should be taken to save the loss of birds and trees. Any clearing of weedy small bird habitat from Rozelle Rail Yards should be staged to maintain transitional habitat for small birds during construction for adaptive/survival purposes. Cleared areas should be replaced with new native vegetation areas of equivalent size, to provide adequate habitat compensation for locally vulnerable species such as small birds
- Efforts should be made to retain existing, valuable pockets of native vegetation throughout the Rozelle Rail Yards site and to use this vegetation as sources for propagation and progressive re-vegetation of new open space areas within and adjacent to the site. This is in keeping with the Greenway recommendation 4.2.

### Response

Potential impacts of the project on the Eastern Bentwing-bat is provided in **section C18.3.1**.

Prior to the commencement of any works associated with the modification of the Victoria Road bridge, an inspection will be carried out by a suitably qualified and experienced ecologist to confirm the presence of roosting microbats, in accordance with environmental management measure B2 (see **Chapter E1** (Environmental management measures)). If roosting microbats are identified, measures to manage potential impacts will be developed in consultation with an appropriate microbat expert and included in the CFFMP prior to the commencement of any work with the potential to disturb the roosting locations (as confirmed by the microbat expert).

The investigation of trees to be removed as part of the project (refer to Annexure A of Appendix S (Technical working paper: Biodiversity) of the EIS) was based on the current project footprint and concept design for the project. During detailed design, further opportunities to retain trees may emerge. However, where retention of trees is not possible, compensatory planting will be carried out with replacement trees planted within or close to the project footprint where feasible and practical, in accordance with environmental management measure B6 in **Chapter E1** (Environmental management measures). In addition, protection of trees on project sites will be carried out in consultation with a qualified arborist and tree removal, pruning and maintenance work will be carried out by a qualified arborist (see environmental management measures B7 and B8 in **Chapter E1** (Environmental management measures)). Replacement trees will be included in the relevant UDLPs. UDLPs will be prepared in consultation with local communities and relevant local councils.

As discussed in **section C18.2.1**, the majority of vegetation clearing, including weed removal, at the Rozelle Rail Yards is being undertaken as part of the Rozelle Rail Yards site management works. The site management works were subject to a separate environmental assessment in a REF which was approved by Roads and Maritime under Part 5 of the EP&A Act in April 2017. As required by the REF, a staged approach is being used for the removal of vegetation at the site, with a break between the clearing stages.



The likelihood of impacts on birds as a result of loss of trees is limited due to the high mobility of birds, allowing them to move to similar habitat in the locality and accessing replacement trees planted as part of the project. Notwithstanding this, the CFFMP to be developed and implemented during construction of the project, will include pre-disturbance inspection requirements to identify features of biodiversity conservation significance and select appropriate management measures and environment controls (see environmental management measure B7 in **Chapter E1** (Environmental management measures)).

In addition, as many trees as possible will be retained during construction and in the event that tree removal cannot be avoided, a tree replacement strategy will be prepared (see environmental management measure B6 in **Chapter E1** (Environmental management measures)). The project will also deliver up to 10 hectares of open space at the Rozelle Rail Yards, which will provide a significant opportunity for replacement tree planting. This is discussed further in **section C18.2.1**.

## C19 Groundwater

This chapter addresses issues raised in community submissions associated with the groundwater assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 19 (Groundwater) and Appendix T (Technical working paper: Groundwater) of the EIS for the further details on the groundwater assessment.

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## C19.1 Level and quality of groundwater assessment

38 submitters raised concerns about the quality of the groundwater assessment. Refer to section 19.1 of the EIS and Appendix T (Technical working paper: Groundwater) for details of the groundwater assessment methodology.

### C19.1.1 Inadequate information in the EIS on groundwater impacts

Submitters expressed concern that the EIS contains uncertainties and little information on the impact of the project on groundwater and therefore it does not meet the standards of an EIS. Specific concerns included:

- The EIS does not address the impacts to groundwater, provides little information and should not be accepted as an EIS
- There is no evidence that the tunnels have been carefully designed to avoid groundwater contamination
- The lack of detailed design for the Rozelle interchange makes it impossible for the NSW Department of Planning and Environment (DP&E) to assess whether the tunnels will have an impact on the mobilisation of contaminants in groundwater and/or prevent contaminated groundwater flow. To approve a proposal with identified risks that has so little project detail or mitigation information jeopardises the health of Sydney residents and adds to ecological risks, particularly at Rozelle
- The water quality results that are contained in Appendix T do not include an interpretive analysis of each identified contaminant with no explanation for measured change in analytical results.

### Response

A groundwater assessment to support the EIS has been undertaken to address the Secretary's Environmental Assessment Requirements (SEARs) relevant to groundwater. The assessment presented in the EIS includes:

- Consideration of the existing environment that the project would interact with, including the hydrogeological conditions and environmental values of the surrounding environment
- An impact assessment, which characterises the impacts of the tunnels on groundwater and environmental features that interact with groundwater using numerical modelling techniques to quantify impacts
- Groundwater management and monitoring measures required to mitigate impacts and manage tunnel inflows.

Groundwater samples were collected from monitoring wells across the groundwater assessment study area and were tested and analysed to characterise the local groundwater levels and quality. A three-dimensional numerical groundwater model was developed to simulate existing groundwater conditions and the effects of proposed tunnel alignments, caverns and associated subsurface ancillary infrastructure. The groundwater model was used to predict future groundwater conditions and potential impacts related to the project. The groundwater model was prepared by an independent specialist, HydroSimulations, and was peer reviewed in accordance with Australian Groundwater Modelling Guidelines (Barnett *et al* 2012) by an independent peer reviewer engaged by Sydney Motorway Corporation (SMC). It was also reviewed by the Roads Maritime Environment Branch. An independent peer review of the report is also being undertaken on behalf of DP&E. Although the EIS is based on a concept design, the model is conservative in nature and includes an assessment of all elements of the project, including the mainline tunnels and the Rozelle interchange. As a result it is considered to provide a good estimate of likely groundwater impacts. Any substantial departure from the concept design in the EIS would be subject to further assessment.

During the geotechnical and hydrogeological field investigations a network of 58 monitoring wells were established along the alignment between May 2016 and May 2017. The monitoring wells were constructed to monitor groundwater within the geological formations intersected by the tunnel alignments including alluvium, Ashfield Shale, Mittagong Formation and Hawkesbury Sandstone. At some locations nested wells were constructed monitoring groundwater from the alluvium and underlying Hawkesbury Sandstone. The wells have been regularly monitored at monthly intervals for groundwater levels and quality commencing in June 2016 and the results have been used to inform the development of the groundwater model.

Appendix T (Technical working paper: Groundwater) of the EIS outlines how groundwater was sampled and analysed to characterise the local groundwater quality. Routine groundwater samples were tested for several components including major ions, metals, nutrients and sulfate reducing bacteria. This was used to create a baseline for the existing groundwater quality within the study area. Groundwater levels are also monitored on a monthly basis with groundwater levels also being recorded automatically on an hourly basis in data loggers in most monitoring wells.

Groundwater contamination monitoring was conducted in September and November 2016 to support the site contamination investigations. The groundwater contamination sampling was targeted based on an assessment of previous and current land usage. The contamination analytical suite included hydrocarbons (total recoverable hydrocarbons (TRH), naphthalene, benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAH)), volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs) including herbicides and pesticides. Groundwater assessment criteria were developed in accordance with relevant guidelines to inform what levels of these components are appropriate for discharge into the receiving environment, in order to inform the groundwater treatment required.

Potential construction and operation impacts were identified through the assessment and are considered in sections 19.3 and 19.4 of the EIS. These include several aspects such as reduced water recharge, tunnel inflow, groundwater level decline, groundwater quality, ground movement and groundwater balance.

Potential impacts to the local community from the mobilisation of contaminated groundwater are described in Chapter 16 (Contamination) of the EIS and are also discussed in **section C19.3.1**. Areas within and along the project footprint that may contain contaminated soil and/or groundwater due to past or present land use practices have been investigated. A potential contamination risk identified in the EIS includes the migration of contaminated groundwater plumes towards the tunnels due to the potential groundwater contamination located in the area.

Potential groundwater contamination impacts would be monitored prior to and during construction in the groundwater monitoring network established for the project.

The development of management measures to minimise impacts on groundwater were developed from the outcomes of the assessment and include undertaking further modelling prior to construction and the development and implementation of a groundwater monitoring program (see **Chapter E1** (Environmental management measures)). Measures also provide commitments about the design of the tunnels, including:

- Groundwater inflows within the tunnels will be minimised by designing the final tunnel alignment to minimise intersections with known palaeochannels and alluvium present in the project footprint (such as at Rozelle), identified during geotechnical investigations
- Appropriate waterproofing measures will be identified and included in the detailed design to permanently reduce, where feasible and reasonable, the inflow into the tunnels to below one litre per second per kilometre for any kilometre length of the tunnel
- Appropriate measures will be investigated and implemented at dive structures and shafts and for cut-and-cover sections of the tunnel to minimise groundwater inflow
- A detailed groundwater model will be developed by the design and construction contractor(s) during detailed design that will be used during construction using additional data collected during the construction program to refine model predictions as required.

Groundwater investigations to date have indicated that the majority of groundwater contamination is likely to be within the shallow unconfined alluvium such as at the Rozelle Rail Yards. Tunnel sections intersecting the alluvium at the Rozelle Rail Yards are to be undrained (tanked) so any contaminated groundwater is not drawn directly into the tunnel or mobilised. Any captured contaminated groundwater through tunnel inflows will be treated in water treatment plants proposed at the Rozelle motorway operations complexes (MOC2 and MOC3) and the Darley Road motorway operations complex (MOC1) at Leichhardt. During the operational phase of tunnel inflow, groundwater quality will be routinely monitored to detect any water quality changes and treated as required prior to discharge where it meets the discharge criteria, or otherwise collected for disposal.

### C19.1.2 Groundwater modelling

Submitters raised concerns about modelling of groundwater. Specific concerns include:

- Concern that despite the predicted permanent decline of groundwater levels, there is no modelling and assessment on the local impact of settlement due to groundwater withdrawal
- Concern that requirement 10(b) of the SEARs; 'impacts from any permanent and temporary interruption of groundwater flow, including then extent of drawdown and the potential for settlement' was not addressed by the EIS. The submitter states that localised modelling should be undertaken at the EIS stage instead of later by the construction contractor
- A submitter also suggested that the EIS has not modelled the localised impact of settlement resulting from groundwater withdrawal, based on this sentence on page 19-39 of the EIS: 'the model is a regional groundwater model and is not considered appropriate for use in estimating groundwater induced settlement at a more localised level'.

### Response

Ground settlement due to groundwater drawdown is discussed in section 19.3.8 and section 12.3.4 of the EIS. The preliminary assessment does not include prediction of settlement as a result of groundwater drawdown (consolidation settlement). In contrast to predicting tunnel excavation-induced ground movement, which has a well-documented and accepted methodology, prediction of consolidation settlement relies on the prediction of induced groundwater drawdown, which is complex and subject to significant uncertainties.

Settlement that occurs due to groundwater drawdown is gradual and generally occurs at a slow rate (possibly over years). It can sometimes be difficult to distinguish from settlement due to groundwater drawdown that may be naturally occurring or occurring due to seasonal variations which cause swelling or shrinkage of the soil. The extent of groundwater drawdown often occurs over a wider area beyond the location of the tunnels and results in a wider and shallower settlement trough. As a result settlement from groundwater drawdown is less likely to result in differential settlement which causes tensile strain on buildings and building damage.

Cumulative settlement impacts include the combined impacts of settlement from tunnel excavation induced ground movement and groundwater drawdown. Tunnel excavation induced ground movement is anticipated to be the prevalent mechanism causing ground movement given that the proposed tunnels are primarily located within competent bedrock (Hawkesbury Sandstone and Ashfield Shale).

The risks associated with groundwater drawdown and induced settlement within the Ashfield Shale and Hawkesbury Sandstone would be low because of the geotechnical properties of the rock. As water is removed from these rock types the structural integrity and strength of the rock remains due to its competent nature. Residual soil profiles developed on the weathered sandstone and shale bedrock are typically relatively thin, stiff and of low compressibility and as such would be less susceptible to ground settlement groundwater drawdown. As a result, settlement impacts due to groundwater drawdown are not anticipated to occur for tunnels excavated in the Hawkesbury Sandstone or Ashfield Shale.

In contrast, as groundwater drawdown occurs within alluvium (as found in parts of Rozelle), the structural integrity of the unconsolidated sediment is compromised, resulting in more settlement than would be expected from the sandstone and shale. Since ground settlement is more likely to occur within the alluvium where tunnels are constructed, design measures have been instigated to minimise groundwater drawdown induced settlement at those locations. Where alluvium is intersected the tunnels would be tanked to minimise groundwater ingress and associated groundwater drawdown and



settlement above the tunnel. In addition, beneath Hawthorne Canal and Johnstons Creek, the tunnels have been designed to dive beneath the alluvium to reduce groundwater ingress to the tunnels.

The regional groundwater model is not considered appropriate for use in estimating groundwater induced settlement at a more localised level. Prediction of consolidation settlement relies on the prediction of induced groundwater drawdown, which is complex and subject to significant uncertainties. As described above, settlement that occurs due to groundwater drawdown is gradual and generally occurs at a slow rate and over a wide area which minimises the potential for differential settlement and the associated risk to damage to buildings. A preliminary assessment based on geotechnical conditions has been carried out to assess the potential for ground movement as a result of the project.

A detailed groundwater model is to be developed by the design and construction contractor during detailed design to predict groundwater inflow rates and volumes within the tunnels and groundwater levels (including drawdown) in adjacent areas during construction and operation of the project (see environmental management measure GW7 in **Chapter E1** (Environmental management measures)). Further assessment of potential settlement impacts, including numerical modelling, will be undertaken during detailed design (see environmental management measure PL7 in **Chapter E1** (Environmental management measures)).

Building condition surveys of potentially impacted property and infrastructure would be undertaken before the commencement of construction activities that would pose a settlement risk, to determine appropriate settlement criteria to prevent damage. In the event that damage occurs to a property as a result of the construction of the project, the damage will be appropriately rectified in a timely manner. See **section C12.5** for further information regarding potential settlement impacts to property.

Settlement monitoring will be undertaken during construction and operation at properties and infrastructure where exceedances of the settlement criteria are predicted. Settlement monitoring may include the installation of settlement markers or inclinometers. In the event that damage occurs to properties or infrastructure due to settlement during operation of the project, measures will be taken to 'make good' the impact (see **Chapter E1** (Environmental management measures)).

## C19.2 Tunnel inflow and groundwater level decline

39 submitters raised concerns about the tunnel inflow and groundwater level decline. Refer to section 19.3 and 19.4 of the EIS for details of tunnel inflow and groundwater level decline.

### C19.2.1 Groundwater impacts and treatment in tunnels

Submitters were concerned that there is a potential for impacts on groundwater from tunnelling activities. Specific concerns included:

- Impacts from changed soil moisture content (including property damage). Submitters noted that the EIS acknowledges that moisture drawdown (groundwater drawdown) caused by tunnelling activities will occur
- Estimates of groundwater generation rates in tunnels do not provide sufficient information to determine measures required to protect the environment
- The proposed sizing and performance of tunnel treatment to reduce infiltration is not clearly stated
- Rozelle interchange will impact the water table.

## Response

Changes in soil moisture can result in ground movement and associated damage to buildings and structures. Ground movement due to soil moisture depletion caused by tunnel leakage is a long term effect as groundwater drawdown extends outwards from the tunnel. Some settlement occurs naturally in soils as groundwater and soil moisture levels fluctuate due to climatic variation. Areas most affected by soil moisture depletion are those where there are deeper alluvial soils present such as the Rozelle Rail Yards. At the Rozelle Rail Yards and other areas where there are deep soils the tunnels are designed to be either undrained (tanked) or dive beneath the alluvium such as the palaeochannel at Hawthorne Canal. This approach is designed to minimise groundwater depletion from deeper alluvial soils. In addition, there is little major infrastructure designed on these deeper alluvial soils mainly because they are known to be geotechnically unstable.

Potential construction and operation impacts due to groundwater drawdown as a result of tunnelling activities is discussed in section 19.3.3 and 19.4.3 of the EIS. Groundwater level drawdown was predicted by groundwater modelling as part of the EIS and the key findings for the operational phase of the project were:

- After the commencement of operations in 2023 the estimated long term inflows to the motorway tunnels are predicted to be 0.47 litres per second per kilometre initially, reducing to 0.25 litres per second per kilometre in 2100
- The predicted long term tunnel inflow or 'take' (from the combined motorway tunnels and ventilation tunnels) is estimated to vary from 1.74 megalitres per day (635.1 megalitres per year) in 2023, reducing to 0.99 megalitres per day (361.4 megalitres per year) in 2100
- The predicted long term tunnel inflows represent a small percentage of the Long Term Average Annual Extraction Limit (LTAAEL) as outlined in the water sharing plan for the Sydney Basin Central, which range from 0.7 per cent to 1.3 per cent.

During stakeholder consultation on the EIS, Department of Primary Industries – Water (DPI-Water) advised that the predicted amount of groundwater take is available and thus the proposed level of extraction should not pose a threat to the environment.

These predictions will be refined during construction in a similar model to be updated by the design and construction contractor(s). Management measures include a groundwater monitoring program during construction and the operations phases and measures to 'make good' any impacts on impacted water supply bores by restoring the water supply to pre-development levels.

The veracity of the groundwater modelling undertaken for the EIS is discussed in **section C19.1** and is considered adequate to inform the management measures to minimise risks of potential impacts. Conservative estimates of tunnel inflows were made by assuming a maximum groundwater inflow rate of one litre per second per kilometre along the whole drained tunnel length during operation of the project, although inflow rates in some sections of the tunnels would be less than the maximum allowed rate.

Management measures include minimising groundwater inflows within the tunnels by designing the alignment to minimise intersecting known palaeochannels and alluvium present in the project footprint, and implementing appropriate waterproofing. At the Rozelle Rail Yards, tunnels intersecting the alluvium would be fully lined to prevent direct inflow of groundwater from the alluvium. The detailed groundwater model developed prior to construction will be used to predict groundwater inflow rates and volumes to meet the required performance criteria (see **Chapter E1** (Environment mitigation measures)).

Groundwater tunnel inflows would be reduced during construction by waterproofing measures such as grout injection, pressure cementing or pre-grouting to reduce the bulk hydraulic conductivity and hence inflows. The installation of geofabric liners or membranes is also an option to control groundwater inflows. At cut and cover sections groundwater inflows will be controlled by the installation of cut-off walls. The volume of groundwater and treatment requirements would differ depending on the tunnel depth and the geological units through which it passes. Groundwater treatment is discussed in section 19.3.4 of the EIS.

During construction, the wastewater generated in the tunnel (including collected groundwater) would be captured, tested and treated at a construction water treatment plant (if required) prior to reuse or discharge, off-site as required.

During operation, treated groundwater flows from the Rozelle water treatment plant would drain via a constructed wetland to Rozelle Bay. Treated flows from the Darley Road water treatment plant would be discharged to Hawthorne Canal. A small portion (around 1.6 kilometres) of M4-M5 Link tunnel would also drain to the New M5 operational water treatment plant at Arncliffe. Operational water discharge criteria would be developed in accordance with ANZECC (2000) and with consideration of the relevant NSW Water Quality Objectives (WQOs) and in consultation with relevant agencies including the NSW Environment Protection Authority (NSW EPA), DPI-Water and local councils.

## C19.3 Groundwater quality

Nine submitters raised concerns about groundwater quality impacts of the project. Refer to section 19.3 and section 19.4 of the EIS and Chapters 5 and 6 of Appendix T (Technical working paper: Groundwater) of the EIS for an assessment of groundwater quality impacts.

### C19.3.1 Contamination

Submitters were concerned about contamination of groundwater and the mobilisation of existing contaminated groundwater. Specific concerns included:

- That there is a potential for toxic pollutants to be leached from the project to the local groundwater
- Concern that at Rozelle, and specifically at Easton Park, there is a risk for contaminated groundwater to be exposed
- There is no evidence that the tunnels have been designed to avoid groundwater contamination
- Contaminated groundwater and saltwater intrusion has not been quantified
- In relation to the management of groundwater pollution, that the Alexandria Landfill exercise will be repeated and residents will be subject to offensive odours
- There is a potential for groundwater contamination at the Rozelle civil and tunnel site, as the soils present were found to include lead, arsenic, cadmium and zinc
- Contamination of groundwater is known to be present, widespread and likely to be exposed
- Construction has the potential to pollute the underground stream under Springside Street.

### Response

Groundwater quality risks from construction activities include the potential to contaminate groundwater from fuel, oil or other chemical spills; and intercepting contaminated groundwater during tunnelling. There is also potential to intersect acid sulfate soils. Known contaminants within soils at the Rozelle Rail Yards could be mobilised by altered groundwater flow paths. As required by environmental management measure GW9, a groundwater monitoring program will be prepared and implemented to monitor groundwater inflows in the tunnels and groundwater levels as well as groundwater quality in the three main aquifers and inflows during construction. The program will identify groundwater monitoring locations, performance criteria in relation to groundwater inflow and levels and potential remedial actions that will be considered to address any non-compliances with performance criteria. As a minimum, the program will include manual groundwater level and quality monitoring monthly and inflow volumes and quality weekly (see **Chapter E1** (Environmental management measures)). Potential impacts on water quality as a result of mobilisation of contaminants are discussed in Chapter 16 (Contamination) of the EIS. This includes the management of odorous materials.

The primary risk to groundwater quality due to the project is the migration of contaminated groundwater along altered groundwater flow paths due to the tunnel construction. This risk is present throughout the project footprint, including at the Iron Cove Link (near Springside Street). At the Rozelle Rail Yards, groundwater beneath the site within the alluvium is shallow and impacted by historical industrial land uses. Potential contaminants of concern include heavy metals (arsenic, cadmium, copper, lead, nickel and zinc) and hydrocarbons. Tunnel sections through the alluvium would be constructed as undrained (tanked), and cut-off walls would be installed at tunnel portals and cut-and-cover sections to reduce the ingress of groundwater from the palaeochannels, minimising potential contaminated groundwater migration and addressing the requirements of DPI-Water. Since the majority of the tunnels are constructed within the Hawkesbury Sandstone at depths in excess of 20

metres and given the location of the tunnel in relation to the contaminant sources, the risk of intercepting contaminated groundwater is considered to be low.

As summarised in Chapter 15 (Groundwater) and Appendix T (Technical working paper: Groundwater) of the EIS, some saltwater intrusion from tidal areas towards tunnels is expected to occur over time. Capture zone analysis using particle tracking was used to provide an indication of areas where saltwater intrusion may occur and areas where the groundwater resources may be impacted as part of the modelling reported by Hydrosimulations (2017). Saltwater intrusion is not expected to be a significant environmental impact for a number of reasons including:

- There are no sensitive receptors (registered groundwater users or groundwater dependent ecosystems) in the vicinity of the tidal waterways or discharge treatment locations
- Areas where saline waters are expected to pass between tidal water bodies and the tunnels are within the tidal fringe which is already naturally saline due to tidal mixing
- Average times for water originating in tidal watercourses to reach the tunnels are predicted to be more than 100 years and maximum times are in the order of thousands of years. As a result, groundwater quality in the tunnel catchment zones would slowly become more saline over thousands of years. Since the operational lifetime for major infrastructure is in the order of 100 years, the slow salinity increase should have minimal impacts on the tunnels and infrastructure in the project's operational lifetime
- Groundwater use between the foreshore and tunnels is limited because the groundwater is typically saline and there is a reticulated water supply provided by Sydney Water. For these reasons the beneficial use of groundwater in the project footprint is unlikely to change due to an increase in salinity.

All groundwater captured during construction would be directed to water treatment plants, and contaminants would be removed prior to discharge or disposed of at a licensed facility in circumstances where contaminated water cannot be treated appropriately. During operation, groundwater inflows will be treated at water treatment plants located at motorway operations complexes at Darley Road at Leichhardt and Rozelle, to meet acceptable discharge criteria before being discharged to Hawthorne Canal and Rozelle Bay respectively. A groundwater monitoring program will be prepared and implemented during construction and operation to monitor groundwater quality in the three main aquifers and inflows. The monitoring program will be developed in consultation with relevant government agencies.

The contamination assessment (refer to Appendix R (Technical working paper: Contamination) of the EIS) identified that a number of the construction ancillary facilities were of medium and high contamination risk and these sites were recommended as requiring further intrusive site investigations. The additional site investigations may identify further groundwater contamination issues that will need to be managed.

Management measures will be implemented to appropriately store hazardous goods and potentially contaminating substances and reduce the potential for environmental contamination due to spills and leaks (see **Chapter E1** (Environmental management measures)). The risks to groundwater as a result of such incidents would be managed through standard construction management procedures in accordance with a construction environment management plan for the project. Further, emergency spill kits would be available on site during construction and staff would be trained in their use. All liquid dangerous goods and hazardous chemicals would be stored within a bunded storage container or spill tray within the construction ancillary facilities. Where possible, refuelling of vehicles or plant equipment would take place on hardstand or bunded areas.

## C19.4 Cumulative groundwater impacts

One submitter raised concerns about cumulative groundwater impacts of the project. Refer to section 26.4 of the EIS and Chapter 7 of Appendix T (Technical working paper: Groundwater) of the EIS for an assessment of cumulative groundwater impacts.

### C19.4.1 Cumulative impacts with Western Harbour Tunnel

A submitter was concerned that the Western Harbour Tunnel project has the potential to cause cumulative groundwater impacts with the M4-M5 Link project in the Rozelle area. The submitter noted that while cumulative groundwater impacts should be addressed in the future as part of the EIS for the Western Harbour Tunnel project, Rozelle is in a floodplain and should therefore be assessed now.

#### Response

The groundwater model has been used to quantify cumulative impacts of existing road tunnel projects and the WestConnex component projects (including the existing M5 East, New M5, M4 East and M4-M5 Link) on the hydrogeological regime (refer to Chapter 7 of Appendix T (Technical working paper: Groundwater) of the EIS). In addition, the cumulative impacts of other projects such as the proposed future Western Harbour Tunnel and Beaches Link program of works have been qualitatively assessed. Quantitative assessment was not possible at the time of the EIS as details of these projects, such as tunnel alignment, construction program and construction technique, were not available.

The proposed future Western Harbour Tunnel and Beaches Link program of works would include tunnelling which is likely to impact groundwater during the construction and operation phases. The M4-M5 Link project would construct tunnels and entry ramps that would link the Rozelle interchange with the proposed future Western Harbour Tunnel. These link structures have been included in the groundwater model and are assessed as part of the construction of the M4-M5 Link.

As the Rozelle Rail Yards are located within a floodplain and are underlain by alluvium, the tunnels constructed within the alluvium would be constructed as undrained (tanked) tunnels to prevent direct groundwater ingress into the tunnels. Most of the Rozelle interchange and the tunnels that link to the Western Harbour Tunnel would be excavated within the Hawkesbury Sandstone, a competent rock with geotechnical engineering properties suited to tunnelling. The sandstone has a lower bulk hydraulic conductivity than the alluvium, restricting potential groundwater ingress to the tunnels. The parts of Rozelle that are in a floodplain have therefore been assessed in the EIS for the M4-M5 Link project.

At the time of preparing the M4-M5 Link EIS and the groundwater model there was insufficient project details available regarding the alignment, construction program and construction techniques for the proposed future Western Harbour Tunnel and Beaches Link to enable an assessment of potential cumulative groundwater impacts. The proposed future Western Harbour Tunnel and Beaches Link program of works will be subject to separate environmental impact assessments and it is expected that their EISs would include a cumulative impact assessment of potential impacts to groundwater as a result of other projects, including the M4-M5 Link.

## C19.5 Groundwater assessment environmental management measures

Three submitters raised concerns about the environmental management measures for groundwater impacts. See **Chapter E1** (Environmental management measures) for a summary of the environmental management measures.

### C19.5.1 Groundwater monitoring network to assess groundwater contamination

A submitter noted that the EIS states that no groundwater monitoring wells have been installed specifically for the purposes of monitoring. The submitter requested that a measure regarding monitoring of groundwater contamination be included.



## Response

As part of the groundwater assessment, a groundwater monitoring network was developed, including the conversion of 58 boreholes to monitoring wells throughout the project footprint. The monitoring network has provided baseline information about existing groundwater conditions (groundwater levels and quality) in the vicinity of the project footprint.

A groundwater monitoring program will be prepared and implemented to monitor groundwater inflows to the tunnels and groundwater levels and quality in the three main aquifers during construction. The program will identify groundwater monitoring locations, performance criteria in relation to groundwater inflows and levels and potential remedial actions that will be considered to address any non-compliance with performance criteria. As a minimum the program will include manual groundwater level and quality monitoring monthly and inflow volumes and quality weekly. The monitoring program will be developed in consultation with the NSW EPA, NSW Department of Primary Industries (DPI-Fisheries and DPI-Water) and the relevant councils.

The groundwater monitoring program prepared and implemented during construction will be augmented and continued during the operational phase. Groundwater will be monitored during the operational phase for three years or as otherwise required by the project conditions of approval and the program will include trigger levels for response or remedial action based on monitoring results and relevant performance criteria (see **Chapter E1** (Environment management measures)).

### C19.5.2 Reduction in groundwater flow to Whites Creek

A submitter was concerned that there will be a 60 per cent reduction in groundwater contribution into Whites Creek and that this will impact on the ecosystem. Options should be considered to minimise the reduction in groundwater flow.

## Response

Potential impacts on surface water and baseflow are discussed in section 19.3.3 of the EIS.

Predicted impacts of construction on baseflow for major watercourses have been modelled. For the purposes of modelling, baseflow is considered to be the groundwater that discharges to the creek and is simulated in the model only when groundwater reaches the ground surface and enters the drainage system. The baseflow component is small in terms of volume of water because it only occurs after large rainfall events sufficient to locally raise the groundwater to ground level. Groundwater contributions to baseflow are also limited as the creeks are concrete lined.

The majority of stream flow would be derived from stormwater runoff entering the drainage system rather than groundwater baseflow. Thus the overall contribution of groundwater baseflow as a percentage of total flow is small because:

- The concrete lining of creeks such as Whites Creek restrict groundwater inflows to the creek
- The lower reaches of the creeks are tidally influenced with equal volumes of groundwater recharging and discharging the creeks during the tidal cycle
- The catchments are heavily urbanised resulting in surface water run-off being directed into stormwater drains reducing natural groundwater recharge.

Therefore, groundwater drawdown under Whites Creek due to the project is not considered likely to significantly alter flows in the ecosystem of the waterway.

### C19.5.3 Environmental management measures

Submitters were concerned about the groundwater mitigation measures. Specific concerns included:

- Groundwater and fire sprinkler water treatment has not been identified
- Specific details of parameters are required to design and reduce risk of an inadequate water treatment plant
- There is little detail on mitigation of mobilisation of contaminated groundwater.

## Response

Operational impacts on water quality are discussed in section 15.4.2 of the EIS. The drainage infrastructure would be designed to accommodate groundwater ingress, stormwater ingress at portals, tunnel wash-down water and fire suppressant deluge water. The tunnels would include two separate tunnel drainage systems including one system to capture groundwater and the other to deal with any other drainage from the tunnel (including spills etc). The groundwater drainage stream is expected to produce flows containing a variety of pollutants that require treatment before discharge to manage potential impacts on the receiving environment. Tunnel wastewater would be pumped to water treatment facilities at the Darley Road motorway operations complex (MOC1) at Leichhardt and the Rozelle East motorway operations complex (MOC3) at Rozelle.

Elevated metals and nutrients were recorded during groundwater sampling and groundwater was identified as brackish. Metal, nutrient and ammonia loading to Hawthorne Canal and Rozelle Bay is likely to increase as a result of the continuous treated groundwater discharges. To prevent adverse impacts on downstream water quality within Rozelle Bay and Hawthorne Canal, water treatment plants would be designed so that tunnel wastewater would be of suitable quality for discharge to the receiving environment. For further discussion of potential impacts to downstream water quality as a result of discharges from the water treatment plants (see **section B5.3.2**). Groundwater quality will be monitored throughout construction and operation in accordance with a groundwater monitoring program developed in consultation with relevant stakeholders including NSW EPA, DPI-Water and local councils.

Temporary construction water treatment plants would be located at each construction ancillary facility where tunnelling would occur, and would be designed to treat construction water and groundwater inflows encountered during construction. See **section C15.3** for further details on water quality management.

The migration of contaminated groundwater due to altered flow paths from tunnel construction will be mitigated through the design and construction of undrained (tanked) tunnels to avoid the ingress of groundwater from palaeochannels at Whites Creek or the diving of the tunnels beneath the palaeochannels such as at Hawthorne Canal. Further discussion of issues associated with potential mobilisation of contaminated groundwater is contained in **section C19.3**.

Potentially contaminated areas directly affected by the project will be subject to further investigation and management in accordance with the relevant requirements of guidance endorsed under section 105 of the *Contaminated Land Management Act 1997* (NSW). If contamination posing a risk to human or ecological receptors is identified, a Remediation Action Plan will be prepared. Mitigation measures to avoid impacts due to the mobilisation of contaminated groundwater are described in **Chapter E1** (Environmental management measures).

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