27 Cumulative impacts

This chapter provides a summary of the cumulative impacts associated with the project.

Table 27-1 identifies the Secretary's Environmental Assessment Requirements (SEARs) as they relate to cumulative impacts, and identifies where they have been addressed in this environmental impact statement (EIS).

Table 27-1 SEARS – cumulative impacts

SEARs	Where addressed
An analysis of the proposal including an assessment, with a particular focus on the requirements of the listed key issues, in accordance with clause 7(1)(d) of Schedule 2 of the Regulation (where relevant), including an identification of how relevant planning, land use and development matters (including relevant strategic and statutory matters) have been considered in the impact assessment (direct, indirect and cumulative impacts) and/or in developing mitigation measures (to avoid, manage, offset and monitor impacts and where relevant, improve the existing environment).	An assessment of cumulative impacts associated with the project is provided in **Section 27.4**.
Details of the proposal's relationship to and consistency with the broader WestConnex, and an assessment of the cumulative impacts taking into consideration the WestConnex program of works.	An assessment of the cumulative impacts of the project with other components of the WestConnex program of works is detailed within **Section 27.4**.
Consideration of the potential cumulative impacts due to other development in the vicinity (completed, underway or proposed).	An assessment of the cumulative impacts of the project with other components of the WestConnex program of works is detailed within **Section 27.4**.

27.1 Nature of cumulative impacts

An assessment of cumulative impacts considers projects being planned, constructed or operated at the same time as the project. In isolation, a particular impact from one project may be considered minor, but when the impact of multiple projects on the same receivers is considered, the impacts may be more substantial. Impacts can be either adverse or beneficial. Beneficial impacts of the project as a result of the overall WestConnex program of works are provided in **Chapter 3** (Strategic context and project need).

Cumulative impacts typically include:

- Impacts on local, regional and State traffic, transport and road users
- Social and economic effects, including changes to land use, access, settlements, employment and businesses
- Changes to local and regional amenity, including noise, vibration, visual quality and air quality
- Environmental changes including effects on water quality, hydrology and biodiversity.

Another type of cumulative impact is construction fatigue. This concept relates to sensitive receivers that experience construction impacts from a variety of projects over a long period of time with few or no breaks between construction periods. Construction fatigue typically relates to amenity impacts from projects that are constructed consecutively or 'back to back'.

The impacts associated with the construction and operation of the project and other relevant projects are the subject of this cumulative impact assessment. Prediction and evaluation of cumulative impacts is not a straightforward process as information relating to other proposed projects may not be publicly available.

The following sections provide an assessment based on the most current and publicly available information.

27.2 Assessment methodology

Cumulative impacts have been assessed in two categories: impacts related to the overall WestConnex program of works and impacts from other developments in the vicinity of the project.

Impacts associated with the WestConnex program of works have been assessed assuming that all components (refer to **Section 27.3.1** for discussion) are constructed.

The identification of other developments that could occur in the vicinity of the project only included 'major' projects, as identified by the NSW Department of Planning & Environment, and included in its public register of applications for State significant development and State significant infrastructure.

Consideration was also given to other 'strategic' projects being considered by government. This cumulative impact assessment considered developments located within the suburbs of Narwee, Beverly Hills, Kingsgrove, Bexley North, Earlwood, Bardwell Park, Bardwell Valley, Arncliffe, Turrella, Wolli Creek, Tempe, Sydenham, St Peters, Alexandria and Mascot.

27.3 Existing and proposed projects

27.3.1 WestConnex program of works

The project is a component of the WestConnex program of works, which would provide a 33 kilometre motorway linking Sydney's west and south-west with Sydney Airport and the Port Botany precinct. The location of WestConnex is shown in **Figure 1.1** in **Chapter 1** (Introduction) of this EIS. The individual components of WestConnex are:

- M4 Widening – Pitt Street at Parramatta to Homebush Bay Drive at Homebush (planning approval granted and under construction)
- M4 East – Homebush Bay Drive, Homebush to Parramatta Road and City West Link (Wattle Street) at Haberfield (planning application lodged and subject to planning approval)
- New M5 – (the subject of this EIS)
- King Georges Road Interchange Upgrade (planning approval granted and work has commenced)
- Future M4-M5 Link – Haberfield to St Peters (undergoing concept development and subject to planning approval)
- Future Sydney Gateway (undergoing concept development and subject to planning approval)
- Future Southern extension (undergoing concept development and subject to planning approval).

Separate applications for approval have been (or will be) lodged for each component project and each project will be assessed separately. **Table 27-2** outlines the anticipated timing of each of the WestConnex projects and shows that there is potential for the construction phases of projects to overlap.

The two other WestConnex components most likely to result in cumulative impacts during construction of the project are the King George Road Interchange project and the future M4-M5 Link, as they are located directly adjacent to the project and would potentially involve overlapping construction periods.

Other component projects, such as the M4 Widening and M4 East, are located further from the project and are more likely to impact the M4 corridor during construction. The likelihood of significant cumulative impacts being generated by construction of the project, the M4 Widening and the M4 East is therefore low.

Table 27-2 also identifies the respective environmental impacts identified for the individual components of the WestConnex program of works. As the environmental assessment process for the future M4–M5 Link has not yet formally commenced, there are limited details of specific impacts that would potentially contribute to cumulative impacts.

Construction impacts would be minimised through further consideration during detailed design and construction planning, application of appropriate management and mitigation measures, and consultation with affected residents.

The construction strategy for the project (and the wider 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 environment, road users and the surrounding road network.

Prior to the commencement of construction, more detailed construction planning would be undertaken for the New M5. General principles of the construction strategy are as follows:

- Achieve safe, efficient and convenient access for construction vehicles, plant and equipment along the length of the project and to and from public roads while at the same time minimising impacts
- Consider impacts to road users, the effect on urban amenity and the suitability of local road pavements
- Manage risks to existing infrastructure including roads, railways, utilities and services
- Minimise disruptions to traffic on the existing road network. The construction strategy allows for construction staging and night works to allow safe construction while maintaining vehicle movements and minimising impacts to amenity
- Manage community and environmental issues including noise, access, amenity and general disruption.

The design of the project has been carefully considered to minimise construction fatigue as far as practical. This includes completing the necessary local road upgrades and building the interchange and stubs to accommodate the future M4-M5 Link. The intent is to reduce the overall cumulative or repeat impacts on the community over a longer period.

Table 27-2 Timing of WestConnex components and Identified environmental impacts

Project	Key dates	Construction	Operation
M4 Widening	Approved on 21 December 2014 Work started in 2015 Operational late 2016	During construction of the project, potential impacts may include: • Noise and vibration, including potential night time disturbance associated with works outside standard construction hours • Dust and construction vehicle emissions • Traffic and access impacts • Impacts on three threatened ecological communities (Swamp Oak floodplain forest, Shale gravel transition forest and Freshwater wetlands on coastal floodplains). This would be limited to a total of approximately 0.17 hectares of moderate condition vegetation and 0.35 hectares of low condition habitat.	During operation of the project, potential impacts may include: • Traffic noise requiring new noise barriers and property treatments in some cases • Visual impacts associated with new viaducts and bridges • Changes in traffic patterns on Parramatta Road and the surrounding road network • Minor changes in flooding patterns along A'Becketts Creek.
M4 East	Determination expected in early 2016 Work to start mid 2016 (subject to approval) Operational early 2019	During construction of the project, potential impacts may include: • Traffic and access impacts due to construction traffic and changes to the road network • Noise and vibration, including potential night time disturbance associated with works outside standard construction hours • Dust and construction vehicle emissions • Impacts on non-Aboriginal heritage items located within the project footprint • Vegetation clearance.	During operation of the project, potential impacts may include: • Traffic noise requiring new noise barriers and property treatments in some cases • Visual impacts of new infrastructure • Property impacts due to acquisition for operational components of the project • Groundwater drawdown impacts due to inflow into the drained tunnels.
This project (New M5)	Determination expected in early 2016 Work to start mid 2016 (subject to approval) Operational late 2019	During construction of the project, potential impacts may include: • Traffic and access impacts due to construction traffic and changes to road network • Noise and vibration, including potential night time disturbance associated with works outside standard construction hours • Dust and construction vehicle emissions • Habitat for the Green and Golden Bell Frog	During operation of the project, potential impacts may include: • Traffic noise requiring property treatments in some cases • Visual impacts of new infrastructure • Property impacts due to acquisition for operational components of the project • Groundwater drawdown impacts due to inflow into the drained tunnels.

Project	Key dates	Construction	Operation
King Georges Road Interchange Upgrade	Approved 3 March 2015 Work started July 2015 Operational in 2017	During construction of the project, potential impacts may include: • Noise and vibration, including potential night time disturbance associated with works outside standard construction hours • Dust and construction vehicle emissions • Traffic and access impacts • Changes to existing cycle routes.	During operation, potential impacts may include: • Traffic noise, requiring a combination of new noise barriers, adjustments to the height of one existing noise barrier, and treatments at six residential properties • Visual impacts associated with new bridge structures and retaining walls • Changes to existing cycle routes.
Future M4-M5 Link	Potential approval in 2017/18 Work to start 2019 Operational 2023	As the environmental approvals process for the future M4–M5 Link has not commenced, there are limited details of any specific impacts that may potentially contribute to cumulative impacts. Environmental impacts of the whole of the WestConnex program of works were identified in the Strategic Environmental Review (Sydney Motorways Project Office, 2013b), and the following potential impacts are considered relevant to the future M4–M5 Link project: • Construction and operation noise and vibration impacts, particularly in a highly urbanised area • Socio-economic impacts on the surrounding community • Construction traffic impacts associated with spoil removal • Visual impacts of construction areas and operational facilities • Groundwater drawdown impacts due to inflow into the drained tunnels.	
Future Sydney Gateway	Construction early 2018 Operation 2023	Subject to environmental planning approval, there is the potential for construction of the future M4-M5 Link to commence in 2019 when the New M5 would be in the late stages of construction. The future Sydney Gateway may also commence in early 2018. It is expected that peak construction of the New M5 would be complete, and the construction activities would largely comprise mechanical and electrical fit-out and landscaping and rehabilitation works. There is the potential for localised cumulative construction works around the St Peters interchange as a result of the future M4-M5 Link or Sydney Gateway. This includes a portion of the site potentially used for a construction compound for the future M4-M5 Link. As the New M5 and these projects would likely be at different stages and unlikely to have concurrent peak construction periods, and the local road upgrades would be complete, it is expected that the potential for significant cumulative noise impacts would be limited. During construction, ongoing consultation would be undertaken with local communities potentially affected by concurrent construction of projects that form part of the WestConnex program of works. Additionally, consultation would be undertaken with proponents of other nearby projects to increase the overall awareness of project timeframes and impact.	

27.3.2 Other nearby developments

The project has the potential to have cumulative impacts with other nearby developments that are not related to the WestConnex program of works. **Table 27-3** identifies major and strategic projects as identified in the Department of Planning & Environment's major projects register in suburbs along and around the project alignment. Discussion of these major and strategic projects in relation to the existing environment is provided in the following sections.

Table 27-3 Other nearby developments

LGA	Suburbs	Major projects and other strategic projects
Canterbury	• Narwee • Kingsgrove • Earlwood	No major or strategic projects were identified
Hurstville	• Beverly Hills	No major or strategic projects were identified
Rockdale	• Bexley North • Bardwell Park • Bardwell Valley • Arncliffe • Turrella • Wolli Creek	A number of mixed use and residential developments have been identified around the Wolli Creek redevelopment area. Key developments include: • The Discovery Point Precinct • A multi-unit residential development, located at 12-40 Bonar Street and 5 Loftus Street • A mixed use retail / residential development located at 78-96 Arncliffe Street and 31-45 Princes Highway. The Princes highway corridor between Arncliffe and Banksia has been identified as including priority precincts for development.
Marrickville	• Sydenham • Tempe • St Peters	Marrickville Metro Shopping Centre is located north-west of Camdenville Park (approved 2015), and lies just outside the suburbs affected by the project.
Botany Bay	• Mascot	Mascot Station Town Centre Precinct Masterplan
Sydney	• Alexandria	Green Square Development

Development precincts

Wolli Creek redevelopment area

Developments have been proposed within and in the vicinity to the Wolli Creek redevelopment area, which is an initiative of Rockdale City Council. Historically an industrial precinct, the area is being transformed to a high density urban environment for living, working and recreation and forms part of a growing redevelopment zone extending along the Airport Rail line linking Wolli Creek to Sydney Airport, Mascot, Green Square and the Sydney CBD.

A concept plan approval was obtained for the establishment of a mixed use development within the 'Discovery Point Precinct' at 1 Princes Highway, Wolli Creek on 5 May 2011. This area is bounded by the Princes Highway, Cooks River, the Illawarra and East Hills Railway lines and Magdalene Terrace. The original concept plan was granted approval for the following development proposal:

- Building envelopes for 14 sites including maximum heights, total gross floor area, mix and size of apartments, total parking numbers and parking rates
- Landscaping of the site including completion of discovery point park, new plazas, common open space, station park, waterfront park and new neighbourhood park
- Road layout and streetscape treatments.

The concept plan identified environmental impacts that could be effectively managed through mitigation and management measures detailed in the statement of commitments. A number of modifications and project applications have since been submitted in relation to the Discovery Point Precinct with the most recent modification being approved 5 June 2015.

Key issues identified in the environmental assessment report prepared by the Department of Planning & Environment included density, built form, car parking, residential amenity, public benefits and design guidelines.

Specialist studies accompanying this report are of a level of detail to demonstrate the suitability of the site for the concept plan. The studies demonstrate that future development is capable of being implemented without resulting in adverse environmental impacts. Subsequent project applications for the site would be subject to further environmental assessment to identify issues that may arise as the result of more detailed designs. Such issues may then be addressed in order to ameliorate impacts.

Arncliffe to Banksia priority precincts

Rockdale City Council nominated the Princes Highway Corridor between Arncliffe and Banksia as a 'priority precinct' following a study into the renewal of the Princes Highway corridor around the Arncliffe and Banksia railway stations.

Community facilities being considered in this area include new walkways, cycle ways, playgrounds, multipurpose community centres and public art. The government will invest up to $5 million in local infrastructure, with a precinct proposal currently being drafted. No further details are currently available but it is possible that there may be some overlap with construction of the New M5.

Green Square development

The Green Square development covers 278 hectares and includes part of Alexandria (among other suburbs). A number of projects are associated with this development. The Green Square Centre (2014 – 2024) is the closet component of the Green Square development precinct to the project and being built next to the Green Square railway station, bordered by Bourke Street to the north and Joynton Avenue to the south (located within one kilometre from the New M5 local roads works). Construction works include:

- Soil remediation
- Construction of a library, plaza, streets, retaining walls and housing
- Demolition of the Waverley depot
- Refurbishment of the green infrastructure centre.

Based on the anticipated duration of the construction period, it is likely that there would be some overlap of construction activities with the New M5.

Mascot Station Town Centre precinct

The Mascot Station Town Centre Precinct has been identified as an appropriate location for increased growth and to meet the population targets of the City of Botany Bay within the Metropolitan Plan for Sydney 2036, the Draft East Sub-Regional Strategy 2007 and recent planning strategies for the City of Botany Bay.

These studies have identified the need to relate growth targets to the appropriate provision of public transport, public open space and desirable built form outcomes, to create a sustainable and efficient town centre with high levels of amenity.

New streets, parks and pedestrian connections would be designed to provide suitable access and amenity to new, relatively fine grained urban blocks. Concepts of street proportions, daylight to streets, view corridors and sun access to parks would inform the design of the built form and public domain. Transport measures including the provision of cycleways, traffic movement patterns, public transport measures and pedestrian links are integrated into the design of the public domain.

Marrickville Metro shopping centre

The Marrickville Metro expansion concept plan was approved on 19 March 2012. A modification was approved 23 April 2015 to split the staging of construction. The site comprises two parcels of land at 34 Victoria Road and 13-55 Edinburgh Road. Overall the approved development includes:

- Demolition of existing warehouse buildings and associated structures on the Edinburgh Road site
- Refurbishment and construction of a first floor addition to the existing retail building on the Victoria Road site and construction of a new building providing for two levels of retail on the Edinburgh Road site
- 528 additional car parking spaces to provide a total of 1628 spaces in two levels of roof top parking over both buildings
- Staging of development into two stages.

The key issues identified during assessment of the project included economic impact, traffic, access, public transport and car parking, height and built form, residential amenity and landscaping.

Qantas land at Mascot

On 9 December 2013, Qantas Airways Limited submitted a planning proposal that proposes amendments to the Botany Bay Local Environmental Plan (BBLEP) 2013 in respect of Qantas' land at Mascot. The Qantas Land is located immediately to the north of Sydney Airport and is bounded by Qantas Drive and Sydenham-Botany Railway Line to the south and Coward Street to the north.

The proposal will enable a range of uses that will support Sydney Airport; strengthen the economic activity of the Global Economic Corridor and Sydney Airport & Environs Specialised Centre; generate additional employment opportunities for the Botany Bay LGA; have minimal adverse impacts to the environment; and result in positive social and economic effects.

27.4 Cumulative impacts of WestConnex component projects

The King Georges Road Interchange Upgrade project is scheduled for completion by around late 2016/ early 2017. There may be an overlap of construction periods of around six to nine months with the New M5 (construction commencing early to mid-2016 pending approval).

The future M4-M5 Link is anticipated to commence construction in 2019 (subject to approval) and this would result in a short term overlap with construction of the New M5 (about six months).

There is potential for construction fatigue and cumulative impacts associated with the King Georges Road Interchange Upgrade project and the future M4-M5 Link, as discussed in **Section 27.4.1**.

The M4 East (is anticipated to be completed in early 2019, pending approval) and M4 Widening (anticipated to be completed by 2017) projects are located further from the New M5 project and are more likely to utilise the M4 corridor during construction and therefore have limited potential to generate cumulative impacts with the project.

Significant cumulative impacts relating to greenhouse gases, soil, water, flooding, human health, visual amenity, contamination, groundwater, resources and waste are not expected to occur. Further details on potential impacts to these environmental values are provided in the respective chapters of this EIS.

27.4.1 Traffic and transport

Construction

Construction haulage routes and vehicle access routes are expected to be similar between the project and the King Georges Road Interchange Upgrade project given the location and nature of construction. During the overlap period, construction vehicle movements associated with the King Georges Road Interchange Upgrade project would reduce, as the peak workforce demand would have subsided. As a result, the combined impact during this period is expected to be less than during the peak construction period for the project alone.

Subject to planning approval, the project currently has a projected construction timetable extending from around early to mid-2016 until late 2019. This is only about six months later than the construction period for the M4 East project. There is therefore a large overlap between the construction periods for these two projects. The majority of heavy vehicle and other routes associated with the M4 East would use the existing Parramatta Road corridor, and would therefore have limited potential for cumulative construction traffic impact with the project.

Operation

Traffic modelling undertaken for the 2031 'with project' scenario models the impacts on the road network with all components of WestConnex program of works constructed (i.e. M4 Widening, M4 East, M4–M5 Link, New M5 and the King Georges Road Intersection Upgrade project). **Chapter 4** (Project development and alternatives) describes the various alternative scenarios defined for the project. Traffic modelling is discussed in **Chapter 9** (Traffic and transport).

The modelling identified that under the full WestConnex program of works scenario in 2031, there would be a significant increase in total traffic demand during the AM and PM peak. Although total traffic demand would increase, the completion of the WestConnex program of works, including the future Sydney Gateway, would provide enough additional capacity on the road network to effectively distribute and accommodate the predicted increases in traffic on the local road network around St Peters interchange.

As a result, there would be a cumulative benefit of the projects, resulting in significant increases in travel speeds through the local road network, and a reduction in the average travel times.

27.4.2 Air quality

Construction

Potential air quality impacts during construction of the King Georges Road Interchange Upgrade project and the future M4-M5 Link would result from similar construction activities as the New M5 project.

These include clearing of vegetation and topsoil, excavation and levelling of soil, haulage of spoil and fill, wind erosion from unsealed surfaces and stockpiles, and construction vehicles using unsealed roads in some cases.

However, cumulative construction impacts are unlikely to significantly vary from those discussed in **Chapter 10** (Air Quality) following the application of mitigation and management measures adopted for this project.

Operation

By 2031, the New M5 is predicted to accommodate about 34,500 vehicles per day and about 81,500 vehicles per day if the full WestConnex program of works are completed. This would be a 134 per cent increase and would be due to traffic using the future M4-M5 Link and the future Southern extension, with the traffic volume including traffic heading east / west on the New M5 and south west / north-east on the future Southern extension.

If the full WestConnex program of works is completed, the two-way daily volume on Stoney Creek Road is forecast to reduce and two-way daily traffic on the Princes Highway, north of the M5 East interchange, is forecast to decrease from 79,000 vehicles per day without the project to about 25,000 vehicles per day. This 69 per cent decrease is a substantial reduction along this congested section of the strategic road network

In the majority of cases the ambient air quality results for the expected traffic scenarios (ground level concentrations) for community receptors in the 2031 'cumulative scenario' were very similar to those for the 2031 'with project' scenario. The results for the 2031 'cumulative scenario' at the recreational, workplace and residential receptors were also broadly similar to those for the 2031 'with project' scenario.

Changes in annual mean $PM_{2.5}$ concentrations in the 2031 'cumulative scenario' were considered for elevated receivers at heights of 10 metres above Australian Height Datum (AHD) and 30 metres AHD. At a height of 30 metres AHD, the increases in concentration were larger than at 10 metres AHD, but they were much more localised around the ventilation outlets.

No recreational, workplace or residential receptors were predicted to experience a change in annual average PM2.5 of more than 0.8 µg/m3 at a height of 10 metres AHD. The largest increase was 0.8 µg/m3. At a height of 30 metres AHD, the increase in PM2.5 was greater than 0.8 µg/m3 at 38 receptors. There were 17 recreational, workplace or residential receptors that were predicted to have a change in annual average PM2.5 of more than 1.6 µg/m3. All these receptor locations were very close to the assumed location of the future Southern extension ventilation facility. However, the precise location and design of the future Southern extension ventilation outlets has not yet been determined and therefore potential impacts to elevated receivers from PM2.5 are not able to be quantified. Potential impacts and any necessary management or mitigation measures would be considered as part of the future Southern extension air quality assessment.

27.4.3 Noise and vibration

Construction

Construction of the King Georges Road Interchange Upgrade project would potentially overlap with construction of the New M5 for about six to nine months in 2016. There is potential for receivers around the western surface works to be affected by cumulative construction noise impacts from these two projects. Potential cumulative construction noise impacts may involve:

- Finishing works for King Georges Road Interchange Upgrade project, and potentially some road works scheduled for late in the construction program
- Early works, site establishment and potentially the initial phases of tunnelling for the New M5.

Based on the nature of the potential concurrent project works, and the anticipated noise impacts from each, it is expected that the dominant noise source during this period would be the New M5.

Subject to the progress of both projects, specific measures would be developed to coordinate mitigation and management of construction noise from concurrent construction activities. These measures would be detailed in the construction environmental management plan(s) for the project, and would include consideration of both physical and program measures (such as coordinating periods of respite).

The M4 East Project would be carried out at a significant distance from the New M5 and therefore there is unlikely to be any cumulative noise impact between the two projects.

Subject to environmental planning approval, there is the potential for construction of the future M4-M5 Link to commence in 2019 when the New M5 would be in the late stages of construction.

It is expected that peak construction of the New M5 would be complete, and the construction activities would largely comprise mechanical and electrical fit-out and landscaping and rehabilitation works.

There is the potential for localised cumulative construction works around the St Peters interchange, with a portion of the site potentially used for a construction compound for the future M4-M5 Link. As both projects would be outside of peak construction periods, and the local road upgrades would be complete, it is expected that the potential for significant cumulative noise impacts would be limited.

During construction, ongoing consultation would be undertaken with local communities potentially affected by concurrent construction of projects that form part of the WestConnex program of works. Additionally, consultation would be undertaken with proponents of other nearby projects to increase the overall awareness of project timeframes and impact.

Operation

The operational noise assessment undertaken as part of the project included an assessment of 2031 traffic volumes, which included the cumulative noise impacts of vehicles using WestConnex when all projects are completed. The assessment is discussed in **Chapter 12** (Noise and vibration).

Noise levels have been predicted at sensitive receiver locations throughout the project area for both the daytime and night-time scenarios. The opening of the full WestConnex program of works (including the future M4-M5 Link) and the future Southern extension would increase direct traffic flows on infrastructure delivered as part of this project. Therefore, a noise assessment was completed for the most stringent scenario, which is the design year for WestConnex Stage 2 (2031) assuming the full WestConnex program of works and the future Southern extension is operational.

Around the M5 East Motorway, in the Kingsgrove area, road traffic volumes would reduce. This would result in an appreciable reduction in noise levels throughout the study area along the alignment of the project and M5 East Motorway (between Beverly Hills and Kingsgrove). However, road traffic noise levels are predicted to be 'acute' at one noise sensitive receiver. This receiver would be eligible for consideration of additional noise mitigation.

For the St Peters interchange the night-time period was the more stringent time period. Road traffic noise levels at a total of 145 residential sensitive receivers exceeded the $LA_{eq(9hour)}$ noise criterion. In accordance with the Noise Mitigation Guideline (Roads and Maritime, 2015) it was not considered reasonable to consider additional noise mitigation measures at receivers that would experience an increase in road traffic noise levels of 2 dB(A) or less, and were not considered 'acute'. As such a total of 144 residential receivers were considered for additional noise mitigation measures. In addition two school buildings (St Peters Public School) are eligible during the daytime only.

A cumulative noise assessment of operational facilities, or 'fixed' facilities, was also undertaken and found that these facilities would comply with the applicable criteria at the most affected residential receivers. This would be confirmed during the detailed design phase.

27.4.4 Economic impacts

Construction

Cumulative benefits on local businesses and the economy would result from overlapping construction periods for the project, the King Georges Road Interchange Upgrade project and the M4 East.

The construction of multiple projects would intensify the beneficial economic impacts that have been identified for the project only, and described in **Chapter 15** (Social and economic). In particular, these impacts relate to employment opportunities and economic stimulus.

The labour demand from WestConnex and other major projects in the area (and across wider Sydney) would increase employment opportunities for local residents. An increased demand for construction workers would also potentially increase wages.

The opportunity for local businesses to supply goods or services during the construction of these multiple projects, both to the projects directly and to their workforces has the potential to increase business turnover.

In contrast, however, there is the potential for businesses located close to the project and other WestConnex projects to experience impacts on amenity, which could result in a temporary downturn in their usual business.

The staggered nature of the WestConnex projects (in particular the King Georges Road Interchange Upgrade project and the New M5, for which some works would occur in a similar location) results in an extension of the period of construction and the impacts experienced in any one area. For example, the area of Kingsgrove around the Kings Georges Road interchange would experience a construction period which would potentially last five years.

There is the potential for construction vehicles associated with other projects to contribute further to congestion on the road network and further increase travel times along the M5 Motorway corridor. This would further affect the movement of freight via these routes during the construction periods, resulting in delays and potentially leading to increased costs. Such impacts would also flow on to motorists, who may spend longer in transit. These impacts would be temporary for the duration of construction only, with long term improvements in travel times expected during operation.

Operation

The operation of WestConnex would result in beneficial impacts on the economy and businesses in the vicinity of the project. The freight industry would benefit from WestConnex enabling the efficient movement of freight from Western Sydney to Sydney Airport and Port Botany (and vice versa), thus improving access to interstate and international markets.

WestConnex provides one of the missing links in the Sydney motorway network by creating a connection between the M4 and M5 motorways. The resulting benefits for freight include the opportunity to streamline interstate movements around and through Sydney. This provides businesses with connections to service more diverse and dispersed markets across the Sydney metropolitan area and potentially beyond.

Other key benefits would include a reduced demand on alternative routes on the existing road network, including the M5 East Motorway, which in turn would improve connectivity and amenity for communities along these routes. The beneficial cumulative impact of WestConnex would lead to improvements in connections between employment and population centres along the M5 Motorway corridor and beyond, catering for existing and future demand.

This would include a direct connection to employment zones within Sydney's global economic corridor generally and specifically near Sydney Airport and Port Botany via the St Peters interchange.

27.4.5 Social impacts

Construction

Construction of the project and the King Georges Road Interchange Upgrade project would overlap, resulting in extended durations of construction impacts in the vicinity of Kingsgrove. Social impacts related to travel delays, diversions and inconvenience, exposure to visual and noise amenity impacts would be prolonged for commuters, public transport users, pedestrians and cyclists.

Additionally, during construction of the future M4–M5 Link, sensitive receivers in the vicinity of St Peters would again be subject to construction impacts. However, the project includes preparatory works in this location for the future M4–M5 Link in order to minimise the amount of work which is required during future stages. This would reduce impacts to the community.

Operation

The M5 East Motorway currently experiences heavy traffic congestion, slow speeds and unreliable travel times especially in the morning and afternoon peaks, and increasingly at other times of the day and also on weekends.

Sydney's population is expected to increase by more than 1.6 million people by 2031 and without major investment in road network infrastructure this growth would result in worsening road congestion, potentially leading to increased anxiety and stress.

The project, in combination with the wider WestConnex scheme, has the ability to connect residential communities with employment centres, due to reduced congestion and decreased travel times. The project also provides greater accessibility for residents of south and south-west Sydney to access Sydney Airport and the Sydney CBD.

Cumulative impacts are therefore anticipated to be largely beneficial from a social perspective.

27.4.6 Non-Aboriginal heritage impacts

The King Georges Road Interchange Upgrade heritage assessment included a review of statutory and non-statutory heritage registers and a site inspection. The site inspection did not find any unlisted heritage items. The assessment found that there are no statutory items or conservation areas within or in close proximity to the upgrade works.

Two non-statutory conservation areas are adjacent to the existing M5: the Pallamanna Parade and Welfare Avenue Urban Conservation Area. These are listed on the Register of the National Estate, which has ceased to be a statutory list. These areas are separated from the M5 Motorway by noise walls and roadside vegetation. The New M5 is not expected to have any direct or indirect impacts on these areas.

There are no cumulative impacts to Non-Aboriginal heritage expected as a result of the WestConnex program of works.

27.4.7 Biodiversity impacts

WestConnex projects such as the King Georges Road Interchange Upgrade project and the future M4-M5 link (subject to planning approval) would result in removal of planted vegetation and fauna habitats. The M4 East project would involve the removal of small patches of highly fragmented planted vegetation.

The King Georges Road Interchange Upgrade project includes the removal of a small area (0.01 hectares) of Cook River / Castlereagh Ironbark Forest in the Sydney Basin endangered ecological community, the removal of low quality habitat (3.23 hectares) with potential food habitat for the Grey headed flying fox (*Pteropus poliocephalus*) and removal of nine affected Downy Wattle (*Acacia pubescens*) individuals. Given the small areas, poor condition and low site value scores, impacts on biodiversity would be minor for the King Georges Road Interchange project.

No significant cumulative impacts to the habitat for the Green and Golden Bell Frog (*Litoria aurea*) are expected to occur as a result of other WestConnex projects. Overall these projects and other developments would result in some further loss of habitat from an already modified environment with only limited natural biodiversity value. Cumulative impacts to biodiversity are therefore unlikely to be significant.

27.5 Cumulative impacts of nearby projects

As outlined in **Section 27.3.2**, there are few major developments in the vicinity of the project that would potentially be under construction at a similar time as the New M5.

The following sections outline the potential cumulative impacts associated with other non-WestConnex developments. Given the nature of these developments and their distance from the project, the main potential cumulative impacts relate to traffic and amenity.

27.5.1 Traffic and transport

Construction

The construction of nearby projects has the potential to result in additional construction traffic on the surrounding road network.

The Marrickville Metro Shopping Centre gained planning approval in April 2015 and although no certain construction dates have been indicated, it is assumed that construction would likely take place during the same period as the project.

Traffic from the construction of the Marrickville Metro Shopping Centre, north-west of Camdenville Park, may contribute to cumulative impacts, most notably during the construction of the St Peters interchange and local road upgrades.

No construction traffic numbers for the Marrickville Metro Shopping Centre are currently available to allow a quantitative assessment of potential traffic impacts. While the Marrickville Metro Shopping Centre project would likely result in an increase in the number of vehicles in the locality, it is likely that the number associated with this development would not significantly contribute to overall traffic numbers.

The greatest increase in traffic flows to the Marrickville Metro Shopping Centre are likely to be caused by the main approach routes; being Edinburgh Road, Victoria Road, Enmore Road and Belmore Road. These roads would not be used as major routes for construction traffic for New M5.

Intersections surrounding the Marrickville Metro would operate at a satisfactory level provided the Marrickville Metro Shopping Centre incorporates the recommended improvements to Unwins Bridge Road, Bedwin Road, May and Campbell Street intersection, as well as providing a new roundabout to Edinburgh and Sydney Steel Road, as stated in the Environmental Assessment Report (July 2010) for the Marrickville Metro Shopping Centre Concept Plan Application (Ref: MP 09_0191).

The Green Square Development, Mascot Station Town Centre Precinct Masterplan and Wolli Creek redevelopment area would all be developed progressively (i.e. staged) and are generally located away from areas affected by the project. Traffic from these developments is therefore unlikely to contribute substantially to cumulative traffic impacts in the vicinity of the project during its construction phase.

The Qantas Land at Mascot was required to undertake a traffic impact assessment as part of the application to Council. The traffic impact assessment indicated that the additional traffic generated from the Qantas Land as a result of the planning proposal would have “a negligible impact on the surrounding network taking into account the number and spread of access points to the road system. The assessment predicts the additional floor space would result in an additional 887 employees on the Qantas Land with a resultant traffic generation of 168 AM peak hour trips. This increase represents a 3.3% increase in employees across the Mascot precinct and 2.1% increase in peak hour vehicle trips” (City of Botany Bay, 2014)

The traffic assessment also took into consideration Stage 2 of the WestConnex and future road widening project on O’Riordan Street in Mascot. The report concludes that these projects have the “potential to provide regional traffic relief to enable development potential under the Local Environment Plan 2013 planning control” (City of Botany Bay, 2014).

Operation

During operation, the developments outlined in **Section 27.3.2** would contribute some traffic to the road network; however, this traffic is likely to disperse via the arterial road network. Where possible, the modelling undertaken (described in **Chapter 9** (Traffic and transport)) has factored in growth in the surrounding area which could lead to increases in vehicle numbers on the road network. The results of the modelling are outlined in Section 9.3.2 of **Chapter 9** (Traffic and transport).

In summary, the modelling identified that the project would reduce vehicle delays along the M5 Motorway corridor, the area around the St Peters interchange and local roads.

27.5.2 Amenity impacts

The timing and positioning of the developments outlined in **Section 27.3.2** mean that cumulative noise, air quality, traffic and visual impacts are likely to be limited.

However, longer term developments, such as the Green Square Urban Renewal Area and the Mascot Station Town Centre Precinct, would potentially occur during the later stages of the project or directly after the project is complete.

Although not directly located within the project footprint, these developments have the potential to create construction fatigue impacts, which occur when impacts from multiple construction projects extend over a longer period of time than would be experienced from a single project.

Such impacts are likely to be more evident in the vicinity of St Peters and Kingsgrove, where the project would include the establishment of construction ancillary facilities. Following the construction period for the project, there is the potential for the redevelopment of these areas to result in extended impacts on the surrounding community over a greater period of time.

During construction, ongoing consultation would be undertaken with local communities potentially affected by concurrent construction of other nearby projects to increase the overall awareness of project timeframes and impacts.

27.6 Management of impacts

Environmental management measures relating to cumulative impacts during construction and operation are provided in **Table 27.4**. Measures provided in **Chapter 9** (Traffic and transport) would also assist in minimising cumulative impacts, as the majority of potential impacts are traffic related.

Table 27.4 Environmental management measures – cumulative

Impact	No.	Environmental management measure	Timing
Construction			
Cumulative impacts	CI01	Consultation would be undertaken with local communities potentially affected by the impacts of multiple projects in addition to the project.	Construction
	CI02	Where relevant, consultation would be undertaken with proponents of other nearby developments to increase the overall awareness of project timeframes and impacts.	Construction

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