

C20 Non-Aboriginal heritage

This chapter addresses issues raised in community submissions associated with the non-Aboriginal heritage assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 20 (Non-Aboriginal heritage) and Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for the further details on the non-Aboriginal heritage assessment.

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C20.1 Level and quality of the non-Aboriginal heritage assessment

549 submitters raised concerns about the quality of the non-Aboriginal heritage assessment. Refer to section 20.1 and Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for details of the non-Aboriginal heritage assessment methodology.

C20.1.1 Adequacy of the non-Aboriginal heritage assessment

Concerns were raised that the EIS does not appropriately assess the impacts on non-Aboriginal heritage items including areas associated with the project.

Submitters specifically raised concern over the lack of assessment of the impacts of tunnelling (including noise and vibration) on non-Aboriginal heritage items located above the tunnels, particularly in areas such as Newtown and Rozelle. Other specific concerns include:

- There should have been a full report on all heritage buildings within the tunnel project boundaries
- Concern that there are no areas of disturbance and Historical Archaeological Management Units (HAMUs) identified in the City of Sydney Local Government Area (LGA)
- The number of heritage houses in the Rozelle interchange construction zone has not been specifically addressed
- Industrial heritage issues were not addressed in the EIS, nor was the heritage of the built environment of Bignell Lane
- Insufficient research of the impact on White Bay Power Station and request for excavation details at the site
- The EIS does not adequately assess the impacts on the historic Yasmar Estate
- Insufficient and inadequate research of the archaeology of the Rozelle Rail Yards
- The assessment does not address the cumulative impacts on heritage from the WestConnex program of works
- The methodology used is simply to describe heritage
- Objection to the approach of removing items that are within the project footprint and justification of removal of buildings by salvaging other items
- Older, historic inner suburbs and low-lying foreshore areas have been ignored
- The heritage report downplays potential impacts on hundreds of homes from Newtown to Annandale and Rozelle
- The impact on key high level heritage protection areas and sites in Newtown with a significant number of heritage protected buildings in the project's footprint not quantified.

Response

Adequacy of assessment

A robust heritage impact assessment was undertaken for the project in accordance with key guidelines and policies relevant to heritage management in NSW including the NSW heritage criteria set out in *Assessing Heritage Significance*, *NSW Heritage Manual* (Heritage Council of NSW 2002) and *Assessing Heritage Significance for Historical Archaeological Sites and 'Relics'* (Heritage Branch of the NSW Department of Planning 2009).

The non-Aboriginal heritage assessment (refer to Appendix U (Technical working paper: Non-Aboriginal) of the EIS) was prepared in accordance with the requirements of the *Heritage Act 1977* (NSW), including identification of potential impacts on items of heritage values, heritage conservation areas (HCAs), built heritage landscapes and archaeology during construction and operation.

The assessment of the project identified non-Aboriginal heritage values within and surrounding the project footprint by completing a desktop review of statutory heritage lists, field surveys of the study area, a review of previous heritage reports and archaeological assessments prepared for relevant items and areas within the study area, and desktop historical research including review of relevant conservation management plans. This included consideration of the history of the suburbs within the study area. The assessment evaluated the potential impacts of the project on these heritage values and each heritage item was assigned a potential impact type and impact rating. Heritage items that are proposed to be demolished were assigned a major adverse impact rating. The heritage items that have the potential to be affected by the project, including how they could be affected, have been identified in section 20.3 of the EIS. The detailed design and construction of the project would be managed to ensure that the identified potential heritage and archaeological impacts are minimised and/or avoided as far as practical, by implementing a range of environmental management measures (see **Chapter E1** (Environmental management measures)).

The EIS, including all technical working papers, was reviewed by the NSW Department of Planning and Environment (DP&E) and key government agencies to confirm that it adequately addressed the Secretary's Environmental Assessment Requirements (SEARs) for the project prior to being placed on public exhibition. Feedback received from DP&E and agencies was considered and addressed in the EIS, where relevant, prior to public exhibition.

Assessment of the impact of tunnelling (particularly in Newtown and Rozelle)

The study area for the non-Aboriginal heritage assessment (refer to section 20.1.5 of the EIS) was separated into six areas that would be subject to surface disturbance from the project, and the area above the mainline tunnel alignment. The assessment therefore focused on impacts to heritage items and HCAs associated with surface works and infrastructure, and also impacts to items fully or partially located directly above the project tunnel alignment. This included heritage items above the project tunnel alignment in areas such as Newtown and Rozelle.

Figure 6-13 to Figure 6-20 in section 6.14 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS illustrates heritage items and conservation areas listed on local, State and Section 170 Registers located above the tunnel alignment. Potential for vibration impacts on heritage items associated with tunnelling is described in section 6.11 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. Potential settlement impacts on heritage items are described in section 6.13 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. In the assessment of settlement and vibration impacts to heritage items consideration was given to:

- The depth of tunnelling in the vicinity of the heritage item
- Predicted settlement impacts as detailed in section 12.3.4 of the EIS
- Predicted vibration impacts as detailed in Chapter 5 of Appendix J (Technical working paper: Noise and vibration) of the EIS.

Study areas and HAMUs in the City of Sydney LGA

The study area for the non-Aboriginal heritage assessment (refer to section 20.1.5 of the EIS) includes the locations subject to surface disturbance from the project and the area above the mainline tunnel alignment. The study area for the locations subject to surface disturbance is separated into six areas (and 11 HAMUs located across these six areas). There are no areas of surface disturbance located within the City of Sydney LGA and therefore there were no HAMUs within the City of Sydney LGA identified for the non-Aboriginal heritage impact assessment. The study area for areas located above the tunnel alignment includes items within the City of Sydney LGA. Impacts to items located above and directly intersecting with the project tunnel alignment are identified in Table 6-48 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS.

Heritage properties in the Rozelle interchange construction zone

All listed and potential heritage items and conservation areas located within the Rozelle interchange construction zone, and potential impacts to these items, have been identified in section 6.7 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS.

Figure 6-15 in section 6.14 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS identifies the heritage items located above the tunnel alignment at Rozelle. Table 6-48 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS identifies the heritage items in this area of the project tunnel alignment that may be subject to indirect impacts (including nine items in Rozelle which would be subject to minor adverse impacts).

Further assessment of potential settlement impacts, including numerical modelling, will be undertaken during detailed design. In areas where ground movement in excess of settlement criteria is predicted, an instrumentation and monitoring program to measure settlement, distortion or strain will be implemented. Feasible and reasonable measures will be investigated and implemented to ensure where possible that the predicted settlement is within the criteria. Measures that will be considered may include (but are not limited to):

- Review of the proposed tunnel design including:
 - The depth and alignment of tunnels
 - The proximity of multiple tunnels to each other
 - The proposed tunnel support system
 - The tunnel lining to manage groundwater inflows
- Rationalising the layout of the proposed ventilation tunnels including the number, location and length of tunnels
- Review of the proposed construction methodology
- Consideration of ground improvement options.

A Settlement Monitoring Program will be prepared that will provide details on:

- Settlement criteria and predictions
- Location of monitoring points
- Duration of monitoring
- Data collection (type and method)
- Comparison of actual settlement with predictions
- Triggers and corrective actions that will be implemented if, based on monitoring results, actual settlement is likely to exceed predictions or the relevant criteria, with the aim of complying with the criteria.

The Settlement Monitoring Program will be endorsed the Independent Property Impact Assessment Panel (see environmental management measure PL11 in **Chapter E1** (Environmental management measures) prior to the commencement of any construction activities with the potential to result in settlement, as determined by the panel, unless otherwise agreed to by the Secretary of DP&E.

Settlement monitoring will be carried out for the period in accordance with the program starting prior to commencement of works with the potential to result in ground movement and settlement through to until all settlement has stabilised following completion of tunnel construction. The results of settlement monitoring will be compared to predicted settlement. The implementation and adequacy of the Settlement Monitoring Program will be monitored by the Independent Property Impact Assessment Panel.

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.

Assessment of industrial heritage items

The non-Aboriginal heritage assessment considered heritage items and areas that reflect industrial development from the nineteenth and twentieth centuries, such as in Rozelle and Annandale (refer to section 4.4 and 4.6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. The Rozelle Rail Yards and Annandale are two areas in particular which are likely to contain industrial heritage value.

Potential impacts to listed and potential heritage items identified within and in the vicinity of Rozelle Rail Yards and Annandale are outlined in section 6.7 and 6.9 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS, respectively. Where impacts are unavoidable, management measures would be implemented including photographic recording, an Interpretation Strategy and a Heritage Salvage Strategy (see **section C20.7** for a summary of these measures).

Assessment of the built heritage in Bignell Lane

The assessment of industrial and built heritage issues was assessed as part of Area 5 - Annandale and in potential heritage items during the EIS process (refer to section 6.9 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS). There are no State or locally listed heritage items or HCAs located in Bignell Lane at Camperdown, however, the area was also inspected for items of potential heritage significance. The 'Former Bank of NSW', located at 164 Parramatta Road, Annandale (which backs onto Bignell Lane) was assessed as a potential heritage item of local significance and would be demolished for the project. The James Squire Brewery and Storage King building at this location were not assessed as having potential heritage significance during the site inspection.

Where impacts are unavoidable, management measures would be implemented including photographic recording, an Interpretation Strategy and a Heritage Salvage Strategy see **section C20.7** for a summary of these measures).

HAMU 10 includes Bignell Lane. There are no heritage register listings for potential historical archaeological remains within the Bignell Lane HAMU. Given the size of the twentieth century buildings and the absence of basements within this HAMU there is potential for archaeological remains to survive beneath the existing floor slabs and between building footings (refer to section 5.7.2 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS). A Historical Archaeological Research Design (HARD) would be prepared prior to the start of proposed works within HAMU 10, which would include an assessment of any detailed design plans to develop a methodology and scope for a program of test excavation to determine the nature, condition and extent of potential archaeological remains.

Research and assessment of the White Bay Power Station

The non-Aboriginal heritage assessment identified the non-Aboriginal heritage values associated with the White Bay Power Station in section 4.4.4 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. Review and consideration of the Conservation Management Plan for the White Bay Power Station was undertaken as part of this assessment. The assessment also considered impacts on non-Aboriginal heritage value of the White Bay Power Station in sections 20.3.1 and 20.3.2 of the EIS.

The project temporarily encroaches into the south western boundary of the curtilage of the White Bay Power Station which is a State Heritage Register (SHR) listed item. The minor encroachment occurs during the construction phase of the project as a result of the alignment of the temporary Victoria Road bridge. However, the works would be some distance from the Power Station building itself and the building would not be physically impacted by the project.

One structure assessed as being a potential heritage item of State significance would be indirectly impacted through vibration, which is the southern penstock associated with the White Bay Power Station.

The EIS recognises that there are potentially extant archaeological elements associated with the White Bay Power Station HAMU (HAMU 7), including water channels associated with the southern penstock. The specific location, depth and extents of the channels are unknown. The extent and location of excavation proposed in this area would be confirmed during detailed design.

Part D (Preferred infrastructure report) of this report describes and assesses proposed changes to the project presented in the EIS. These changes include the inclusion of an additional construction ancillary facility (the White Bay civil site (C11)) located directly adjacent to but not within the listed heritage curtilage of the White Bay Power Station. An assessment of the non-Aboriginal heritage impacts as a result of this change is provided in **section D1.4.5**.

Assessment of impacts to Yasmar Estate

The Yasmar Estate is located more than 100 metres away from the mainline tunnel alignment and is therefore unlikely to be impacted by tunnelling. Under Option A and B for the construction scenario at Haberfield and Ashfield, the Yasmar Estate is located adjacent to but outside of the heritage study area (refer to section 6.5 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS) and is unlikely to be directly impacted by construction of the project. The closest extent of the construction footprint to Yasmar Estate is the Parramatta Road East civil site (C3b). Yasmar Estate would not be within vibration minimum working distances for construction activities as identified in Annexure J of Appendix J (Technical working paper: Non-Aboriginal heritage) of the EIS.

Assessment of the archaeology at Rozelle Rail Yards

The non-Aboriginal heritage impact assessment assessed historical archaeology across the project footprint, allocating 11 HAMUs across the six heritage study areas, according to historical phases, archaeological potential, past construction activities, proposed impacts and management requirements. Section 5.5.2 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS provides a detailed assessment of the archaeological potential and potential archaeological impacts within HAMU 5 – Rozelle Rail Yards (West) and HAMU 6 – Rozelle Rail Yards (East).

The heritage impact assessment for the Rozelle Rail Yards site management works also contained an archaeological assessment (refer to Rozelle Rail Yards HIA (GML 2016)).

HAMU 5 has a low potential for archaeological remains, and any surviving remains are likely to have been highly disturbed and would likely not meet the threshold for local significance. Therefore, the works proposed in HAMU 5 are unlikely to impact on significant archaeological remains.

Part of the works proposed in HAMU 6 would require deep excavation in areas where archaeological deposits may be present. These works are likely to have a moderate to minor adverse impact on the potential historical archaeological remains, depending on the location, extent and nature of the proposed works. A HARD would be prepared prior to the start of proposed works within HAMU 6, which would include an assessment of any detailed design plans to develop a methodology and scope for a program of test excavation to determine the nature, condition and extent of potential archaeological remains.

Non-Aboriginal cumulative impacts of the WestConnex program of works

Chapter 7 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS assessed the cumulative impact of non-Aboriginal heritage from the WestConnex program of works (which includes the M4-M5 Link and the New M5) and other RMS and related transport projects. This was also summarised in Chapter 26 (Cumulative impacts) of the EIS.

Overall, the cumulative impact of the WestConnex program of works on non-Aboriginal heritage items is considered to be major and irreversible given its scale and results primarily from the impacts to the Haberfield HCA from the M4 East project. The M4-M5 Link project has been assessed as resulting in a moderate adverse heritage impact.

C20.2 Impacts to non-Aboriginal historical archaeology

79 submitters raised concerns about the impacts to non-Aboriginal historical archaeology. Refer to section 20.3 of the EIS and Chapter 5 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for an assessment of the potential impacts to historical archaeology.

C20.2.1 Impacts to potential non-Aboriginal historical archaeology

Submitters were concerned that non-Aboriginal historical archaeology would be impacted by the project. Specific concerns include that works proposed (deep excavation) around Lilyfield Road and Gordon Street may result in impacts on archaeological remains.

Response

Of the 11 HAMUs located across four of the heritage study areas, there were five in Area 3 (Rozelle), which included HAMU 3 – Lilyfield Road and Gordon Street. HAMU 3 was assessed having potential for archaeological remains of local significance.

HAMU 3 – Lilyfield Road and Gordon Street would be impacted by the project. Much of the works in this HAMU may require deep excavation in areas where archaeological deposits are likely to be present, and in the location of the known stormwater drain. Extensive ground disturbance of this kind will have a major adverse impact on any archaeological remains which may be present.

Activities associated with surface earthworks, drainage, and finishing works (such as service installation, installation of bridge foundations and landscaping) would have more localised impacts on the historical archaeological resource. These works are likely to have a minor to moderate adverse impact on the potential historical archaeological resource, depending on the location, extent and nature of the proposed works.

A Historical Archaeological Research Design (HARD) will be prepared, in consultation with NSW Heritage Council, prior to the start of proposed works within HAMU 3. The HARD will be prepared by a

qualified archaeologist in consultation with the NSW Heritage Council and will include:

- Descriptions of clear significance thresholds for possible archaeological items that may be uncovered during works
- A methodology and scope for a program of archaeological excavation, investigation, and recording of any historical archaeological remains that will be impacted by the project
- Requirement for post-excavation reporting, including artefact analysis and additional historical research, where necessary, and long term management of records
- Details of what will happen with any artefacts uncovered and associated reports.

The archaeological investigation and recording of any remains within HAMU 3 will ensure the research value of these remains is realised. Depending on what is found during the archaeological investigation, the findings would be considered during the development of the Interpretation Strategy for the project to ensure that any significant findings of the archaeological investigations are communicated to the public.

In addition, before excavation of archaeological management sites, a suitably qualified Excavation Director who complies with Criteria for Assessment of Excavation Directors (Heritage Council of NSW 2011) will be engaged to advise on matters associated with historic archaeology. Where archaeological excavation is required, the Excavation Director will oversee excavation and advise on archaeological matters (see environmental management measure NAH05 in **Chapter E1** (Environmental management measures)).

C20.3 Direct impacts on non-Aboriginal heritage items

928 submitters raised concerns about direct impacts to non-Aboriginal historical items. Refer to section 20.3 of the EIS and Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for details of potential impacts to non-Aboriginal heritage items.

C20.3.1 Direct impacts on non-Aboriginal heritage items

Submitters were concerned that non-Aboriginal heritage items would be impacted by the project. Specific concerns that were raised included:

- Request for a list of existing heritage structures which are proposed to be demolished
- Places would be demolished that are of potential heritage significance but are not approved under statutory heritage recognition
- Demolition of heritage buildings and urban heritage, specifically at Rozelle (including the stormwater canal) and 50 heritage listed homes in Haberfield/Ashfield
- The demolition of heritage listed houses will destroy the heritage of Victoria Road
- Heritage listed houses at Ashfield and Haberfield will be acquired for the project
- Demolition of historical warehouses, bank, brewery and laneways between Pyrmont Bridge Road and Mallet Street and historic street frontages around Bignell Lane, Camperdown
- Heritage houses that have already been demolished at the St Peters Interchange
- Direct impacts to heritage items in Newtown
- The use of a rockbreaker may directly impact heritage items at Camperdown and Haberfield
- Concern that the EIS team do not appreciate the value of heritage items, and that it is pushed aside if it prevents project plans
- Concern that by designating the project 'State significant infrastructure', damage to heritage is acceptable
- The plan will impact on key high level heritage protection areas and sites in Newtown with a significant number of heritage protected buildings in the project's footprint. The damage to them will seriously impact our national cultural history.

A number of submitters advocated comments from the Heritage Council of NSW, stating that the significant direct impact on heritage buildings is not acceptable.

Response

Construction of a transport infrastructure project of this scale in an established urban area will inevitably generate a range of localised impacts. For this project, one of the unavoidable impacts is the partial and full demolition of structures, including listed and potential heritage items. Where feasible and reasonable, the aboveground motorway infrastructure has been located and designed to reduce heritage impacts. The benefits of the project must be balanced against impacts, and the project must be able to demonstrate an overall net community benefit. The benefits and impacts of the project were comprehensively assessed in the EIS and associated technical working papers, and management measures are proposed to minimise impacts where possible. Potential impacts to heritage items have been considered and minimised during the preparation of the concept design for the project. See the sections below for further information.

Demolition of structures

The M4-M5 Link is considered to have a moderate adverse impact to non-Aboriginal heritage overall, with direct impacts, including the demolition of buildings.

The non-Aboriginal heritage impact assessment in the EIS concluded that the project would potentially impact both listed and potential heritage items. The listed heritage items across the study area that the project would directly affect are:

- Demolition of three statutory heritage items of local heritage significance, being:
 - Stormwater canal at Lilyfield Road, Rozelle
 - 'Cadden Le Messurier' at 84 Lilyfield Road, Rozelle
 - Former hotel at 78 Lilyfield Road, Rozelle
- Partial demolition of one statutory heritage item of local heritage significance, being the Whites Creek Stormwater Channel No. 95
- The project temporarily encroaches into the south-western boundary of the curtilage of the White Bay Power Station which is a SHR listed item. The minor encroachment occurs during the construction phase of the project, as a result of the alignment of the temporary Victoria Road bridge. However, the works would be some distance from the power station building itself and the building would not be physically impacted by the project.

The individual buildings/structures assessed as being potential local heritage items which would be fully demolished are:

- Victoria Road bridge at Rozelle
- Former White Bay Hotel site foundations (plinth and archaeology) at Rozelle
- 260 Victoria Road, Rozelle
- 262 Victoria Road, Rozelle
- 264 Victoria Road, Rozelle
- 266 Victoria Road, Rozelle
- 248 Victoria Road, Rozelle
- 250 Victoria Road, Rozelle
- 164 Parramatta Road (former Bank of NSW), Annandale.

In addition, the sandstone cutting on the northern side of Rozelle Rail Yards (a landscape feature) was assessed as being a potential local heritage item and would be partially demolished.

Demolition of the stormwater channel at Rozelle would result in the permanent loss of the heritage item. It would remove evidence of early stormwater management infrastructure associated with the industrialisation of this area.

The potential for heritage impacts resulting from the project in the Rozelle area would arise from the demolition of SREP listed heritage items (Stormwater Canal, 'Cadden Le Messurier' and Former Hotel) and contributory items within the Hornsey Street HCA to facilitate the dive portals, cut-and-cover tunnels, and ancillary infrastructure. Management measures would be implemented for these heritage items including photographic archival recording and the preparation of an Interpretation Strategy and a Heritage Salvage Strategy. These environmental management measures (NAH03, NAH02 and NAH09 respectively) are listed in **Chapter E1** (Environmental management measures).

Victoria Road

No listed heritage items would be demolished along Victoria Road as a result of the project (refer to section 6.8 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS).

Six potential heritage items identified as being of local heritage significance located along Victoria Road would be demolished as a result of the project. Management measures would be implemented, including photographic recording of some houses along Victoria Road, and the preparation and implementation of an Interpretation Strategy and a Heritage Salvage Strategy. These measures are listed in **Chapter E1** (Environmental management measures).

Haberfield and Ashfield

Two heritage items listed in the Ashfield Local Environmental Plan 2013 (Haberfield HCA and a commercial building at 479 Parramatta Road, Ashfield) were identified within Area 1 (refer to section 20.3.2 of the EIS). These items were assessed as having a neutral impact rating associated with visual setting, vibration and settlement impacts (refer to section 20.3.2 of the EIS). The construction footprint for the Parramatta Road West civil and tunnel site (C1b) and Parramatta Road East civil site (C3b) do not contain heritage items and are not within the HCA. A number of potential heritage items were identified in Bland Street and Alt Street in the vicinity of the construction footprint, however due to the physical separation of these items from the construction footprint their impact was assessed as neutral (refer to section 20.3.3 of EIS).

Camperdown

There are no listed heritage items that would be directly impacted between Parramatta Road and Mallet Street as part of the project and this area is not located in a HCA. However, as listed above, the 'Former Bank of NSW' located at 164 Parramatta Road at Annandale was assessed as having potential heritage significance (refer to Table 20-18 of the EIS and Annexure A of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS). This item would be subject to a direct impact through demolition to allow for the construction of the Pyrmont Bridge Road tunnel site (C9). There were no other potential heritage items identified between Pyrmont Bridge Road and Mallet Street, or in Bignell Lane, which would be directly impacted by the project.

Environmental management measure NAH03 (see **Chapter E1** (Environmental management measures)) proposes that photographic archival recording will be undertaken of the Former Bank of NSW in accordance with the NSW Heritage Office guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006). The photographic archival recording will occur prior to any works that have the potential to impact on the building and the report development process will include the identification of appropriate stakeholders to receive copies of the documentation.

St Peters interchange

There would be no heritage items demolished in the vicinity of the St Peters interchange for the M4-M5 Link project. The demolition of heritage items in this area to allow the construction of the St Peters Interchange was assessed as part of the New M5 EIS (AECOM 2015b). This included the preparation and implementation of a heritage salvage strategy. Cumulative impacts of the M4-M5 Link with other WestConnex component projects, including the New M5 project, are described and assessed in Chapter 26 (Cumulative impacts) of the EIS.

Newtown

No areas of surface disturbance from the project would be located within Newtown, and no heritage items or conservation areas in Newtown would be directly impacted by the project.

Section 20.30.2 of the EIS identified the listed and potential non-Aboriginal heritage items within the study area that would be potentially subject to indirect impacts as a result of tunnelling through vibration and settlement during construction. Table 6-48 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS contains details of the heritage items and HCAs located above and directly intersecting the project tunnel alignment only. It was concluded that the project would have a 'neutral' or 'minor adverse' impact on all heritage items listed in Table 6-48 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS that are within Newtown, given the depth of the tunnelling and predicted levels of settlement in the vicinity of the heritage items. Environmental management measures to manage potential settlement impacts are described in **Chapter E1** (Environmental management measures).

Blasting and rockbreaking

Blasting and rockbreaking may be used to help excavate the tunnels. If blasting is proposed during detailed design, a Blast Management Strategy will be prepared in accordance with relevant guidelines. The alignment of the tunnels and the locations of tunnel portals have given regard to maximising the use of the best possible geotechnical conditions, therefore reducing the impact of tunnelling (including the use of roadheaders and rockbreakers) on properties at the surface.

Impacts to heritage items due to blasting or rockbreaking for tunnelling would be indirect (rather than direct). Potential indirect impacts on non-Aboriginal heritage items as a result of tunnelling, including vibration and settlement, are addressed in section 20.3.4 of the EIS.

A range of measures have been proposed to avoid and/or minimise potential impacts to heritage and indirect impacts through vibration (see **Chapter E1** (Environmental management measures)), including:

- CNVMP will be prepared for the project. The plan will:
 - Identify relevant performance criteria in relation to noise and vibration
 - Identify noise and vibration sensitive receivers and features in the vicinity of the project
 - Include standard and additional mitigation measures from the *Construction Noise and Vibration Guideline* (CNVG) (NSW Roads and Maritime Services (Roads and Maritime) 2016) and details about when each will be applied
 - Describe the process(es) that will be adopted for carrying out location and activity specific noise and vibration impact assessments to assist with the selection of appropriate mitigation measures
 - Include protocols that will be adopted to manage works required outside standard construction hours in accordance with relevant guidelines
 - Detail monitoring that will be carried out to confirm project performance in relation to noise and vibration performance criteria
- Location and activity specific noise and vibration impact assessments will be carried out prior to (as a minimum) activities:
 - With the potential to result in noise levels above 75 dBA at any receiver
 - Required outside standard construction hours likely to result in noise levels greater than the relevant noise management levels
 - With the potential to exceed relevant performance criteria for vibration

The assessments will clarify predicted impacts at relevant receivers in the vicinity of the activities to assist with the selection of appropriate management measures, consistent with the requirements of *Interim Construction Noise Guideline* (NSW Department of Environment and Climate Change NSW (DECC) 2009) (ICNG) and CNVG that will be implemented during the works

- Monitoring will be carried out at the commencement of activities for which a location and activity specific noise and vibration impact assessment has been prepared to confirm that actual noise and vibration levels are consistent with noise and vibration impact predictions and that the management measures that have been implemented are appropriate
- A Blast Management Strategy will be prepared and implemented for the project if blasting is proposed. The strategy will:

- Identify relevant performance criteria in relation to potential noise and vibration impacts due to blasting with reference to (as a minimum) *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (Australian and New Zealand Environment Conservation Council (ANZECC) 1990) and Australian Standard AS 2187.2-2006 Explosives - Storage, transport and use, Part 2: Use of explosives
- Describe trials that will be carried out to confirm vibration levels from blasting and facilitate development of predictive tools to allow potential noise and vibration impacts to be identified
- Include details of management measures that will be implemented to ensure compliance with relevant performance criteria
- Include details of community consultation requirements prior to commencing blasting
- The Blast Management Strategy will be implemented for all blasting carried out as part of the project.

Concern over value held for and damage to Non-Aboriginal heritage

As outlined in the responses above, construction of a State significant transport infrastructure project of this scale in an established urban area will inevitably generate a range of impacts. The impact to heritage has been reduced by tunnelling and through the selection process for construction ancillary facilities. The criteria for selection of construction sites included consideration of surrounding land uses including heritage values.

Specific impacts to heritage from the M4-M5 Link project have been avoided through:

- Locating the Rozelle interchange predominantly underground, resulting in construction activities being contained within the Rozelle Rail Yards with no impact on the adjacent Easton Park (locally listed)
- Retaining important elements of the White Bay Power Station site
- Removal of the Camperdown interchange which avoided direct and indirect impacts on HCAs and heritage items such as the University of Sydney and Victoria Park (both subject to an application for State significance) and on the locally listed sandstone retaining wall on the northern side of Parramatta Road
- Removal of potential construction ancillary facility considered at Easton Park which avoided direct impact to the locally listed park, reduced impacts on the Easton Park HCA, as well as allowing the retention of the locally listed Sewage Pumping Station No.6
- Removal of the potential construction ancillary facility considered at Angel Street/Railway Lane construction ancillary facility at Newtown from the construction footprint which avoided direct impact (demolition) on the former Newtown Tram Sheds (of State significance)
- Removal of the potential mid-point construction ancillary facility considered at Derbyshire Road which avoided direct impact (demolition) of one local heritage item, which consisted of two buildings, including the former State Rail Authority (SRA) cable store and traffic office at Leichhardt.

Refer to Chapter 4 (Project development and alternatives) of the EIS for further detail on the development of the project including consideration of alternative construction ancillary facilities.

Management of impacts

Management measures to avoid, reduce and manage impacts to heritage items are outlined in **Chapter E1** (Environmental management measures), which include specific measures for items that would be demolished, including photographic archival recording, the implementation of a Heritage Salvage Strategy and an Interpretation Strategy. The 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 Urban Design and Landscape Plans (UDLPs) for the project, in accordance with NSW Heritage Office *Interpreting Heritage Places and Items Guideline August 2005* (see environmental management measure NAH02 in **Chapter E1** (Environmental management measures)).

A Construction Heritage Management Plan (CHMP) will also be prepared and implemented as part of the Construction Environmental Management Plan, which would include measures that will be implemented to manage potential impacts to items of heritage significance and include heritage awareness and management training for relevant personnel involved in site works (see environmental management measure NAH01 in **Chapter E1** (Environmental management measures)).

The detailed design and construction will be managed to ensure, as far as possible, that the identified potential heritage impacts are minimised and/or avoided by the implementation of a range of general and specific measures.

C20.3.2 Impacts to heritage items within the Rozelle Rail Yards

Submitters requested that heritage items at the Rozelle Rail Yards be retained.

Response

Roads and Maritime has undertaken an assessment under Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) for a suite of site management works on part of the Rozelle Rail Yards. These works would remove rail and rail related infrastructure from the site and allow existing issues at the site such as waste and noxious weeds to be appropriately managed.

Key features of the works include removal of existing above ground rail infrastructure including gantries, railway lines, ballast, sleeps and buildings (excluding the southern penstock, switching station, transformer and rail infrastructure to the east of the Victoria Road bridge) generally to a depth of 500 millimetres below ground level, except where drainage channels and sediment basins are required. The site management works were assessed in a Review of Environmental Factors (REF) which was approved by Roads and Maritime under Part 5 of the EP&A Act on 10 April 2017 and which can be accessed on the Roads and Maritime website¹. The environmental assessment included the preparation of a heritage impact assessment. Mitigation measures including archival recordings of these items and salvage and storage of the lighting tower and rail gantries for potential reuse in future development of the Rozelle Rail Yards were recommended in the REF. See **section C30.3.1** for response to submissions raised on the Rozelle Rail Yards site management works.

The historical significance of the Rozelle Rail Yards was comprehensively assessed in section 20.2.3 and Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. The assessment found that there would be no direct heritage impacts to listed heritage items at the Rozelle Rail Yards as part of the M4-M5 Link project.

However, a potential heritage item located within the Rozelle Rail Yards would be impacted, being the sandstone cutting. This potential heritage item has been assessed in the EIS as having local heritage significance and would be partially demolished as a result of the new motorway portals.

The Victoria Road bridge, which is located above a small section of the Rozelle Rail Yards, would be demolished as part of the project. This item is not a listed heritage item but has been assessed in the EIS as a potential heritage item of local heritage significance.

The White Bay Power Station southern penstock (and its associated water channels) is located within the Rozelle Rail Yards to the east of the Victoria Road bridge. The item is to be retained, however it has the potential to be indirectly impacted through vibration. A condition assessment of the southern penstock (and its associated water channels) will be carried out by a heritage specialist and a structural engineer prior to any works in the vicinity. In addition, the southern penstock and its associated water channels (location and extent unknown) will be protected from indirect impacts during works associated with the reconstruction of the Victoria Road bridge.

Where impacts are unavoidable, measures would be implemented including photographic archival recording, an Interpretation Strategy and a Heritage Salvage Strategy. The Interpretation Strategy would identify how the rail related infrastructure salvaged from the Rozelle Rail Yards will be reused.

Chapter D2 (White Bay civil site (C11)) describes an additional construction ancillary facility at Rozelle, adjacent to the east of the White Bay Power Station, primarily for heavy vehicle truck marshalling and construction workface parking. The northern penstock, an associated feature of the White Bay Power Station, is partly within the cosmetic damage minimum working distances for vibration associated with construction activities proposed at the site, and therefore may potentially be indirectly impacted (see **Figure D2-7**).

¹ <http://www.rms.nsw.gov.au/projects/sydney-inner/rozelle-rail-yard-site-management/index.html#Projectdocuments>

As required by environmental management measure NAH16 (see **Chapter E1** (Environmental management measures)), a condition assessment of the northern penstock will also be carried out by a heritage specialist and a structural engineer prior to any vibratory works in the vicinity that have the potential to impact on the item. The condition assessment will inform additional management measures to protect the northern penstock, if required. Any conservation works required to limit potential impacts on deteriorated fabric (loose bricks, corroded steel) will be identified and implemented prior to commencement of the relevant vibratory works in the vicinity. Further assessment of the northern penstock is provided in **section D2.4.2** and **section D2.4.6**.

C20.4 Indirect impacts to non-Aboriginal heritage items

683 submitters raised concerns about indirect impacts to non-Aboriginal heritage items. Refer to section 20.3 of the EIS and Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for details of potential impacts to non-Aboriginal heritage items.

C20.4.1 Indirect impacts to non-Aboriginal heritage items

Submitters raised concern regarding potential for the project to result in indirect impacts to non-Aboriginal heritage through potential vibration, settlement and change in visual setting. Potential indirect impacts of concern raised by submissions included:

- Potential impacts of tunnelling on heritage items in Newtown and Rozelle
- The three layers of tunnelling under Rozelle is technically complicated and poses a risk to heritage homes and buildings
- Potential for ground movement to impact heritage structures at Newtown, including the Silos building in Gladstone Street, which is close to the tunnel alignment near Station Street
- Heritage items and areas in the inner west that are not directly affected would be degraded as a result of impacts on historic communities
- Twenty-one statutory listed (State and local) items of heritage would be subject to indirect impacts through vibration, settlement and visual setting
- The Rozelle interchange will impact the heritage area and heritage houses, due to the concrete portals, large volumes of traffic and construction disruptions including increased noise and vibration
- Further loss of heritage houses affecting the visual amenity of the environment
- Potential for indirect impacts to occur on the historic Yasmar Estate
- After construction is complete, traffic around the St Peters interchange has the potential to impact the visual amenity of existing heritage at Newtown, Enmore and Stanmore
- Potential for impacts to heritage properties at Glebe.

Response

Section 20.30.2 of the EIS identified the listed and potential non-Aboriginal heritage items within the study area that would be potentially subject to indirect impacts through vibration and settlement during construction, and indirect impacts through visual setting during construction and operation. Twenty-one heritage items were identified to have the potential to be indirectly impacted, however the magnitude of these impacts were found to be either minor adverse or neutral.

The Yasmar Estate is located more than 100 metres away from the mainline tunnel alignment and is therefore unlikely to be impacted by tunnelling. Under Option A and B for the construction scenario at Haberfield and Ashfield, the Yasmar Estate is located adjacent to but outside of the heritage study area (refer to section 6.5 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS) and is unlikely to be directly impacted by construction of the project.

The closest extent of the construction footprint to Yasmar Estate is the Parramatta Road East civil site (C3b). Yasmar Estate would not be within vibration minimum working distances for construction activities as identified in Annexure J of Appendix J (Technical working paper: Non-Aboriginal heritage) of the EIS.

No heritage properties in Glebe have been identified as being potentially indirectly impacted as a result of settlement, vibration or visual setting for the project.

Tunnelling impacts at Rozelle and Newtown

Figure 6-13 to Figure 6-20 in section 6.14 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS illustrates heritage items and conservation areas listed on local, State and Section 170 Registers located above the tunnel alignment including within Rozelle and Newtown. Potential for vibration impacts on heritage items associated with tunnelling is described in section 6.11 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. Potential settlement impacts on heritage items are described in section 6.13 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. In the assessment of settlement and vibration impacts to heritage items consideration was given to:

- The depth of tunnelling in the vicinity of the heritage item
- Predicted settlement impacts as detailed in section 12.3.4 of the EIS
- Predicted vibration impacts as detailed in Chapter 5 of Appendix J (Technical working paper: Noise and vibration) of the EIS.

Table C20-1 contains details of the heritage items and HCAs located above and directly intersecting the project tunnel alignment at Rozelle and Newtown. **Table C20-1** is an extract of the relevant items from Table 6-48 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. The project is expected to have a minor adverse vibration and/or settlement impact on heritage items that are shaded grey in **Table C20-1**, meaning the project would either affect only a small part of the item or a distant/small part of the setting of a heritage place. The impact may also be temporary and/or reversible. Impacts to other items in **Table C20-1** (ie not shaded grey), have been identified as neutral, meaning they would have no heritage impact.

Table C20-1 Heritage items and HCAs on local, State and S170 Registers located above or directly intersecting the tunnels at Newtown and Rozelle

Item name	Address	Significance	Listing	Depth of tunnel at this location	Impact type	Impact rating
Corner shop – including interiors	88 Chelmsford Street, Newtown	Local	Marrickville Local Environment Plan (LEP) 2011 #I141	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Victorian Georgian house and stables – including interiors	38 and 54 Albermarle Street, Newtown	Local	Marrickville LEP 2011 #I130	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Group of Victorian Style Terraces – including interiors	92–98 Chelmsford Street, Newtown	Local	Marrickville LEP 2011 #I142	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Former electricity substation	134 Lennox Street, Newtown	Local	Marrickville LEP 2011 #I163	35 m to 65 m below ground	Unlikely to be impacted	Neutral
St Joseph's Boys School – including interiors	93 Chelmsford Street, Newtown	Local	Marrickville LEP 2011 #I309	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Bedford Street Retail Group – including interiors	15, 27 and 37 Bedford Street and 167 Probert Street, Newtown	Local	Marrickville LEP 2011 #I138	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Community building 'St George's Hall' (352 King Street) including interior	344–358 King Street, Newtown	Local	Sydney LEP 2012 #I1014	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Saints Constantine and Helen Greek Orthodox Church including buildings and their interiors, front fence and grounds	366–378 King Street, Newtown	Local	Sydney LEP 2012 #I1015	35 m to 65 m below ground	Unlikely to be impacted	Neutral

Item name	Address	Significance	Listing	Depth of tunnel at this location	Impact type	Impact rating
Service station 'Rising Sun' (426 King Street) including interior and front forecourt	424–430 King Street, Newtown	Local	Sydney LEP 2012 #I1016	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Commercial building including interior	482–496 King Street, Newtown	Local	Sydney LEP 2012 #I1017	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Commercial building including interior	522–524A King Street, Newtown	Local	Sydney LEP 2012 #I1018	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Formerly 'Molloys' shop – including interiors	539 King Street, Newtown	Local	Marrickville LEP 2011 #I156	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Shop counters – including interiors	555 King Street, Newtown	Local	Marrickville LEP 2011 #I157	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Newtown/Erskineville	King Street	Local	Sydney LEP 2012 C47	35 m to 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	5 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I733	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	7 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I734	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	9 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I735	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	11 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I736	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	13 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I737	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	15 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I738	Greater than 65 m below ground	Unlikely to be impacted	Neutral
House – including interiors	17 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #I739	Greater than 65 m below ground	Unlikely to be impacted	Neutral

Item name	Address	Significance	Listing	Depth of tunnel at this location	Impact type	Impact rating
House – including interiors	21 Coulon Street, Rozelle	Local	Leichhardt LEP 2013 #1740	Greater than 65 m below ground	Unlikely to be impacted	Neutral
St Thomas' Church group including interiors	668 Darling Street, Rozelle	Local	Leichhardt LEP 2013 #1745	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Stone building – including interiors	75 Evans Street, Rozelle	Local	Leichhardt LEP 2013 #1758	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Semi-detached house – including interiors	77 Evans Street, Rozelle	Local	Leichhardt LEP 2013 #1759	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Semi-detached house – including interiors	79 Evans Street, Rozelle	Local	Leichhardt LEP 2013 #1760	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Terrace – including interiors	101 Evans Street, Rozelle	Local	Leichhardt LEP 2013 #1762	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Terrace – including interiors	103 Evans Street, Rozelle	Local	Leichhardt LEP 2013 #1763	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Former Mechanics Institute – including interiors	114 Victoria Road, Rozelle	Local	Leichhardt LEP 2013 #1806	Greater than 35 m below ground	Unlikely to be impacted	Neutral
Former tramway stables and substation garage – including interiors	10A Hancock Street, Rozelle	Local	Leichhardt LEP 2013 #1770	Greater than 35 m below ground	Unlikely to be impacted	Neutral
Single storey shops – including interiors	731–735 Darling Street, Rozelle	Local	Leichhardt LEP 2013 #1748	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Single storey commercial building – including interiors	736 Darling Street, Rozelle	Local	Leichhardt LEP 2013 #1749	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Corner building – including interiors	22 Belmore Street, Rozelle	Local	Leichhardt LEP 2013 #1729	Greater than 65 m below ground	Unlikely to be impacted	Neutral
Semi-detached house – including interiors	122 Foucart Street, Rozelle	Local	Leichhardt LEP 2013 #1766	35 m to 65 m below ground	Unlikely to be impacted	Neutral

Item name	Address	Significance	Listing	Depth of tunnel at this location	Impact type	Impact rating
Semi-detached house – including interiors	120A Foucart Street, Rozelle	Local	Leichhardt LEP 2013 #I767	35 m to 65 m below ground	Unlikely to be impacted	Neutral
Easton Park HCA		Local	Leichhardt LEP 2013 C18	Ground to 65m below ground	Refer to detailed impact assessment in Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS	
Easton Park	Denison Street, Rozelle	Local	Leichhardt LEP 2013 #I752	Ground to 65m below ground	Refer to detailed impact assessment in Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS	
Sewage Pumping Station No. 6 (SP0006)	Lilyfield Road, Rozelle	Local	Sydney Water S170 # 4571704	Ground to 65m below ground	Refer to detailed impact assessment in Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS	
Semi-detached house – including interiors	15 Burt Street, Rozelle	Local	Leichhardt LEP 2013 #I730	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse
Semi-detached house, including interiors	17 Burt Street, Rozelle	Local	Leichhardt LEP 2013 #I731	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse
Smith's Hall including interiors	56 Burt Street, Rozelle	Local	Leichhardt LEP 2013 #I732	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse
Corner shop and residence – including interiors	67 Denison Street, Rozelle	Local	Leichhardt LEP 2013 #I753	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse
Shop and residence including interiors	69 Denison Street, Rozelle	Local	Leichhardt LEP 2013 #I754	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse

Item name	Address	Significance	Listing	Depth of tunnel at this location	Impact type	Impact rating
House 'Rotherhithe Cottage' including interiors	73 Denison Street, Rozelle	Local	Leichhardt LEP 2013 #I755	10 m to 35 m below ground	Potential settlement and vibration	Minor adverse
Cottage and former broom factory including interiors	84 Foucart Street, Rozelle	Local	Leichhardt LEP 2013 #I765,	35 m to 65 m below ground	Unlikely to be impacted	Neutral

Figure 6-13 to Figure 6-20 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS illustrates heritage items and conservation areas listed on local, State and Section 170 Registers located above the tunnel alignment. Figure 6-18 identifies that the 'Cragos Flour Mill Site, including interiors' (the Silos building in Gladstone Street) is a local heritage listed item under the Sydney Local Environmental Plan 2012 (Item #I152). It is located around 80 metres from the mainline tunnel alignment for the project and identified in **Figure C20-1**. Considering the Cragos Flour Mill Site is located around 80 metres from the tunnel alignment and the tunnel would be around 40 metres below ground at this point, it is unlikely that this item would be indirectly impacted by tunnelling. The predicted level of settlement at this location would be within accepted settlement criteria (refer to section 12.3.4 of the EIS and Figure 12-21 of the EIS.)

Management measures to avoid and/or minimise indirect impacts to heritage items due to vibration and settlement are outlined in **Chapter E1** (Environmental management measures). These management measures are listed in **section C20.7**.

Visual setting impacts

Section 20.3.2 of the EIS identified that the project has the potential to impact on the curtilage or visual setting of heritage items or HCAs and potential heritage items during construction and operation.

The majority of the project footprint would be underground. However, surface works would be required to support tunnelling activities as well as construction ancillary facilities and to construct surface infrastructure such as interchanges, tunnel portals, ventilation facilities, ancillary operations buildings and facilities.

Table 20-17 of the EIS summarises the potential impacts on listed heritage items, including those which would be subject to setting (such as visual) impacts. The suburbs of Newtown, Enmore and Stanmore are located along the tunnel alignment and are not located within the areas of surface works and disturbance. It is therefore considered unlikely that they would be subject to visual impacts during either construction or operation. Additional traffic to be generated on surface roads by the project is not considered likely to impact on the visual setting of heritage items or HCAs. A number of surface roads are predicted to have reduced surface road traffic as a result of the project (refer to section 8.3.3 of the EIS).

A CHMP will be prepared and implemented as part of the Construction Environmental Management Plan (CEMP). The CHMP will include measures that will be implemented to manage potential impacts on items of heritage significance during construction (including impacts on visual setting) (see environmental management measure NAH01 in **Chapter E1** (Environmental management measures)).

The Rozelle interchange has been designed to be located mostly underground, minimising visual impacts on heritage items. Entrances and exits (tunnel portals) are also mostly orientated to face away from the heritage items and areas located at Rozelle. Potential visual setting impacts to items and HCAs located at Rozelle were assessed in the EIS and summarised in Table 20-17 of the EIS. Six listed items within Area 3 (Rozelle, Lilyfield and Annandale) would be subject to indirect minor adverse visual setting impacts, meaning the impact would be temporary and/or reversible.

The demolition of six potential heritage items at Rozelle along Victoria Road would impact on the streetscape of Victoria Road. Management measures would be implemented to minimise and mitigate the heritage impacts as a result of the demolition (see **section C20.7**).

During detailed design, consideration will be given to using urban design techniques such as architectural design, building materials and colour palettes to merge new infrastructure into the existing visual environment where feasible and reasonable.

Management measures to avoid and/or minimise impacts to the visual setting of non-Aboriginal heritage includes:

- 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, in accordance with *Interpreting Heritage Places and Items Guideline* (NSW Heritage Office 2005) (see environmental management measure NAH02 in **Chapter E1** (Environmental management measures))
- The potential for impacts to the railway cutting on the eastern side of Victoria Road, associated with the White Bay Power Station, will be considered during the development of the detailed design for the realigned Victoria Road and associated bridge. The final design will seek to avoid

impact to the railway cutting and maintain the visual relationship between the cutting and the White Bay Power Station site. Landscaping sympathetic to the relationship, developed in consultation with a heritage specialist, will be included in the UDLPs for the project (see environmental management measure NAH11 in **Chapter E1** (Environmental management measures))

- Landscaping, following the construction of the substation, should consider screening the substation and water treatment plant, from the Leichhardt (Charles Street) Underbridge. The design and location of the landscaping will be informed by a heritage specialist and should seek to create a visual separation between the new structure and the heritage item (see environmental management measure NAH15 in **Chapter E1** (Environmental management measures)).

Appendix O (Technical working paper: Landscape and visual impact) of the EIS provides a detailed visual impacts of the project during construction and operation and also recommends various management measures to minimise these impacts which are summarised in **Chapter E1** (Environmental management measures).

Noise and vibration impacts

Section 20.3.4 of the EIS identified that the construction of project may result in vibration impacts to heritage items as a result of vibration intensive construction activities and equipment. Potential vibration impacts to heritage items were assessed. The assessment found that 11 listed heritage items are located within safe working distances of the surface works for the project and may experience vibration impacts. These items are summarised in **Table C20-2**. Potential vibration impacts to the White Bay Power Station northern penstock from the White Bay civil site (C11) are described in **section D2.4.5**.

The project would result in partial demolition and reshaping of the Whites Creek Stormwater Channel No. 95, resulting in moderate vibration (and setting) impacts. This item is shaded grey in **Table C20-2**.

Table C20-2 Summary of potential impacts on listed heritage items within safe working distances of the project that may experience vibration impacts

Area	Item	Significance	Register	Impact type	Impact rating
Area 2 – Leichhardt	Leichhardt (Charles Street) Underbridge	Local	<ul style="list-style-type: none"> RailCorp S170 Register (#4805738) 	Setting (from removal of existing trees along the northern boundary of the Darley Road civil and tunnel site (C4)), vibration	Minor adverse
Area 3 – Rozelle, and Lilyfield	White Bay Power Station (including northern and southern penstocks)	State	<ul style="list-style-type: none"> SHR (01015) SREP 26 (11) Pacific Power S170 Register (74) 	Vibration, setting and minor curtilage encroachment	Minor adverse
	Easton Park	Local	<ul style="list-style-type: none"> Leichhardt LEP 2013 (ID I752) 	Setting (disturbance of tree roots), temporary visual impacts) vibration and settlement	Minor adverse
	Sewage Pumping Station No. 6	Local	<ul style="list-style-type: none"> Sydney Water S170 Register (#4571704) 	Setting, vibration and settlement	Minor adverse
	Whites Creek Stormwater Channel No. 95	Local	<ul style="list-style-type: none"> Sydney Water S170 Register (#4570343) 	Partial demolition, reshaping, setting, and vibration	Moderate adverse
	Annandale (Railway Parade) Railway Bridge	Local	<ul style="list-style-type: none"> SREP 26 (7) RailCorp S170 Register (#4803231) 	Setting, vibration	Minor adverse
	Annandale (Johnston Street) Underbridge	Local	<ul style="list-style-type: none"> SREP 26 (9) RailCorp S170 Register (#4803229) 	Setting, vibration	Neutral
Area 5 – Annandale	Kerb and gutter on Chester Street	Local	<ul style="list-style-type: none"> Leichhardt LEP 2013 (ID I613) 	Setting, vibration	Neutral
	Warehouse including interiors at 52–54 Pyrmont Bridge Road	Local	<ul style="list-style-type: none"> Leichhardt LEP 2013 (ID I616) 	Setting, vibration	Minor adverse
	Former Grace Bros Repository including interiors	Local	<ul style="list-style-type: none"> Sydney LEP 2012 (ID I2242) 	Setting, vibration	Minor adverse
	Bridge Road School (former Camperdown Public School), including interiors	Local	<ul style="list-style-type: none"> Marrickville LEP 2011 (ID I5) 	Setting, vibration and settlement	Minor adverse

The noise and vibration assessment in Appendix J (Technical working paper: Noise and vibration) of the EIS assesses minimum working distances for vibration intensive plant. Where vibration impacts are predicted, a number of mitigation measures can be implemented including:

- Validation of predicted vibration levels at the nearest receiver buildings to the vibration intensive works
- Use of alternative methods to de-couple load path/equipment that generates less vibration where feasible and reasonable.

Vibration trials and/or attended vibration monitoring or would be undertaken prior to and during any works proposed within the minimum working distances for cosmetic damage to ensure that levels remain below the criteria. In the event that damage occurs to a property as a result of the construction of the project, the damage will be appropriately rectified.

Operational vibration due to the movement of cars and trucks inside the tunnel is considered to be negligible and would not be expected to cause any noticeable impact at surface level properties (refer to section 4.10 of Appendix J (Technical working paper: Noise and vibration) of the EIS).

Potential vibration impacts to features of heritage significance will be managed in accordance with the recommendations of the noise and vibration assessment including the Construction Noise and Vibration Management Plan (CNVMP) prepared for the project, summarised in **Chapter E1** (Environmental management measures), including:

- Location and activity specific noise and vibration impact assessments will be carried out prior to (as a minimum) activities:
 - With the potential to result in noise levels above 75 dBA at any receiver
 - Required outside standard construction hours likely to result in noise levels greater than the relevant noise management levels
 - With the potential to exceed relevant performance criteria for vibration.
 - The assessments will clarify predicted impacts at relevant receivers in the vicinity of the activities to assist with the selection of appropriate management measures, consistent with the requirements of the ICNG and CNVG that will be implemented during the works
- Monitoring will be carried out at the commencement of activities for which a location and activity specific noise and vibration impact assessment has been prepared to confirm that actual noise and vibration levels are consistent with noise and vibration impact predictions and that the management measures that have been implemented are appropriate

Also, 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 measures PL11 and PL13 in **Chapter E1** (Environmental management measures)).

Settlement impacts

A preliminary assessment of the potential for settlement as a result of the project was undertaken and is described in Chapter 12 (Land use and property) of the EIS. The assessment indicated that settlement would be less than 20 millimetres (which is the most stringent maximum settlement criterion for sensitive receivers proposed for the project) over the majority of the tunnel alignment and in the range of 20 millimetres to 35 millimetres in the following locations:

- North and north west of the Rozelle Rail Yards
- North of Campbell Road at St Peters
- In the vicinity of Lord Street at Newtown.

Settlement is not anticipated to impact heritage items identified along the mainline tunnel alignment given the proposed depth of tunnelling and the generally favourable ground conditions. Where settlement is predicted to exceed accepted settlement criteria a range of measures are available to minimise settlement (refer to section 12.3.4 of the EIS).

Potential heritage impacts due to settlement and ground movement caused by the project will be managed in accordance with the relevant measures identified in **Chapter E1** (Environmental management measures) these include:

- Ground settlement will be managed to comply where possible with the criteria specified in environmental management measure PL6 in **Chapter E1** (Environmental management measures))
- Further assessment of potential settlement impacts, including numerical modelling, will be undertaken based on detailed design. In areas where ground movement in excess of settlement criteria is predicted, an instrumentation and monitoring program to measure settlement, distortion or strain will be implemented. Feasible and reasonable measures would be investigated and implemented to ensure where possible that the predicted settlement is within the criteria (see environmental management measure PL7 in **Chapter E1** (Environmental management measures))
- Settlement monitoring will be carried out for the period in accordance with the program starting prior to commencement of works with the potential to result in ground movement and settlement through to until all settlement has stabilised following completion of tunnel construction (see environmental management measure PL9 in **Chapter E1** (Environmental management measures))
- 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) or as otherwise directed by the Independent Property Impact Assessment Panel (see environmental management measure PL10 in **Chapter E1** (Environmental management measures))
- In the event that damage occurs to a property as a result of the construction of the project, the damage will be appropriately rectified (see environmental management measure PL13 in **Chapter E1** (Environmental management measures))
- An Independent Property Impact Assessment Panel will be established prior to the commencement of works with the potential to result in ground movement and settlement or damage due to vibration (see environmental management measure PL11 in **Chapter E1** (Environmental management measures))
- Interface agreements will be entered into with the owners of infrastructure and utility services likely to be impacted by construction of the project (see environmental management measure PL12 in **Chapter E1** (Environmental management measures)).

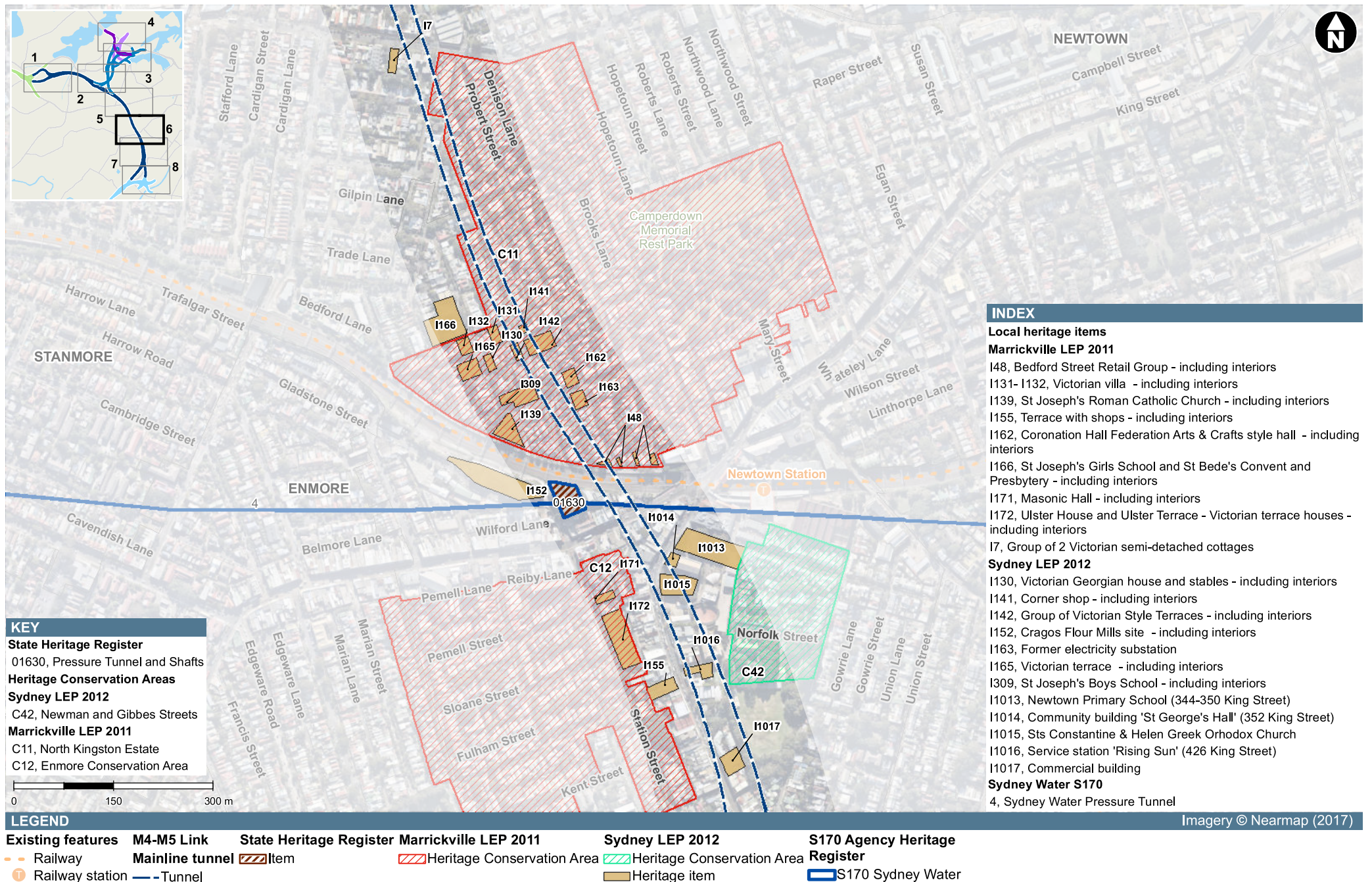
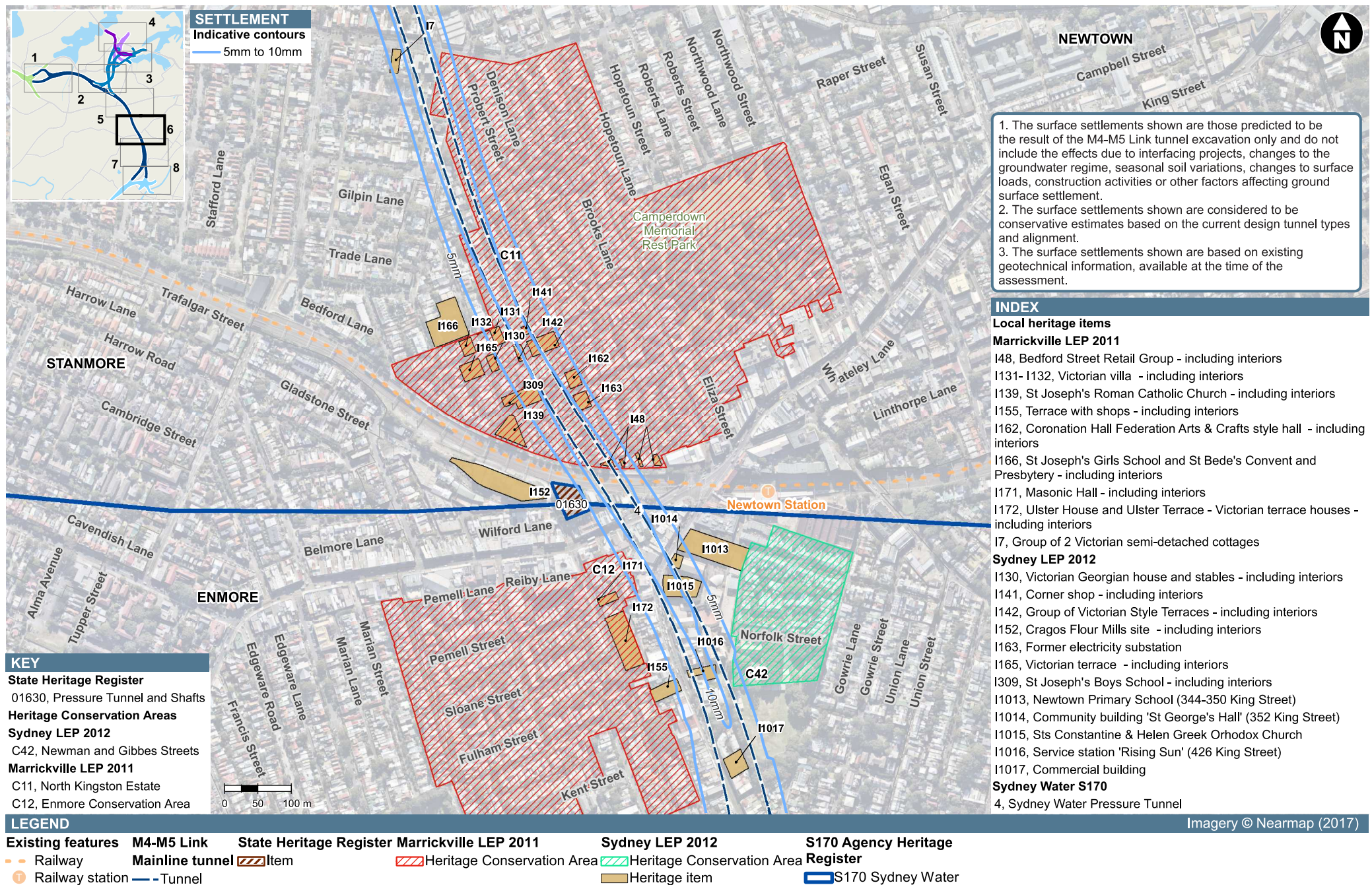


Figure C20-1 Heritage items within 100 metres of the project footprint in the vicinity of Newtown Map 6



C20.5 Impacts to heritage conservation areas

14 submitters raised concerns about impacts to HCAs. Refer to section 20.3 of the EIS and Chapter 6 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for details of potential impacts to HCAs.

C20.5.1 Impacts to non-Aboriginal heritage conservation areas

Submitters expressed concern that the construction of the M4-M5 Link could potentially jeopardise the heritage values of HCAs. Specific concerns raised included:

- The proposed ventilation facilities will degrade the heritage value at Rozelle
- Concern that Sydney Motorway Corporation (SMC) and the NSW Government do not comprehend the social, historical and architectural importance of Haberfield's heritage and of the potential destruction of the historical suburb
- Construction sites at Haberfield have the potential to impact on the heritage integrity of Haberfield as a Federation garden and conservation heritage suburb
- Impacts on the heritage integrity of this precinct, which has risen in critical appraisal in the last two decades to 'Ideal Suburb' [Rozelle].

Response

Five HCAs were identified within the study area where surface works associated with the project are proposed, including:

- Haberfield HCA, Haberfield
- Brennan's Estate HCA, Rozelle
- Easton Park HCA, Rozelle
- Hornsey Street HCA, Rozelle
- Iron Cove HCA, Rozelle.

The significance of these HCAs was discussed further in section 6.5 to section 6.10 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS. Potential impacts to HCAs were assessed in section 20.3.2 of the EIS. The outcome of this assessment was presented in Table 20-17 of the EIS.

Impacts associated with the demolition of heritage and contributory items within the Haberfield HCA, and construction of new motorway infrastructure (including the Parramatta Road ventilation facility) at Haberfield under construction scenarios Option A and B, have already been assessed in the M4 East Non-Aboriginal Heritage Impact Assessment (GML 2015) for the M4 East project. No direct impacts to Haberfield HCA are proposed as part of the M4-M5 Link. Visual setting, vibration and settlement impacts to the Haberfield HCA as a result of construction scenarios Option A and B would be negligible.

The project would result in a neutral impact (ie no impact) on the Hornsey Street HCA as the project would involve the demolition of a non-contributory buildings, and visual setting, vibration and settlement impacts to the HCA would be negligible.

The project would result in a neutral impact (ie no impact) on the Iron Cove HCA as visual setting and vibration impacts would be negligible.

The following HCAs would be subject to a minor adverse impact:

- Brennan's Estate HCA
- Easton Park HCA.

Based on the detailed heritage impact assessment in section 6.7.4 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS, the minor adverse impact on Brennan's Estate HCA and Easton Park HCA is a result of vibration, settlement and visual setting impacts from the temporary construction buildings and hoardings, and from permanent above ground infrastructure (including the Rozelle ventilation facility). The Rozelle East motorway operations complex (MOC3) including the ventilations exhaust facility and outlets, substation, water treatment facility and constructed wetland at Rozelle has is sited closer to City West Link away from the HCAs to the north to reduce heritage impacts.

Section 6.7.3 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS assessed the potential impacts of aboveground project infrastructure on the visual setting of HCAs to the north of Rozelle (ie Brennan's Estate and Easton Park HCA). The Rozelle West motorway operations complex (MOC2) including the ventilation supply facility and substation at Rozelle is contained in the motorway operations complex and is sited at the south-western extent of the Rozelle civil and tunnel site and away from the HCAs to the north, adjacent to facilities constructed for the central business district (CBD) and South East Light Rail project. This is to maximise physical and visual separation in an effort to minimise intrusion/impacts on the curtilage and setting of the HCAs to some extent.

Where feasible, the size, form, design and materiality of the proposed ventilation facility, outlets and water treatment plant would be as visually recessive as possible to reduce permanent visual impacts on the HCAs. Urban design and landscaping would also be designed to reduce the prominence of the infrastructure within the overall design of remaining project land.

Management measures to avoid and/or minimise impacts to HCAs through vibration, settlement and visual setting are discussed in **section C20.4.1**.

C20.6 Cumulative non-Aboriginal heritage impacts

99 submitters raised concerns about cumulative non-Aboriginal heritage impacts of the project. Refer to section 26.4 of the EIS and Chapter 7 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS for an assessment of cumulative non-Aboriginal heritage impacts.

C20.6.1 Cumulative impacts to non-Aboriginal heritage

Submitters raised concerns that a number of non-Aboriginal heritage items had already been demolished as part of the WestConnex program of works and were opposed to more non-Aboriginal heritage items being impacted as part of the project. Specific concerns were raised over the cumulative impact on heritage at Concord, Haberfield and St Peters.

A submission acknowledged and concurred with the view that the cumulative impact to heritage has been dramatically reduced by tunnelling and through site selection process for construction areas.

Response

Chapter 7 of Appendix U (Technical working paper: Non-Aboriginal heritage) of the EIS assessed the cumulative impact of non-Aboriginal heritage from the WestConnex program of works and other related transport projects. Overall, the cumulative impact of the WestConnex program of works on non-Aboriginal heritage items is considered to be major and irreversible given the scale of WestConnex, primarily resulting from the impacts to the Haberfield HCA from the M4 East project. The M4-M5 Link project has been assessed as resulting in a moderate adverse heritage impact. **Table C20-3** lists the overall heritage impact rating for each WestConnex project.

Table C20-3 WestConnex overall heritage impact ranking

WestConnex project	Overall heritage impact ranking
New M5	Moderate adverse
King Georges Road Interchange Upgrade	Nil
M4 Widening	Nil
M4 East	Major adverse
M4-M5 Link	Moderate adverse

Construction of transport infrastructure projects of this scale in established urban areas will inevitably generate a range of localised impacts. For the WestConnex program of works, one of the unavoidable impacts is the demolition of listed and potential heritage items. Where feasible and reasonable, aboveground motorway infrastructure has been located and designed to reduce heritage impacts.

Cumulative impacts to heritage has been dramatically reduced for the M4-M5 Link by having the majority of the project infrastructure underground and through the site selection process for surface infrastructure and facilities (see **section C20.3.1**).

The heritage impacts from the WestConnex program of works are further addressed and managed through the implementation of a range of environmental mitigation measures including archival recording, heritage interpretation and urban design and landscape initiatives (see **Chapter E1** (Environmental management measures)).

No direct physical impacts would be encountered for the Haberfield HCA during the M4-M5 Link project, but there would be cumulative impacts associated with the continued use of construction ancillary facilities for Option A, and extension of visual impacts on the Haberfield HCA associated with Option B. Heritage impacts at Haberfield have been reduced by reusing construction ancillary facilities from the M4 East project and reducing their footprint (Option A). The Option B sites would have minimal heritage impact.

St Peters would be impacted by the New M5 in addition to the M4-M5 Link. For the area of overlap between the New M5 and the M4-M5 Link projects, no additional property acquisitions or demolitions would be required. The physical separation between the existing and proposed intermediary buildings/structures/landscaping between the motorway operations complex and the heritage items in the vicinity means negligible indirect visual setting impacts would be encountered.

The benefits of each WestConnex component project must be balanced against the impacts, and each project must be able to demonstrate an overall net community benefit. The benefits and impacts of each project were comprehensively assessed in the relevant EIS's and associated technical working papers. Overall, the impacts the M4-M5 Link project is considered to deliver a net community benefit.

The M4-M5 Link project is not expected to result in cumulative impacts at Concord, as Concord is located around 1.9 kilometres from the project footprint.

The submission noting that the cumulative impact to heritage has been dramatically reduced by tunnelling and through site selection process for construction areas is noted.

C20.7 Non-Aboriginal heritage environmental management measures

195 submitters raised concerns about the environmental management measures for non-Aboriginal heritage impacts. See **Chapter E1** (Environmental management measures) for further details on the non-Aboriginal heritage environmental management measures.

C20.7.1 Non-Aboriginal heritage environmental management measures

Submitters raised concerns and suggested requests regarding the environmental management measures for non-Aboriginal measures. Specific concerns and requests include:

- Lack of functional management plan for the management of heritage houses in the Rozelle interchange construction zone
- Concern that the promise for repairs to be undertaken on heritage buildings is not adequate
- Request that Haberfield be immediately assessed for SHR protection
- Lack of mitigation of construction impacts on heritage buildings at Haberfield
- Concern that the requirement to mitigate impacts is 'where feasible and reasonable', ie not mandatory
- Suggestion that every effort should be made to connect (physically and thematically) the Rozelle Rail Yards recreation area with the rich non-Aboriginal heritage of Callan Park and the Iron Cove foreshore area

- Concern that the development of a HARD would be carried out post-approval, meaning the community would not have input and that community history would be destroyed.

Response

The management measures outlined in **Chapter E1** (Environmental management measures) have been developed to ensure that potential Non-Aboriginal heritage and archaeological impacts are minimised and/or avoided as far as practicable. The management measures include:

- A CHMP will be prepared and implemented as part of the CEMP. The CHMP will include:
 - Measures that will be implemented to manage potential impacts to items of heritage significance
 - Inclusion of heritage awareness and management training for relevant personnel involved in site works
 - Details regarding the conservation and curation of any historical artefacts recovered during works
- 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, in accordance with *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
- Photographic archival recording will be undertaken of:
 - Infrastructure associated with the White Bay Power Station site that could be affected by the project
 - Whites Creek Stormwater Channel (in the area to be impacted)
 - Stormwater Canal off Lilyfield Road
 - 'Cadden Le Messurier' at 84 Lilyfield Road
 - Former Hotel at 78 Lilyfield Road
 - Victoria Road overbridge
 - Each house at 260–266 Victoria Road
 - Each house at 248–250 Victoria Road
 - Former Bank of NSW (164 Parramatta Road).

It will be undertaken in accordance with the NSW Heritage Office guidelines *Photographic Recording of Heritage Items Using Film or Digital Capture* (2006). The photographic archival recording will occur prior to any works that have the potential to impact upon the items and the report development process will include the identification of appropriate stakeholders to receive copies of the documentation

- As part of the CHMP, a HARD will be prepared before the start of proposed works within each of the following HAMUs: HAMU 3, HAMU 6, HAMU 7, HAMU 10 and HAMU 11. The HARD will be prepared by a qualified archaeologist in consultation with the NSW Heritage Council and will include:
 - Descriptions of clear significance thresholds for possible archaeological items that may be uncovered during works
 - A methodology and scope for a program of archaeological excavation, investigation, and recording of any historical archaeological remains that will be impacted by the project

- Requirement for post-excavation reporting, including artefact analysis and additional historical research, where necessary, and long term management of records
- Details of what will happen with any artefacts uncovered and associated reports
- Before excavation of archaeological management sites, a suitably qualified Excavation Director who complies with Criteria for Assessment of Excavation Directors (Heritage Council of NSW 2011) will be engaged to advise on matters associated with historic archaeology. Where archaeological excavation is required, the Excavation Director will oversee excavation and advise on archaeological matters
- Potential vibration impacts to features of heritage significance will be managed in accordance with the CNVMP prepared for the project
- Potential settlement and ground movement caused by the project in the vicinity of heritage items will be predicted based on the detailed design for further numerical modelling and monitored in accordance with the Settlement Monitoring Program
- Any items of potential heritage conservation significance or human remains discovered during construction will be managed in accordance with an Unexpected Heritage Finds and Humans Remains Procedure developed for the project in accordance with relevant guidance provided by the Heritage Council of NSW, the NSW Heritage Division of OEH and the Standard Management Procedure Unexpected Archaeological Finds (Roads and Maritime 2015a). The procedure will detail requirements regarding notification of relevant agencies and the NSW Police and will be implemented for the duration of construction
- A Heritage Salvage Strategy will be prepared to identify the salvage potential of the fabric and features from heritage items and potential heritage items that will be demolished to facilitate the project. This could include timber joinery, fireplaces, stained glass, stairs, decorative tiles, bricks, steel truss structures, windows etc. The strategy will also identify options and a process for dissemination of salvaged items to owners, community groups and interested parties
- Sandstone kerbing in the vicinity of 32 and 34 Victoria Road, Rozelle that will be removed to facilitate the project will be salvaged and provided to Inner West Council
- The potential for impacts to the railway cutting on the eastern side of Victoria Road, associated with the White Bay Power Station, will be considered during the development of the detailed design for the realigned Victoria Road and associated bridge. The final design will seek to avoid impact to the railway cutting and maintain the visual relationship between the cutting and the White Bay Power Station site. Landscaping sympathetic to the relationship, developed in consultation with a heritage specialist, will be included in the UDLPs for the project
- A condition assessment of the southern penstock (and its associated water channels) will be carried out by a heritage specialist and a structural engineer prior to any works in the vicinity with the potential impact upon the item. If required any conservation works required to limit potential impacts on deteriorated fabric (loose bricks, corroded steel) will be identified and implemented prior to construction
- The southern penstock and its associated water channels (location and extent unknown) will be protected during works associated with the reconstruction of the Victoria Road bridge
- A condition assessment of the northern penstock will also be carried out by a heritage specialist and a structural engineer prior to any vibratory works in the vicinity that have the potential to impact on the item. The condition assessment will inform additional management measures to protect the northern penstock, if required. Any conservation works required to limit potential impacts on deteriorated fabric (loose bricks, corroded steel) will be identified and implemented prior to commencement of the relevant vibratory works in the vicinity
- The new bridge over the Whites Creek Stormwater Channel must not impact the extant significant heritage fabric of the channel and should be a solely independent structure
- Landscaping, following the construction of the substation, should consider screening the substation and water treatment plant, from the Leichhardt (Charles Street) Underbridge. The design and location of the landscaping will be informed by a heritage specialist and should seek to create a visual separation between the new structure and the heritage item.

These measures will be subject to assessment by DP&E and approved by the NSW Minister for Planning, who would issue the project conditions of approval. The project must be undertaken in accordance with those conditions and subject to independent audit to ensure compliance. The final management measures will be further refined during detailed design and documented in a CEMP. A CHMP will be prepared and implemented as part of the CEMP to manage potential impacts on items of heritage significance.

Management plan for heritage houses in the Rozelle interchange construction zone

A number of the management measures for Non-Aboriginal Heritage relate directly to the management of impacts as a result of the construction of the Rozelle interchange and the potential heritage items located along Victoria Road that would be fully demolished for the project. See the environmental management measures outlined above.

Repairs for heritage buildings damaged during construction

The noise and vibration assessment in Appendix J (Technical working paper: Noise and vibration) of the EIS assesses minimum working distances for vibration intensive plant. Environmental management measures would be implemented to manage potential vibration impacts to heritage items as described in **section 10.8.5** and **Chapter E1** (Environmental management measures).

In the event that damage occurs to a property as a result of the construction of the project, the damage will be appropriately rectified.

Assessment of Haberfield for State heritage protection

An assessment to determine whether areas such as Haberfield should be protected on the SHR is beyond the scope of the EIS. The Heritage Division of OEH are responsible for maintaining the SHR and have developed criteria to help establish whether items may be State significant. The Heritage Council of NSW provided comment on the EIS, and these comments have been responded to in **Chapter B7**.

Management of construction impacts at Haberfield

Impacts to heritage during construction at Haberfield are discussed in **section C20.3.1**.

Mandatory nature of management measures

Some environmental management measures would be implemented where 'feasible and reasonable' as defined in the EIS. A mitigation measure is 'feasible' if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements. A mitigation measure is considered 'reasonable' if the overall benefits outweigh the overall adverse social, economic and environmental effects of implementing the measure, including consideration of the cost of the measure.

The identified level of significance for heritage items and conservation areas influences the degree of impact that may be acceptable or the level of investigation and recording that may be required. Consequently, the environmental management measures and recommendations were formulated in accordance with the heritage significance of the listed and potential heritage items and conservations areas.

Interpretation of non-Aboriginal heritage values at Callan Park and Iron Cove

The project does not include a connection between the Rozelle Rail Yards, Callan Park and the Iron Cove foreshore area. 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 UDLs for the project, in accordance with NSW Heritage Office *Interpreting Heritage Places and Items Guideline August 2005* (see environmental management measure NAH02 outlined above and in **Chapter E1** (Environmental management measures) for further detail regarding the Interpretation Strategy).

Preparation of HARD post-approval

The HARD would be prepared before the start of the proposed works to allow for the detailed design of the project to be considered. This would allow for a more accurate methodology and scope to be prepared for a program of archaeological excavation and investigation. This is consistent with the approach adopted for a number of major infrastructure projects in NSW, including other WestConnex projects.

The HARD will be prepared by a qualified archaeologist in consultation with the NSW Heritage Council and will include:

- Descriptions of clear significance thresholds for possible archaeological items that may be uncovered during works
- A methodology and scope for a program of archaeological excavation, investigation, and recording of any historical archaeological remains that will be impacted by the project
- Requirement for post-excavation reporting, including artefact analysis and additional historical research, where necessary, and long term management of records
- Details of what will happen with any artefacts uncovered and associated reports.

See environmental management measure NAH04 outlined above and in **Chapter E1** (Environmental management measures) for further detail regarding the HARD.

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C21 Aboriginal Heritage

This chapter addresses issues raised in community submissions associated with the Aboriginal heritage assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 21 (Aboriginal heritage) and Appendix V (Technical working paper: Aboriginal heritage) of the EIS for further details on the Aboriginal heritage assessment.

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C21.1 Level and quality of assessment

One submitter raised concerns about the level and quality of the Aboriginal heritage assessment. Refer to section 21.1 of the EIS for details of the Aboriginal heritage assessment methodology.

C21.1.1 Adequacy of the Aboriginal heritage assessment

Potential damage to Aboriginal heritage sites along the tunnel alignment and surrounding areas has not been adequately addressed.

Response

The Aboriginal heritage assessment presented in the EIS was carried out in accordance with NSW Roads and Maritime Services (Roads and Maritime)'s *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (2011), and the NSW Office of Environment and Heritage's (OEH) *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (NSW Department of Environment, Climate Change and Water 2010). The assessment was undertaken in accordance with the relevant requirements identified in the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DP&E). This involved an assessment of known and potential Aboriginal cultural heritage values relevant to the project footprint and provided appropriate recommendations for any further assessment as well as the identification of appropriate management and mitigation measures.

The assessment also included a review of the Aboriginal Heritage Information Management System (AHIMS) maintained by the OEH. This review did not identify any recorded sites of Aboriginal objects or places within the project footprint. A site inspection, undertaken in conjunction with the Metropolitan Local Aboriginal Land Council, confirmed there were no surface expressions of Aboriginal heritage objects or places within the project footprint. The closest recorded AHIMS site (#45-6-2278, a rockshelter with midden) is located around 50 metres north of the Rozelle Rail Yards. See **section C21.2.1** for further information on potential impacts to AHIMS site #45-6-2278 from the project.

Historically, land use activities within the project footprint have primarily included residential and industrial development. The majority of the ground surface of the project footprint comprises bitumen roads, buildings and concrete. A significant portion of the project footprint is also within disturbed terrain, concentrated with the Rozelle Rail Yards and along watercourses, being areas that have been impacted by past development or other human activity (Australian Soil Classification Soil Type map of NSW (OEH 2014)).

As a result of the project footprint having been heavily disturbed previously, the likelihood of finding intact *in situ* Aboriginal cultural heritage deposits during construction is low. In addition, a large extent of the project (namely the mainline tunnels) is at a depth at which it is unlikely that Aboriginal heritage items would be uncovered.

Nevertheless, in the event that an Aboriginal heritage item is discovered during construction, the Unexpected Heritage Finds and Human Remains Procedure developed for the project would be followed (see environmental management measure AH1 in **Chapter E1** (Environmental management measures)).

C21.2 Impacts on Aboriginal heritage items

84 submitters raised concerns about the impact of the project on Aboriginal heritage items. Refer to section 21.3 of the EIS for an assessment of potential Aboriginal heritage impacts.

C21.2.1 Impacts on Aboriginal heritage items during the construction work

Submitters were concerned that Aboriginal heritage would be impacted by the project during construction. In particular, submitters raised the following issues:

- Concern that the 13 Aboriginal sites within 500 metres of the M4-M5 Link project footprint will be negatively impacted as the specific routes and construction methods are unknown
- Concern with construction on the banks of Whites Creek potentially impacting middens and other Aboriginal heritage items

- Concern with Aboriginal heritage impacts in the inner west area of Sydney
- Concern with the works along Parramatta Road impacting an associated walking route used historically by Aboriginals to access Farm Cove.

Response

The Aboriginal heritage assessment undertaken for the EIS identified known and potential Aboriginal cultural heritage values relevant to the project footprint. A review of the AHIMS maintained by OEH identified no recorded sites of Aboriginal objects or places within the project footprint. The AHIMS search area covered an area of 11 kilometres by nine kilometres, which is larger than the project footprint. The reason for the larger search area was to provide an adequate buffer around the project footprint, understand the spread and distribution of previously recorded Aboriginal sites and to provide context to the project footprint. A site inspection also confirmed there were no surface expressions of Aboriginal heritage objects or places within the project footprint.

Although there are 49 sites identified in the AHIMS search area (refer to Table 21-3 in section 21.2.3 of the EIS), the closest recorded AHIMS site (#45-6-2278, a rockshelter with midden) is located around 50 metres north of the Rozelle Rail Yards, as shown in Figure 21-1 in section 21.1.5 of the EIS, which identifies the AHIMS sites in proximity of the project footprint.

Excavation associated with tunnelling will be required in the general area beneath registered AHIMS site #45-6-2278. Therefore, there is potential for the site to be indirectly impacted from vibration and settlement during construction of the project. However, the site is outside the minimum safe working distance for vibration intensive plant associated with the mainline tunnel works, with vibration impacts associated with tunnelling works expected to be negligible. Environmental management measures AH2 and AH3 (see **Chapter E1** (Environmental management measures)), have been proposed to mitigate potential impacts to this AHIMS site. These include:

- Subject to gaining access from the relevant landholder, a suitably qualified archaeologist would inspect AHIMS site #45-6-2278 prior to the commencement of any vibration intensive construction activities in the vicinity of the site to verify the site and to confirm and record its current condition
- If the AHIMS site #45-6-2278 is verified, an assessment will be completed by a suitably qualified and experienced person prior to the commencement of any vibration intensive construction activities in its vicinity. The assessment will consider all vibration intensive activities that will occur in the vicinity, the likely vibration levels and relevant vibration criteria and identify the management measures, including monitoring, that will be implemented to prevent and reduce potential impacts. A final condition assessment will be carried out at the completion of construction detailing recommendations for remediation measures, if required.

Ground movement is discussed in section 12.3.4 of the EIS. A preliminary assessment of potential ground movement showed that over the majority of the tunnel alignment predicted ground movement is less than 20 millimetres which would be consistent with the most stringent maximum settlement criterion. There are a number of discrete areas, including to the north and northwest of the Rozelle Rail Yards, where ground movement above 20 millimetres is predicted. These discrete areas generally coincide with areas of shallower tunnelling and/or where multiple tunnels are located close to each other. To manage potential impacts from ground movement and settlement, environmental management measures PL7, PL8 and PL9 have been proposed (see **Chapter E1** (Environmental management measures)). These include:

- Further assessment of potential settlement impacts, including numerical modelling, will be undertaken based on detailed design. In areas where ground movement in excess of settlement criteria are predicted, feasible and reasonable measures would be investigated and implemented to ensure, where possible, predicted settlement is within the criteria
- A Settlement Monitoring Program will be prepared which will include settlement criteria and predictions, location and monitoring points, duration of monitoring, data collection, and comparison of actual settlement with predictions and triggers and corrective actions.
- Settlement monitoring will be carried out for the period in accordance with the program starting prior to commencement of works with the potential to result in ground movement and settlement through to until all settlement has stabilised following completion of tunnel construction. The results of settlement monitoring will be compared to predicted settlement. The implementation and adequacy of the Settlement Monitoring Program will be monitored by the Independent Property Impact Assessment Panel.

Section 21.2.4 of the EIS presents the conclusions drawn from site observations regarding the potential for Aboriginal items and/or objects to be present within the project footprint, which are not currently listed in the AHIMS register. If unregistered Aboriginal shell middens were present, they would be most likely to occur in tidal estuarine foreshore zones (within 10 metres of high water level) including areas adjacent to Rozelle Bay, Iron Cove, Whites Creek, Johnstons Creek, Hawthorne Canal (formerly Long Cove Creek) and Alexandra Canal (formerly Sheas Creek). However, it is unlikely that any shell midden sites remain in the project footprint given the high level of disturbance of those areas from activities including vegetation clearance, landscape modification, channelising of creek channels, urban infill, alteration of pre-existing shorelines and road development. In particular, the banks of Whites Creek have been subject to channelisation as it is a concrete lined channel. It is also a heavily disturbed area associated with City West Link and the light rail corridor.

Based on the results of the Aboriginal heritage assessment, impacts on identified objects or places of Aboriginal heritage are considered unlikely. No known, potential or intangible cultural heritage values were identified within the project footprint. No known places of Aboriginal cultural heritage significance would be impacted by the project, and no known archaeological remains are expected to be disturbed. Indirect impacts, such as those resulting from vibration during construction and settlement during operation, are also not anticipated, or are considered to be negligible. Therefore, impacts on Aboriginal heritage would be avoided and no further assessment is required.

The concept design for the project presented in the EIS was assessed using a conservative approach, which included assessing the worst case impacts and scenarios during construction and operation. The design, including tunnels and operational facilities, considered the best available technical information and adopted good practice environmental standards, goals and measures to minimise environmental risks. The detailed design would be reviewed against the concept design, EIS and approval conditions, to determine whether further assessment and/or approval would be required under the *Environmental Planning and Assessment Act 1979* (NSW). If further assessment/approval is required, the applicable statutory process would be followed prior to the commencement of construction of the relevant aspect of the project. However, based on the location of the known AHIMS sites (see Figure 21-1 in section 21.1.5 of the EIS), potential changes to the alignment of the M4-M5 Link would be unlikely to result in direct impacts to AHIMS sites.

In the event that an Aboriginal heritage item is discovered during construction (including shell middens and other Aboriginal heritage items), the Unexpected Heritage Finds and Human Remains Procedure developed for the project, would be followed (see environmental management measure AH1 in **Chapter E1** (Environmental management measures)).

As no AHIMS registered Aboriginal sites occur within the areas of surface disturbance for the project, no known sites would be directly or indirectly impacted by the project.

The corridor that is now Parramatta Road was once utilised by Aboriginal people as a walking track to access the Parramatta area, a section of which was known as Farm Cove. It is considered highly unlikely that the project (including the construction ancillary facilities in the vicinity of Parramatta Road) would impact upon Aboriginal sites along Parramatta Road as it has been subject to high levels of previous disturbance due to the installation of road infrastructure and general urban development.

C21.3 Aboriginal heritage environmental management measures

One submitter raised concerns about Aboriginal heritage environmental management measures for potential Aboriginal heritage impacts. See **Chapter E1** (Environmental management measures) for further details on the Aboriginal heritage environmental management measures.

C21.3.1 Heritage interpretation at Callan Park

A submitter raised concern over the impact of the project on the Aboriginal significance of Callan Park and the Iron Cove foreshore area. The submitter suggests that every effort should be made to connect (physically and thematically) the Rozelle Rail Yards recreation area with the rich Aboriginal heritage of Callan Park and the Iron Cove foreshore area.

Response

The EIS has concluded that the project is not likely to result in impacts to items of Aboriginal cultural heritage significance. Therefore the Interpretation Strategy (see environmental management measure NAH02 in **Chapter E1** (Environmental management measures)) is focused on managing impacts to items of non-Aboriginal heritage significance which are to be potentially impacted by 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 Urban Design and Landscape Plans (UDLPs) for the project, in accordance with the NSW Heritage Office *Interpreting Heritage Places and Items Guideline* (2005). The Interpretation Strategy will build on themes, stories and initiatives proposed as part of other WestConnex component projects to ensure a consistent approach to heritage interpretation for the project. The remaining project land at the Rozelle Rail Yards would be subject to the relevant UDLP (and therefore the Interpretation Strategy) for the project. UDLPs for the project will be prepared in consultation with relevant local councils and the community.

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C22 Greenhouse gas

This chapter addresses issues raised in community submissions associated with the greenhouse gas (GHG) assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 22 (Greenhouse gas) and Appendix W (Detailed greenhouse gas calculations) of the EIS for further details on the GHG assessment.

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C22.1 Level and quality of greenhouse gas assessment

115 submitters raised concerns about the GHG assessment. Refer to section 22.1 and Appendix W (Detailed greenhouse gas calculations) of the EIS for a detailed description of the GHG assessment methodology.

C22.1.1 Inadequate assessment of greenhouse gas emissions

Submitters have raised concerns that the impacts of GHG emissions have not been adequately assessed, including long-term impacts on climate change. Specific concerns included:

- The EIS has not responded to the global threat of climate change and does not demonstrate how the project will contribute to climate change, through GHG emissions generated by traffic, and provides no serious case of how it will be responsive to mitigating against future climate change
- The claim of reduced emissions from vehicles is selective and not credible
- Rail transport (passenger and freight) and surface road options should have been included in the assessment for a comparison of total energy consumption over the life of the project
- The assessment was based on flawed traffic modelling (WestConnex Road Traffic Model version 2.3 (WRTM v2.3))
- The EIS has not properly assessed the cumulative impacts on GHG emissions in the 2033 scenario. If free flow traffic conditions do not occur, the modelled greenhouse gas outcomes could be significantly different
- Emissions were not modelled beyond 2033, even though the contractual life of the project is until 2060. Therefore the longer outcome of the project is likely to increase GHG emissions
- The EIS concludes that the 2023 'With project' scenario would increase net GHG emissions and the 2023 'Cumulative' scenario would have a net decrease of GHG emissions. However, as the 2023 'Cumulative' scenario includes the proposed future Sydney Gateway and Western Harbour Tunnel projects, which are neither planned nor approved, the 2023 'With project' scenario should be considered as a likely outcome, which would mean an increase in emissions would occur.

Response

Contribution to global climate change

The project's impact on future climate change is through the emission of GHG. Chapter 22 (Greenhouse gas) and Appendix W (Detailed greenhouse gas calculations) of the EIS provide an estimate of the project's contribution to climate change through an assessment of GHG emissions attributed to the project's construction, operation and use.

While the effects of climate change vary based on local context, the cause of anthropogenic climate change, being the increased generation and concentration of GHG emissions in the atmosphere, occurs on a global scale. The global nature and long lag times associated with climate processes means that the contribution of GHG emissions from one project cannot be attributed to local changes in climate. As a result, the estimate of GHG emissions generated by the project is considered as a contribution to global climate change. Climate change impacts on the project and adaptation measures to respond to climate change risks are addressed in Chapter 24 (Climate change risk and adaptation) of the EIS.

As discussed in section 22.2 of the EIS, mitigation of GHG emissions is addressed through international, national and state policy frameworks including the Kyoto Protocol (United Nations Framework Convention on Climate Change (UNFCCC) 2012), the Paris Agreement (UNFCCC 2015), the Australian Government's Direct Action Plan, Emissions Reduction Fund (Australian Government Clean Energy Regulator), the NSW Government's Climate Change Policy Framework (NSW Office of Environment and Heritage (OEH) 2016) and NSW Government Resource Efficiency Policy (OEH, 2014). The *NSW Long Term Transport Master Plan (Transport Master Plan)* (Transport for NSW 2012) and *Transport for NSW Environment and Sustainability Policy Framework* (2013) also include provisions for improved energy efficiency and a reduction in GHG emissions. The project has been developed in line with targets identified in these policy frameworks, and the WestConnex Sustainability Strategy, to reduce the project's contribution to global GHG emissions.

Road transport emissions account for approximately 15 per cent of Australia's annual GHG emissions, with 80.8 million tonnes of carbon dioxide equivalent (t CO₂-e) released annually (based on data in the 2015 National Inventory Report (Australian Government 2017)). The GHG assessment undertaken for the project demonstrates the benefits of road tunnel usage in urban areas, where travel along a more direct route at higher average speeds results in fewer GHG emissions being generated by road users, as reduced congestion and stop-start driving improves the fuel efficiency of vehicles. Despite increases to overall daily vehicle kilometres travelled on motorways and a reduction in performance of some non-motorway roads, a reduction in annual GHG emissions is estimated as a result of the project compared with the 'Do minimum' traffic modelling scenario (refer to section 22.4 of the EIS).

Management measures to further reduce the GHG emissions from the project are detailed in **Chapter E1** (Environmental management measures).

Assessment of alternative modes of transport

Chapter 4 (Project development and alternatives) of the EIS describes the alternatives that were considered during development of the project, and explains how and why the project was selected as the preferred option. Alternatives considered included rail transport (passenger and freight) and improvements to surface roads within the existing arterial road network.

Section 4.4.2 of the EIS recognises that the WestConnex program of works is part of a broader integrated transport solution for the management of freight and passenger movements, as one of more than 80 projects outlined in the *Transport Master Plan* to address the state's complex transport needs. As part of a broader integrated transport and land use solution, WestConnex supports a coordinated approach to the management of freight and passenger movements, and is complementary to other modes of transport including rail, bus, ferries, light rail, cycling and walking. However, as discussed in the EIS, Sydney's freight, commercial and services tasks require distribution of goods and services across the Sydney basin, which relies on more diverse and dispersed point-to-point transport connections that can only be provided by the road network.

The GHG assessment therefore does not compare GHG emissions of the project with alternative modes, since these modes are intended to be complementary, rather than exclusive. Development of alternative modes would be subject to separate environmental assessment and planning approvals, as required.

GHG assessment methodology

The methodology for the GHG assessment described in section 22.1 of the EIS has been based on relevant GHG reporting legislation and international reporting guidelines, including:

- *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (World Council for Sustainable Business Development and World Resources Institute 2004)
- *National Greenhouse and Energy Reporting Act 2007* (Commonwealth)
- AS ISO 14064.1:2006 *Greenhouse Gas Part 1: Specification with guidance at the organisational level for quantification and reporting of greenhouse gas emissions and removals*
- The current Australian National Greenhouse Accounts: *National Greenhouse Accounts Factors* (NGA Factors) (Australian Government Department of the Environment, 2015a)
- *Greenhouse Gas Assessment Workbook for Road Projects* (the TAGG Workbook) (Transport Authorities Greenhouse Group (TAGG) 2013).

The TAGG Workbook provides a consistent methodology for estimating the GHG emissions from activities that may contribute significantly to the overall emissions associated with the construction, operation and maintenance of road projects. The TAGG workbook has been adopted for the project.

To calculate the potential GHG emissions associated with the project, the following steps were followed:

- Define the assessment boundary and identify potential sources of GHG emissions associated with the project
- Determine the quantity of each emission source (fuel and electricity consumed, vegetation cleared, construction materials used and waste produced)
- Quantify the potential GHG emissions associated with each GHG source using equations and emission factors specified in the NGA Factors and the TAGG Workbook.

Appendix W (Detailed greenhouse gas calculations) of the EIS provides a detailed description of the GHG assessment methodology, including the emissions factors used for emission sources, and detailed calculation methods used to estimate the GHG emissions from fuel combustion, electricity consumption, vegetation clearing, materials use and the decomposition of waste.

As discussed in Appendix W (Detailed greenhouse gas calculations) of the EIS, it was necessary to define a study area for the assessment of Scope 3 road use emissions, to determine the changes in daily traffic volumes and performance on the road network (both increases and decreases) as a result of the project. As the project would not replace a single existing route within the road network, the GHG study area boundary was selected to include key routes that currently serve as alternate routes to the project as well as other roads within the vicinity that were considered to be influenced by the project.

These key routes for the GHG study area boundary were identified in accordance with Appendix H (Technical working paper: Traffic and transport) of the EIS, using:

- Difference plots from WRTM v2.3 – the difference plots showed the percentage change in traffic flows between different road network scenarios and confirmed the study area would cover the material changes in traffic volumes as a result of the project
- Screenline analyses – used to examine how traffic patterns may change between the alternative parallel corridors through the study area. Four screenlines were selected to analyse directional and two-way traffic volume outputs from the different modelling scenarios for each common future year.

Assessment of operational and cumulative GHG emissions using traffic modelling

Chapter C8 (Traffic and transport) provides responses to issues raised relating to the adequacy of the methodology for the traffic forecasts and modelling. The traffic and transport assessment for the project utilised an industry standard strategic transport model administered by NSW Roads and Maritime Services. An integral part of the traffic modelling process was the involvement of independent expert peer reviewers to examine model development, traffic forecasts and associated methodologies. It is therefore considered that the traffic model comprised the best available input for calculating GHG emissions from vehicles. Concerns with regards to the traffic modelling undertaken for the project are discussed in **Chapter C8** (Traffic and transport).

The assessment of operational impacts was based on the timeframes adopted for the traffic modelling, which aimed to make best use of available traffic count data and modelling software to determine base and future traffic conditions for the project and surrounding road network (in terms of estimating travel demand and traffic volumes). These traffic conditions were then used to assess the operational performance of the network, in scenarios with and without the project. Traffic volumes were modelled for 2023 and 2033 consistent with Appendix H (Technical working paper: Traffic and transport) of the EIS. These future years were chosen as they provide an indication of road network performance at project opening (2023) and 10 years after opening (2033).

Estimation of GHG emissions beyond 2033 is not considered appropriate for a number of reasons, including:

- Traffic forecasts beyond the operational traffic impact footprint for the project, which was assessed up to 2033, were not available
- There is significant uncertainty in the prediction of conditions beyond 2033, including traffic forecasts, vehicle efficiencies and fuel mixes

- To extrapolate data using the average emissions interpolated between 2023 and 2033 would not provide a credible estimate of annual emissions.

Discussion provided in section 22.5 of the EIS acknowledges that savings in emissions would reduce over time as traffic volumes increase in line with forecast population growth. However, improvements in fuel efficiency and increased uptake of vehicles which do not release GHG emissions, including electric vehicles, are likely to offset some of the increased emissions due to increased traffic volumes.

Chapter 22 (Greenhouse gas) of the EIS acknowledges that the magnitude of greenhouse gas emissions savings for the 'Cumulative' scenarios is likely to be attributable not only to an increase in average speeds, but also to a reduction in the number of vehicles using roads within the study area, as alternative routes become available with the completion of the WestConnex program of works and other major transport infrastructure projects in Sydney. This conclusion is consistent with the future forecast traffic performance of the study area as identified in Appendix H (Technical working paper: Traffic and transport) of the EIS.

C22.2 Greenhouse gas emissions during construction

One submitter raised concerns about GHG emissions during construction. Refer to section 22.3 of the EIS for details of potential GHG impacts during construction.

C22.2.1 Project would increase greenhouse gas emissions from construction activities

A submitter raised concerns that construction activities would exacerbate the effects of global warming by generating GHG emissions through vehicle use and the use of large quantities of concrete.

Response

Key GHG emissions sources during construction of the project are summarised in Table 22-2 and Table 22-3 and shown in Figure 22-1 of the EIS.

GHG emissions generated during project construction would occur once and are estimated at around 500,000 t CO₂-e. As discussed in section 22.5 and shown in Figure 22-2 of the EIS, the one-off emissions generated during construction and the annual operation and maintenance emissions for the project would be offset against emissions savings from improved road performance within the study area boundary in the 2023 and 2033 cumulative and 2033 'With project' scenarios compared with the 'Do minimum' scenario.

As described in section 22.3.3 of the EIS, the GHG emissions calculations for the project demonstrated that the majority of GHG emissions associated with the construction of the project are attributed to indirect Scope 3 emissions (around 60 per cent). Scope 3 emissions during construction include upstream/downstream emissions generated in the wider economy due to third party supply chains and the transportation of materials, spoil and waste to/from, and around, the project footprint.

The embodied energy associated with the offsite mining, production and transport of materials that would be used for the construction of the project contributes the largest proportion of indirect Scope 3 emissions, accounting for around 89 per cent of these emissions. The use of concrete, cement and, to a lesser extent, steel would contribute significantly to Scope 3 emissions.

The GHG assessment was based on a conservative approach, in line with relevant GHG reporting legislation and international reporting guidelines including the *Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* (World Council for Sustainable Business Development and World Resources Institute 2004). The detailed GHG calculations (refer to Appendix W of the EIS) provide the assumptions that were used to inform the assessment of GHG emissions, with conservative emissions factors and default quantity factors used where inputs were unavailable or unknown during preparation of the EIS.

Chapter E1 (Environmental management measures) provides a list of measures that will be implemented to further reduce GHG emissions during construction of the project. Measures to reduce the carbon footprint of the project during construction include:

- Selection of low emission construction materials, where feasible
- Use of recycled content road construction materials, such as recycled aggregates in road pavement and surfacing, where feasible

- Construction plant and equipment will be operated and maintained to maximise efficiency and reduce emissions
- Selection, where feasible and reasonable, of construction plant and equipment that has the highest fuel efficiency or that uses lower GHG intensive fuel such as biofuels (eg biodiesel, ethanol)
- Procurement of locally produced goods and services, where feasible and cost effective, to reduce transport fuel emissions
- Energy efficient systems will be installed where reasonable and practicable
- At least 20 per cent of construction energy (electricity) required for the project will be sourced from renewable energy generated onsite and/or from an accredited GreenPower energy supplier, where possible. At least six per cent of construction energy (electricity) use will be offset, with any offset undertaken in accordance with the Australian Government National Carbon Offset Standard.

Environmental management measures for construction are described in full in **Chapter E1** (Environmental management measures).

C22.3 Greenhouse gas emissions during operation

287 submitters raised concerns about GHG emissions during operation. Refer to section 22.4 of the EIS for details of potential GHG impacts during operation.

C22.3.1 Project would increase greenhouse gas emissions during operation

Submitters have raised concern that the project would increase GHG emissions, consume fuel resources and contribute to global warming thereby exacerbating climate change. In particular submitters raised the following issues:

- The project would exacerbate the effects of global warming through vehicle emissions (from induced traffic demand and congestion on arterial roads at either end of the mainline tunnels) and use of fossil fuels
- Savings in emissions from improved road performance would reduce over time as traffic volumes increase
- Increased carbon emissions and high per-capita GHG emissions
- The project does not meet Australia's commitment to reduce GHG emissions under the Paris Agreement.

Response

The estimated GHG emissions that would be generated by vehicles using the M4-M5 Link are presented in Table 22-6 of the EIS. Annual emissions from vehicles have been calculated according to the GHG assessment methodology summarised in section 22.4.2 of the EIS and the assumptions and inputs provided in Appendix W (Detailed greenhouse gas calculations) of the EIS. As described in Chapter 6 of Appendix W (Detailed greenhouse gas calculation) of the EIS, the GHG assessment of Scope 3 road use operational emissions was based on an assessment of the changes in traffic and network performance on the road network in the vicinity of the M4-M5 Link project, for a number of future modelled scenarios. In summary, the project would result in total annual road user emissions of 46,886 t CO₂-e per year in 2023 and 54,686 t CO₂-e per year in 2033, representing approximately five per cent of the operational road use GHG emissions in the existing road network within the study area.

The GHG assessment demonstrates the benefits of road tunnel usage in urban areas, where travel along a more direct route at higher average speeds results in fewer GHG emissions being generated by road users, as reduced congestion and stop-start driving improves vehicle fuel efficiency. Despite increases to overall daily vehicle kilometres travelled on motorways and a reduction in performance of some non-motorway roads, a reduction in GHG emissions is estimated as a result of the project compared with the 'Do minimum' traffic modelling scenario.

The GHG assessment assessed both the emissions associated with the M4-M5 Link project and the 'Cumulative' scenario'. Table 22-6 of the EIS notes that the project will result in annual savings of 361,581 t CO₂-e across the existing road network and the M4-M5 Link compared to the 'Do minimum (without project)' scenario in 2023 and annual savings of 504,751 t CO₂-e in 2033 compared to the 'Do minimum' scenario. When the cumulative scenario is considered, these savings increase to 602,501 t CO₂-e annually in 2023 and 821,128 t CO₂-e in 2033. The predicted reduction in GHG emissions as a result of the project would be due to an improvement in vehicle fuel efficiency for some links within the study area as well as the operational efficiency of the project tunnels.

The discussion provided in section 22.5 of the EIS acknowledges that savings in emissions would reduce over time as traffic volumes increase in line with forecast population growth. However, improvements in fuel efficiency and increased uptake of vehicles which do not release GHG emissions, including electric vehicles, are likely to offset some of the increased emissions due to increased traffic volumes.

Chapter 24 (Climate change risk and adaptation) of the EIS assesses the effect of global warming on the project and identifies adaptation measures to respond to future climate change. The Australian Government's commitments under the UNFCCC Paris Agreement are outlined in section 22.2 of the EIS, including aims to reduce Australia's GHG emissions by creating positive incentives to adopt better technologies and practices.

The design of the project has already considered measures to reduce energy and resource requirements, and therefore GHG emissions. These include (but are not limited to):

- Reducing the length of the mainline tunnels, thereby reducing the lighting and ventilation required, and emissions generated from operational road use by vehicles
- Reduced power consumption through the design of the ventilation system, which incorporates low pressure fans that consume approximately 50 per cent less energy compared with a high pressure fan solution.

An Energy Efficiency and Greenhouse Gas Emissions Strategy and Management Plan (GHG1) will be prepared to identify initiatives to be implemented during operation of the project to improve energy efficiency, reduce GHG emissions, energy use and embodied life cycle impacts (see **Chapter E1** (Environmental management measures)).

In addition, as discussed in section 4.4.2 of the EIS, by reducing surface road traffic along sections of Parramatta Road and Victoria Road, the project would facilitate potential future developments in public transport, which are acknowledged to have lower per-capita GHG emissions compared with private vehicle use. The project would also deliver new and improved active transport links within residual land created by the project such as within the Rozelle Rail Yards and along the south side of Victoria Road.

Environmental management measures for operation are described in full in **Chapter E1** (Environmental management measures).

C22.4 Greenhouse gas environmental management measures

63 submitters raised concerns about management of greenhouse gas emissions. See **Chapter E1** (Environmental management measures) for GHG environmental management measures.

C22.4.1 Targets for renewable energy and carbon offsets

Submitters were concerned that the targets for renewable energy supply and carbon offsets (refer to Table 22-8) were not clear and not aligned with NSW Government policy.

Response

As described in section 22.7.2 of the EIS, mitigation measures will be incorporated during the construction and operation of the project to further reduce GHG emissions generated by the project, in accordance with the WestConnex Sustainability Strategy (Sydney Motorway Corporation 2015).

The WestConnex Sustainability Strategy outlines a sustainability vision, commitments, guiding principles, objectives and overarching targets across a range of sustainability themes, and was prepared to align with the *Transport for NSW Environment and Sustainability Policy Framework* (Transport for NSW 2013g) as well as other relevant government sustainability instruments. These instruments include those specific to GHG emissions and energy use, being the *NSW Government Resource Efficiency Policy* (OEH 2014c) and the *NSW Climate Change Policy Framework* (OEH 2016a), as described in the section 27.2 of the EIS. The *NSW Government Resource Efficiency Policy* (OEH 2014c) aims to drive resource efficiency, with a focus on energy, water and waste, and a reduction in harmful air emissions. The project electricity targets align with the *NSW Government Resource Efficiency Policy* of sourcing a minimum of six per cent of electricity from an accredited GreenPower energy supplier. Carbon offsets will be undertaken in accordance with the Australian Government National Carbon Offset Standard.

The *NSW Climate Change Policy Framework* (OEH 2016a) aims to maximise the economic, social and environmental wellbeing of NSW in the context of a changing climate. As part of the implementation of this framework, two additional draft plans have been released for public consultation, including the *Draft Climate Change Fund Strategic Plan 2017–2022* which sets out priority investment areas for funding over the next five years to prepare NSW for a changing climate, and the *Draft Plan to Save NSW Energy and Money* (OEH 2016c) which is proposed to meet the NSW Government's energy efficiency target of 16,000 gigawatt hours of annual energy savings by 2020, and contribute to achieving net zero emissions by 2050.

The *Draft Plan to Save NSW Energy and Money* outlines the preferred options for achieving the state's energy savings target, including a proposal to investigate opportunities to implement minimum energy standards or benchmarks for State significant developments (SSD) and major infrastructure projects. The draft plan provides examples of the energy savings that could be achieved, such as standards that require new SSD and major infrastructure projects to consume 10 per cent less energy per year than similar existing projects. As part of this proposal, the NSW Government will conduct further analysis to (OEH 2016c):

- Improve the baseline for SSD and major infrastructure energy consumption and costs to better determine achievable energy savings
- Determine what energy savings requirements could feasibly be realised from different project types (for example, railways and motorways)
- Determine how individual project needs should be reflected in these requirements
- Assess which is the best mechanism to introduce standards.

Public consultation for the draft plan was undertaken between 3 November and 16 December 2016. Based on the feedback received, the NSW Government is currently developing a new action plan for national leadership in energy efficiency.

An Energy Efficiency and Greenhouse Gas Emissions Strategy and Management Plan will be prepared for the project as part of the project's Sustainability Management Plan (see environmental management measure GHG1 in **Chapter E1** (Environmental management measures)). This plan would incorporate new policy guidance and revise energy efficiency targets, where required.

Environmental management measures for construction and operation are described in full in **Chapter E1** (Environmental management measures).

C23 Resource use and waste minimisation

This chapter addresses issues raised in community submissions associated with the resource use and waste minimisation assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 23 (Resource use and waste minimisation) of the EIS for the further details on resource use and waste minimisation.

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C23.1 Level and quality of resource use and waste minimisation assessment

43 submitters raised concerns about the quality of the resource use and waste minimisation assessment. Refer to section 23.1 of the EIS for details of resource use and waste minimisation assessment methodology.

C23.1.1 Level and quality of the resource use and waste minimisation assessment

Submitters raised concern about the adequacy of the resource use and waste minimisation assessment in the EIS. Specific concerns included:

- An inadequate calculation of the volume of surplus spoil to be removed, including for the Rozelle interchange
- Request for a verified calculation of the total amount of spoil to be removed to be undertaken
- Insufficient detail on the methodology for removing contaminants from the Rozelle Rail Yards
- NSW Roads and Maritime Services (Roads and Maritime) fails to explain how contaminants removed from the tunnel water, collected at permanent water treatment plants (specifically at the Darley Road facility), will be disposed of and what conditions would apply to its treatment and disposal. Roads and Maritime fails to assess the risk of these contaminants which will be generated by the project
- Spoil haulage has a high environmental impact and the failure to describe the impacts of each the possible spoil haulage options is a serious omission in the EIS.

Response

Spoil estimates presented in the EIS considered the construction of tunnels to accommodate up to four lanes of traffic in each direction and large underground interchanges (the Inner West subsurface interchange and the Rozelle interchange). Up to about 4,000,000 cubic metres of spoil would be generated during construction of the project. Waste types, anticipated quantities of waste and resource use estimates would be revised by the successful construction contractors during the detailed design of the project and would be finalised as part of the detailed construction planning and during construction.

Indicative quantities and types of waste that would be generated from the project were estimated in the EIS based on a concept design for the project. This information formed the basis for the preliminary classification in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (NSW Environment Protection Authority (NSW EPA) 2014).

A contamination assessment was undertaken in Chapter 16 (Contamination) of the EIS, which identified soil and groundwater contamination at the Rozelle Rail Yards. The methodology and strategies for removing contaminated spoil and preventing cross-contamination at the Rozelle Rail Yards would be in accordance with NSW EPA requirements. Procedures for handling and storing potentially contaminated substances will be detailed in the Construction Waste Management Plan (CWMP) as part of the Construction Environmental Management Plan (CEMP).

Waste from the operation water treatment plant, based on the current reference design which assumes total suspended solids removal, pH adjustment and iron and manganese treatment, is described below:

- Waste sludge containing sediment, iron and manganese, caustic soda, polyaluminium chloride, coagulant polymers and flocculent polymers
- The sludge would need to be disposed of as inert solid waste to a general landfill
- Likely volume would be about one skip bin monthly.

Wastewater from the tunnels would be treated prior to discharge into the stormwater network. Water collected within the tunnels not suitable for treatment would be discharged to the local sewer system or disposed of at an appropriate waste facility. Water treatment and discharge criteria are discussed in **section C15.5**.

Potential environmental impacts associated with spoil haulage are considered throughout the environmental assessment including in Chapter 8 (Traffic and transport), Chapter 9 (Air quality) and Chapter 10 (Noise and vibration) of the EIS. The disposal and use of construction spoil is discussed in **section C23.2.1**. Measures to manage impacts associated with spoil haulage are provided in **Chapter E1** (Environmental management measures).

C23.2 Spoil handling and management

Three submitters raised concerns about spoil handling and management. Refer to section 23.3 of the EIS for details of spoil management.

C23.2.1 Disposal and use of construction spoil

Submitters raised concern about the incorrect disposal and use of construction spoil. Specifically, submitters were concerned that there has been inadequate planning for the safe haulage and disposal of spoil.

Response

The project design presented in the EIS has taken into account the principles of the resource management hierarchy as defined in the *Waste Avoidance and Resource Recovery Act 2001* (NSW) (WARR Act), including minimising excess spoil generation, as far as practical. As described in section 23.3.2 of the EIS, where possible and fit for purpose, spoil would be beneficially reused as part of the project before alternative spoil reuse or disposal options are pursued. Excess spoil which cannot be reused or recycled would be disposed of at a suitably licensed waste facility in accordance with NSW EPA requirements. The project would seek to reuse or recycle around 95 per cent of uncontaminated spoil, either within the project or at other locations. **Table C23-1** lists the potential sites for receipt of spoil which cannot be reused within the project.

Table C23-1 Potential spoil management sites

Spoil management site	Location	Distance from the project (kilometres)	Capacity for site to accept spoil (cubic metres)
Horsley Park (manufacturing facility)	Wall Grove Road at Horsley Park	About 40	Capacity for entirety of project spoil generation ¹
Blacktown Waste Services (landfill)	920 Richmond Road at Marsden Park	About 45	250,000
Sakkara Development (industrial estate)	Riverstone Parade at Riverstone	About 45	3,500,000
Kurnell Landfill	330 Captain Cook Drive at Kurnell	About 20	7,000,000
Moorebank Intermodal Terminal Precinct	Moorebank Avenue, Moorebank	About 30	2,500,000
Western Sydney Airport	Lot 1 DP 838361, Badgerys Creek	About 50	Capacity not known at this stage

Note:

¹ The Horsley Park spoil management site is a manufacturing facility and currently does not have a definitive limit for the amount of spoil it can receive.

Spoil would be delivered to the spoil management sites in accordance with the conditions of planning approvals and any environment protection licences governing those sites. The spoil reuse and disposal sites identified above are based on the current existing availability of spoil receiving locations (including projects with a fill deficit) across the Sydney area. Construction of the project would occur over a five-year period, with spoil generation peaking in 2019-2021 when both the mainline tunnels and Rozelle interchange are under construction concurrently. It is therefore anticipated that alternative locations may emerge during construction that could represent an improved outcome.

The following criteria would be applied to determine the priority given to the identified spoil reuse and disposal sites, including how much spoil would be sent to each site, and to evaluate any additional spoil reuse or disposal options that emerge during construction:

- Economic – feasibility of transporting the spoil compared to the options already identified, including consideration of the distances to be travelled
- Approvals – any receiving location would need to be approved to receive the applicable type and volume of spoil
- Traffic impacts – with a preference for haulage routes that keep to major arterial roads and minimise total haulage requirements as far as possible
- Environmental benefit – in terms of a preference for the material to be reused for such purposes as:
 - Environmental works (eg coastal protection works, flood mitigation or restoration)
 - Clean fill on other projects (eg landscaping, barrier mounds, land reclamation, capping)
 - Land restoration (eg filling of disused mines and quarries).

Spoil would be hauled using heavy vehicles to spoil reuse and disposal sites. The construction traffic and transport assessment has taken into account heavy vehicle movements associated with spoil management during the peak construction period. Chapter 8 (Traffic and transport) of the EIS provides a summary of heavy vehicle movements at each construction ancillary facility, including spoil related haulage. Spoil would be transported from construction ancillary facilities to spoil management locations, generally along arterial roads and the M4 East Motorway, the New M5 Motorway, the M5 East Motorway and the M5 South West Motorway. Construction traffic routes for the project would use the existing motorway and arterial road network as much as possible, reducing traffic related impacts on local roads. Environmental management measures will ensure safe haulage such as identifying and communicating haulage routes, along with site access requirements and restrictions, to all spoil haulage drivers (see **Chapter E1** (Environmental management measures)).

Indicative haulage routes from the construction ancillary facilities are shown in section 6.6.5 of the EIS. Where reuse is not possible, disposal of spoil would be the last resort. **Table C23-1** lists the potential sites that have been identified for receiving excess spoil from the project. Negotiations for the final destination(s) for excess spoil would be carried out during detailed design. In addition, there is the potential that spoil could be removed by barge, subject to further investigations. Spoil haulage routes would be confirmed during detailed design and will be documented in the Construction Traffic and Access Management Plan (CTAMP) for the project.

C23.3 Waste management (other than spoil)

113 submitters raised concerns about the management of wastes other than spoil. Refer to section 23.3 of the EIS for details of construction waste management and 23.4 for operational waste management.

C23.3.1 Handling, transport and disposal of contaminated waste generated during construction

Submitters raised concerns about the disposal of contaminated waste generated during construction. Concerns include:

- Risk to the community from removal, transfer and handling of contaminated material (including asbestos, metals and hydrocarbons) from the Darley Road civil and tunnel site (C4), a known contaminated site
- Option B construction ancillary facilities at Haberfield/Ashfield pose a risk to the health and welfare of the community, as a result of possibly contaminated soil particles coming off of trucks leaving the sites.

Response

Various waste streams would be generated during construction of the project, including construction and demolition waste, vegetation waste, packaging materials, liquid wastes and contaminated materials. All waste would be managed in accordance with the waste provisions contained within the *Protection of the Environment Operations Act 1997* (NSW) and, where reused off-site, would comply with relevant NSW EPA resource recovery exemptions and requirements.

Asbestos and other contaminants are likely to be located within the project footprint, as discussed in Chapter 16 (Contamination) of the EIS. The Darley Road civil and tunnel site (C4) has been assessed as a medium contamination risk, as investigations have identified contaminants as present in the area. All proposed options for construction ancillary facilities at Haberfield and Ashfield have also been assessed and range from low to medium risk. Exposure to contaminants during construction may result in health risks for construction workers and people in neighbouring communities. Environmental management measures to manage potential risks related to contaminated materials include the development and implementation of a Work Health and Safety Plan, incorporating asbestos handling and management measures. 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). If contamination posing a risk to human or ecological receptors is identified, a Remediation Action Plan will be prepared.

Material that is identified as contaminated will be segregated from uncontaminated material on site to prevent cross-contamination. The CWMP will describe methodologies and strategies to prevent cross-contamination. Strategies to transport and dispose of the contaminated materials would be also detailed in the CWMP, including ensuring contaminated waste is properly contained and secured during transport and transported by appropriate persons in accordance with requirements of the *Protection of the Environment Operations Act 1997* (NSW) and in particular the Protection of the Environment Operations (Waste) Regulation 2014 (NSW). As described in section 23.3.2 of the EIS, suitable areas will be identified to allow for contingency management of unexpected waste materials. Suitable areas will be hardstand or lined areas that are appropriately stabilised and bunded, with sufficient area for stockpile storage and segregation. All vehicle loads with the potential to result in dust generation will be covered during transport in accordance with relevant road regulations (see environmental management measure AQ15 in **Chapter E1** (Environmental management measures)).

A proposed new haulage route for the Darley Road civil and tunnel site (C4) is described in **section C4.18**. Haulage routes for other construction ancillary facilities, including those proposed at Haberfield and Ashfield, are described in section 6.6.5 of the EIS. Spoil haulage routes would be confirmed during detailed design and will be documented in the CTAMP for the project.

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C24 Climate change risk and adaptation

This chapter addresses issues raised in community submissions associated with the climate change risk and adaptation assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 24 (Climate change risk and adaptation) and Appendix X (Climate change risk assessment framework) of the EIS for the further detail on the climate change risk and adaptation assessment.

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C24.1 Level and quality of climate change risk and adaptation assessment

Two submitters raised concerns about the quality of the climate change risk and adaptation assessment. Refer to section 24.1 of the EIS for details of the climate change risk and adaptation assessment methodology.

C24.1.1 Level and quality of climate change risk and adaptation assessment

Submitters raised concern over the level, quality and scope of the climate change risk assessment. Specific concerns included:

- Use of a 100 year average return interval (ARI) for flood modelling and concern that this does not account for an increase in the frequency of severe weather events due to climate change
- Risks from sea level rise due to climate change were not adequately assessed and no mitigation for these risks has been included
- Ignoring parameters other than temperature and rainfall eg groundwater recharge, sea level rise and rainfall intensity. This should be corrected given the low lying land and drainage basin function of the Rozelle Rail Yards. The EIS should be revised to include more severe events than it currently anticipates
- The climate change risk assessment should be independently reviewed by experts in the international insurance industry.

Response

The climate change risk and adaptation assessment was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) to assess the risk and vulnerability of the project to climate change in accordance with relevant guidelines, quantify specific climate change risks and incorporate specific adaptation actions in the design to improve the project's resilience to climate change.

The assessment adopted the approach of the *Technical Guide for Climate Change Adaptation for the State Road Network* (NSW Roads and Maritime Services (Roads and Maritime) (unpublished) 2015) and was conducted in line with key international, national and industry standards and guidelines, including:

- The risk assessment approach set out in *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines* and *ISO/IEC 31010 Risk Management – Risk assessment techniques*
- *AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach*, which follows *AS/NZS ISO 31000:2009 Risk Management – Principles and guidelines*
- *Australian Government, Climate Change Impacts & Risk Management – A Guide for Business and Government* (Australian Government 2006)
- *Guideline for Climate Change Adaptation*, Revision 2.1 (Australian Green Infrastructure Council 2011)
- *Guidelines for Risk Management* (Roads and Maritime 2014).

Climate change projections adopted for the risk assessment were based on information published by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Bureau of Meteorology (BOM) in 2015 using the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5), as recommended in the draft *Technical Guide: Climate Change Adaptation for the Road Network* (Roads and Maritime (unpublished) 2015). These projections have used the representative concentration pathway (RCP) 8.5 which projects up to four degrees Celsius by 2100. Projections provided by CSIRO and BOM were considered the most appropriate for the project as they include projections for all climate change variables relevant to the project, including changes to temperature and rainfall, as well as extreme temperature, extreme rainfall, wind speed, bushfire weather, sea level rise, extreme sea levels and storm surge and increases in atmospheric carbon dioxide.

It was considered prudent to include the potential impact of sea level rise on the project, given the project's proximity to the coastline, particularly at Rozelle Bay, and the sensitivity of road infrastructure to inundation impacts.

An alternative source of climate change projections was available from the NSW and the Australian Capital Territory (ACT) Regional Climate Modelling (NARClIM) project (2014), which was published in collaboration with NSW Office of Environment and Heritage (OEH). These projections provide downscaled climate change data for a 10 kilometre resolution specific to NSW and the ACT. However, as discussed in section 24.2.2 of the EIS, while both sets of projections provide robust information on possible changes to the NSW climate, NARClIM projections are not yet available for a number of key climate variables (extreme rainfall, sea level rise, storm surge, wind speed), are based on earlier climate models used for the IPCC's Fourth Assessment Report (AR4), and the 'far future' projections are limited to the period 2060 to 2079. This presented limitations when considering potential climate change impacts on road planning and design, particularly the potential impacts of sea level rise on the project.

The difference between the sources of projections is not considered to have impacted the development of risk scenarios for the project. A review of the climate change risk assessment by the international insurance industry is not considered necessary as AECOM's team includes practitioners that have provided climate advisory services to the insurance sector. Furthermore, the insurance industry has an opportunity to review and provide comments on the EIS as part of the public exhibition.

Consideration of climate change in flood modelling

The climate change risk and adaptation assessment was also prepared in accordance with the SEARs for flooding, taking into account the projected changes in sea level rise and storm intensity due to climate change.

As discussed in section 24.4 of the EIS, key climate change risks for the project are associated with an increase in the intensity of extreme rainfall and sea level rise, which are likely to exacerbate the existing flood risk experienced in some project locations, particularly the intersection of The Crescent and City West Link at Rozelle. In order to assess the impact of climate change on flood behaviour, sensitivity analyses were undertaken for increases in extreme rainfall and sea level rise, with design refinements made to manage potential flood risks and flood risks likely to be exacerbated by climate change.

As discussed in Chapter 17 (Flooding and drainage) and Appendix Q (Technical working paper: Surface water and flooding) of the EIS, the flood modelling undertaken for the project considered the impact of climate change on rainfall using the approach recommended in the *Practical Considerations of Climate Change – Floodplain Risk Management Guideline* (NSW Department of Environment and Climate Change 2007). This approach recommends sensitivity testing of increases in rainfall intensities above the 100 year return interval of between 10 and 30 per cent. As discussed in section 24.2.2 of the EIS, sensitivity testing of the project's design was undertaken against the 200 year and 500 year ARI design rainfall intensities as, under present day climatic conditions, increasing the 100 year ARI design rainfall intensity by 10 per cent would produce about a 200 year ARI event and increasing the 100 year ARI design rainfall intensity by 30 per cent would produce about a 500 year ARI event. Results of sensitivity testing for increases in rainfall intensities are presented in Appendix Q (Technical working paper: Surface water and flooding) of the EIS.

Flood modelling for the project also adopted a conservative approach for sensitivity testing of future sea level rise. Sensitivity testing was undertaken for up to 0.9 metres of sea level rise, which is slightly more conservative compared with the current CSIRO and BOM (2015) projections for Sydney, which project up to 0.88 metres of sea level rise by 2090 under a 'High' emissions scenario. Results of sensitivity testing for sea level rise are presented in Appendix Q (Technical working paper: Surface water and flooding) of the EIS.

Adaptation to respond to climate change risks

As discussed in section 24.5 of the EIS, adaptation measures were incorporated in the project's design to respond to potential risks from climate change.

The EIS acknowledges the low-lying nature of the Rozelle Rail Yards and its susceptibility to increases in extreme rainfall and sea level rise due to climate change. As discussed in section 24.4 of the EIS, key climate change risks for the project are associated with an increase in the intensity of extreme rainfall and sea level rise, which are likely to exacerbate the existing flood risk experienced in some project locations, particularly the intersection of The Crescent and City West Link at Rozelle.

To address these risks, the project's design incorporated a number of adaptation actions (refer to section 24.5.1 of the EIS). These included incorporation of constructed wetland and bioretention treatment facilities, design of landscape topography to act as additional waterways and flood storage, consideration of increased flows in the design of surface connections and tunnel portals, upgrade of existing road infrastructure susceptible to flooding, and increasing the capacity of White's Creek to accommodate increases in flood events and rises in sea levels.

Adaptation actions were also identified for additional climate change risks. Consideration of increased extreme heat events was incorporated into the urban design of project surface infrastructure and areas of open space created by the project, including landscaped areas to increase shading and areas of respite and reduce the absorption of heat by infrastructure, where possible.

During detailed design, a detailed climate change risk assessment would be undertaken in accordance with the standard *AS 5334-2013 Climate change adaptation for settlements and infrastructure - A risk based approach*, informed by the initial climate change risk assessment set out in Chapter 24 (Climate change risk and adaptation) of the EIS. During detailed design, adaptation options for the specific risks associated with infrastructure components of the project would be identified and implemented where appropriate.

C24.2 Impacts from climate change

13 submitters raised concerns about the impacts from climate change during construction and operation. Refer to section 24.3 and 24.4 of the EIS for details of impacts from climate change during construction and operation.

C24.2.1 Impact of sea level rise on the project

A submitter was concerned that there has been little to no consideration of sea level rise when choosing the location for major infrastructure for this project. The submitter questions how it is justifiable for major infrastructure be built on low lying land, some of which has been recognised as flood prone land near Rozelle Bay, given that climate change is to be considered in planning and development decisions under the *Environmental Planning and Assessment Act 1979* (NSW).

Response

For the development of new infrastructure, such as the M4-M5 Link project, a climate change risk assessment identifying potential risks and recommending adaptation measures is considered the appropriate approach to managing climate risks at this stage of the project. The preliminary climate change risk assessment undertaken for the EIS was carried out in accordance with relevant industry standards and assessment guidelines and in accordance with the *Technical Guide for Climate Change Adaptation for the State Road Network* (Roads and Maritime (unpublished) 2015).

As discussed in section 24.4.1 of the EIS, a total of 33 direct and indirect climate change risks to the project were identified. Of these risks, one extreme, four high and 12 medium risks were identified for the project's operation.

The EIS acknowledges the low-lying nature of the Rozelle Rail Yards and its susceptibility to increases in extreme rainfall and sea level rise due to climate change. As discussed in section 24.4 of the EIS, key climate change risks for the project are associated with an increase in the intensity of extreme rainfall and sea level rise, which are likely to exacerbate the existing flood risk experienced in some project locations, particularly the intersection of The Crescent and City West Link at Rozelle.

In order to assess the impact of climate change on flood behaviour, sensitivity analyses were undertaken for increases in extreme rainfall and sea level rise, with design refinements made to manage potential flood risks and flood risks likely to be exacerbated by climate change.

The climate change risk assessment included as part of the project's EIS would inform a detailed climate change risk assessment to be undertaken during detailed design, in accordance with *AS 5334-2013 Climate change adaptation for settlements and infrastructure - A risk based approach*. The assessment will identify and implement adaptation measures to address high and extreme risks, which would be factored into the detailed design as appropriate. The decision to implement adaptation measures for medium risks will also be considered during detailed design.

Management of potential impacts

Adaptation measures incorporated in the project design during EIS preparation were associated with broader design refinements and opportunities for optimisation, with consideration given to avoiding, minimising or managing risks from future climate change, where possible (refer to section 24.5.1 of the EIS).

To address key risks from extreme rainfall and sea level rise, the project's design incorporated a number of adaptation actions (refer to section 24.5.1 of the EIS), including incorporation of a constructed wetland and bioretention treatment facilities, design of landscape topography to act as additional waterways and flood storage, consideration of increased flows in the design of surface connections and tunnel portals, upgrade of existing road infrastructure susceptible to flooding, and increasing the capacity of Whites Creek to accommodate increases in flood events and rises in sea levels.

Adaptation actions were also identified for additional climate change risks, including consideration of increased extreme heat events through the urban design of project surface infrastructure and areas of open space created by the project, consideration of power consumption and redundancy in the event of a power outage and the long term performance and durability of structures in the context of a changing climate. These design refinements are discussed further in section 24.5.2 of the EIS.

Section 24.5.2 of the EIS listed recommended next steps for the development of adaptation options to be further considered during detailed design and the further detailed climate change risk assessment. These next steps became the proposed environmental management measures for climate change impacts and are summarised in **Chapter E1** (Environmental management measures).

C24.2.2 Urban heat island effect

Submitters were concerned over the role of the project in contributing to the urban heat island effect. Specific concerns included:

- The reduced vegetation cover and the broad heat sink created by the project may increase the heat load and burden on the suburbs, as it has done at Haberfield/Ashfield. Delays in restoring Urban Design and Landscape Plan (UDLP) lands, with consequent delays in restoring aspects of the street tree canopy will exacerbate this problem
- Large areas of sealed surfaces produce urban heat and contribute to global warming
- The cumulative costs of continued urban motorway developments on human health, including health impacts due to extreme summer temperatures, exacerbated by the urban heat island effect
- The project will increase the urban heat island effect which will enforce higher costs on households through increased requirements for cooling and energy use
- The ability of the city to manage urban heat is greatly reduced by removing vegetation
- Urban heat poses risks to public health and puts critical infrastructure at risk, resulting in cost increases in other areas (ie health).

Response

Urban areas, comprising a greater density of hard surfaces such as roads, pavements and buildings, absorb and retain more heat compared with areas of natural land cover. This is known as the urban heat island (UHI) effect and results in increased average temperatures experienced within areas of high urban development. The UHI effect is also related to the urban canyon effect, where the narrow arrangement of buildings in urban areas restricts wind flows which assist with cooling. Increased temperatures in urban areas can have negative effects on human health, plants, and animals, and can impact on the efficiency and performance of critical infrastructure and services.

The UHI effect is not considered to contribute directly to global warming. However, the UHI effect results in localised warming around urban centres and is likely to be exacerbated by increasing temperatures due to climate change. This in turn may result in increased requirements for cooling and energy use associated with air conditioning.

The majority of the project is located underground in tunnels or involves replacing existing hard surfaces with new hard or previously cleared surfaces. As a result the project is considered to have only a minor impact on the UHI effect in the long term.

In the short term, around 4.49 hectares of vegetation is proposed to be removed during construction activities. This vegetation predominantly comprises urban native and exotic vegetation and may result in highly localised impacts (in terms of UHI effect) to residents directly adjacent to the vegetation, mostly due to the loss of shade that the trees provided.

The EIS arborist report (refer to Annexure G of Appendix S (Technical working paper: Biodiversity Assessment Report) of the EIS) noted that around 1,675 trees, predominantly around the Rozelle Rail Yards and within land owned by the Port Authority of NSW, are proposed to be removed, although the project will seek to retain as many trees as possible. As discussed in **section B11.18.3**, the project has committed to a tree replacement strategy as reflected in the environmental management measure B6 (see **Chapter E1** (Environmental management measures)). In addition, the project has committed to providing up to 10 hectares of public open space.

Section 5.5.6 of Appendix L (Technical working paper: Urban design) of the EIS identifies the UHI effect as an element of the water sensitive urban design principles to be considered during the finalisation of the UDLPs for the project (see environmental management measure UD1) through:

- Maximising irrigation of green spaces to reduce local temperatures
- Retaining water and maximising areas of open water and marshlands to provide cooling
- Maximising the use of trees and irrigating them to encourage quick growth to establish the tree canopy
- Selecting pavement designs which can reduce the UHI effect and maximise cooling, where possible.

Roads and Maritime acknowledges the City of Sydney Council and the former Marrickville Council's involvement with 2020 Vision, a commitment to achieve a 20 per cent increase in green space in urban areas by 2020, and will consult with councils during the development of UDLPs and the provision of public open space for areas within their respective local government boundaries.

As discussed in section 24.5 of the EIS, consideration of increased extreme heat events due to climate change has been incorporated into the urban design of project surface infrastructure and areas of open space created by the project, including landscaped areas to increase shade and areas of respite and reduce the absorption of heat by infrastructure, where possible.

Responses to issues related to the project's contribution to climate change (in the form of GHG emissions) are discussed in **Chapter C22** (Greenhouse gas). Responses to human health and biodiversity issues are discussed in **Chapter C11** (Human health risk) and **Chapter C18** (Biodiversity), respectively.

C25 Hazard and risk

This chapter addresses issues raised in community submissions associated with the hazard and risk assessment for the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 25 (Hazard and risk) of the EIS for the further detail on the hazard and risk assessment.

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C25.1 Level and quality of hazard and risk assessment

One submitter raised concerns about the quality of the hazard and risk assessment. Refer to section 25.1 of the EIS for details of the hazard and risk assessment methodology.

C25.1.1 Level and quality of hazard and risk assessment

A submitter suggests that the EIS needs to assess the long term risk identified with transportation of hazardous materials on surface roads, since transport of these substances will be excluded from the tunnels, in the context of proposed urban renewal of Parramatta Road and various parts of the Inner West Council area. The submitter suggests that rail freight transport might be a safer option for the transport of dangerous goods.

Response

Significant controls are placed on the transport of dangerous goods by road, which are set out in legislation including the *Work Health and Safety Act 2011* (NSW), *Dangerous Goods (Road and Rail Transport) Act 2008* (NSW), *Dangerous Goods (Road and Rail Transport) Regulation 2014* (NSW) and relevant Australian Standards. The NSW Government also has a number of long term freight strategies to reduce the amount of surface road freight and to move more freight onto rail, including the *NSW Freight and Port Strategy* (Transport for NSW 2013).

No hazardous materials would be transported in the project tunnels as they would be listed as a prohibited area under Road Rules 2014 – Regulation 300-2: NSW rule: carriage of dangerous goods in prohibited areas (Regulation 300-2) (NSW). Regulation 300-2 does not allow dangerous goods and hazardous substances to be transported within prohibited areas. The risk from the transport of hazardous materials along existing surface roads would not be increased as a result of the project. The M4-M5 Link would not result in a change of current practices where dangerous goods are already transported on surface roads. Surface roads and infrastructure have been designed to provide an efficient and safe road network.

An Incident Response Plan will be developed as part of the Emergency Response Plan for the project and implemented in the event of an accident or incident (see **Chapter E1** (Environmental management measures)). Therefore, it is not anticipated that there will be any long term adverse impacts associated with the transportation of hazardous materials as result of the project. While dangerous goods can be transported by rail, it is likely that there would still be demand for the transport of dangerous goods by road.

C25.2 Dangerous goods and hazardous substances impacts

Three submitters raised concerns about impacts from dangerous goods and hazardous substances. Refer to sections 25.1 and 25.2 of the EIS for further information on storage, handling and transport of dangerous goods and hazardous substances.

C25.2.1 Transportation of dangerous goods and hazardous substances during construction

Submitters raised concerns about transportation of dangerous goods and hazardous substances. Specific concerns included:

- Request for detailed plans for contaminated soil movements from Rozelle by route and time, with evidence to ensure residents will not be impacted during construction
- Concern about the transportation of dangerous goods and hazardous substances used on the project via the Pyrmont Bridge Road tunnel site (C9).

Response

Section 25.1.2 of the EIS provides an assessment of potential impacts during construction of the project as a result of the transportation of dangerous goods and hazardous substances. Some dangerous goods and hazardous substances will be required to be transported to the construction ancillary facilities, including the Pyrmont Bridge Road tunnel site (C9). Potential hazards and risks associated with the transportation of dangerous goods and hazardous substances have been considered by comparing the type, quantity and frequency of dangerous goods and hazardous substances with the thresholds presented in the State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33 Guidelines).

The transportation of dangerous goods and hazardous substances during construction will be managed to avoid impacts from spills or leaks by measures including (see **Chapter E1** (Environmental management measures)):

- Transport of dangerous goods and hazardous substances will be conducted in accordance with relevant legislation and codes, including the Dangerous Goods (Road and Rail Transport) Regulation 2014 (NSW) and the Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission 2008) (see environmental management measure HR5 in **Chapter E1** (Environmental management measures))
- Safety Data Sheets for dangerous goods and hazardous substances will be stored on site prior to their arrival (see environmental management measure HR4 in **Chapter E1** (Environmental management measures)).

There is potential for heavy metals such as lead and other potential contaminants to exist at the Rozelle civil and tunnel site (C5), given the various historical land uses of the Rozelle Rail Yards. Material that is identified as contaminated will be segregated from uncontaminated material on site to prevent cross-contamination. A Construction Waste Management Plan (CWMP) will be prepared as part of the Construction Environmental Management Plan for the project. The CWMP will describe methodologies and strategies to prevent cross-contamination and for the transport and disposal of contaminated materials, including ensuring contaminated waste is properly contained and secured during transport and transported by appropriate persons in accordance with requirements of the *Protection of the Environment Operations Act 1997* (NSW) and in particular the Protection of the Environment Operations (Waste) Regulation 2014. These measures will ensure residents will not be impacted by the mobilisation of contaminated materials and this is further discussed in **Chapter C16** (Contamination).

Indicative spoil haulage routes would be confirmed during detailed design and construction planning. However, the indicative haulage routes are outlined in **Table C25-1**. Spoil haulage from the Pyrmont Bridge Road tunnel site (C9) is proposed to occur 24 hours per, seven days per week as identified in Table 6-27 of the EIS.

Table C25-1 Indicative spoil haulage routes

Location		Indicative spoil haulage route
C1a	Wattle Street civil and tunnel site ¹	<ul style="list-style-type: none"> Entry: via the Wattle Street interchange entry ramp Exit: via the Wattle Street interchange exit ramp and onto Parramatta Road, heading west
C2a	Haberfield civil and tunnel site ¹	<ul style="list-style-type: none"> Entry and exit via the M4 East tunnel connection
C3a	Northcote Street civil site	No spoil haulage would occur from this site
C1b	Parramatta Road West civil and tunnel site	<ul style="list-style-type: none"> Entry: eastbound along the M4 Motorway, southbound along Centenary Drive, eastbound along the Hume Highway, then left onto Parramatta Road heading north Exit: northbound along Parramatta Road
C2b	Haberfield civil site	No spoil haulage would occur from this site
C3b	Parramatta Road East civil site	No spoil haulage would occur from this site
C4	Darley Road civil and tunnel site ²	<ul style="list-style-type: none"> Entry: eastbound along City West Link, James Craig Road, westbound on City West Link and then left into James Street Exit: westbound along City West Link
C5	Rozelle civil and tunnel site ¹	<ul style="list-style-type: none"> Entry: eastbound along City West Link and into the site Exit: westbound along City West Link
C6	The Crescent civil site	<ul style="list-style-type: none"> Entry: City West Link, then south along The Crescent and into the site Exit: northbound along The Crescent (to be facilitated via construction traffic management measures), then City West Link
C7	Victoria Road civil site	No spoil haulage would occur from this site
C8	Iron Cove Link civil site	<ul style="list-style-type: none"> Entry: northbound along Victoria Road and into the site Exit: northbound along Victoria Road
C9	Pymont Bridge Road tunnel site ¹	<ul style="list-style-type: none"> Entry: eastbound along Parramatta Road and into the site Exit: westbound along Pymont Bridge Road and then Parramatta Road
C10	Campbell Road civil and tunnel site ¹	<ul style="list-style-type: none"> Entry: southbound along Campbell Road and then into the site Exit: northbound along Campbell Road, then south along the Princes Highway

Note:

1 Indicative spoil haulage routes may vary based on the final construction methodology and program.

2 The proposed haulage route has been amended since the exhibition of the EIS. See **section C4.18.1** for more information.

C25.2.2 Transport of dangerous goods and hazardous substances during operation

A submitter is opposed to surface roads (including local streets) being used to transport hazardous materials instead of through the tunnels as this would in turn create traffic issues such as increase in number of vehicles, truck movements and noise in local areas.

Response

As with all other road tunnels in Sydney (including the M5 East tunnel), vehicles carrying dangerous goods and hazardous substances would not be permitted to use the M4-M5 Link tunnels as the tunnels are prohibited areas under Regulation 300-2 (see **section C25.1.1**).

It is considered unlikely that the prohibition of these vehicles in the tunnels would lead to an increase in their proportion on other roads beyond that attributable to general traffic growth. Vehicles carrying dangerous goods would likely continue to use existing surface freight routes.

C25.3 Aviation risks

One submitter raised issues with aviation risks. Refer to sections 25.1 and 25.2 of the EIS for details of potential aviation risks during construction and operation.

C25.3.1 Management of aviation risks

A submitter supported the management of aviation risks in the EIS, specifically the commitment that lighting during construction would adhere to established guidelines.

Response

The support for the project commitment to the management of aviation risks is noted.

C25.4 Other potential hazard and risk impacts

14 submitters raised concerns about other potential hazard and risk impacts. Refer to section 25.1 and 25.2 of the EIS for details of potential hazard and risk impacts during construction and operation.

C25.4.1 Risks associated with incidents and emergencies in the tunnels

Submitters raised concerns about risks associated with incidents and emergencies in the tunnels. Specific concerns included the consideration of safety features and lack of design surrounding access to emergency escape points within the Rozelle interchange tunnels and mainline tunnels, particularly when a traffic incident, fire, bomb or terrorist attack occurs in the tunnel.

Response

Section 25.2.4 of the EIS provides an assessment of the potential impacts during operation as a result of incidents in the tunnels.

All roads carry an inherent risk of vehicle collision associated with its operation. The project has been designed to provide for efficient, free-flowing traffic with physical capacity to accommodate the forecast traffic volumes. The design has incorporated all feasible and reasonable design measures in relation to geometry, pavement, breakdown bays, lighting and signage. The design is consistent with current Australian Standards, road design guidelines and industry best practice, inherently minimising the likelihood of incidents and crashes.

Some of the key tunnel features designed to minimise the likelihood of incidents and crashes and manage those that occur include:

- Vehicle height detection system prior to the tunnel entry portals
- Tunnel barrier gates to prevent access in the event of tunnel closure
- Closed-circuit television (CCTV) throughout the tunnel and approaches
- Adjustable speed signs

- Appropriately spaced breakdown bays and emergency telephones.

The project has also been designed to meet appropriate fire and life safety requirements in the event of an incident or accident in the tunnel (as described in Chapter 5 (Project description) of the EIS). Consultation has been undertaken and would be ongoing with Fire and Rescue NSW and other emergency services to ensure the fire and life safety requirements are achieved.

Each project tunnel would be one-directional, reducing the risk of crashes through head-on collisions and simplifying smoke management and egress requirements. The transport of dangerous goods and hazardous substances would be prohibited through the mainline tunnels and entry and exit ramps, reducing the risk of very large fires or the release of toxic materials in the tunnel.

Other fire and life safety aspects that would be incorporated into the project include:

- State of the art CCTV and audible systems to detect incidents and manage evacuation processes
- Pedestrian cross-passages between the mainline tunnels and longitudinal egress passages along the entry and exit ramps, to allow pedestrians to exit the tunnel and ramps in the event of a major incident. Cross-passages would cater for egress for people with disabilities; therefore, stairs or ramps with steep grades would be limited, or alternative safe holding zones would be provided where necessary
- Automatic fire and smoke detection within the tunnels
- Longitudinal ventilation to 'push' smoke in the direction of traffic flow away from the fire source towards a ventilation facility or tunnel portal
- A water deluge system that could be activated manually or automatically at the fire source
- Structures, linings and services that would be fire hardened to protect them from fire damage before the activation of the deluge system, or if the deluge system fails.

The likelihood of a fire during operation of the project cannot be entirely removed. Uncontrollable human factors inherently lead to a risk of incidents and crashes, although the likelihood of such events is low and the consequence of such incidents is reduced through the provision of fire safety systems within the tunnels.

In the event of an incident, approaching traffic would be prevented from entering the mainline tunnels. Vehicle occupants at the location of the fire and upstream of the fire source would be instructed to stop their vehicles, and exit in the opposite direction through the section of carriageway that would be protected by the smoke management system, or through an exit door to a cross-passage leading to the other ('non-incident') mainline tunnel, which is fire and smoke separated from the incident tunnel.

Occupants downstream of the fire source would be encouraged to continue driving out of the tunnel. If this is not possible and they are forced to evacuate on foot, egress would be provided via an exit door to a cross-passage leading to the non-incident mainline tunnel. Emergency services would be able to reach the fire source via the non-incident tunnel (by foot or in some cases by vehicle), or from the upstream direction in the affected tunnel (by foot).

An Incident Response Plan will be developed as part of the Emergency Response Plan for the project and will be implemented in the event of an accident or incident. The response to incidents within the motorway would be managed in accordance with the memorandum of understanding between Roads and Maritime and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.

The tunnels would have some resilience to bomb/terrorist attack and the safety measures described above will reduce the impact of these types of events. However, due to the variable nature of these events, reliance is placed on other dedicated government agencies with regard to dealing with such incidents.

C25.4.2 Safety hazards

A submitter raised a concern regarding the potential for unsafe demolition methods which could pose a serious risk to public safety, including to the Rozelle Public School. A submitter was also concerned about potential safety breaches at the Pyrmont Bridge Road tunnel site such as asbestos and/or other hazardous materials or substances emanating from the site and affecting the Malt Shovel Brewery's patrons and workers.

Response

Section 25.1.3 of the EIS discusses the safety hazards of the project, including risks associated with demolition such as exposure to airborne pollutants such as asbestos fibres. During construction and demolition activities, airborne pollutants have the potential to be generated, including dust and toxic gas. If this were to occur, it may result in oxygen deficient or toxic environments and other potential health risks for construction workers and local community members. See **Chapter C9** (Air quality) for issues raised regarding potential air quality impacts, including for Rozelle Public School.

Some dangerous goods and hazardous substances will be used at the Pymont Bridge Road tunnel site (C9). Section 25.1.2 of the EIS outlines the dangerous goods and hazardous substances that would be transported to and used/stored at construction ancillary facilities. Management measures will be implemented to reduce the risk of impact on safety to the local community, including storage of dangerous goods and hazardous materials in accordance with suppliers' instructions and relevant Australian Standards and legislation (see **Chapter E1** (Environmental management measures)). Any incident would be managed in accordance with the Incident Response Plan for the project, which will outline notification protocols to neighbouring properties and emergency services in the event of a serious incident.

Environmental management measures to be implemented to reduce these risks are discussed in **section C25.5.1**.

C25.4.3 Risks to nuclear facilities

A submitter has raised concern that the vibrations caused by the tunnelling of the M4-M5 Link would impact nuclear facilities.

Response

The project is not expected to result in vibration impacts on nuclear facilities. The nearest nuclear reactor is located at Lucas Heights, which is over 20 kilometres from the project. Vibration impacts from the project are discussed in **Chapter C10** (Noise and vibration). Nuclear medicine or research facilities which may be located at the Royal Prince Alfred Hospital are also not expected to be impacted by construction vibration. Vibration and ground-borne noise impacts would be managed in accordance with relevant guidelines and contractor procedures. See **section C10.9.5** and **Chapter E1** (Environmental management measures) for details of how vibration impacts would be managed during construction of the project.

C25.5 Hazard and risk environmental management measures

Five submitters raised concerns about the environmental management measures for hazard and risk impacts. See **Chapter E1** (Environmental management measures) of the EIS for further details on the hazard and risk environmental management measures.

C25.5.1 Hazard and risk environmental management measures

Submitters raised concerns regarding hazard and risk environmental management measures. Specific concerns included:

- The treatment of asbestos and breaches of asbestos management
- Calls for the requirement of contact details and protocols to be provided to local residents and businesses including Malt Shovel Brewery to advise on all potential safety incidents
- Requests for monitored hazard plans during construction for work site safety and removal of toxic materials (during demolition, excavation and construction)
- The need for adequate and independently monitored hazard plans during construction, especially work site safety and the quarantining and removal of toxic materials during demolition, excavation and construction.

Response

Several environmental management measures are proposed to manage hazards and risks from the project during construction and operation (see **Chapter E1** (Environmental management measures)). The relevant measures that would address the issues raised in submissions include:

- A hazardous materials assessment will be carried out prior to and during the demolition of buildings. 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)
- Asbestos handling and management will be undertaken in accordance with an Asbestos Management Plan and consistent with relevant codes of practice. The plan will include prior notification to adjacent communities about potential hazards (see environmental management measure RW14)
- 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). 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 will be prepared (see environmental management measure CM01)
- All potentially hazardous material will be identified and removed from buildings in an appropriate manner prior to the commencement of and/or progressively during demolition and in accordance with all relevant codes of practice (see environmental management measure AQ18)
- An Incident Response Plan will be developed as part of the Emergency Response Plan for the project and implemented in the event of an accident or incident (see environmental management measure OpHR4).

It is considered that these measures will adequately reduce the risk of impacts on safety of site workers and the local community.

Section 7.6.2 of the EIS discusses communication and consultation with stakeholders and the community during construction that will be undertaken by the design and construction contractor(s). This would focus on providing updates on construction activities and program, responding to enquiries and concerns in a timely manner and minimising potential impacts where possible.

During construction, a dedicated community relations team would deliver:

- A detailed Community Communication Strategy (identifying relevant stakeholders, procedures for distributing information and receiving/responding to feedback, and procedures for resolving stakeholder and community complaints during construction and operation)
- Notification letters and phone calls to residents and businesses directly affected by construction works, changes to traffic arrangements and out of hours works
- Face-to-face meetings with landowners as needed
- Regular community updates on the progress of the construction program
- Regular updates to the WestConnex website
- Media releases and project advertising in local and metropolitan English language and non-English language newspapers to provide contact information for the project team
- Site signage around construction ancillary facilities
- 24 hour, toll-free project information and complaints line, a dedicated email address and postal address.

A Complaints Management System will be in place for the duration of construction. 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.

C26 Cumulative impact assessment

This chapter addresses issues raised in community submissions associated with the cumulative impact assessment for the M4-M5 Link project. Cumulative impact issues raised associated with specific environmental issues are addressed in the relevant environmental chapters (**C8** to **C25**). Refer to Chapter 26 (Cumulative impacts) and Appendix C (Cumulative impact assessment methodology) of the Environmental Impact Statement (EIS) for the further detail on the cumulative impact assessment.

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C26.1 Level and quality of the cumulative impact assessment approach

340 submitters raised concerns about the cumulative impact assessment. Refer to Chapter 26 (Cumulative impacts) and Appendix C (Cumulative impact assessment methodology) of the EIS for details of the approach to the cumulative impact assessment. The methodology for the cumulative impact assessment for the following EIS chapters: Chapter 8 (Traffic and transport), Chapter 9 (Air quality), Chapter 10 (Noise and vibration) and Chapter 11 (Human health risk), are discussed further within these chapters of the EIS and their respective technical working papers which were appended to the EIS.

C26.1.1 Cumulative impact assessment is not adequate

Submitters have raised concerns about the adequacy of the cumulative impact assessment presented in the EIS. Specific issues raised include:

- Objection to the methodology used for the cumulative impact assessment
- Concerns regarding the lack of assessment and analysis of the cumulative impacts of the M4 East and M4-M5 Link projects on the community of Haberfield and Ashfield
- The assessment does not specifically address cumulative impacts associated with :
 - Noise, dust, traffic, loss of heritage, commercial and residential property acquisitions and night works on residents during construction
 - Impacts to open spaces which will be in close proximity to unfiltered ventilation outlets and the project's road infrastructure
 - Construction and operation of the M4-M5 Link and preceding WestConnex projects
 - The impacts and experiences from the preceding WestConnex stages as they have been omitted
 - The Western Harbour Tunnel project, because it is a separate project to the Rozelle interchange
 - Construction and operation of past and current developments including those associated with improvements to the existing arterial roads and motorways.

Response

Cumulative impact assessment methodology

The methodology for the cumulative impact assessment for the construction and operational phases of the project was developed in consultation with NSW Department of Planning and Environment (DP&E). It has been undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued for the project, which required that the assessment generally address the following:

- The cumulative impacts of the project taking into account other WestConnex component projects, the proposed future Western Harbour Tunnel project, projects that have been approved but where construction has not commenced, projects that have commenced construction and projects that have recently been completed
- The cumulative impacts of concurrent project construction activities and proposed and approved projects (where information is available at the time the EIS was prepared).

The assessment included potential cumulative traffic and transport, air quality, noise, human health, urban design and visual amenity, social and economic, non-Aboriginal heritage, biodiversity, soil and water quality, flooding and drainage, groundwater and Aboriginal heritage impacts. The technical studies prepared for the EIS and Chapter 26 (Cumulative impacts) of the EIS provide a detailed cumulative impact assessment of the project with other WestConnex projects. The studies considered in some detail the interfaces between the M4-M5 Link and the M4 East at Haberfield/Ashfield and the New M5 at St Peters. This took into account potential impacts at these locations from the M4-M5 Link project and concurrent projects in the study area to ensure cumulative impacts could be avoided, managed and minimised.

Screening criteria to identify projects

The assessment methodology presented in Appendix C (Cumulative impact assessment methodology) of the EIS outlines the screening criteria applied in determining whether projects have the potential to result in cumulative impacts and a justification for projects considered but not included in the assessment.

Cumulative impacts have been assessed and considered in two categories; impacts related to the overall WestConnex program of works and impacts from other related infrastructure projects or projects in the vicinity of the M4-M5 Link project footprint. The identification of other projects that could occur in the vicinity of the M4-M5 Link included relevant projects listed on the NSW Major Projects website as State significant development or State significant infrastructure and known or proposed projects of a relevant scale or impact that involve activities that could result in a cumulative impact with the M4-M5 Link project.

Following the application of the screening criteria to identify relevant projects, the projects included in **Table C26-1** (adapted from section 26.2 of the EIS) were considered in the assessment of cumulative impacts for the project. The status of each of these projects and the available public information at the time of the EIS was used in the cumulative impact assessment. Since then, some of these projects have progressed further. **Table C26-1** provides a description of the current status of these projects, based on publicly available information.

Table C26-1 Projects included in the cumulative impact assessment

Project	Description of current project status
WestConnex projects	
King Georges Road Interchange Upgrade (KGRIU)	Open to traffic
M4 Widening	Open to traffic
M4 East	Under construction. The project is expected to be completed and open to traffic in 2019.
New M5	Under construction. The project is expected to be completed and open to traffic in 2020.
Other projects	
Sydney Gateway	Undergoing concept design development and subject to separate environmental assessment and approval. For the purposes of the cumulative impact assessment presented in the EIS, the Sydney Gateway project was conservatively assumed to be operational by 2023. No further information is available on the NSW Roads and Maritime Services (Roads and Maritime) website ¹ .

¹ <http://www.rms.nsw.gov.au/projects/sydney-south/sydney-gateway/index.html>

Project	Description of current project status
Western Harbour Tunnel and Beaches Link program of works	<p>Both projects in the program are undergoing concept design development and are subject to separate environmental assessment and approval. For the purposes of the cumulative impact assessment presented in the EIS, the Western Harbour Tunnel project was conservatively assumed to be operational by 2023, noting that construction may continue after the expected opening year of the M4-M5 Link project. For the purposes of the cumulative impact assessment, the Beaches Link project was conservatively assumed to be operational by 2033.</p> <p>Further information on these projects has been made public since the cumulative impact assessment for the M4-M5 Link EIS was undertaken.</p> <p>A concept design for the Western Harbour Tunnel project has been prepared and work is underway on preparing the reference design and EIS.</p> <p>SEARs for both projects have been issued and are available on the NSW Major Projects website². The timing for the construction and operation of these projects is still not known.</p>
F6 Extension	<p>Future strategic project, subject to separate environmental assessment and approval. For the purposes of the cumulative impact assessment presented in the EIS, the F6 Extension was conservatively assumed to be operational by 2033.</p> <p>Since the cumulative impact assessment for the M4-M5 Link EIS was undertaken, Roads and Maritime has lodged a Scoping Report for Stage 1 (linking the New M5 at Arncliffe with President Avenue at Kogarah) with the NSW Department of Planning and Environment's (DP&E), which is available on the Major Projects website. No further information is available on the timing of the project.</p>
Rozelle Rail Yards Site Management Works	<p>Works commenced in mid-2017 and are expected to take up to 12 months to complete. This information remains current.</p>
Sydney Metro City and Southwest	<p>Stage 1 (Chatswood to Sydenham) was approved in January 2017. Stage 2 (Sydenham to Bankstown) was under environmental assessment at the time of the M4-M5 Link EIS. The EIS for Stage 2 has since been placed on public exhibition.</p> <p>The main project feature relevant to the cumulative impact assessment is the southern dive structure (about 400 metres in length) and tunnel portal north of Sydenham Station and south of Bedwin Road at Marrickville (called the Marrickville dive site) for Stage 1.</p> <p>Additional information on the Marrickville dive site is provided in the Sydenham Station Modification Report, available on the NSW Major Projects website.</p>
Central business district (CBD) and South East Light Rail – Rozelle Maintenance Depot (also referred to as the Lilyfield Depot)	<p>The maintenance depot is under construction. The construction of the maintenance depot is expected to be complete by early 2018.</p> <p>The CBD and South East Light Rail (CSELR) project includes a light rail vehicle stabling facility at Randwick and a maintenance depot at Rozelle, at the western end of the Rozelle Rail Yards site. The maintenance depot is still under construction.</p>

² <http://majorprojects.planning.nsw.gov.au/>

Project	Description of current project status
Parramatta Road Corridor Urban Transformation Strategy	Future strategic project. While the final strategy was published with a high level implementation plan for 2016-2023 (UrbanGrowth NSW 2016a), details of specific works along Parramatta Road are not yet known. The strategy identifies the 'Camperdown Triangle' at the intersection of Parramatta Road, Pyrmont Bridge Road and Mallett Street as a potential biomedical hub. The strategy identifies a public transport 'super stop' at the intersection of Pyrmont Bridge Road and Parramatta Road.
The Bays Precinct Transformation Plan	Future strategic project. Preliminary investigation and consultation is underway for the development of the White Bay Power Station site, the most relevant 'destination' to the M4-M5 Link. Specific details and timing of the redevelopment are not known.
Whites Creek naturalisation	A concept design was prepared in December 2016. The specific design details and construction timelines for these works are still not known.

Cumulative impact assessment scenarios

Development projects and infrastructure that already exists was used to develop the baseline year (2015) of assessment in the traffic modelling. The baseline year scenario supported the future year predictions for cumulative impacts. Cumulative impacts during the operation of the project are based on the findings of the operational traffic and transport assessment and how this in turn affects changes in air quality within the broader airshed, changes in noise levels, subsequent human health risks and impacts on the social and economic environment. The traffic assessment included modelling of cumulative operational traffic scenarios at 2023 (year of opening) and 2033 (ten years after opening).

The two operational scenarios used for the assessment of cumulative operational impacts were:

- At the year of opening of the M4-M5 Link (2023) with operation of NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5, and the proposed future Sydney Gateway and Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link program of works)
- Ten years after opening of the M4-M5 Link (2033), with operation of NorthConnex, M4 Widening, M4 East, King Georges Road Interchange Upgrade and New M5 and the proposed future Sydney Gateway, Western Harbour Tunnel, Beaches Link and the F6 Extension.

The modelling forecast traffic from the operation of the approved WestConnex projects and the M4-M5 Link as well as a number of proposed motorway projects (see **Table C26-2**). The traffic modelling was based on land use and employment forecasts for metropolitan Sydney including forecasts for proposed growth precincts and urban developments such as the Parramatta Road corridor, The Bays Precinct, Central to Eveleigh corridor, Green Square and Mascot town centre. The modelling also included a range of approved and proposed major road and public transport projects including the CBD and Southeast Light Rail and Sydney Metro City and Southwest projects. It also included forecast growth in the Sydney Airport and Port Botany precinct and the proposed Western Sydney Airport at Badgerys Creek.

While the projects in **Table C26-2** were included in the traffic modelling, some of these projects are still in early stages of design development, do not have a finalised business case and an EIS has not yet been prepared (this includes Sydney Gateway, F6 Extension, Western Harbour Tunnel and Beaches Link). As a result there is limited information available about project design, construction methodology and timeframes for these projects. Reasonable assumptions were therefore adopted for the M4-M5 Link cumulative traffic assessment. Further cumulative impact assessment would occur as part of the environmental assessment processes for these proposed future projects.

Table C26-2 Cumulative operational scenarios as defined for the traffic, air quality, noise and vibration and human health assessments

Scenario description				Projects included									
Traffic/ Air quality	Noise and vibration	Human health risk	Existing road network	WestConnex M4 Widening	WestConnex M4 East	WestConnex KGRU	WestConnex New M5	WestConnex M4-M5 Link	NorthConnex	Sydney Gateway	Western Harbour Tunnel ¹	Beaches Link ¹	F6 Extension
Do minimum	No build	Without project	✓	✓	✓	✓	✓		✓				
2023 – Do something (DS)	2023 Build Do-something	2023 With project	✓	✓	✓	✓	✓	✓	✓				
2023 – Do something cumulative (DSC)	2023 Build Do-something plus	2023 With project cumulative	✓	✓	✓	✓	✓	✓	✓	✓	✓		
2033 – Do something	2033 Build Do-something	2033 With project	✓	✓	✓	✓	✓	✓	✓				
2033 – Do something cumulative	2033 Build Do-something plus	2033 With project cumulative	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes:

1 A component of the proposed future Western Harbour Tunnel and Beaches Link program of works.

Longer term cumulative construction impacts assessment

An assessment of longer term construction impacts considered an extended loss of amenity as a consequence of concurrent or consecutive activities occurring over extended periods. Impacts from longer term construction impacts typically relates to traffic and access disruptions, noise and vibration, air quality, visual amenity and social and economic impacts from projects that have overlapping construction phases or are carried out back-to-back. The cumulative impact assessment identified three specific geographic areas where longer term construction impacts from concurrent or consecutive activities with other WestConnex component projects and other relevant projects was likely to be experienced, being:

- Haberfield/Ashfield (M4 East)
- Rozelle (Rozelle Rail Yards site management works and CSELR maintenance depot)
- St Peters (New M5 and Sydney Metro City and Southwest).

Potential longer duration construction impacts in these areas are assessed in section 26.3.1 of the EIS. Additional responses to submissions on longer duration construction impacts are included in **section C14.12**. Measures to effectively manage longer duration construction impacts affecting the community are provided in **section C14.13** and **Chapter E1** (Environmental management measures).

Lessons learned from other WestConnex projects

Feedback gained from stakeholders and the community on other projects and relevant lessons learnt from design and construction contractor(s) and utility companies were considered in the assessment of potential cumulative impacts (refer to Chapter 7 (Consultation) of the EIS).

C26.1.2 Other projects not included in the cumulative impact assessment

Submitters expressed concern that the cumulative impact assessment had not considered the following developments and projects:

- Sydney Metro West (which would have a significant impact on travel behaviour, including mode share)
- King Street Gateway
- Alexandria to Moore Park Connectivity Upgrade
- Parramatta Road pinch point project
- Parramatta Road Bus Rapid Transit
- Parramatta Light Rail
- Johnstons Creek naturalisation
- Inner West Greenway
- Various active transport projects currently under development such as the City West Bicycle Links and Inner West Regional Bike Network
- Iron Cove Creek naturalisation project.

Response

The cumulative impact assessment methodology (refer to section 1.1.2 of Appendix C (Cumulative impact assessment methodology) of the EIS), outlines clear rationale for the screening criteria applied in determining whether projects should be assessed for cumulative impacts. The screening criteria included the following:

- **Spatial relevance:** A project was considered to be spatially relevant where that project overlapped or was adjacent or proximal to the M4-M5 Link project footprint
 - A project was considered to be adjacent to the M4-M5 Link project where it was within 500 metres of the M4-M5 Link project footprint
 - A project was considered to be proximal to the M4-M5 Link project where it was within two kilometres of construction sites or within 10 kilometres of the M4-M5 Link project footprint

- **Temporal relevance:** A project was considered to be temporally relevant where the expected timing of the construction or operation of a project would be concurrent (ie overlap) with the timing of the construction or operation of the M4-M5 Link project
- **Publicly available information:** Projects under consideration must have publicly-available information (at the time of preparing this EIS), with an adequate level of detail. If a potential future project was known to the EIS team, but there was insufficient public data available to allow a qualitative assessment of the potential cumulative impacts, it was not able to be included in the cumulative impact assessment.

All of the above criteria were applied in determining whether a project would be included in the cumulative impact assessment presented in the EIS. **Table C26-3** summarises the projects considered for the cumulative assessment and the justification for why they were not included (refer to section 1.2 of Appendix C (Cumulative impact assessment methodology) of the EIS). This table lists all the projects summarised in the EIS as well as those identified in submissions which were not outlined in the EIS. The status of these projects and the information available was accurate at the time of the assessment for the EIS.

Table C26-3 Projects considered but not assessed in the cumulative impact assessment

Project name	Potential interaction with the M4-M5 Link	Justification for exclusion
King Street Gateway	Overlaps with the M4-M5 Link mainline tunnel footprint. Potential construction time period overlap with the M4-M5 Link project (however the program is unknown at this stage). Traffic implications on the road network around the M4-M5 Link.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment.
Alexandria to Moore Park Connectivity Upgrade	The project footprint at the Euston Road intersection with Maddox Street is in proximity (less than one kilometre) to the M4-M5 Link footprint at the St Peters interchange and directly connects to the WestConnex New M5 project at this intersection.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment • Roads and Maritime is preparing a separate Review of Environmental Factors to assess the potential impacts of this project.
Parramatta Road Bus Rapid Transit	The M4-M5 Link would provide reductions in traffic along sections of Parramatta road thereby enabling public transport improvements on this corridor. One of the proposed bus rapid superstops is planned for Parramatta Road at the intersection with Pyrmont Bridge Road, which is adjacent to the M4-M5 Link Pyrmont Bridge Road tunnel site. Changes to traffic conditions as a result of a new rapid transit system would also potentially impact on communities impacted by the M4-M5 Link project. There is a potential for construction periods to overlap.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment.

Project name	Potential interaction with the M4-M5 Link	Justification for exclusion
Parramatta Light Rail	<p>There is a potential for construction periods to overlap. Spatial overlap is unlikely as the proposed corridor location of Parramatta Light Rail Stage 1 and Stage 2 is some distance to the west of the M4-M5 Link project.</p> <p>Changes to traffic conditions as a result of a new light rail system are anticipated to be minor as the route is localised around Parramatta and surrounding areas.</p>	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Project footprint unlikely to overlap • Impacts and the timing of the project were not known at the time of the EIS assessment.
Sydney Metro West	The project is in spatial proximity to the M4-M5 Link around The Bays Precinct.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment.
Inner West Greenway	<p>Spatial overlap above the M4-M5 Link mainline tunnel alignment at Haberfield and Leichhardt near Hawthorne Canal and also adjacent to the Darley Road civil and tunnel site.</p> <p>Potential for construction of the missing links in and around the project footprint to occur at the same time as construction for the M4-M5 Link.</p>	<ul style="list-style-type: none"> • Design of the missing links of the project in early stages • Insufficient public information was available • Impacts and the timing of the missing links of the project were not known at the time of the EIS assessment.
The Green Grid	It is possible that the Green Grid project may spatially overlap with some parts of the M4-M5 Link footprint. The 'central region' of the Green Grid includes the area at Alexandria Canal, which is close to the St Peters interchange.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment.
Johnstons Creek naturalisation	The naturalisation project does not interact directly with the M4-M5 Link project footprint but at its closest point is within 500 metres of the project footprint at the intersection of The Crescent and City West Link.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment • There is no direct overlap with the project footprint for the M4-M5 Link.
Lilyfield Road Regional Bike Route Separated Cycleway	Spatial overlap along Lilyfield Road and Victoria Road near the Rozelle Rail Yards.	<ul style="list-style-type: none"> • Design of the project in early stages • Insufficient public information was available • Impacts and the timing of the project were not known at the time of the EIS assessment.

Project name	Potential interaction with the M4-M5 Link	Justification for exclusion
Superyacht Marina	Proximal to the Rozelle Rail Yards.	<ul style="list-style-type: none"> Design of the project in early stages Insufficient public information was available Impacts and the timing of the project were not known at the time of the EIS assessment.
CBD Metro	Spatial overlap at Rozelle where a new station and stabling facility were proposed. The station would be located beneath Victoria Road, near the corner of Darling Road and in proximity to the proposed Iron Cove Link.	<ul style="list-style-type: none"> Temporal relevance not determined Although the design has considered the protected corridor, there is currently no government commitment to proceed.
Cooks Cove precinct redevelopment – Stage 1: Southern Precinct	The Cooks Cove Southern Precinct is located around three kilometres from the St Peters interchange.	<ul style="list-style-type: none"> Design of the project in early stages Insufficient public information was available Impacts and the timing of the project were not known at the time of the EIS assessment.
Easing Sydney's Congestion Pinch Point Program	<p>Pinch points projects are generally small upgrades of specific intersections or short lengths of road. The current project program runs from 2012 for five years.</p> <p>Two projects on Parramatta Road have already been completed. One project, Parramatta Road and Great North Road, remains and is adjacent to the M4-M5 Link project area.</p> <p>In 2015 a new 10 year program of corridor studies were proposed by the NSW Government. This includes a study of Parramatta Road: Strathfield to Leichhardt and public transport improvements to Victoria Road. No specific projects have been identified however.</p>	<ul style="list-style-type: none"> Corridor analysis in early stages No future projects for Parramatta Road have been identified.
Iron Cove Creek naturalisation program	The naturalisation of a section of Iron Cove Creek (also known as Dobroyd Canal) is currently being investigated by Sydney Water. 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 portals works (by M4 East) and Wattle Street entry and exit ramp works (by M4-M5 Link).	<ul style="list-style-type: none"> Design of the naturalisation of Iron Cove Creek was still in the early stages Impacts and timing of the project were not known at the time of the EIS assessment There is no direct overlap with the project footprint for the M4-M5 Link.

Project name	Potential interaction with the M4-M5 Link	Justification for exclusion
City West Bicycle Links (CWCL)	<p>The CWCL would extend the Greenway from North Leichhardt along the light rail corridor to Anzac Bridge. The corridor would provide a continuous connection to the Sydney CBD that is completely separated from motor vehicles.</p> <p>The western end of the CWCL would link to the Greenway corridor and the Cooks River cycle path as well as to major routes through the Bay Run. The eastern end of the CWCL would connect to the Sydney CBD along Anzac Bridge and to major northern routes along Victoria Road.</p>	<ul style="list-style-type: none"> The design of this project was still in early stages, as a concept, at the time of the EIS assessment.
Inner West Regional Bike Network	<p>The Inner Sydney Regional Bicycle Network included an investigation into a broad network of routes across inner Sydney suburbs including various through the project footprint.</p>	<ul style="list-style-type: none"> Design of the bike network was still in early stages Timing of construction works located in and around the project footprint was not available at the time of the EIS assessment.

C26.2 Cumulative impact of multiple environmental issues during the M4-M5 Link project

Six submitters raised concerns about the cumulative impact of multiple environmental issues during the M4-M5 Link project. Refer to Chapter 26 (Cumulative impacts) and Appendix C (Cumulative impact assessment methodology) of the EIS for details regarding cumulative environmental impacts.

C26.2.1 Multiple environmental impacts during both construction and operation

Submitters have raised concern regarding multiple environmental impacts of the project occurring at the same time during both construction and operation of the M4-M5 Link. Specific issues raised include:

- Concern no attempts were made to consider the cumulative impacts of all the separate negative risks of the project and how they would impact on the overall resilience and health of inner west communities
- Concern regarding the cumulative impact of increased traffic and subsequent air pollution, demolition and safety concerns. These concerns are specifically raised for the residential areas of Leichhardt and Haberfield
- Concern with the cumulative impacts of project construction and utilities works around Darley Road.

Response

The EIS assesses the environmental, health and social impacts which may affect individual receivers and neighbourhoods. Each technical chapter of the EIS (Chapters 8 to 25) assessed the potential impacts which may occur from the construction or operation of the M4-M5 Link while Chapter 26 (Cumulative impacts) of the EIS comprises a detailed cumulative impact assessment. These include consideration of consecutive and concurrent (cumulative) impacts relating to increased traffic (refer to Chapter 8 (Traffic and transport)), air quality (refer to Chapter 9 (Air quality)), noise (refer to Chapter 10 (Noise and vibration)), human health (refer to Chapter 11 (Human health risk)) and public safety issues resulting from demolition (refer to Chapter 25 (Hazard and risk)) of the EIS.

The outcomes of the EIS technical assessments were used to inform the development of management and mitigation measures (see **Chapter E1** (Environmental management measures)) and the collective implementation of these measures would minimise a combination of impacts at each receiver. Construction impacts would be minimised where feasible and reasonable during detailed design and construction planning through the development of appropriate management and mitigation measures and consultation with affected residents and stakeholders. The construction strategy for the project (and the broader WestConnex program of works) focuses on balancing the need for construction to occur in a safe and efficient manner while managing constructability constraints and minimising cumulative impacts on the community, environment, road users and the surrounding road network.

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, construction traffic, dust, visual impacts and impacts on parking on local streets around construction sites. Construction activities most likely to result in longer duration impacts include surface road works, utility works, tunnelling and tunnelling support (such as spoil handling and transport). Refer to **section B2.2.1** for further information regarding ongoing construction impacts at Haberfield and St Peters, including a list of strategies to further manage the impacts associated with longer duration construction impacts from the concurrent and consecutive construction of the WestConnex component projects in these areas.

For the Darley Road civil and tunnel site (C4), utility works including protection and/or adjustment of existing utilities, removal of redundant utilities and installation of new utilities are scheduled to begin in 2018 and be completed in early 2019. Potential impacts to local communities from utility works around Darley Road were considered within the construction assessments in the traffic, noise and air quality chapters of the EIS and within Appendix F (Utilities Management Strategy) of the EIS. Potential cumulative impacts between the M4-M5 Link and utility works by service providers will be managed in accordance with the Utilities Management Strategy.

Operational cumulative impacts are captured in the operational traffic modelling informing the cumulative operational assessments for traffic, air quality, noise and human health risk. The project has therefore included design measures to minimise cumulative operational impacts with other interfacing projects including the M4 East and the New M5 projects. For projects still in early design development such as Sydney Gateway and the Western Harbour Tunnel and Beaches Link, there will be a requirement to assess cumulative impacts as part of the environmental assessment processes for these projects. Environmental management measures such as a review of operational network performance would be implemented to ensure that cumulative operational traffic impacts are identified and considered in future operational network performance planning (see **Chapter E1** (Environmental management measures)) for a full list of the projects traffic environmental management measures).

C26.3 Cumulative impacts with other projects

81 submitters raised concerns about the cumulative impacts of the M4-M5 Link and other projects across multiple environmental issues. Refer to section 26.4 of the EIS for details of cumulative impacts with other projects.

C26.3.1 Cumulative impacts with other projects

Concerns have been raised relating to the cumulative impacts arising from a combination of the construction and operation of the project with other projects. The following specific concerns have been raised:

- Cumulative impacts of road expansion and associated sprawl
- Construction overlap with the Western Harbour Tunnel and Beaches Link projects. Specifically, a submitter requested further information on how M4-M5 Link would be managed alongside the proposed Western Harbour Tunnel project, so that the community is not subject to nearly a decade of work. Questions asked included:

- Is this work going to happen simultaneously?
- How have the adverse impacts of these two projects happening together been assessed and how will these impacts be mitigated?
- Impacts from tunnelling for the M4-M5 Link and Sydney Metro City and Southwest on the communities of Tempe, Sydenham, St Peters, Newtown and Camperdown
- Public transport efficiency will be impacted by the compounded effect of Sydney Metro reducing train services during construction and New M5 and M4-M5 Link on bus services around St Peters interchange.

Response

The cumulative impact assessment considered potential cumulative impacts from the construction and operation of the project and other projects such as the proposed future Western Harbour Tunnel and Beaches Link and Sydney Metro City and Southwest (refer to section 26.4 of the EIS). This included an assessment of consideration of consecutive and concurrent (cumulative) traffic and transport (refer to Chapter 8 (Traffic and transport)), air quality (refer to Chapter 9 (Air quality)), noise (refer to Chapter 10 (Noise and vibration)), human health (refer to Chapter 11 (Human health)), urban design and visual amenity (refer to Chapter 13 (Urban design and visual amenity)), social and economic (refer to Chapter 14 (Social and economic)), soil and water quality (refer to Chapter 15 (Soil and water quality)), flooding and drainage (refer to Chapter 17 (Flooding and drainage)), biodiversity (refer to Chapter 18 (Biodiversity)), groundwater (refer to Chapter 19 (Groundwater)), non-Aboriginal heritage (refer to Chapter 20 (Non-Aboriginal heritage)), Aboriginal heritage impacts (refer to Chapter 21 (Aboriginal heritage)) and cumulative impacts (refer Chapter 26 (Cumulative impacts)).

The strategic traffic modelling for the project included land use and employment forecasts for the Sydney metropolitan area including areas with proposed growth precincts such as the Parramatta Road corridor, Bays Precinct, Central to Eveleigh corridor, Green Square and Mascot town centre. The modelling also included a range of proposed major road and public transport projects including CSELR and Sydney Metro City and Southwest (refer to section 26.3.2 of the EIS).

Future population and employment growth and associated land use development across Sydney, including upgrades of transport infrastructure and roads, are considered cumulatively by the NSW Government through policy development and the preparation of integrated land use and transport strategies. This is discussed further in **section C3.1.2**.

Western Harbour Tunnel and Beaches Link program of works

Details regarding construction of the Western Harbour Tunnel are not available at this time as the project is in the early stages of design development. For the purpose of the EIS, it was assumed that the construction of the proposed future Western Harbour Tunnel would indicatively occur from 2019 to 2025 and as such would overlap with the M4-M5 Link construction. The likely trip generation for heavy and light vehicles travelling west from the Western Harbour Tunnel construction site, assumed to be travelling a similar route to M4-M5 Link traffic, was added to the cumulative construction traffic assessment presented in this EIS.

Analysis indicated that the impact from additional Western Harbour Tunnel construction traffic on the road network would be minimal, with most intersections operating at the same level of service as modelled for the M4-M5 Link. A few intersections along Wattle Street and Parramatta Road are forecast to experience a slight worsening in level of service during the AM and PM peak periods as a result of Western Harbour Tunnel construction traffic, namely:

- Parramatta Road/Wattle Street intersection in the AM peak hour
- Parramatta Road/Harris Road and Parramatta Road/Croydon Road/Arlington Street intersections in the AM peak hour
- Wattle Street/Ramsay Street in the PM peak hour (refer to section 7.6 of Appendix H (Technical working paper: Traffic and transport) of the EIS).

These cumulative impacts on the road network would not be experienced for the full duration of the consecutive construction period of the M4-M5 Link and the Western Harbour Tunnel and Beaches Link project and would be subject to further assessment in the Western Harbour Tunnel EIS.

On-road public transport in the cumulative construction scenario would generally experience levels of service as they do under the M4-M5 Link project construction scenario with a small reduction in levels of service in some locations due to the increased demand generated by the Western Harbour Tunnel construction traffic.

Air quality impacts, principally relating to dust from construction activities, would be manageable through well established and effective management and mitigation measures. Therefore cumulative air quality impacts from construction ancillary facilities are not expected to be significant.

The potential impacts on pedestrians and cyclists along Lilyfield Road adjacent to the Rozelle civil and tunnel site, potentially in the form of additional light vehicle movements along Lilyfield Road during construction, would likely be lengthened due to the construction of the proposed future Western Harbour Tunnel and Beaches Link project.

The construction of the project will not result in a significant increase in construction vehicle numbers on the road network compared to existing traffic levels. Construction traffic to and from construction ancillary facilities represents a very small increase in traffic compared to background traffic volumes therefore the magnitude of potential impacts is minor.

Given that several tunnelling works activities may operate simultaneously at Rozelle associated with the M4-M5 Link and the proposed future Western Harbour Tunnel, cumulative construction noise impacts may be apparent during out-of-hours works periods where cumulative impacts are predicted to result in noise management level exceedances of up to 20 dB(A) at times during the night-time period. Receivers most likely to be affected by these construction impacts include those adjoining Lilyfield Road between Justin Street and Ryan Street and adjoining Brennan Street between Starling Street and White Street.

The Western Harbour Tunnel project has potential to have cumulative groundwater impacts with the M4-M5 Link project in the Rozelle area. At the time the EIS was drafted, only limited information was available about the proposed design and construction methodology for the Western Harbour Tunnel project and as a result no meaningful analysis of impacts was possible. Cumulative groundwater impacts would be addressed in the future as part of the EIS for the Western Harbour Tunnel project.

It is assumed that the construction of the Western Harbour Tunnel surface works at the Rozelle Rail Yards would occur concurrently with the M4-M5 Link and consecutively beyond 2023. This would result in the proposed open space area at Rozelle Rail Yards being delivered in stages – the first stage in late 2023 after completion of the M4-M5 Link project and the next stage some time post 2023 after completion of the Western Harbour Tunnel construction. This would also extend the visual impacts associated with construction for a longer duration at Rozelle.

Positive cumulative impacts to local businesses and the economy would likely result from the concurrent construction activity associated of the M4-M5 Link and the Western Harbour Tunnel and Beaches Link project, which is likely to intensify employment and economic stimulus impacts. There is potential for wages to increase due to high demand for construction workers and opportunities for local businesses to supply goods or services for construction of these projects and to project personnel. Business turnover is also likely to increase due to demand.

Potential negative impacts to business and the economy 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. Roads and Maritime acknowledge that the impacts from construction of the two projects at Rozelle are not short term and would extend the duration of impacts to a period of up to seven years for some receivers in this area.

Sydney Metro City and Southwest project

Elements of the M4-M5 Link construction program would likely also overlap with the construction of the Sydney Metro City and Southwest project (Stage 1: Chatswood to Sydenham). Construction traffic from the Sydney Metro Stage 1 Marrickville dive site, which is around one kilometre to the northwest of Campbell Road civil and tunnel site (C10), may use the Princes Highway, which would also be used by traffic from the M4-M5 Link construction site at Campbell Road at St Peters.

The Sydney Metro City and Southwest rail tunnels are to be constructed as undrained (tanked) tunnels that would cross the M4-M5 Link project alignment in the vicinity of Lord Street at Newtown. As the twin Sydney Metro tunnels are to be constructed as tanked tunnels, there will be negligible cumulative impacts on groundwater drawdown. The station boxes are to be constructed and operated as drained shafts and will extract groundwater from the local hydrogeological regime over time. The closest drained structure is proposed at Marrickville Station which is some distance to the west of the M4-M5 Link, and as such is considered unlikely to have significant cumulative impacts on groundwater drawdown.

The Sydney Metro tunnels are likely to be constructed prior to the M4-M5 Link tunnels although it is unlikely they would be operational by the time the M4-M5 Link tunnel excavation was complete. Therefore it is anticipated that there would be no cumulative ground borne noise impacts. The Sydney Metro tunnels are likely to be subject to settlement as a result of the M4-M5 Link. The magnitude of settlement, however, is unlikely to adversely impact the integrity of the Sydney Metro tunnels (refer to section 12.3.4 of the EIS).

Elements of the M4-M5 Link construction program would also occur concurrently with the construction of the Sydney Metro City and Southwest project (Stage 1: Chatswood to Sydenham). Construction traffic from the Sydney Metro Marrickville dive site, which is some distance to the west, may use the Princes Highway, which would also be used by traffic from the M4-M5 Link at Campbell Road construction ancillary facility (C10) at St Peters (refer to section 26.4.1 of the EIS).

C26.4 Management of cumulative issues

144 submitters have raised concerns regarding the management of cumulative construction impacts from several overlapping construction projects. See **Chapter E1** (Environmental management measures) for details of cumulative environmental management measures.

C26.4.1 Adequacy of management of cumulative impacts

Submitters raised concerns that not enough is being done to manage and minimise cumulative impacts. Specific issues raised include:

- The mitigation strategies, for the multiple cumulative impacts, are generic and not strong enough. This requires significant further development, before any approvals should be given
- Mitigation measures are lacking to ease the cumulative construction impacts of several tunnelling projects operating simultaneously in Camperdown
- The lack of appropriate management measures to address the cumulative impacts relating to utility works, due to poor coordination.

Response

The mitigation strategies proposed to manage and minimise cumulative impacts assumes that site specific mitigation measures for each study discipline presented in the EIS would already be in place (see **Chapter E1** (Environmental management measures)). The project will maintain regular communication with other projects that have the potential to result in cumulative impacts with the M4-M5 Link, including the projects listed in Table 26-2 of the EIS and other projects that are approved during construction of the project and have the potential to result in cumulative impacts, as determined using the screening criteria described in section 1.1.2 of Appendix C (Cumulative impact assessment methodology) of the EIS. Information will be requested from each project regarding upcoming works scheduled in the vicinity of the M4-M5 Link to facilitate coordination of project works to manage potential cumulative impacts where feasible (refer to environmental management measure C1 in **Chapter E1** (Environmental management measures)). A Community Consultative Committee will be established for the project (refer to environmental management measure C2 in **Chapter E1** (Environmental management measures)). The committee will provide a forum for discussion between Roads and Maritime, the design and construction contractor(s), local community and councils regarding the project, including cumulative impacts.

Construction impacts would be minimised where feasible and reasonable during detailed design and construction planning through, application of appropriate management and mitigation measures, and consultation with affected residents and stakeholders. The construction strategy for the project focuses on balancing the need for construction to occur in a safe and efficient manner while managing constructability constraints and minimising cumulative impacts on the community, environment, road users and the surrounding road network.

A Utilities Management Strategy was developed for the EIS (refer to Appendix F (Utilities Management Strategy) of the EIS). Section 9 of this strategy outlines the coordination and consultation process for proposed utility works between the design and construction contractor(s) and utility service providers. Environmental management measures to manage potential impacts are discussed in **section C12.9.1** and **section C12.11.2** and include the establishment of a Utility Co-ordination Committee. The implementation of the Utilities Management Strategy is an environmental management measure for the project (see environmental management measure PL14 in **Chapter E1** (Environmental management measures)).

To minimise 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, with the use of the White Bay civil site (C11) 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) at Haberfield as a construction workforce car park and laydown area. 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), 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 each shed 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 contractor, 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, 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.

The Pyrmont Bridge Road tunnel site (C9) would be located between Parramatta Road and Pyrmont Bridge Road at Annandale on the boundary with the suburb of Camperdown. Construction work at this site and in the vicinity of this site would include the following activities for the M4-M5 Link:

- Construction of a temporary access tunnel for tunnelling works
- Tunnel excavation of the northbound and southbound mainline tunnels (about 100 metres west of the construction site boundary).

No other significant projects that have the potential to interact with the M4-M5 Link to result in cumulative impacts have been identified in the Camperdown area. The management measures identified above and in **Chapter E1** (Environmental management measures) would minimise the combination of impacts from the project which may affect Camperdown residents in the vicinity of the Pyrmont Bridge Road tunnel site (C9) and construction of the mainline tunnels.

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C27 Sustainability

This chapter addresses issues raised in community submissions associated with sustainability of the M4-M5 Link Environmental Impact Statement (EIS). Refer to Chapter 27 (Sustainability) of the EIS for the further detail on the sustainability of the M4-M5 Link project.

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C27.1 Ecological sustainable development

Three submitters raised concerns about ecological sustainable development in relation to the M4-M5 Link project. Refer to section 27.4 of the EIS for details of ecological sustainable development.

C27.1.1 Government requirements and consistency with ecological sustainable development

A submission expressed concern that the project does not comply with the government's requirements for ecological sustainable development. A submitter was also concerned that the project would worsen intergenerational equity and cause legacy impacts.

Response

The relevant requirements identified in the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DP&E) relating to sustainability have been addressed in Chapter 27 (Sustainability) of the EIS.

In NSW, the commitment to the concept of ecologically sustainable development is expressed in current legislation. It is an object of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) (section 5 (a) (vii)) to encourage ecologically sustainable development. This would be achieved through the implementation of the following four principles of ecologically sustainable development:

- The precautionary principle
- Inter-generational equity
- Conservation of biological diversity and ecological integrity
- Improved valuation and pricing and incentive mechanisms.

The principles of ecologically sustainable development have been an integral consideration throughout the design of the project. This includes the effective integration of the economic and environmental considerations in the decision making process, as defined by section 6(2) of the *Protection of the Environment Administration Act 1991* (NSW).

The precautionary principle has been applied during the design and development of the project through the alternatives and options analysis, adopting a conservative approach to evaluation of environmental impacts and identifying and considering potential environmental risks associated with the project to ensure that an appropriate amount of time was afforded for the detailed specialist studies carried out as part of the environmental assessment (refer to Chapter 28 (Environmental risk analysis) of the EIS). Safeguards and management measures have been developed to manage and reduce impacts identified in these assessments (see **Chapter E1** (Environmental management measures)). Refer to section 27.4.1 of the EIS for further information on how the project has applied the precautionary principle. See **section C27.1.2** for a discussion on issues raised on the precautionary principle.

The project has considered inter-generational equity with the management of potential environmental impacts discussed throughout the EIS (refer to section 27.4.2 of the EIS). The project is anticipated to contribute to inter-generational equity through improved connectivity, reduced congestion, as well as facilitating urban renewal and future economic growth.

Specific examples of project outcomes that support the principle of inter-generational equity include:

- During construction and operation of the project, opportunities would continue to be sought to reduce material use and maximise the use of materials with low embodied environmental impact, where practical
- In terms of air quality impacts and its impact on future generations, under expected traffic conditions, the contribution of project tunnel ventilation outlets to pollutant concentrations was found to be negligible for all sensitive receivers identified. Exceedances of some air quality criteria were predicted to occur at a small proportion of sensitive receivers both with and without the construction of the M4-M5 Link. However, the total number of receivers with exceedances is anticipated to decrease slightly with the project and in the cumulative scenarios. Where increases

in pollutant concentrations at receptors were predicted, these were mostly small (refer to section 9.7 of the EIS for the assessment of potential operational air quality impacts)

- Notwithstanding the project benefits and the renewable energy targets (that would apply as part of either national or state legislation) or the environmental management measures (see environmental management measure OGHG9 in **Chapter E1** (Environmental management measures)), the project may have an impact on inter-generational equity through the consumption of non-renewable fuel resources during operation. As road transport is a significant and necessary element of the NSW economy that also provides many social benefits, NSW Roads and Maritime Services (Roads and Maritime) would continue to ensure that all potential impacts on this system, such as peak oil, are identified and action is taken to manage these risks.

Conservation of biological diversity and ecological integrity is a fundamental consideration of the project. The design and assessment of the project has been undertaken with the aim of identifying, avoiding, minimising and mitigating potential biodiversity and ecological impacts. This EIS provides a detailed biodiversity assessment, which identifies potential impacts on biodiversity, and provides a range of mitigation measures to further avoid and minimise potential impacts on biodiversity. Refer to section 27.4.3 of the EIS for further detail on how conservation of biological diversity and ecological integrity has been applied to the project and Chapter 18 (Biodiversity) and Appendix S (Technical working paper: Biodiversity) of the EIS for further detail on the biodiversity assessment.

The principle of improved valuation, pricing and incentive mechanisms has been demonstrated in the design features incorporated into the project and the management measures to be implemented during construction and operation. Specific examples of design features include relocating the Rozelle interchange to be predominantly below ground to reduce surface impacts, creation of additional open space and the realignment of the mainline tunnels to avoid impacts on heritage conservation areas and heritage items, where possible. Environmental impacts have been avoided or minimised where practical during the design development for the project. Environmental management measures provided in **Chapter E1** (Environmental management measures) will be implemented during construction and operation of the project. Additionally, the costs associated with the planning and design of measures to avoid/minimise adverse environmental impacts and the costs to implement them have been included in the overall project costs. Refer to section 27.4.4 to the EIS for further detail on how the principle of improved valuation and pricing and incentive mechanisms has been applied to the project.

C27.1.2 Consistency with the precautionary principle

A submitter was concerned that aspects of the air quality and health assessments were not carried out in line with the precautionary principle. Areas of concern included:

- Not considering ultrafine particles in the assessments on the basis that there are no existing Australian criteria for ultrafine particles and no ambient data
- Not considering black carbon in the assessments, due to little data being available and no health criteria
- Predication of the effect on ozone generation resides with the proponent.

Response

Section 6(2)(a) of the *Protection of the Environment Administration Act 1991* (NSW) states the following in regards to the precautionary principle:

'The precautionary principle-namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.'

In the application of the precautionary principle, public and private decisions should be guided by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
- an assessment of the risk-weighted consequences of various options'.*

The precautionary principle has been applied to both the air quality and human health risk assessments in the EIS through the conservative approach undertaken for the modelling. Both the air quality and human health assessments considered risk-based consequences of the project. Examples of applying a conservative and risk-based approach, as per the precautionary principle, to the air quality assessment include:

- One type of modelling scenario undertaken in the air quality assessment consisted of the regulatory worst case scenarios. The objective of regulatory worst case scenarios was to demonstrate that compliance with the concentration limits for the tunnel ventilation outlets would deliver acceptable ambient air quality to the surrounding receptors. The scenarios assessed emissions from the ventilation outlets only. This represented the theoretical maximum changes in air quality for all potential traffic operations in the tunnel, including unconstrained and worst case traffic conditions from an emissions perspective, as well as vehicle breakdown situations. The results of this analysis demonstrated the air quality performance of the project if it operates continuously in the worst operating conditions. In reality, ventilation outlet concentrations would vary over a daily cycle due to changing traffic volumes and tunnel fan operation. This assessment is therefore very conservative, and provided results in emission contributions from project ventilation outlets that would be much higher than those that would occur under usual operational conditions in the tunnel
- Consideration was also given to the potential cumulative impacts of the project with the other component projects of the WestConnex program of works and other related major infrastructure projects that are likely to be operational within 10 years of the opening of the project. By including potential projects, a worst case scenario was assessed, even if some future projects are not approved
- Air quality data from a number of the NSW Office of Environment and Heritage (OEH) and Roads and Maritime sites was assessed and analysed within the EIS. Using current background information for future air quality scenarios (beyond 2023) is a conservative estimate. Based on trends over the last few decades, the contribution of road vehicles to pollution levels in Sydney has fallen. This is because of improvements to fuels and pollution management systems on vehicles. New less polluting vehicles replace older polluting vehicles over time. This has led to a reduction in vehicle generated pollution even with traffic growth and it is expected that this will continue to happen for some time into the future.

In NSW, the statutory methods used for assessing air pollution from stationary sources are listed in the NSW Environment Protection Authority (NSW EPA) Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2016). These criteria include the latest (2016) Updated NSW EPA Approved Methods for particulate matter.

The project was assessed against the air quality criteria listed in the updated Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2016) (updated Approved Methods). The updated Approved Methods adopted The National Environment Protection (Ambient Air Quality) Measure (AAQNEPM) standards, which ensure compliance with air quality standards, in order to attain 'ambient air quality that allows for the adequate protection of human health and wellbeing'.

There are currently no standards for assessment of 'ultrafine' particles (UFPs) (ie particles with a diameter of less than 0.1 micrometre). As UFPs are a subset of PM_{2.5}, the assessment of PM_{2.5} is considered to include the potential impacts of UFPs. This approach is in line with the World Health Organisation (WHO) Regional Office for Europe (2013) which has stated the following:

'The richest set of studies provides quantitative information for PM_{2.5}. For ultrafine particle numbers, no general risk functions have been published yet, and there are far fewer studies available. Therefore, at this time, a health impact assessment for ultrafine particles is not recommended'.

Criteria for black carbon, a component of PM_{2.5}, is not listed in the NSW EPA Approved Methods for particulate matter. There is therefore no project criteria established for black carbon. However, as black carbon is a component of PM_{2.5}, the assessment of PM_{2.5} is considered to include the potential impacts of black carbon.

Refer to section 9.2.6 of the EIS for further information on the pollutants and metrics not assessed including ultrafine particles.

As a result of its secondary and regional nature, ozone cannot practicably be considered in a local air quality assessment. Emissions of ozone precursors (oxides of nitrogen (NO_x) and volatile organic compounds (VOCs)) are distributed unevenly in urban areas, and concentrations vary during the day. Complicating this further are the temporal and spatial variations in meteorological processes. Ozone formation is non-linear, so reducing or increasing NO_x or VOC emissions does not necessarily result in an equivalent decrease or increase in the ozone concentration. This non-linearity makes it difficult to develop management scenarios for ozone control (NSW Department of Environment, Climate Change and Water, 2010b). Ozone was, however, considered in the regional air quality assessment. The results of the regional air quality assessment are discussed in section 9.8 of the EIS. Overall, it was concluded that the regional impacts of the project would be negligible, and undetectable in ambient air quality measurements at background locations.

See **Chapter C9** (Air quality) and **Chapter C11** (Human health risk) for responses to issues raised by the community on air quality and human health risks.

In summary, the EIS has assessed the threat of serious or irreversible environmental damage and project decisions have been guided by the evaluation and (risk based) assessment of impacts. Although there is no criteria available for the assessment of UFPs and black carbon, the EIS included an assessment of PM_{2.5}, which is considered to include the potential impacts of UFPs and black carbon.

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C28 General

This chapter addresses issues raised in community submissions associated with general concerns about the M4-M5 Link project. Specific issues raised are addressed in the remainder of **Part C** (Response to community submissions).

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C28.1 General environment

69 submitters raised issues regarding general environmental impacts of the project.

C28.1.1 General environmental concerns

Submitters raised general concerns with regards to environmental impacts on the immediate project footprint and surrounding areas (such as Haberfield, St Peters, Rozelle and North Annandale) as well as across Sydney. Submitters were concerned about impacts on residents, childcare centres and schools during construction and into the future, including traffic congestion and pollution.

A submitter was also concerned with the general environmental impacts of the Darley Road civil and tunnel site (C4).

Response

The WestConnex program of works is part of an integrated transport solution to the increasing pressure on Sydney's transport network. The WestConnex program of works, including the project, would facilitate improved connections between western Sydney and Sydney Airport and Port Botany (via the St Peters interchange and the proposed future Sydney Gateway project), as well as better connectivity between key employment hubs and local communities. The project would help deliver the transport connectivity required to meet future urban growth expectations as part of the transformation of Greater Sydney. The strategic context for the project is discussed in Chapter 3 (Strategic context and project need) of the EIS.

The EIS included the preparation of a range of detailed technical studies. These technical studies were prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) as well as industry standards and guidelines. Project objectives and how they would be achieved are described in section 30.1.2 of the EIS.

The detailed studies to identify potential environmental impacts associated with the project, including impacts at Haberfield, St Peters, Rozelle, North Annandale and across Sydney more generally, are included in Appendix H to X of the EIS and summarised in Chapters 8 to 25 of the EIS. Environmental concerns raised by submitters during the public exhibition of the EIS have also been addressed throughout this Submissions and preferred infrastructure report. Each of the assessments presented in the EIS makes clear reference to the receivers and communities which may be affected by the project. The assessments provide details of the anticipated level of impact, its level of acceptability relative to established, applicable assessment criteria and presents appropriate mitigation measures for the identified impacts.

Identified impacts from the construction and operation of the M4-M5 Link project would be managed in accordance with the environmental management measures identified in **Chapter E1** (Environmental management measures). These management measures aim to ensure the best possible environmental outcomes are achieved during construction and operation of the project, and would adhere to relevant industry standards and guidelines. For example, a proposed measure to manage air quality impacts during construction would be favouring the use of mains electricity over diesel or petroleum powered generators, where practicable, to reduce air emissions from construction sites. Further opportunities to reduce impacts from the project will be refined during detailed design and construction planning.

As discussed in **section 3.4** and Appendix H (Technical working paper: Traffic and transport) of the EIS, a number of key benefits and improvements are forecast as a result of the project:

- Non-motorway roads in the Inner West local government area (LGA) are forecast to experience faster trips with the daily average speed increasing by about 10 per cent. Similarly, the vehicle distance travelled on non-motorway roads is forecast to reduce by about 12 per cent. This indicates that on average, these trips are fewer in number and faster
- Improved 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 (VKT) and reduction in vehicle hours travelled (VHT) is mainly due to traffic using the new motorway, with reductions in daily VKT and VHT also forecast on non-motorway roads

- The project, along with investment in other road, public transport and active transport projects, would help to accommodate the forecast growth in population and travel demand in the Sydney metropolitan area
- Reduced travel times are forecast on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct
- Reduced traffic is forecast on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, King Georges Road and Sydenham Road
- Around 2,000 heavy vehicles are forecast to be removed from Parramatta Road, east of the M4 East Parramatta Road ramps, each weekday.

Where the project would connect to the existing road network, increased congestion is forecast in parts of Mascot, along Frederick Street at Haberfield, Victoria Road north of Iron Cove Bridge, Johnston Street at Annandale and on the Western Distributor. A number of these areas are forecast to improve when the proposed future Sydney Gateway and the proposed future Western Harbour Tunnel and Beaches Link are completed and operational.

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 the Parramatta Road Corridor Urban Transformation and The Bays Precinct Transformation, 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.

The project would enhance the environment through:

- Allowing for improved efficiency of the road network and predicted travel time savings, resulting in lower vehicle emissions, a long term reduction in greenhouse gas emissions and an overall improvement in air quality
- Delivering up to 10 hectares of new open space at the Rozelle interchange
- Enhancing pedestrian and cycleway infrastructure around Rozelle, thereby improving social welfare by providing greater connectivity for cyclists and pedestrian journeys.

The potential impacts associated with the Darley Road civil and tunnel site (C4) are discussed in various environmental impact assessment sections in the EIS. Responses to issues raised in submissions in relation to the Darley Road civil and tunnel site (C4) are included in **Chapter C4** (Project development and alternatives) through to **Chapter C26** (Cumulative impacts) of the EIS.

C28.2 Endorsement of other submissions

23 submitters expressed their endorsement of other submissions

C28.2.1 Endorsement of other submissions

Submitters expressed their endorsement of other submissions, which included issues over a variety of environmental aspects and locations.

Response

The issues raised in these submissions have been addressed in the relevant sections of this report throughout **Part B** (Response to key stakeholder submissions), **Part C** (Response to community submissions), **Part D** (Preferred infrastructure report) and **Part E** (Environmental management measures and conclusion).

C28.3 General support

Eight submitters expressed general support for the project.

C28.3.1 Support for the project

Submitters expressed general support for the project, including the project outcome of reducing traffic congestion, removing traffic from surface roads and connecting Sydney's motorway network.

Response

The support for the project is noted.

C28.4 General objection

101 submitters raised issues regarding general objections to the project.

C28.4.1 Objection to the project

Submitters raised general objections to the project in whole and/or in part, due to various reasons including the short and long term impacts at local, regional and global level on residents and the community. Submitters also expressed a general concern about the management of impacts and requested consideration of criticism of the project by experts be taken into account. Key local areas of concern included the inner west area generally, southwest Sydney generally, Newtown, Rozelle, Lilyfield, Enmore, Erskineville, Ashfield, Haberfield, St Peters and Rosebery.

Response

The transport network in Sydney is expected to be put under increasing pressure over the next 20 years. A *Plan for Growing Sydney* (NSW Government 2014) indicated that from 2011 to 2031, Sydney's population is forecast to increase from 4.3 to 5.9 million, which equates to an average of 80,000 additional residents per year. Moreover, by 2036, the number of trips made around Sydney each day is forecast to increase by 31 per cent, from 16 to 21 million vehicle trips. This growth will place increasing pressure on the NSW transport network and the key travel demand corridors connecting regional cities and major centres across the greater Sydney metropolitan area.

The road network in the study area for the traffic and transport assessment currently functions under high levels of traffic demand, which often exceeds the operational capacity, especially city bound during the AM peak period. The study area includes some of the most highly congested road corridors in Sydney. Major routes, such as Parramatta Road, City West Link, Victoria Road, Anzac Bridge/Western Distributor, Southern Cross Drive, Princes Highway and King Street experience significant congestion, with resultant increases in travel time and variability, which can cause typical morning and evening peak hours to spread over longer periods.

The current congestion on arterial roads and the missing links in the motorway network impede the efficient flow of traffic to the important economic centres along Sydney's Global Economic Corridor. The Global Economic Corridor extends from the Sydney Airport and Port Botany precinct, through the Sydney central business district (CBD) and North Sydney to Macquarie Park and Sydney's geographical centre, Parramatta, with connections also to the developing economic hubs on the Rhodes peninsular.

The project is listed as a 'high priority initiative' in the *Australian Infrastructure Plan: The Infrastructure Priority List* (Infrastructure Australia 2016). The project is also part of the NSW Government's commitment to deliver WestConnex for Sydney in response to the recommendations from the *State Infrastructure Strategy 2012–2032* (Infrastructure NSW 2012), the *State Infrastructure Strategy Update 2014* (Infrastructure NSW 2014), the *NSW Long Term Transport Master Plan (Transport Master Plan)* (Transport for NSW 2012), the *NSW State Priorities* announced in September 2015 (NSW Government 2015) and the *NSW Freight and Port Strategy* (Transport for NSW 2013).

The WestConnex program of works, which includes the project, has the potential to be a catalyst for major urban renewal and complements *A Plan for Growing Sydney* (NSW Government 2014) and the *Draft Central District Plan*¹ (Greater Sydney Commission 2016). The project also complements the vision established in the *Draft Towards our Greater Sydney 2056* (Greater Sydney Commission 2016) by providing an integrated transport solution to support population and commercial growth in western Sydney.

Investment in the M4-M5 Link, together with the other WestConnex projects, would assist in facilitating the delivery of other major city-shaping improvements, such as outlined in the *Parramatta Road Corridor Urban Transformation Strategy* (UrbanGrowth NSW 2016a) and the *Transformation Plan: The Bays Precinct, Sydney* (UrbanGrowth NSW 2015), which would all contribute to delivering economic growth. Delivery of the *Transformation Plan: The Bays Precinct, Sydney* is intended to be staged and coordinated with the planning and delivery of infrastructure projects including WestConnex. 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.

A number of key benefits and improvements are forecast as a result of the project:

- Non-motorway roads in the Inner West LGA are forecast to experience faster trips with the daily average speed increasing by about 10 per cent. Similarly, the vehicle distance travelled on non-motorway roads is forecast to reduce by about 12 per cent. This indicates that on average, these trips are fewer in number and faster
- Improved 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 VKT and reduction in VHT is mainly due to traffic using the new motorway, with reductions in daily VKT and VHT also forecast on non-motorway roads
- The project, along with investment in other road, public transport and active transport projects, would help to accommodate the forecast growth in population and travel demand in the Sydney metropolitan area
- Reduced travel times are forecast on key corridors, such as between the M4 Motorway corridor and the Sydney Airport/Port Botany precinct
- Reduced traffic is forecast on sections of major arterial roads including City West Link, Parramatta Road, Victoria Road, King Street, King Georges Road and Sydenham Road
- Around 2,000 heavy vehicles are forecast to be removed from Parramatta Road, east of the M4 East Parramatta Road ramps, each weekday.

Where the project would connect to the existing road network, increased congestion is forecast in parts of Mascot, along Frederick Street at Haberfield, Victoria Road north of Iron Cove Bridge, Johnston Street at Annandale and on the Western Distributor. A number of these areas are forecast to improve when the proposed future Sydney Gateway and the proposed future Western Harbour Tunnel and Beaches Link are completed.

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 the Parramatta Road Corridor Urban Transformation and The Bays Precinct Transformation, 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.

The EIS has been prepared in consideration of all relevant legislative requirements, and assesses key issue impacts during construction and operation objectively and thoroughly to provide confidence that the project would be constructed and operated within acceptable levels of impact. Each of the assessments presented in the EIS (Chapters 8 to 25) makes clear reference to the receivers and communities that may be affected by the project, and provides details of the anticipated level of impact, its level of acceptability relative to established, applicable assessment criteria and presents appropriate mitigation and management measures for the identified impacts. While the development of the project would result in unavoidable impacts during construction and operation, overall, the project would deliver a large number of benefits over the medium to long term, as discussed above.

¹ Note that this draft plan was replaced by the *Revised Draft Eastern City District Plan* (Greater Sydney Commission 2017) after the EIS was exhibited

The environmental management and mitigation measures proposed in **Chapter E1** (Environmental management measures) will minimise adverse environmental impacts during construction and operation of the project as far as is practicable. Environmental management and mitigation measures have been developed to cover all areas impacted by the project including the inner west and southwest Sydney generally. These management measures aim to ensure the best possible environmental outcomes are achieved during construction and operation of the project, and would adhere to industry standards and guidelines. Further opportunities to reduce impacts from the project would be refined during detailed design. Should the project be approved, the proponent (Roads and Maritime) must and will comply with all requirements of the conditions of approval for critical State significant infrastructure.

Lessons learnt from preceding WestConnex component projects and other recent major infrastructure projects in NSW, including feedback from the community, key stakeholders, design and construction contractor(s) and the NSW Department of Planning and Environment, have been considered in the development of the environmental management measures for the M4-M5 Link. As a result, a number of additional measures are proposed compared to the M4 East and New M5 projects.

All issues raised in submissions are addressed in **Part B** (Response to key stakeholder submissions), **Part C** (Response to community submissions).

C29 Other WestConnex projects

This chapter addresses issues raised in community submissions associated with other WestConnex projects.

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C29.1 WestConnex New M5

1,841 submitters raised concerns about the WestConnex New M5 project.

C29.1.1 Inadequacy of the WestConnex New M5 project EIS and approval process

Submitters raised a number of concerns regarding the Environmental Impact Statement (EIS) and approval process for the New M5 project. Specific concerns included:

- Issues were not adequately responded to in the New M5 Submissions and preferred infrastructure report, such as in-tunnel air quality and ventilation
- The EIS was rushed, inaccurate and had underestimated or not assessed impacts, in particular noise, dust and odours, resulting in residents being unaware of the scale of destruction from construction of the New M5 project
- The conditions of approval for the New M5 project have not benefited communities
- The EIS for the New M5 did not adequately plan for integration with public transport, open spaces or filtering of ventilation outlets, or discuss the management of the contaminated landfill at Alexandria during construction
- The EIS for the New M5 project did not address compensation options and assessment of homes damaged by the works
- In Stage 2 of WestConnex, tenders were awarded before project approval which has resulted in payments to the successful contractor for variations to the contract. This demonstrates a very poor approach to the administration of government funds
- The New M5 EIS does not indicate how the impacts of pollution from congestion on human health will be ameliorated or overcome
- The New M5 did not adequately account for the acquisition and removal of housing on May Street at St Peters and the proximity of construction work to apartments on McEvoy Street at Alexandria
- Documentation of adverse health and social and economic impacts caused by the New M5 project has not been sufficient.

Response

The New M5 project is being constructed as a separate project and was subject to its own planning assessment process under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). An EIS for the New M5 project was prepared in accordance with the relevant provisions of the EP&A Act, the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW) and the NSW and Federal bilateral process under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act). The EIS addressed the Secretary's Environmental Assessment Requirements (SEARs) issued by the Secretary of the NSW Department of Planning and Environment (DP&E) for the New M5 project.

The New M5 EIS assessed strategic alternatives to the project, including investment in public transport and rail improvements, and reviewed different ventilation system options, in line with the New M5 SEARs. The EIS also detailed consultation to date and the future consultation planned at the time that the EIS was being prepared.

The New M5 EIS, including detailed technical studies (including for air quality, social and economic, land use and property, and human health risk), was reviewed by NSW Roads and Maritime Services (Roads and Maritime) subject matter experts, key regulatory agencies and 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.

DP&E produced an Environmental Assessment Report outlining the findings of their assessment of the project – this is published on the NSW Major Projects website¹. The New M5 project was approved by the NSW Minister for Planning on 20 April 2016 and the Commonwealth Minister on 11 July 2016. Further information on the New M5 including the details of the EIS and conditions of approval can be found on the WestConnex website².

The approval for the New M5 project was on the basis that the proposed mitigation measures and conditions of approval would be implemented by the proponent, Roads and Maritime. In developing the New M5, the NSW Government has endeavoured to identify and pursue reasonable opportunities to streamline project delivery in recognition of the project's strategic importance to the NSW economy and state productivity. This included the carrying out of some preparatory works, including the engagement of a design and construction contractor during the preparation of the EIS. The contractor's design and preliminary construction methodology formed the basis of the preferred design assessed in the EIS.

During the development of the New M5, the acquisition of properties in the vicinity of the project corridor was required to facilitate construction of the project and this was described and assessed in the New M5 EIS.

C29.1.2 Justification and need for the New M5 and benefits of the New M5

Submitters raised concerns regarding the justification for building the New M5 project. Specifically, the following concerns were raised:

- The New M5 project was politically driven by a contribution from the Commonwealth Government. There is no need for Stage 2 of WestConnex
- Based on the conceptual example of a rail corridor above the M5 Motorway, the New M5 is not needed
- The New M5 will not solve congestion issues.

Response

The New M5 EIS described the strategic context and need for the project, including an assessment of strategic alternatives and an assessment of the project against the project objectives. The New M5 Submissions and preferred infrastructure report include responses regarding:

- Justification and need for the project in section 5.3.1
- Project cost and funding – New M5 and WestConnex in section 5.3.2
- WestConnex business case in section 5.3.4
- Benefit cost ratio in section 5.3.9
- Traffic and transport impacts in section 5.8.

The New M5 EIS and Submissions and preferred infrastructure report identifies that the New M5 project would:

- Provide additional motorway capacity along the main connection to Sydney Airport, Port Botany and southwest Sydney which would provide reliability and savings in travel time for through traffic
- Provide improved access and connectivity between employment and population centres as well as for local vehicle trips and for active transport
- Enable improvements to public transport including more frequent cross-regional bus services connecting to Sydney Airport
- Facilitate local road upgrades in St Peters and Mascot.

The project would also increase network resilience along the M5 Motorway corridor by providing an alternative to the M5 East Motorway. This would provide network resilience in the event of incidents or planned maintenance on the M5 East Motorway.

¹ <http://majorprojects.planning.nsw.gov.au/>

² www.westconnex.com.au

C29.1.3 Construction impacts of the WestConnex New M5 project

Submitters raised a number of concerns about the construction phase of the New M5 project, including impacts on residents from dust, noise, vibration and traffic. In particular, the following concerns were raised:

- Working hours:
 - Impacts from out-of-hours construction work that has occurred
 - Promises of noise mitigation measures from night works during the construction of the New M5 have not offered adequate protection for residents resulting in physical and mental stress for many residents through a loss of sleep from frequent night works with no respite
 - Notification from contractors of necessary breaches of normal working hours has not been provided to residents
- Conditions of approval:
 - Concerns over conditions of approval for the New M5 with construction management of the contaminated landfill causing worse than expected impacts at Alexandria
 - The conditions of approval for the New M5 have not minimised impacts on communities. Instead, impacts are worse than expected
 - Conditions of approval have been disregarded by the proponent
- Community consultation:
 - Lack of respect from Sydney Motorway Corporation (SMC) in responding to complaints about the construction of the New M5, including a lack of empathy and fairness in the management of construction impacts with mitigation measures being disproportionately applied leaving vulnerable residents exposed. Affected residents are being refused assistance on the basis that they are considered not sufficiently affected
 - Out-of-hours construction noise without respite periods and without adequate notice has resulted in residents experiencing interrupted sleep with unsatisfactory responses to their concerns
 - Many residents, especially the most vulnerable such as those in rental properties or in public housing, are unwilling to complain about impacts experienced
 - Response from the NSW Department of Education has not been satisfactory in relation to the impact of the construction of the New M5 on children at St Peters Public School
 - Complaints to construction contractors have not been adequately handled and seeking redress for property damage has been difficult
 - Residents have been advised that there are no noise mitigation measures available for construction, measures are only available post-construction
 - Responses to complaints relating to settlement issues have been slow and reluctant, resulting in residents spending their own money to repair their homes
- Management of impacts:
 - Management of utilities, dust and odour, noise and vibration, traffic, property acquisition and contamination has not been effective and been poorly managed during construction of the New M5 at St Peters. The poor management has caused multiple disturbances with potential health implications including toxic dusts, odours and disruption to mains water supply
 - SMC has failed to comply with the environmental protection licences that it was granted as part of previous approvals
 - The release of odours and gasses at the Alexandria landfill were not managed adequately
 - The construction traffic and access management plan for the New M5 has been poorly managed
 - Management of contamination impacts at various locations
 - Management of tree removal, including approval of 'tree reports'
 - Noise mitigation measures during construction of the New M5 were not enforceable

- Impacts from construction:
 - Construction works are impacting lives and investments from a general lack of understanding and control of construction works leading to poor health and safety outcomes including damage to homes
 - Social impacts from property acquisitions and subsequent emotional impact from demolition of homes and significant buildings including the Rudders Bond Store
 - Damage to habitat of the Green Bell Frog and Golden Bell Frog
 - The widespread reduction in access to footpaths on local roads as a result of the project to allow for increased traffic volumes
 - Loss of employment as a result of the construction of the New M5
 - A negative impact on heritage, community cohesion, liveability and health from construction of the New M5
 - Impact on residents from utility works at St Peters occurring through the night. These works have led to burst water mains and residents' water being disconnected
 - Odours from the St Peters site have been a cause for concern, specifically during rain events
 - It is unethical to widen roads such as Euston Road in front of residents' houses.

Response

Roads and Maritime acknowledge that the M4-M5 Link project has interfaces with both the M4 East and New M5 projects and that these projects are all part of the WestConnex program of works. However, specific impacts associated with the construction of the New M5 project are beyond the scope of the M4-M5 Link project.

The proponent and the New M5 design and construction contractor are required to comply with the conditions of approval and requirements of environment protection licences. The contractor is responsible for managing impacts from their activities, in accordance with an approved Construction Environmental Management Plan (CEMP), and for notifying the community about construction works.

Feedback from the community received during the construction of the New M5 project to date has been considered in the preparation of the environmental management measures for the project. Construction impacts of the New M5 project are also considered in the EIS in relation to cumulative impacts. Cumulative impacts of the M4-M5 Link project and the New M5 project are summarised in Chapter 26 (Cumulative impacts) of the EIS.

The concerns raised regarding the New M5 project construction in submissions received for the M4-M5 Link EIS have been passed on to the New M5 communication and environmental project teams. Any additional issues or concerns about the New M5 project construction can be directed to SMC via the project website³ or the toll free number (1800 660 248).

C29.1.4 Operational impacts of the WestConnex New M5 project

Submitters raised a number of concerns about the operation of the New M5 project. In particular, the following concerns were raised:

- The New M5 will result in thousands more vehicles per day on the roads to the airport, which are already at capacity
- The St Peters off-ramp will lead to increased traffic on Euston Road and McEvoy Road at Alexandria. This will increase air pollution and traffic noise at a time when the population is growing rapidly
- The St Peters Active Recreation Area is of no value to the community. Sited around a ten-storey motorway and in close proximity to ventilation facilities, this recreation area does not improve the amenity of the area
- A concern that the New M5 will result in a significant decrease in access to public transport at St Peters

³ www.westconnex.com.au

- Concern that the increase in lanes at the intersection of Alison Road and Anzac Parade will increase risks to children through exposure to pollution and vehicle related injury or death.

Response

Specific impacts associated with the operation of the New M5 project are beyond the scope of the M4-M5 Link project. While Roads and Maritime acknowledge that the New M5 and M4-M5 Link will both operate as part of the WestConnex motorway, the New M5 project was subject to a separate planning assessment process (as discussed in **section C29.1.1**). Operational impacts of the New M5 project are considered in the M4-M5 Link EIS in relation to cumulative impacts only. Cumulative impacts of the M4-M5 Link project and the New M5 project are summarised in Chapter 26 (Cumulative impacts) of the M4-M5 Link EIS.

C29.1.5 Vegetation clearance as a result of the New M5 project

Submitters raised concerns regarding vegetation clearance at Sydney Park including:

- The resulting loss of biodiversity
- Loss of Eucalyptus and Melaleuca trees in Sydney Park and resulting loss of habitat for local birds. Measures should be taken to prevent the loss of these trees
- Impacts to waterfowl and other birds at Sydney Park.

Submitters also raised general concerns about the clearance of vegetation at St Peters and Alexandria to widen local roads to increase traffic capacity.

Response

Vegetation clearing within Sydney Park was assessed in the New M5 EIS (Roads and Maritime 2016). The clearance of established trees, including native species such as Melaleucas, was unavoidable in the required footprint for the New M5 project. Vegetation removal within Sydney Park is being carried out in accordance with the New M5 project conditions of approval and the tree replacement strategy included in the Urban Design and Landscape Plan (UDLP) for the New M5.

Rehabilitation and revegetation measures associated with an overlap in construction footprints of the New M5 and M4-M5 Link projects will be implemented as part of the M4-M5 Link project. Future landscaping works at the Campbell Road civil and tunnel site, located directly south of Sydney Park, will be carried out in accordance with the New M5 project conditions of approval and the tree replacement strategy included in the New M5 UDLP, at the completion of construction of the M4-M5 Link project.

C29.1.6 Cost of the WestConnex New M5 project

Concerns were raised about the increased cost of the New M5. The collateral cost implications to local councils, residents and businesses have not been satisfactory.

Response

The cost of the New M5 project is beyond the scope of the M4-M5 Link project. The size and scale of WestConnex requires the program of works to be delivered in stages, as outlined in the *WestConnex Updated Strategic Business Case* (SMC 2015). The WestConnex program of works is naturally aligned to fit in three construction stages, primarily due to the natural 'break points' where the project can be cost effectively integrated into the surrounding network. As such the New M5 project is being developed as a separate project.

C29.1.7 Suggested opportunities

A submitter noted the opportunity for DP&E to apply policies and practices from the UK Cross Rail project retrospectively to the New M5 project.

Response

The consideration of policies and practices from the UK Cross Rail project are outside the scope of the M4-M5 Link project. Policy changes are a matter for DP&E.

C29.2 WestConnex M4 East

974 submitters raised concerns about the WestConnex M4 East project.

C29.2.1 Inadequacy of the WestConnex M4 East project EIS and approval process

Submitters raised concerns that the M4 East EIS had underestimated or not assessed impacts, in particular of noise, dust and odours. Additionally, submitters were concerned that issues were not adequately responded to in the M4 East Submissions and preferred infrastructure report, such as in-tunnel air quality and ventilation. Specific concerns included:

- The EIS for the M4 East did not address compensation options of homes damaged by the works or adequately assess the scale of destruction required for the construction of the M4 East project
- Tenders were awarded before project approval resulting in payments to the successful contractor for variations to the contract. The contract award prior to project approval resulted in the EIS assessment process not facilitating meaningful community consultation
- At the commencement of the M4 East EIS exhibition period, residents did not have complete information on the project on which to base their submissions. The M4 East Submissions Report refers to information in the *WestConnex Updated Strategic Business Case* of November 2015, but this document was only published after the closing date for the M4 East EIS submissions
- Planning for the M4 East has been insufficient. The environmental impact assessment was rushed, insufficient and inaccurate
- The M4 East Submissions and preferred infrastructure report does not respond equally to submissions. While stakeholder submissions (government agencies and local councils) are addressed individually, responses to community submissions are generic. Submissions by non-government organisations should be responded to in the same way that submissions from government organisations are responded to
- The M4 East did not sufficiently plan for rail, the filtering of ventilation outlets, integration with public transport or improvements to cycling infrastructure
- An independent review of process and assessment should be performed on the M4 East Submissions and preferred infrastructure report
- The M4 East EIS did not adequately address pavement drainage and stormwater treatment issues at Haberfield/Ashfield
- The impacts experienced by residents from the M4 East project shows that the predicted modelling of impacts in the M4 East EIS was flawed
- Documentation of adverse health and social and economic impacts caused by the M4 East project has not been sufficient.

Response

The M4 East project is being constructed as a separate project and was subject to its own planning assessment process under Part 5.1 of the EP&A Act. An EIS for the M4 East project was prepared in accordance with the relevant provisions of the EP&A Act and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW). The EIS addressed the SEARs issued by DP&E for the M4 East project.

The M4 East EIS, including detailed technical studies (including for air quality, social and economic, land use and property, and human health risk), was reviewed by Roads and Maritime subject matter experts, key regulatory agencies and 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.

DP&E produced an Environmental Assessment Report outlining the findings of their assessment of the project – this is published on the NSW Major Projects website⁴. Their assessment concluded that the impacts of the M4 East project had been satisfactorily addressed in the EIS and Submissions and preferred infrastructure report and that the impacts would be acceptable subject to the implementation of the identified mitigation measures and the recommended conditions of approval. The report concluded that the proposal's benefits outweigh its potential impacts and that any residual impacts can be managed and would not, subject to conditions, result in any long term adverse or irreversible effects.

The NSW Minister for Planning approved the M4 East project on 11 February 2016. Further information on the M4 East project including the details of the EIS and conditions of approval can be found on the WestConnex website⁵.

C29.2.2 Justification and need for the M4 East

Submitters raised concerns regarding the justification for building the M4 East project. Specifically, the following concerns were raised:

- It is unlikely that the M4 East will draw sufficient traffic off Parramatta Road to significantly improve local amenity and lead to significant urban renewal, unless the capacity of Parramatta Road is reduced significantly
- The M4 East will not solve congestion issues.

Response

The M4 East EIS describes the justification and need for the project, including improvements to traffic along Parramatta Road. Chapter 5 of the M4 East Submissions and preferred infrastructure report discusses concerns regarding impacts on road network performance during operation, including on Parramatta Road.

C29.2.3 Construction impacts of the WestConnex M4 East project

Submitters raised a number of concerns about the construction phase of the M4 East project, including impacts on residents from noise, pollution, traffic, dust, disruption and visual amenity. In particular, the following concerns were raised:

- Working hours:
 - Out-of-hours work during the construction of the M4 East has become a regular occurrence and with no respite, particularly with relation to utilities work and when the schedule has fallen behind. This has led to physical and mental stress, impacting the quality of life for many residents through loss of sleep
 - Spoil haulage hours have differed from what was promised
 - Notification from contractors of necessary breaches of normal working hours has not been provided to residents
- Conditions of approval:
 - Contractors have breached the conditions of approval and are not held accountable
 - Breaches of asbestos management has occurred during demolition of houses
 - Conditions of approval for the M4 East have not benefited affected communities
 - The M4 East Residual Land Management Plan condition of approval should be modified prior to any M4-M5 Link construction being approved
 - Road closures have occurred without the required notification
 - There has been minimal enforcement of the conditions of approval

⁴ <http://majorprojects.planning.nsw.gov.au/>

⁵ www.westconnex.com.au

- Community consultation:
 - Lack of respect from SMC in responding to complaints about the construction of the M4 East project. There has been a lack of empathy and respect in the management of construction impacts
 - Complaints from residents about unsatisfactory levels of noise, vibration, dust and other pollutants have been met with a delayed and generic response or no response at all
 - Many residents, especially the most vulnerable such as those in rental properties or in public housing, are unwilling to complain about impacts experienced
 - Seeking redress for cracking in buildings from tunnelling has been difficult with responses to complaints slow and reluctant
 - Concerns relating to acquisition of residential and commercial property have not been adequately managed
 - Damages to properties at Haberfield have been poorly managed and subcontractors not held accountable for compensation
 - Cracks and damages in homes that did not appear on dilapidation reports, such as on Walker Street, need to be repaired
 - Requests for investigations into causes of potential cracking in residential homes along with other impacts has been declined
 - Despite following the elected procedures regarding damage to their homes, residents have not had their claims settled and have had to repair their homes at their own expense
 - Families whose homes were acquired as part of the construction of the M4 East project have not been adequately compensated and have been unable to relocate to a home in the same neighbourhood
- Management of impacts:
 - Inadequate noise mitigation measures are in place for night works
 - Mitigation measures for construction noise are inadequate, poorly regulated and inequitably applied with housing development tenants disproportionately affected
 - Utilities work has been poorly managed during the construction of the M4 East, requiring noisy equipment that should not be deemed minor works
 - Ongoing disruptions during construction since 2016 including impacts due to tunnelling, construction traffic and spoil truck haulage has been inappropriately managed
 - Inappropriate management of dust, noise and vibration, heritage, wildlife, vegetation, traffic, odour, noxious gases and toxic materials has occurred during construction, affecting the liveability of the area surrounding the project and resulting in adverse health problems
 - SMC has failed to comply with the environment protection licence that was granted as part of approvals
 - There have been several breaches in the management of asbestos contaminated soil during the construction of the M4 East project
 - Access restrictions to local roads have not been enforced as construction vehicles use restricted roads regularly
 - Action has not been taken to ensure workers use designated worker parking
 - Unhappy that suggestions made by the Walker Avenue Residents group about visual impacts has been ignored by the contracted construction company
- Impacts from construction including noise, dust, disruption and specifically:
 - Changes to parking provisions due to construction vehicles resulting in parking congestion
 - Works to footpaths and roads around construction sites has involved unnecessary repetition of excavation works and closures
 - Limited access to residential properties due to road dividers

- Loss of employment as a result of construction of the project
 - Increase in vehicle and truck movements from the construction impacting local residents
 - Works have been uncoordinated between the WestConnex contractor and utility companies
 - Property acquisition has had a negative impact on community cohesion
 - Local businesses have been negatively impacted financially but have not been sufficiently compensated
 - There has been a lack of understanding and control of the build, which has led to poor health and safety outcomes
 - Communities have been destroyed through the demolition of houses, apartment blocks, trees and gardens including 50 per cent of apartments at Haberfield
 - Negative impacts on children and staff at Haberfield Public School due to increased noise, vibration, dust, traffic and disruption
 - Increase in traffic on local roads through rat-running has been encouraged through the use of electronic street signs identifying areas of construction congestion
 - Decrease in vegetation as a result of the project has resulted in an increased heat burden in suburbs surrounding the project
 - Haberfield has been divided physically, many Federation homes have been destroyed and residents have been displaced. Years of work to restore these properties have been negated
 - The placement of a barrier on Walker Avenue at Haberfield, is increasing the risk of road accidents due to vehicles regularly speeding along this street
 - Damage to footpaths at Northcote Street, Alt Street, Martin Street, Waratah Street and Reg Coady Reserve has had adverse effects on the community
 - Local roads blocked off for construction have resulted in residents facing long diversions for local travel, often requiring travel on busier arterial roads
 - Increases in traffic on local roads due to construction of the M4 East has resulted in a dangerous environment for children
 - Decreases in property value due to construction of the M4 East project and associated infrastructure including electronic signage
 - Construction of the M4 East has resulted in increased cases of asthma.
- Design of the M4 East
 - The electrical substation at Haberfield should be relocated under existing roads rather than existing properties, as a precaution to health impacts
 - Uncertainty over the rationale for the movement of the bus stop on Northcote Street.

Response

Specific impacts associated with the construction of the M4 East project is beyond the scope of the M4-M5 Link project. The M4 East project is being developed as a separate project and was subject to its own planning assessment process including EIS preparation and exhibition and Submissions and preferred infrastructure report (as discussed in **section C29.2.1**).

Feedback from the community received during the construction of the M4 East project has been considered in the preparation of the environmental management measures in the M4-M5 Link EIS. Construction impacts of the M4 East project are considered in the M4-M5 Link EIS in relation to cumulative impacts only. Cumulative impacts of the M4-M5 Link project and the M4 East project are summarised in Chapter 26 (Cumulative impacts) of the EIS and in **Chapter C14** (Social and economic) and **Chapter C26** (Cumulative impacts).

The proponent and the M4 East construction contractor are required to comply with the conditions of approval and requirements of environment protection licences. The construction contractor is responsible for managing impacts from their activities in accordance with an approved CEMP and for notifying the community about construction works.

The concerns raised regarding the M4 East project construction have been passed on to the M4 East communication and environmental project teams. Any issues or concerns about the M4 East project construction can be directed to SMC via the WestConnex website⁶ or the toll free number (1800 660 248).

C29.2.4 Cost of the WestConnex M4 East project

A submitter is concerned about the increased cost of the M4 East project. The collateral cost implications to local councils, residents and businesses have not been satisfactory.

Response

The cost of the M4 East project is beyond the scope of the M4-M5 Link project. The size and scale of WestConnex requires the program of works to be delivered in stages, as outlined in the *WestConnex Updated Strategic Business Case* (SMC 2015a). The WestConnex program of works is naturally aligned to fit in three construction stages, primarily due to the natural 'break points' where the project can be cost effectively integrated into the surrounding network. As such the M4 East project is being developed as a separate project.

C29.2.5 Suggested opportunities

The following suggestions were made by submitters:

- There is an opportunity for the M4 East project to improve the links between Ashfield and Haberfield for active transport users
- There is an opportunity for DP&E to apply policies and practices from the UK Cross Rail project retrospectively to the M4 East project
- The coordination and integration between all WestConnex projects should be ensured in the event of a disaster.

Response

Although separate planning applications and assessments have been completed, the WestConnex program of works has been coordinated to facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-western Sydney.

Active transport links for the M4 East project are outside the scope of the M4-M5 Link project. The draft M4 East Urban Design Landscape Plan outlines the active transport links to be provided at Haberfield by the M4 East project.

As discussed in section 5.8.4 of the EIS, a 'single operating entity' would undertake day-to-day 'coordinated operations' for the widened M4 Motorway (M4 Widening project), M4 East, New M5 and M4-M5 Link projects (the 'WestConnex Motorway'), as well as the existing M5 East, from a combined traffic control room located at the St Peters interchange, the WestConnex Motorway Control Centre. This would coordinate resources and systems used to respond to incidents, emergencies and threats across the WestConnex Motorway to provide a rapid and coherent response unconstrained by concession boundaries.

The consideration of policies and practices from the UK Cross Rail project are outside the scope of the M4-M5 Link project. Policy changes are a matter for DP&E.

C29.3 WestConnex King Georges Road Interchange Upgrade

Seven submitters raised concerns about the WestConnex King Georges Road Interchange Upgrade project.

C29.3.1 Construction impacts from the King Georges Road Interchange Upgrade

Submitters raised concerns in relation to the construction phase of the King Georges Road Interchange Upgrade. In particular, the following concerns were raised:

⁶ www.westconnex.com.au

- Contractors at Beverly Hills have failed to quarantine and cover outgoing toxic loads such as asbestos, during demolition and excavation
- Home owners at Beverly Hills who have experienced major damage from the King Georges Road interchange works have been denied compensation by both Roads and Maritime and the contractor
- Inadequate landscaping and noise walls at Beverly Hills
- Conditions of approval, including night noise management, community consultation and delivery on promises, has not occurred at Beverly Hills
- Contractors at Beverly Hills have failed to adhere to conditions of approval, including night noise management
- Notification from contractors of necessary breaches of normal working hours has not been provided to residents.

Response

Specific impacts associated with the construction of the King Georges Road Interchange Upgrade are beyond the scope of the M4-M5 Link project. The King Georges Road Interchange Upgrade was developed and constructed as a separate project and was subject to its own planning assessment process under Part 5.1 of the EP&A Act. The NSW Minister for Planning approved the King Georges Road Interchange Upgrade project on 3 March 2015. The King Georges Road Interchange Upgrade was completed and opened to traffic in December 2016.

The proponent and construction contractor were required to comply with the projects conditions of approval and requirements of the environment protection licence. Feedback from the community received during the construction of the King Georges Road Interchange Upgrade project has been considered in the preparation of the environmental management measures in the M4-M5 Link EIS. Construction impacts of the King Georges Road Interchange Upgrade project are considered in the M4-M5 Link EIS in relation to cumulative impacts only. Cumulative impacts of the M4-M5 Link project and the King Georges Road Interchange Upgrade project are summarised in Chapter 26 (Cumulative impacts) of the EIS and in **Chapter C26** (Cumulative impacts).

C29.4 WestConnex M4 Widening

196 submitters raised concerns about the WestConnex M4 Widening project.

C29.4.1 Inadequacy of the WestConnex M4 Widening project EIS and approval process

Submitters raised concerns that the impacts of the M4 Widening on the people of Granville were underestimated in the EIS.

Response

The WestConnex M4 Widening project was constructed as a separate project and was subject to its own planning assessment process under Part 5.1 of the EP&A Act. The NSW Minister for Planning approved the M4 Widening project on 21 December 2014 and the project opened to traffic in July 2017.

An EIS for the M4 Widening project was prepared in accordance with the relevant provisions of the EP&A Act and the relevant provisions of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW). The EIS addressed the SEARs issued by the Secretary of DP&E for the M4 Widening project.

DP&E produced a Secretary's Environmental Assessment Report in December 2014 outlining the findings of their assessment of the project – this is published on the NSW Major Projects website⁷. Their assessment concluded that the impacts of the M4 Widening project, including on the suburb of Granville, had been satisfactorily addressed in the EIS and Submissions report and the DP&Es recommended conditions of approval. The report concluded that the proposal's benefits outweigh its potential impacts and that any residual impacts can be managed and would not, subject to conditions, result in any long term adverse or irreversible effects.

C29.4.2 Construction impacts from the M4 Widening project

Submitters raised concerns about the construction phase of the M4 Widening project. In particular, the following concerns were raised:

- Noise impacts from construction have not been minimal and mitigation measures have been inadequate
- Disruption to an ibis colony
- Residents impacted by the construction of the M4 Widening have had difficulty obtaining mitigation of construction noise impacts
- There have been several breaches in the management of asbestos contaminated soil during the construction of the M4 Widening project
- Management of asbestos contamination impacts at Granville and Harris Park
- Notification from contractors of necessary breaches of normal working hours has not been provided to residents.

Response

The M4 Widening project is beyond the scope of the M4-M5 Link project. The M4 Widening project was constructed as a separate project and opened to traffic in July 2017. Construction on this project is no longer occurring. Issues regarding construction impacts of this project were addressed in the project's EIS and Submissions report.

C29.4.3 Concerns relating to the M4 Widening project during operation

Submitters are concerned the M4 Widening project has resulted in more congestion at Strathfield. Submitters are also concerned that drivers are choosing to use Parramatta Road instead of paying the tolls on the new M4 Motorway.

Response

While the issues raised are acknowledged and will be considered for the M4-M5 Link project, where relevant, the specific impacts associated with the operation of the M4 Widening project are beyond the scope of the M4-M5 Link project.

C29.4.4 Reinstatement of tolls

A submitter raised concerns regarding the reinstatement of the toll on the M4 Motorway after the completion of the M4 Widening, despite the large revenue gain from selling Transgrid and Ausgrid. The backlash in western Sydney about the reintroduction of the extra lane tax on the M4 Motorway to help fund WestConnex should be noted. The impact on local roads of those unable to pay, or choosing not to pay tolls, is exacerbated by congestion at exits and entrances to freeways, as people exercise their objections to this project.

Response

Specific impacts associated with the operation of the M4 Widening project is beyond the scope of the M4-M5 Link project. The M4 Widening project was complete and open to traffic for one toll-free month in July 2017. Distance-based tolls commenced on the new M4 on 15 August 2017. Section 3.12.3 of the Submissions report for the M4 Widening project outlines tolling arrangements and related impacts. Furthermore, cumulative impacts of tolling on the M4-M5 Link project and the M4 Widening project are summarised in Chapter 26 (Cumulative impacts) of the M4-M5 Link EIS.

⁷ <http://majorprojects.planning.nsw.gov.au/>

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C30 Other Roads and Maritime projects

This chapter addresses issues raised in community submissions associated with other Roads and Maritime projects excluding WestConnex projects. Issues associated with WestConnex projects have been addressed in **Chapter C29** (Other WestConnex projects).

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C30.1 Western Harbour Tunnel and Beaches Link

132 submitters raised issues regarding the Western Harbour Tunnel and Beaches Link program of works.

C30.1.1 Concerns relating to the Western Harbour Tunnel and Beaches Link program of works

Submitters were opposed to the Western Harbour Tunnel project, raising the following as concerns:

- Changes in air quality may diminish local amenity and affect public health
- That the additional ventilation facilities associated with the Western Harbour Tunnel project will be located on the Balmain Peninsula and Goat Island, which will drift pollution towards Rozelle
- Rat-running and impact on local streets at Camperdown
- Impact on heritage communities and items in the inner west
- Impact on open space and parkland
- Lack of community consultation with regard to the Western Harbour Tunnel and Beaches Link program of works
- The proposed Western Harbour Tunnel project is poorly integrated into the strategic positioning of the Sydney motorway network
- The Western Harbour Tunnel project will result in extended gridlock on Victoria Road, Anzac Bridge and City West Link and will worsen congestion. Propose that the tunnel be moved further west to align with Lane Cove Road so this congestion is avoided
- The Western Harbour Tunnel should be confined below main arterial roads and unused lands to minimise the impact on local communities
- The Western Harbour Tunnel proposal should be replaced with an extension of Iron Cove Link to join the M2 Motorway at Lane Cove River
- Concern that there has been inadequate planning for the proposed program of works. Many involved in the planning phase were unaware of the extensive network of old coal mines and shafts under the Balmain and Long Nose Point Peninsula
- Public transport alternatives need to be assessed as a feasible alternative to the Western Harbour Tunnel project
- A rail alternative to the Western Harbour Tunnel and Beaches Link program of works, should be considered in the same detail as the current proposal
- Traffic modelling shows severe degradation to City West Link if the Western Harbour Tunnel project is connected
- General concerns and objections towards the Western Harbour Tunnel and Beaches Link program of works
- There is insufficient connectivity between the Drummoyne peninsula and the Western Harbour Tunnel project. Traffic from Drummoyne wishing to access the Western Harbour Tunnel would have to travel along Victoria Road and the Western Distributor to access the tunnel
- Concern that if construction of the Cross Harbour Tunnel [Western Harbour Tunnel] does not begin until the M4-M5 Link is complete, the completion date for the project will be pushed back to 2030
- The Western Harbour Tunnel and Beaches Link program of works is included in the WestConnex concept, but the impact of this component has been hidden from public scrutiny
- Planning for the Western Harbour Tunnel project is incomplete, and it is not clear how this project will be funded
- The Western Harbour Tunnel and Beaches Link program of works will not solve congestion issues

- The Western Harbour Tunnel and Beaches Link program of works have not been funded, designed or modelled yet
- Details regarding the Western Harbour Tunnel and Beaches Link program of works and its business case have not been made available to the public and hence, should not be considered.
- Concern over the operational traffic impacts of the entry and exit ramps of the Western Harbour Tunnel and Beaches Link projects.

Submitters raised a number of questions regarding the Western Harbour Tunnel project and its reliance on the M4-M5 Link. Specific questions include:

- Considering the reliance of the Western Harbour Tunnel project on the M4-M5 Link, why is the Western Harbour Tunnel project not part of WestConnex
- Concern that the Western Harbour Tunnel proposal is causing complexities at the Rozelle interchange
- Congestion created by the construction of the M4-M5 Link will be used as justification for the Western Harbour Tunnel and Beaches Link program of works.

Submitters objected to the Beaches Link project, raising the following concerns:

- The proposed Beaches Link project has not considered public transport options
- Concerns for the health of children
- Lack of community consultation
- The inability to use GPS navigation within the tunnel.

Submitters suggested that future technological advancements to public transport, in particular to bus services, including high capacity, frequent driverless vehicles, would increase commuter capacity and reduce the need for the Western Harbour Tunnel project. Alternatively, light rail or electric bicycles could provide an alternative to the project.

Response

The proposed future Western Harbour Tunnel and Beaches Link program of works are not part of the WestConnex program of works. The Western Harbour Tunnel and Beaches Link program of works includes the proposed future 'Western Harbour Tunnel and Warringah Freeway Upgrade' project (the Western Harbour Tunnel project), and the proposed future 'Beaches Link and Gore Hill Freeway Connection' project (the Beaches Link project). These are both separate projects and as such have their own business case and are subject to their own environmental approval process. Both projects are currently in the early planning and design stage. Details surrounding project need, justification, alternatives, cost and funding would be addressed within the environmental impact assessments for these projects.

Civil construction of elements of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel project are included as part of the M4-M5 Link project. The Western Harbour Tunnel has been considered as part of the M4-M5 Link project only to the extent that it relates to meeting the broader strategic objectives of the WestConnex program of works and in relation to cumulative impacts.

Chapter 12 of Appendix H (Technical working paper: Traffic and transport) of the EIS details the forecast traffic performance of the study area during the cumulative scenarios. The detailed assessments have been undertaken using forecast traffic volumes produced using the WRTM for the following scenarios:

- **Operation 'Cumulative' (2023):** With the 'Do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway and the proposed future Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link project) operational
- **Operation 'Cumulative' (2033):** With the 'Do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and F6 Extension projects operational.

Three other major NSW Roads and Maritime Services (Roads and Maritime) projects are currently in planning and have been included in the cumulative assessments:

- Proposed future Sydney Gateway
- Proposed future Western Harbour Tunnel and Beaches Link
- F6 Extension.

These projects are subject to separate environmental assessment and approval.

These cumulative scenarios were modelled and assessed in the EIS in the following chapters: traffic and transport (refer to section 8.3.4); air quality (refer to section 9.7); and noise and vibration (refer to section 10.4). Cumulative impacts of the M4-M5 Link project and the proposed future Western Harbour Tunnel and Beaches Link are summarised in Chapter 26 (Cumulative impacts) of the EIS.

Further information on the Western Harbour Tunnel and Beaches Link program of works has been made public since the cumulative impact assessment for the M4-M5 Link EIS was undertaken. The Western Harbour Tunnel and Beaches Link program of works consists of two components: the Western Harbour Tunnel and Warringah Freeway Upgrade project and the Beaches Link and the Gore Hill Freeway Connection project.

Scoping reports for these two projects have been submitted to DP&E with SEARs issued to the proponent on 15 December 2017. EISs for each project are being prepared. The Scoping Report for the Western Harbour Tunnel and Warringah Freeway Upgrade project includes mention of a connection to the surface road network at Rozelle. While the construction impact of the proposed future Western Harbour Tunnel entry and exit ramps at the Rozelle interchange is included in this EIS, a comprehensive operational traffic impact of these ramps is not part of this EIS. Due to the ongoing development of the proposed future Western Harbour Tunnel and Beaches Link project, this would be assessed in the future Western Harbour Tunnel and Beaches Link EIS.

However, a high level assessment of potential impacts associated with the proposed future Western Harbour Tunnel and Beaches Link surface ramps at City West Link is provided in section 12.5.8 of Appendix H (Technical working paper: Traffic and transport) of the EIS. The assessment indicates that there is likely to be some reduction in traffic on the Western Distributor and Sydney Harbour Bridge, as more traffic would be able to access the proposed future Western Harbour Tunnel and Beaches Link. However, there is likely to be increased traffic on City West Link, The Crescent and Johnston Street. The impacts of these surface ramps would be assessed in detail as part of future environmental assessment for the proposed future Western Harbour Tunnel and Beaches Link to be carried out by Roads and Maritime.

C30.2 Sydney Gateway

Seven submitters raised issues regarding the Sydney Gateway project.

C30.2.1 Concerns relating to the Sydney Gateway project

Submitters raised concerns regarding the proposed Sydney Gateway project. Specific concerns included:

- Request for traffic modelling in the vicinity of the airport
- Request for consultation strategies that are being devised with relevant stakeholders, especially Sydney Airport Corporation, and surrounding councils
- To improve congestion, the state government should instead buy out the private owners of the Sydney airport rail line and reduce ticket prices
- The Sydney Gateway project has not been funded, designed or modelled yet
- There is no information or preliminary design available, which raises questions about whether the project is feasible, particularly given the technical challenges involved
- Concern that the traffic at the airport would become more congested with the Sydney Gateway
- Concern that construction of the Sydney Gateway would result in delays in other planned Sydney motorways including the Western Harbour Tunnel project.

Response

Specific elements associated with the construction and operation of the proposed future Sydney Gateway project are beyond the scope of the M4-M5 Link project. The Sydney Gateway project is being developed as a separate project and would be subject to a separate environmental impact assessment process to meet the appropriate legislative requirements. Discussion of project options, alternatives, design and associated impacts of the Sydney Gateway project would be addressed in the environmental impact assessment for that project.

Chapter 12 of Appendix H (Technical working paper: Traffic and transport) of the EIS details the forecast traffic performance of the study area during the cumulative scenarios. The detailed assessments have been undertaken using forecast traffic volumes produced using the WRTM for the following scenarios:

- **Operation 'Cumulative' (2023):** With the 'Do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway and the proposed future Western Harbour Tunnel (a component of the proposed future Western Harbour Tunnel and Beaches Link project) operational
- **Operation 'Cumulative' (2033):** With the 'Do minimum' projects completed, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway, Western Harbour Tunnel and Beaches Link and F6 Extension projects operational.

Three other major Roads and Maritime projects are currently in planning and have been included in the cumulative assessments:

- Proposed future Sydney Gateway
- Proposed future Western Harbour Tunnel and Beaches Link
- F6 Extension.

These projects are subject to separate environmental assessment and approval.

The proposed future Sydney Gateway project was included in the 2023 and 2033 cumulative scenario modelled and assessed in the EIS in the following chapters: traffic and transport (refer to section 8.3.4); air quality (refer to section 9.7); and noise and vibration (refer to section 10.4). Cumulative impacts of the M4-M5 Link project, including consideration of the proposed future Sydney Gateway project, are also summarised in Chapter 26 (Cumulative impacts) of the EIS and **Chapter C26** of this report.

C30.2.2 Support of the Sydney Gateway

Submissions in support of the Sydney Gateway project noted that it would create a direct linkage between Sydney Airport, Port Botany and Sydney's overall motorway network.

Response

The support for the Sydney Gateway project is noted.

C30.3 Rozelle Rail Yards site management works

188 submitters raised issues regarding the Rozelle Rail Yards site management works project.

C30.3.1 Rozelle Rail Yards site management works concerns

Submitters raised concerns that work has already begun at the Rozelle Rail Yards, before the M4-M5 Link project has been approved, including removal of buildings, other rail infrastructure and vegetation. Specific construction concerns include:

- Changes to on-street parking provisions and loss of parking as a result of construction workers
- Out-of-hours noise from the enabling works at the Rozelle Rail Yards is sufficient to cause sleep disturbance along Balmain Road ridge top in Lilyfield
- Increase in dust, impacting on local community, including on human health

- Concerns regarding the works at the Rozelle Rail Yards, including the removal of buildings, rail infrastructure and vegetation. These works should have been assessed within the M4-M5 Link EIS
- The proposal to maintain some of the heritage features at Rozelle Rail Yards has been overturned. The removal of these items has already commenced
- The maintenance works at the Rozelle Rail Yards are undermining the possibility of a new surface light rail extension to White Bay and the Balmain Peninsula. This rail corridor should be preserved for future re-use. A railway could streamline Inner West light rail transit services, bypassing Glebe, the Pyrmont loop and Ultimo, and be used to reduce congestion issues
- Objection to the removal of the lighting tower and the Port Authority buildings, as they are of local significance and are representative of the operation of the Rozelle Rail Yards in the first part of the 20th century.

Response

The site management works do not form part of the M4-M5 Link project. The site management works are required irrespective of whether the M4-M5 Link project is approved and proceeds. Should the M4-M5 Link project not proceed, the site management works would allow the Rozelle Rail Yards to be more effectively managed prior to another land use being developed in the future.

Roads and Maritime, as the owner of the site, is responsible for managing environmental and safety issues at the site, including after the site management works are completed. The site management works will benefit future uses of the site (including construction of the M4-M5 Link project if it is approved) because the works will remove material and redundant facilities associated with rail and rail related infrastructure from the site. The undertaking of these works will allow the establishment of the M4-M5 Link construction ancillary facility at the Rozelle Rail Yards to commence following project approval.

The site management works were subject to a separate environmental assessment. The works were assessed in a Review of Environmental Factors (REF) (Rozelle Rail Yards – Site Management Works, Review of Environmental Factors (Roads and Maritime 2016)). The REF was publicly displayed for 21 days between 23 November and 13 December 2016. Submissions relating to the proposal as assessed in the REF were received from stakeholders and the community during this period. Issues raised in the submissions were addressed in the Rozelle Rail Yards – Site Management Works, Submissions Report (Roads and Maritime 2017e). Roads and Maritime considered the submissions and the project was assessed and approved by Roads and Maritime under Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) on 10 April 2017.

The following issues are responded to in the Rozelle Rail Yards Site Management Submissions report:

- Potential traffic and parking impacts in chapter 3.12.2
- Potential impacts from dust in chapter 3.14.1
- Risk of contamination of ground water and waterways and risk of asbestos in chapter 2.3.1
- Potential impacts to Fairy Wrens and other birds in chapter 2.6.5
- Potential impacts on non-aboriginal heritage, including the lighting tower and Port Authority building in chapter 3.9.3
- Construction and demolition noise in chapter 3.13.2
- Independent monitoring of activities in chapter 3.19.1.

Roads and Maritime will continue to manage and maintain the site until after construction of the M4-M5 Link project, if approved. Should the project not proceed, the Rozelle Rail Yards would likely be developed in accordance with *The Bays Precinct Transformation Plan* (UrbanGrowth NSW 2015). Site management works have commenced and will occur over a period of around 12 months. After completion of the works the 'finished site' will be managed and maintained to ensure that the surface cover and stormwater controls are operating effectively.

The Rozelle Rail Yards site management works has been considered in the M4-M5 Link EIS as it relates to cumulative impacts. Results of targeted biodiversity surveys that were carried out within the Rozelle Rail Yards to inform the biodiversity assessment for the site management works were used to assess the potential for any additional impacts of the M4-M5 Link project. Cumulative impacts of the M4-M5 Link project and the site management works have been summarised in Chapter 26 (Cumulative impacts) of the EIS. For the purposes of the assessments for the M4-M5 Link EIS, it was assumed that the site management works are completed prior to construction of the M4-M5 Link project commencing.

Further details on the Rozelle Rail Yards site management works project are available on the Roads and Maritime website¹.

C30.4 F6 Extension

31 submitters raised issues regarding the F6 Extension project.

C30.4.1 Concerns relating to the F6 Extension

Submitters noted that the impacts of the F6 Extension project have not been included in the M4-M5 Link EIS, although some benefits have been included. Submitters considered that the F6 Extension has not been properly assessed.

Submitters were concerned about:

- Impacts on:
 - Homes, including property acquisition and damages
 - Open space, parkland, wetlands, residential neighbourhoods and recreational areas
 - The Royal National Park and the Illawarra
 - The natural heritage along the proposed route
- Motorists not being prepared to pay F6 Extension tolls
- The business case for the F6 Extension is considered to be flawed, not taking into account public transport investment
- The lack of consideration of public transport alternatives to the F6 Extension
- The F6 Extension will cause traffic to exit into local suburbs
- The F6 Extension will not solve congestion issues
- The proposed F6 Extension project is being planned in secrecy.

Response

Specific impacts associated with the construction and operation of the proposed future F6 Extension project are beyond the scope of the M4-M5 Link project. The proposed future F6 Extension project is being developed as a separate project and would be subject to a separate assessment process to meet relevant legislative requirements.

The F6 Extension has been considered as part of the M4-M5 Link EIS only to the extent that it relates to the broader strategic objectives of the WestConnex program of works and in relation to cumulative impacts. The F6 Extension was included in the 2033 cumulative scenario modelled and assessed in the EIS in the following chapters: traffic and transport (refer to section 8.3.4); air quality (refer to section 9.7); and noise and vibration (refer to section 10.4). In addition, cumulative impacts of the M4-M5 Link project and the F6 Extension are summarised in Chapter 26 (Cumulative impacts) of the EIS.

Since the cumulative impact assessment for the M4-M5 Link EIS was undertaken, Roads and Maritime has lodged a Scoping Report for Stage 1 (linking the New M5 at Arncliffe with President Avenue at Kogarah) with DP&E, which is available on the Major Projects website.

¹ <http://www.rms.nsw.gov.au/projects/sydney-inner/rozelle-rail-yard-site-management/index.html>

Further details on the proposed future F6 Extension project are available on the Roads and Maritime project website².

C30.5 King Street Gateway

193 submitters raised issues regarding the proposed King Street Gateway project including:

C30.5.1 Impacts and assessment of the King Street Gateway

Submitters were concerned about the impacts of the King Street Gateway project, specifically why detailed information on the King Street Gateway was not provided in the M4-M5 Link EIS. Submitters were concerned that the King Street Gateway has been excluded from the modelling and cumulative impacts analysis in the EIS, but will alter the road geometry and capacity adjacent to the project.

Response

Specific impacts associated with the construction and operation of the proposed future King Street Gateway project is beyond the scope of the M4-M5 Link project.

The King Street Gateway was considered and excluded from the cumulative impact assessment as described in section 1.2 of Appendix C (Cumulative impact assessment methodology) of the EIS. Key reasons were:

- Design of the project was in the early stages
- Insufficient public information available at the time of the preparation of the EIS
- Impacts and the timing of the project were not yet known.

While investigations into the King Street Gateway project are underway by Roads and Maritime, no confirmed road layout changes or program details were available to inform the technical assessments for the EIS, therefore this project was not included in the operational traffic modelling for the area around the St Peters interchange. The King Street Gateway project would not be precluded by the M4-M5 Link project.

C30.6 Other projects

412 submitters raised issues regarding the other projects:

C30.6.1 Implementation of clearways

Submitters were concerned about the potential impacts of clearways, specifically:

- Objection to introducing clearways to improve travel times. Clearways generate noise and impact small businesses and retail precincts
- When the New M5 project was approved, the community was advised there would be no clearways. This promise has already been broken
- Streets connecting to the WestConnex motorways will become 24 hour clearways.

In particular submitters were concerned with the introduction of clearways on King Street at Newtown. Concerns raised included:

- The NSW Planning assessment decision for the New M5 states that the NSW Government was committed to having no additional clearways on King Street. However, this commitment was not upheld
- Opposition to a 24 hour clearways, including weekends on King Street, Newtown
- Shifting political decisions on King Street clearways: there have been conflicting announcements by Roads and Maritime and the Minister for Roads and the Shadow Minister for Infrastructure about the clearways. These decisions do not seem to be based on an assessment of what the

² <http://www.rms.nsw.gov.au/projects/sydney-south/f6/index.html>

impact of increased traffic flowing from the St Peters interchange will be on King Street and on surrounding roads

- Residents have little trust in Roads and Maritime with respect to upholding promises
- Clearways will have a significant impact on residents, visitors, schools and businesses along King Street, as well as the social and cultural fabric of the community
- Unless WestConnex including Stage 3 is stopped, the thriving precinct of King Street Newtown will be vulnerable to clearways
- SMC does not have authority to establish clearways, but Roads and Maritime does – Roads and Maritime has never said that King Street will not be subject to extended clearways.

Submitters were concerned by the introduction of clearways on Liverpool Road and the Hume Highway at Ashfield, stating that this may result in impacts to local businesses.

Response

There are no plans by Roads and Maritime to change the existing clearways on King Street or to change or implement clearways elsewhere on surface roads as part of the M4-M5 Link project.

C30.6.2 Roads and Maritime construction sites

A submitter raised concerns that while the Work Health and Safety Strategy published online by Roads and Maritime acknowledges the importance of a safe workplace from which workers can go home safely, it does not mention those living in communities adjacent to heavy industrial work sites that operate 24 hours a day, seven days a week. The impacts from these sites are often poorly managed. Submitter raises specific concerns regarding the containment of asbestos contaminated dust.

Response

Several environmental management measures have been developed as part of the M4-M5 Link EIS, in order to minimise risks to the local community. This includes the development and implementation of a Work Health and Safety Plan specifically for construction of the project, which will incorporate asbestos handling and management. A Construction Air Quality Management Plan will also be developed and implemented to monitor and manage potential air quality impacts associated with the construction of the project. See **Chapter E1** (Environmental management measures) for further information.

C30.6.3 Other Roads and Maritime projects (general)

Submitters raised concerns about general impacts due to the following existing or proposed projects:

- Alexandria to Moore Park Connectivity Upgrade (specifically traffic impacts at the Alison Road and Anzac Parade intersection)
- Parramatta Road pinch point project
- Parramatta Road bus rapid transit and future light rail
- Johnsons Creek and Iron Cove Link naturalisation
- Lane Cove Tunnel
- The removal of M4 tolling.

Response

The impacts associated with the construction and operation of other Roads and Maritime projects and the M4-M5 Link have been addressed within the cumulative impact assessment of the EIS, where applicable. Refer to **section C26.4** for further information. The M4-M5 Link does not preclude any proposed projects being assessed separately from the project.

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C31 Out of scope

This chapter addresses issues raised in community submissions associated with issues outside of the scope of the M4-M5 Link Environmental Impact Statement (EIS).

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C31.1 Issues outside the scope of the project

161 submitters raised concerns about issues outside the scope of the M4-M5 Link project.

C31.1.1 Issues unrelated to the project

Submitters were concerned about issues unrelated to the project. Specific concerns included:

- Concern with visual amenity on the Cahill Expressway
- A range of issues in regards to the reduction in petrol vehicle production, the future of electric cars including the installation of charging stations, and the uptake of autonomous cars
- Opal cards should be used in vehicles for tracking, providing benefits for planning and traffic forecasting in real time
- Noise impacts associated with current truck movements and hours of operation from Sydney Ports Corporation/Port Authority of NSW port facilities at Glebe Island using James Craig Road, Anzac Bridge and City West Link bypass under Victoria Road.

Response

The project would not impact on visual amenity associated with the Cahill Expressway.

Electric cars and installation of charging stations

Standalone charging stations are unlikely to be installed in the tunnels as, based on current technology, this would require that the service bays be fitted with point chargers which would need to be manually connected to vehicles. This is not acceptable in the M4-M5 Link tunnels for safety reasons, due to the high potential for vehicle and pedestrian collisions from driver's exiting their vehicles to connect to the charger in a high speed environment, and the extended period of exposure to vehicle emissions whilst charging. The installation of chargers in service bays would also increase the number of vehicles needing to merge in and out of the flowing traffic which would potentially result in slowing down of traffic, resulting in congestion and increasing the risk of collisions. However, the project would not preclude the future installation of charging stations at facilities on the surface road network.

Future developments in induction charging, where vehicles are charged wirelessly during driving, are expected to be possible and it is anticipated that these would be able to be retrofitted into current pavement designs for motorways, and as such could be installed in the tunnels subject to meeting fire safety system requirements.

Autonomous cars

Irrespective of the timing and magnitude of the take up of new technologies such as connected and autonomous vehicles (CAVs), there is still a need to provide for the growth in commercial and freight travel demand and to reduce congestion across the Sydney road network.

The market penetration of CAV's, vehicles with high automation (Society of Automotive Engineers (SAE)) level 4 - drivers are still required to be present) or full automation (SAE level 5 - driverless cars) is expected to take many decades to reach levels high enough to significantly affect traffic and congestion.

Research by IHS Markit (2016) advises that in the Asia Pacific region, the sales of CAV's would account for about 0.6 per cent of new vehicles sold in 2025 and about 4.5 per cent of new vehicles sold in 2036. However, given the time taken for fleet turnover and the time needed for mature regulatory frameworks to be developed, there is likely to be a long period with a mixed fleet of driverless and human driven vehicles.

The UK Department for Transport (DOT UK) report: *Research on impacts of connected and Autonomous vehicles (CAV's) on traffic flow Stage 1: Evidence Review, March 2016* (DOT UK 2016a) examined a range of published research papers to understand the likely impacts of CAV's would have on safety and capacity of road networks. The DOT UK summary of 'the top down' studies it examined concluded:

- In many studies, 100 per cent penetration is assumed to give a 'best case' scenario. Related to this, other studies show little impact on traffic flow and capacity until relatively high penetrations of vehicles with high levels of automation is occurring on road networks
- There is evidence of the potential for demand to rise as capacity increases, or even if just the quality of transport increases
- The way CAV technology is deployed (especially in terms of time gap and the trade-off between comfort, time and safety) by vehicle makers would have a large impact on capacity, and hence policy implications
- Studies are generally confined to self-driving passenger cars, with public transport, freight or alternative ownership models not considered
- There is mixed information and conclusions from earlier studies on capacity, ranging from a potential to reduce it, little change or large increases.

The second stage of the DOT UK report (*Research on the impacts of connected and autonomous vehicles (CAVs) on traffic flow, Stage 2: Traffic Modelling and Analysis Technical Report, May 2016* (DOT UK 2016b)) sought to understand the impacts of CAV's on capacity through modelling of differing types of road next work with a range of differing proportions of CAV's in the vehicle fleet and for differing road hierarchy including motorways/major highways and also on urban roads.

This second stage of investigation concluded that:

- *'Accounting for user preference, comfort and safety, it is plausible that at least a section of the emerging CAV vehicle fleet is more cautious than that currently operating. This has been represented in the design of CAV scenarios, with early (low penetration) deployments of CAVs including a relatively high proportion of cautious vehicles. This results in a potential worsening of measures of network performance and road capacity especially in high-speed, high-flow situations (such as on the Strategic Road Network (SRN))'*
- *'There is great potential for significant capacity, delay and journey time benefits, particularly in high-speed, high-flow situations. However, there is evidence that at low penetrations, any assertive CAVs are limited by the behaviour of other vehicles; that vehicles are not able to make use of their enhanced capability. This leads to suggestion of a tipping point – the proportion of enhanced vehicles required before benefits are seen. This work suggests this may be between 50% and 75% penetration of CAVs. Results for the SRN (peak period) indicate improvements in delay of only 7% for a 50% penetration of CAVs, increasing to 17% for 75% penetration and as high as 40% for a fully automated vehicle fleet.'*

In summary, research suggests that adoption of CAV's in the Asia Pacific region would remain low for at least two decades. With the opening of the M4-M5 Link due in 2023, CAV's are unlikely to have any impact on capacity at this time. With forecast sales of CAV's representing as little as 4.5 per cent of all new vehicles sold in 2036, it would be at least 25 years before they make up a significant proportion of the vehicle fleet. Even when levels of penetration of CAV's into the vehicle fleet reaches 50 per cent their potential their impact on network capacity is likely to range from slightly negative to slightly positive (seven per cent increase).

Future traffic forecasting

Roads and Maritime Services is the operating agency delivering safe, efficient and quality road networks as part of the transport system. One of the functions of this is traffic monitoring and forecasting across Sydney and NSW to enable appropriate planning and design of the future transport network.

The Opal card is a payment system for use of public transport in NSW. It cannot be used for tracking private motor vehicle usage.

Sydney Port Corporation/Port Authority of NSW operations

Concerns relating to existing Sydney ports operations should be made to the Port Authority of NSW. Contact details are available from the authority's website¹.

In relation to potential future contributions of the project to noise around the White Bay area, associated with the proposed White Bay civil site (C11), please see **section D2.4.2**.

C31.1.2 Traffic and transport

Submitters were concerned about the traffic assessment completed for the project and suggested traffic and transport alternatives and solutions for consideration. Specific issues included:

Road transport

- Incorrect traffic modelling of other projects including, Cross City Tunnel, Lane Cove Tunnel and Brisconnex [the Clem7 Tunnel]
- There should be a policy to ban trucks and commercial vehicles on residential streets. Commercial vehicles should be mandated to use toll roads instead
- Extend a study of road congestion to other roads within Newtown, Ultimo, Glebe, Leichardt, Ashfield and Redfern that are outside the scope of the project
- Concern raised about air pollution from Volkswagens and other car manufacturers who have made false claims regarding emissions. This may affect emissions modelling for road projects
- The tolls on the Cross City Tunnel and the M4 Motorway are too expensive for the average commuter
- The M5 East tunnel, which opened in 1999, proposed a cycleway along Wolli Creek Valley and the East Hills Railway corridor to compensate for there not being any cyclist access in the tunnel; however the cycleway was never built.

Public transport

- Sydney Airport supports the delivery of improved public transport services to and from Sydney Airport, including new bus routes, such as from Miranda, and additional trains on the T2 line
- Elevate train link between Ryde/Epping and Parramatta
- Prefer to invest in fast trains rather than airplanes
- Potential solution for congestion at Military Road at Mosman is an elevated or underground light rail
- Suggestion for a fast train instead of the Western Sydney Airport to access the east coast
- Privatisation of buses will not help in reducing traffic from Parramatta Road at Burwood, Ashfield and Leichhardt to the Sydney CBD
- Establish an environmentally friendly shuttle bus service that would connect with trams every 15 minutes at Leichhardt North light rail stop
- Light rail (utilising the Rozelle Rail Yards rail corridor) can service this region much faster than the Sydney Metro West proposal, which is a long way from approval. If the Metro is approved, it would be complimented by an interchange with the more regional light rail network at White Bay
- Multiple suggestions for other potential rail metro connections in the inner west and North Shore/Northern Beaches
- Suggests options to increase freight rail transport capacity for Sydney to Newcastle and Port Botany to inter-modal terminals using international models
- Rail and metro options within the Newtown, Ultimo, Glebe and Redfern suburbs
- Questions why the only substantial public transport investment is aimed at only the CBD and South East Light Rail project and the Sydney Metro project, when the latter does not really expand rail capacity and the former is becoming one of the most expensive light rail projects in the world

¹ <https://www.portauthoritiesnsw.com.au/>

- Plans for the Leichhardt North light rail stop should aim to integrate other nodes of transport and surrounding land uses into its design and improve socioeconomic and ecological outcomes in the area and contribute to regional sustainability
- Statements related to the Sydney Metro design, connectivity and achievable speeds
- A business case for Sydney Metro West should be completed before the determination of the project
- Suggests an elevated rail line over the M5 West corridor as an alternative to Sydney Metro
- A review of potential rail lines eg Epping to Parramatta, West Metro and train lines in the south west
- While the Sydney Metro project will go directly under St Peters station, there is no link between these two rail systems nor is there a metro stop at Alexandria or Erskineville
- The NSW Government is spending many billions of taxpayer dollars on Metro rail in order to relieve a congested City Circle but now it is replicating the City Circle's congested effect with a 60 kilometre road network
- Privatisation of buses would result in the loss of jobs for bus drivers, and therefore result in the reduction in services
- Shanghai and Tokyo have 'excellent public transport rail systems

Active transport

- Active transport and open space options within the Newtown, Ultimo, Glebe and Redfern suburbs.

Response

Road transport

Tolling and traffic modelling completed for the Cross City Tunnel, M4 Motorway, Lane Cove Tunnel and the Clem7 Tunnel are outside the scope of the EIS. The traffic modelling for these projects was completed as part of separate assessment and approval processes.

The implementation of a policy to ban trucks and commercial vehicles on residential streets or mandate that commercial vehicles use toll roads is outside the scope of the project. However, significant reductions in daily heavy vehicle traffic volumes focused on Parramatta Road (east of the M4 East Parramatta Road ramps), City West Link, Victoria Road (east of Iron Cove Bridge), King Georges Road and the existing M5 East Motorway are forecast. There are also reductions forecast along Stanmore Road and Sydenham Road in the inner west. Increases in daily heavy vehicle traffic on surface roads between the St Peters interchange and Sydney Airport are forecast, with reductions in daily heavy vehicle volumes forecast on sections of Princes Highway and Canal Road (refer to Chapter 8 (Traffic and transport) of the EIS).

As discussed in section 6.1.1 of the EIS, the construction strategy would minimise impacts on the local road network by using State, regional and arterial roads, where possible, for heavy vehicle construction traffic and the construction ancillary facilities have been located such that they have direct access onto arterial roads.

The pollution emitted from Volkswagen motor vehicles and the emissions claims made by manufacturers are outside the scope of the project and this EIS. A discussion on emission modelling is included in **section B3.2.3**.

The M5 East tunnels were subject to a separate environmental assessment and approval. The project would have been approved on the basis that it could meet its own conditions of approval. Any proposed cycleways for the M5 East project are considered to be outside the scope of the M4-M5 Link project.

A discussion regarding road options within surrounding areas including Newtown, Ultimo, Glebe, Ashfield, Leichardt and Redfern is outside the scope of this project and any future development works in this area would be subject to a separate assessment and approval.

Public transport

Traffic congestion along Military Road at Mosman is outside the scope of the project.

The privatisation of public transport, improvements to public transport services and new public transport projects (such as additional services, new rail lines, bus routes and stations) are outside the scope of the project and would be subject to a separate environmental assessment and approval. Relevant alternatives to the project are discussed in Chapter 4 (Project development and alternatives) of the EIS.

The Sydney Metro City and Southwest and Sydney Metro West projects (including the design and alternatives) are subject to a separate environmental assessment by Transport for NSW and approval by the Minister of Planning. A *Final Business Case* was completed for the Sydney Metro City and Southwest project by Transport for NSW in 2016 and is considered to be outside the scope of the project.

The costs and benefits of the CBD and South East Light Rail project were assessed in a separate environmental assessment in that project's EIS.

The increase in freight rail transport capacity from Sydney to Newcastle to inter-modal terminals using international models is considered outside the scope of the project.

Active transport

The provision of active transport options within Newtown, Ultimo, Glebe and Redfern as a result of a subway being constructed in these areas is outside the scope of the project.

Strategic alternatives in the scope of the project have been considered in **Chapter C4** (Project development and alternatives).

C31.1.3 Development unrelated to WestConnex

Submitters were concerned about changes to land use and development unrelated to WestConnex such as green corridors. Specific concerns included:

- Build a bridge over the Hawthorne Canal near Blackmore Park so residents of Haberfield can access the light rail stop
- Change the use of Blackmore Park from a recreational oval to an ecological park with a small amphitheatre
- Rezone the underutilised film studio and warehouse near Blackmore Park for redevelopment as medium-density housing with provision for limited mixed commercial and light industrial uses
- Change the land use around the Darley Road site (but not within) including:
 - Rezoning the Orange Grove Public School to allow for a long day care centre
 - Purchase of the bus depot on Balmain Road and relocate it to the Rozelle Rail Yards to rezone the site for community, commercial and residential purposes
 - Rezoning the area bounded by Charles Street and Canal Road to the west to allow for more mixed residential, commercial and cultural uses
 - Development of offices, shops, residences, bus parking and a modest-sized multi sports stadium in the vicinity of the Darley Road site
- Proposed biodiversity corridor between Lane Cove National Park and Royal National Park, extending to Wolli Creek bushland and Sydney Park at St Peters
- High rise development in the inner west is destroying the amenity and heritage character of the community
- Suggestion for development of a biodiversity corridor linking City West Link to the Cooks River and Wolli Creek
- A business case for Sydney Metro West should be completed before determination of the project
- The reduction in surface road traffic as a result of the project should result in benefits to the community including a reduction in the size of City West Link
- Noise impacts following the demolition of a Sydney Ports Corporation shed in 2002 to 2003 which previously acted as a noise barrier to traffic on City West Link
- Changing access arrangement at St Johns School

- Urban design for The Bays Precinct should be prepared and be broadly agreed prior to a revised EIS being prepared
- A higher value use could be had if the Darley Road site, which is situated next to the Leichhardt North light rail stop, was developed for low-rise mixed use transit oriented development, as suggested in a report by Macquarie University in conjunction with Transport for NSW
- Suggested changes to roads:
 - Westbourne Avenue and both Marlborough Street and Bayswater Road should be converted to a two-way and handed back to the local government
 - Traffic accessing Lyons Road via the Victoria Road/Lyons Road intersection could potentially be through slip turning lanes
 - The surface area above the tunnel corridor should be transformed into as well lit, green, pedestrian boulevard (with bus lanes), to make this sector really liveable. This should also connect into a boulevard on Victoria Road, Rozelle.

Response

The rezoning and development suggestions made by submitters are outside the scope of the project. The future use of remaining project land and residual land after construction is discussed in **section C12.8**.

UrbanGrowth NSW is developing proposals for The Bays Precinct. Details can be found in *The Bays Precinct Transformation Plan*, (UrbanGrowth 2015) and at the NSW Government website for the project². Since May 2015, consultation events and opportunities to input into the future development of The Bays Precinct masterplan have been available to the public.

C31.1.4 Air quality impacts from aviation activities

Submitters raised concerns regarding air quality impacts from aviation activities including:

- The deteriorating air quality due to jet fuel in general
- Concerned that residents in the inner west living and working under the flight path are being exposed to aviation fuel, containing organophosphates
- Concerns that pilots, staff and passengers of aircraft are being exposed to high levels of lead
- Concern for chemical trials under flight paths and for air quality due to aviation (lead in aviation fuel)
- Concern for the alleged symptoms of aerotoxic syndrome, caused by breathing air inside the cabin or under the flight path.

Response

Air quality impacts (ground-borne and air-borne) as a result of air travel and jet fuel emissions are outside the scope of the project.

C31.1.5 NSW Government policy and proceedings

Submitters raised concerns regarding NSW Government policy, legislation changes and proceedings. Specific concerns included:

- Issues relating to implementing policy on regulating emissions with demand management methods implying the responsibility for limiting emissions lies with the operator
- Concern the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act) only including emission loads for premises subject to licensing under the POEO Load Based Licensing scheme which means road tunnels are exempt from any emission loads
- The NSW Office of Environment and Heritage (OEH) needs to provide information regarding the 'eight-hour standard' for ozone concentrations, and goals regarding ozone for new motorways
- Objection to the removal of elected councillors within three inner west council districts and appointment of an administrator during critical phases of WestConnex

² <http://www.thebayssydney.nsw.gov.au/>

- The NSW Government are reviewing the policy towards non-filtered outlets. This review should be open and transparent
- The NSW Government to design policies that provide holistic mitigation measures for the wider area, particularly where negative impacts are cumulative and interconnected
- The legislated changes to the EP&A Act were enacted to ensure decisions relating to the project are granted
- Concern that the Planning Assessment Commission is not independent of DP&E
- The NSW Government has a duty of care to keep the community informed about major projects and to act in the best interest of the community
- Concern that the companies who benefit from this project have donated money to NSW political parties
- Request that DP&E staff approach their assessment as planning professionals, and not be pressured by NSW politicians, as there is no legal impediment to this assessment process being a genuine one.

Response

The technical assessments undertaken for the EIS have been based on the Secretary's Environmental Assessment Requirements for the project and the applicable regulatory framework, including relevant legislation and existing NSW Government policies and guidelines. Any future changes to these policies and guidelines are outside the scope of the M4-M5 Link EIS.

The removal of councillors from council districts and appointment of administrators was a decision of the NSW Government and is not relevant to the M4-M5 Link EIS. Consultation with Inner West Council on the project has been ongoing throughout the preparation of the concept design and EIS.

The project, as part of the WestConnex program of works, has been developed in consideration of relevant NSW Government policies and strategies. Further detail on the strategic context for the project is provided in Chapter 3 (Strategic context and project need) of the EIS.

The independence of the Planning Assessment Commission (PAC) is outside of the scope of this project.

Political donations are outside the scope of the EIS for the project.

C31.2 Other

114 submitters raised concerns about various other topics.

C31.2.1 Other issues raised

Submitters raised concerns and suggestions about issues that are outside the scope of the project. Specific issues include:

- Unspecific concerns over Australia's relationship with oil
- Submission suggests a regional biodiversity corridor like the Sydney Green Grid Concept from Royal National Park to Lane Cove National Park and to Ku-ring-gai Chase National Park
- Submission suggests an elevated biodiversity corridor on top of the inner west light rail corridor
- Renovate the Rozelle Hospital to become usable
- Concerned about the dependence on cars of Sydney-siders
- Concern about the shortcomings of the rolling out of the National Broadband Network (NBN)
- The previous Dan Murphy's development application (DA) at the Darley Road site was inadequate
- Concern for asbestos contamination in 2002/03 in relation to the Fox Studios building
- The proposed incinerator at Eastern Creek has some filtration, but the PM_{2.5} air quality issues are not being managed or mitigated

- The increase in traffic on McEvoy Street, Euston Road and Mitchell Road due to developments at the Sydney Technology Park
- Reduced rail services at the Erskineville and St Peters train stations
- The current arrangement of the bypass under Victoria Road amplifies noise impacts.

Response

All of the above issues are outside the scope of the project.

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