WestConnex M4 Widening – Westbound Off-ramp to Parramatta Road and Hill Road Widening

Request for Secretary's environmental assessment requirements to support an application to modify the M4 Widening Project Roads and Maritime Services | March 2019

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Roads and Maritime Services

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Request for Secretary's environmental assessment requirements to support an application to modify the M4 Widening Project

February 2019

Prepared by WSP Australia Pty Ltd and Roads and Maritime Services

Document controls

Approval and authorisation

Title	WestConnex M4 Widening – Westbound Off-ramp to Parramatta Road and Hill Road Widening Application to modify the M4 Widening Project
Accepted on behalf of Roads and Maritime NSW by	
Signed	
Dated	February 2019

Document status

Document status	Date	Prepared by	Reviewed by
Final	February 2019	Jennifer Warren	Andréa Zambolt

Executive summary

Introduction and need

The WestConnex scheme was a key recommendation of the State Infrastructure Strategy 2012–2032 (Infrastructure NSW, 2012) to "ease congestion, create jobs, and connect communities by providing crucial support for Sydney's long-term economic and population growth". To date, the NSW Minister for Planning has approved the development of three of the four stages of the scheme including the WestConnex M4 Widening project (the approved project). The approved project comprises the upgrade of about 7.5 kilometres of the M4 Motorway between Pitt Street at Parramatta and Homebush Bay Drive at Homebush.

During development, WestConnex Delivery Authority considered what upgrade provisions would be needed at the Hill Road interchange. While initially considering building an eastbound on-ramp and a westbound off-ramp, the off-ramp was discounted for various reasons including cost and property impacts.

Since the project was approved, a number of events have led Roads and Maritime to review the need for an off-ramp to Hill Road. Revised forecasts released in 2016 predict that in 15 years' time there would be up to 37 per cent more traffic using Hill Road than allowed for when designing the approved project. The predicted increase in traffic is due to:

- The NSW Department of Planning and Environment (DP&E) identifying the land around Carter Street and Wentworth Point as priority precinct growth areas
- Sydney Olympic Park Authority revising its Masterplan to continue development within the Park.

Roads and Maritime Services (Roads and Maritime) is proposing to modify the WestConnex M4 Widening project (SSI-6148) by building a westbound off-ramp from the M4 Motorway onto Parramatta Road. The modification includes undertaking road intersection upgrades at Parramatta Road and Hill Road and John Ian Wing Parade and Hill Road, Lidcombe as well as widening the M4 Motorway eastbound off-ramp to include an additional turning lane into Hill Road.

Project development and construction

The area surrounding the proposed modification is heavily constrained by urban development. To address this, Roads and Maritime firstly considered building a tunnel under the M4 Motorway to connect into Hill Road. However, it was concluded that this would be difficult to build and its associated high costs would not deliver value for money. As such, five bridge options were identified. Roads and Maritime selected a preferred option in consultation with key stakeholders that:

- Could be built without having any major impact on motorway traffic operations
- Would:
    - Not be prohibitively expensive to build (including consideration of construction time and costs associated with temporary night-time traffic management restrictions on the M4 Motorway).
    - Have minimal impact on an area of threatened ecological habitat to the west of Hill Road compared to other options
    - Relieve congestion and improve travel times into the Sydney Olympic Park Peninsula by providing additional network capacity and functionality
    - Support the development of the strategic growth areas.

The proposed preferred option would include the following:

- Building an off ramp on the southern side of the M4 Motorway to allow traffic to exit the motorway onto Parramatta Road
- Modifying Parramatta Road and Hill Road intersection to provide a left turn slip lane onto Hill Road
- Modifying the footpaths along Parramatta Road and Hill Road within the area of the proposed modification
- Widening the M4 Motorway eastbound off ramp to from one to two lanes and providing traffic signals at the off-ramp intersection with Hill Road
- Widening of Hill Road to allow for improvements at the intersection of Hill Road and John Ian Wing Parade
- Changes to parking on Bombay Street on the southern approach to Parramatta Road.

If approved, the proposed modification would take about 18 months to build starting in 2020.

Planning and assessment process

Roads and Maritime has formed the opinion that the work would form a modification to the approved WestConnex M4 Widening project (SSI-6148). Roads and Maritime is therefore planning to seek approval form the Minister for Planning to modify the terms and conditions of the approved project under section 5.25 of the EP&A Act.

Key environmental issues

The outcomes of the preliminary environmental investigations indicate that the following key environmental issues will require further detailed assessment and may require project specific impact mitigation measures:

- Traffic and transport
- Noise and vibration
- Visual amenity, built form and urban design
- Soils, water and waste
- Hydrology and flooding
- Biodiversity
- Historic (non-Aboriginal) heritage
- Air quality
- Socioeconomic, land use and property
- Cumulative impacts.

Proposed scope of the modification environmental assessment report

The modification environmental assessment report will include the following information to address the above key issues:

- A detailed description of the proposed modification including its components, construction activities, and staging
- A comprehensive assessment of the potential impacts on the key issues including a description of the existing environment, and an assessment of potential direct and indirect and construction, operation and staging impacts
- Description of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor potential impacts
- Issues raised by stakeholders, showing where and how they have been considered and addressed.

Abbreviations and glossary

AEP	Annual exceedance probability
AHD	Australian height datum
AHIMS	Aboriginal heritage information management system
CEMP	Construction environmental management plan
CO	Carbon monoxide
CSSI	Critical State significant infrastructure
DCP	Development control plan
DEC	Department of Environment and Conservation (former)
DECCW	Department of Environment, Climate Change and Water (former)
DGRs	Director Generals requirement: replaced by SEARs
DP&E	Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
HIL	Heath impact limits
ISQG	Interim sediment quality guidelines
km/hr	Kilometre per hour
LEP	Local environmental plan
LGA	Local government area
MNES	Matters of national environmental significance
NCAs	Noise catchment areas
NO_2	Nitrogen dioxide
NSW	New South Wales
OEH	Office of Environment and Heritage

OEMP	Operational environmental management plan
PAHs	Total polyaromatic hydrocarbons
PM	Particulate matter
PMF	Probable maximum flood
Roads and Maritime	Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
sec/km	Seconds per kilometre: a measure of how long traffic is delayed along a section of road
SEPP	State environmental planning policy
SO_2	Sulphur dioxide
SOHI	Statement of heritage impact
SOPA	Sydney Olympic Park Authority
SSI	State significant infrastructure
Strategic growth areas	Referring to the Carter Street priority precinct, the Wentworth Point priority precinct and the Sydney Olympic Park Peninsula
tCO_2^{-e}	Tonnes of carbon dioxide equivalent
TRAQ	Tool for roadside air quality
TSC Act	*Threatened Species Conservation Act 1995*
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*

Contents

Tables

Figures

1 Introduction

1.1 Overview of the proposed modification

Roads and Maritime Services (Roads and Maritime) is proposing to modify the WestConnex M4 Widening project (SSI-6148) by building a westbound off-ramp from the M4 Motorway onto Parramatta Road. at Lidcombe, New South Wales (NSW). The modification would be built within the footprint shown in Figure 1-1 and Figure 1-2, which is located within the City of Parramatta and Cumberland local government areas (LGAs).

The existing Hill Road interchange includes a westbound on-ramp, an eastbound off-ramp and a new eastbound on-ramp that was recently opened as part of the WestConnex M4 Widening project.

The proposed modification footprint is shown on Figure 1-2. Generally, the southern boundary of the footprint commences just west of the Parramatta Road/John Street intersection and extends approximately 900 metres to the Parramatta/Ostend Street intersection. The footprint also extends north for approximately 730 metres from the Parramatta/Hill Road intersection to just past the John Ian Wing Parade/Hill road intersection.

The proposed modification would include the following:

- Building an off ramp on the southern side of the M4 Motorway to allow traffic to exit the motorway onto Parramatta Road
- Modifying Parramatta Road and Hill Road intersection to provide a new left turn slip lane onto Hill Road
- Modifying the footpaths along Parramatta Road and Hill Road within the area of the proposed modification
- Widening the M4 Motorway eastbound off ramp to two lanes and providing traffic signals at the off-ramp intersection with Hill Road
- Widening of Hill Road to allow for improvements at the intersection of Hill Road and John Ian Wing Parade
- Changes to parking on Bombay Street on the southern approach to Parramatta Road.

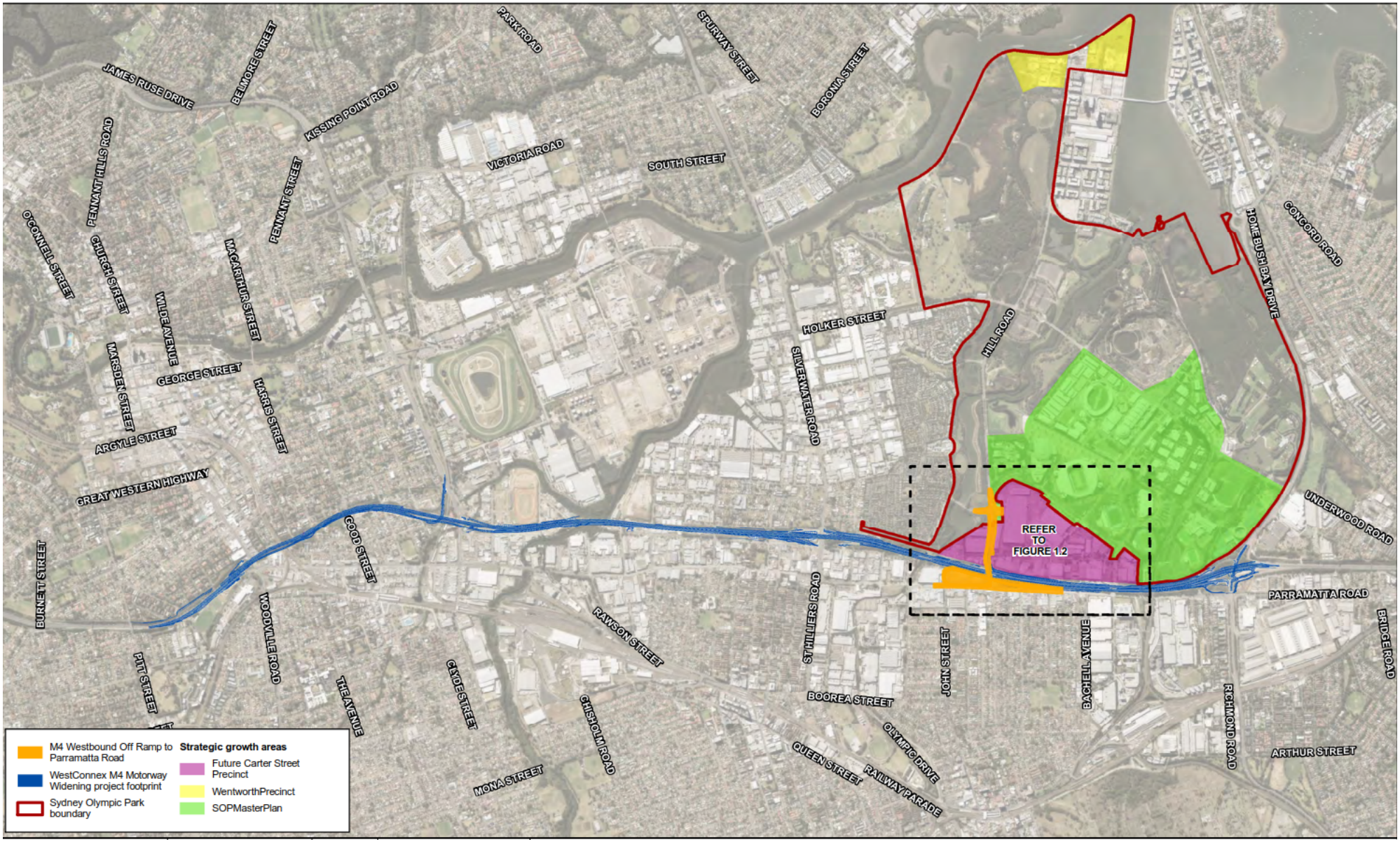


Figure 1-1 Proposed modification location – regional context

Figure 1-2 Proposed modification location – detailed view

1.2 Statutory process

Roads and Maritime is the State Government agency and proponent responsible for planning and delivering the WestConnex scheme. The M4 Widening project (SSI-6148) was approved by the Minister for Planning in December 2014 as critical State significant infrastructure (CSSI). Since this approval, Roads and Maritime have formed a view that the proposal would form a modification of the WestConnex M4 Widening project under section 5.25 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Roads and Maritime is therefore planning to seek approval from the Minister to modify the terms and conditions of the approved project under section 5.25 of the EP&A Act.

Submission of this report to the Secretary of the DP&E is the first step in the planning approval process to modify the terms and conditions of the approved project. This report is to assist the DP&E to formulate Secretary's environmental assessment requirements (SEARs). Roads and Maritime will then undertake an environmental assessment in accordance with the SEARs. Roads and Maritime will publish its findings in a modification environmental assessment report that will be placed on public exhibition by DP&E. Roads and Maritime will consider the comments made by interested parties and document its responses in a submissions report.

The Secretary of DP&E will then prepare an assessment report making a recommendation to the Minister for Planning if the project should be modified. If approved, the Minister for Planning will specify any changes or additions to the conditions of approval attached to the WestConnex M4 Widening project to support construction and operation of the proposed modification.

In addition to the EP&A Act, other relevant environmental legislation, regulation and wider planning policy that may be relevant to the proposed modification has been considered as part of this report. This review has confirmed that no additional requirements under State legislation, regulation or policy would apply to the proposed modification over and above those already identified in the approved project EIS.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the Minister for the Environment and Energy to approve actions that may have a significant effect on matters of national environmental significance (MNES) or a project that is located on, or will affect, Commonwealth land. It is not anticipated that the proposed modification would result in any significant effect on MNES or affect Commonwealth land.

1.3 Purpose of this report

As outlined above, this report has been prepared to support the proposed modification of the M4 Widening project by assisting the DP&E in formulating SEARS under Section 5.25 (3) of the EP&A Act. It does this by:

- Describing the proposal to modify the WestConnex M4 Widening project approval to include a new off-ramp on the south side of the M4 to direct traffic onto Parramatta Road and Hill Road
- Road widening and intersection upgrades on Hill Road
- Identifying the key environmental issues that need considering and assessing in the modification report.

2 Background

2.1 Modification history and background

The approved project comprises the upgrade of about 7.5 kilometres of the M4 Motorway between Pitt Street at Parramatta and Homebush Bay Drive at Homebush.

During the planning and design phases, WestConnex Delivery Authority, which was responsible for delivering the approved project, considered what upgrade provisions would be needed at the Hill Road interchange. While initially considering building an eastbound on-ramp and a westbound off-ramp, the off-ramp was discounted for various reasons including cost, road network integration, interchange operation, and property impacts.

However, since the above project was approved, there have been a number of environmental planning decisions and strategic plans released, which have led to the identification and development of the proposed modification. These are summarised in Table 2-1.

Table 2-1 Modification history background: chronology of events

Document	Context
March 2014	

Carter Street priority precinct announcement	• The NSW Department of Planning and Environment exhibited its proposal to rezone the land around Carter Street to create a priority precinct comprising a mix of housing, employment, retail and amenity land uses to support the Sydney Olympic Park
	• The rezoning proposal also recognised the need to provide access to and from the precinct by public transport and the regional road network
	• Part of this would need to involve improvements to a number of intersections notably including:
	  • Hill Road/Carter Street
	  • Hill Road/John Ian Wing Parade
	  • Hill Road/Parramatta Road/M4 Motorway.

August 2014	
WestConnex M4 Widening Environmental impact statement	• The feasibility for a westbound off-ramp to Hill Road was reviewed in developing the preferred option for the M4 Widening project following the announcement of the Carter Street priority precinct in March 2014 • Three westbound off-ramp options were considered, however none were included as part of the preferred option due to a range of issues, including cost and property impacts • Roads and Maritime did however commit to investigating cost effective options for the off-ramp.
October 2014	
Response to submissions report	• Consideration of the need for an off-ramp at Hill Road was raised as part of the public exhibition of the WestConnex M4 Widening project EIS. The response to these submissions noted that building a westbound off-ramp to Hill Road was not feasible or reasonable due to a range of issues, including cost, road network integration, intersection operation and property impacts. The response also confirmed that a viable option was not identified and the off-ramp was therefore not considered any further • The response to submissions report also noted that a scheme may need to be developed in the future by the relevant authorities, stakeholders and private parties when operational traffic and access requirements are better defined. The report also noted that if a proposed westbound off-ramp in the vicinity of Hill Road was progressed, then it would be subject to environmental assessment.

Document	Context	
December 2014		
State significant infrastructure approval	In approving the M4 Widening project, the NSW Minister for Planning included two conditions of approval relating to the Hill Road intersection.	
	B17	*Within 12 months of operation, the Proponent shall prepare a **Hill Road Options Review** for a westbound off-ramp and associated works at the Hill Road interchange. This review shall be prepared in consultation with relevant stakeholders including, but not limited to the Department, Urban Growth NSW, the Sydney Olympic Park Authority (SOPA), the relevant Council, community groups, business associations and major landowners within the Sydney Olympic Park, Carter Street and Wentworth Point precincts, and include, but not necessarily be limited to:* • *Consideration of land use changes in the vicinity of the interchange, including the Carter Street and Wentworth Point Precincts and associated traffic implications* • *Options for a westbound off-ramp and associated works at Hill Road, or alternative works that provide access to or near Hill Road* • *Potential delivery mechanisms and timing.* *The review shall be provided to the Secretary, stakeholders and be made publicly available.*
	B18	*Within 12 months of SSI approval, the Proponent shall, in consultation with the relevant Council, prepare a report on any additional interchange/intersection works/treatments at the Hill Road and Silverwater Road off-ramps and associated intersections necessary to minimise queuing back on to the main M4 carriageway. The report shall be submitted to the Secretary outlining any identified options for improvements to the functioning of these interchanges. If the preferred option identifies additional works, these works are to be completed prior to operation or as otherwise agreed to by the Secretary.* *Note: identified mitigation measures that are not consistent with the environmental impacts described in the documents listed in condition A2, will need to be further assessed under the Environmental Planning and Assessment Act, 1979. Works will need to meet relevant design standards and be subject to independent road safety audits.*

Document	Context
November 2015	
Carter Street priority precinct finalisation report	• The NSW Department of Planning and Environment released its finalisation report for the rezoning of the land around Carter Street • The finalisation report continued to identify the need to upgrade the key intersections identified in March 2014.
New Community and Road Upgrades for Lidcombe	• The NSW Minister for Planning and NSW Minister for Roads jointly announced Carter Street priority precinct at the end of 2015 • The announcement specifically committed to building a westbound off-ramp from the M4 Motorway to Hill Road.
January 2016	
Auburn local environment plan (LEP) and development control plan (DCP)	• Amendments were made to the Auburn LEP, DCP and land reservation acquisition map to show the rezoned Carter Street priority precinct. These zoning updates demonstrate the commitment to the area's urban renewal, reinforcing the need to build the supporting transport infrastructure as committed by the NSW Minister for Roads and NSW Minister for Planning at the end of 2015.
February 2016	
Bureau of Transport Statistic data	• The Bureau of Transport Statistics released an update of its regional traffic forecast growth data for the local area accounting for development of the strategic growth area (as shown in Figure 1-1) • These data confirmed that the predicted increase in traffic on Hill Road in the future would benefit from the inclusion of a westbound off-ramp from the M4 Motorway to Hill Road as described in section 2.2.
Hill Road options investigation	• Roads and Maritime progressed investigating options for a westbound off-ramp from the M4 Motorway to Hill Road based on the Bureau of Transport Statistic data.
September 2016 to November 2016	
Development applications: Carter Street priority precinct	• City of Parramatta received a number of development applications for residential buildings within the Carter Street priority precinct.
2016 to 2019	
SEARs application for the M4 to Hill Road westbound off-ramp, Lidcombe	• May 2017 community update providing the proposed off-ramp layout and overview • June 2017 SEARs provided by DP&E.
Amendment of Carter Street Master Plan	• In 2017, DPE undertook a review of the Carter Street Master Plan to make refinements to the plan and consider the effects of the off ramp • The revised Master Plan was exhibited for comment in September 2018 • In response to the Master Plan review, Roads and Maritime revised the proposed modification concept design, which resulted in an amendment to the off-ramp design and associated traffic improvements • Updated application prepared to amend the SEARs for the new road off ramp proposal.

2.2 Strategic context and proposed modification need

Hill Road is the only direct access into the western and northern areas of the Sydney Olympic Park. It provides an important function for people accessing and using the park's associated amenities and facilities. It also provides residents with access to and from Wentworth Point and Newington, and it has been identified as key in supporting the future development of the mixed residential, commercial and amenity land uses across the strategic growth areas (Figure 1-1).

In February 2016, the Bureau of Transport Statistics released updated regional traffic forecast data accounting for development of the strategic growth, where there is projected to be an additional 50,000 people living and working on the Sydney Olympic Park Peninsula through the development of 15,000 homes (occupied by 35,000 residents) and the creation of 15,000 jobs. This is very rapid growth within the area identified to support Sydney's housing and employment needs over the next 15 years.

Using these data, Roads and Maritime reviewed the need and options for a westbound off-ramp at Hill Road. This responded to a condition the Minister placed on the approved project in December 2014 (B17). The review concluded up to 8,000 additional trips will be made on Hill Road every day as a result of the planned development of the three strategic growth areas. This is 37 per cent more traffic than currently uses Hill Road.

Under its current configuration, Hill Road will not be able to cope with carrying this additional volume of traffic. As a result, this will lead to increased congestion and unacceptable delays and travel times into and out of the area. Alternatively, by building a westbound off-ramp to Parramatta Road and providing a left turn signalised slip lane at the Parramatta Road and Hill Road intersection, this would introduce additional capacity on the network. In combination, this would maintain travel times locally and provide a means to access the Sydney Olympic Park when travelling westbound on the M4 Motorway from the city as well as eastbound traffic already on Parramatta Road. As such, the proposed modification is needed to support the additional traffic generated from the identified growth and development in the area.

2.3 Project objectives

Project objectives identify clear goals to be achieved when designing, delivering, building and operating the proposed modification. For the westbound off-ramp onto Parramatta Road, the objectives are aligned with the wider WestConnex scheme. They are to:

- Improve access from the M4 Motorway to Hill Road.
- Improve access and support development of the strategic growth areas
- Support the future development of Hill Road
- Improve public transport access
- Improve safety for all road users
- Minimise environmental and social impacts and maximise the quality of the urban environment
- Minimise traffic disruption on the surrounding road network when building the off-ramp
- Deliver value for money.

2.4 Selecting a preferred option

2.4.1 Strategic alternatives

The following strategic alternatives were considered for the proposed modification. Each alternative was reviewed for its ability to deliver on the identified objectives:

- Base case ('do nothing')
- Build an off-ramp (bridge) from the M4 Motorway
- Build an off-ramp (tunnel) under the M4 Motorway.

It was concluded that the do nothing option was not reasonable as it would neither support the planned regional development of the strategic growth areas, nor would it cater for the predicted increase in traffic using Hill Road in the future. As such, this alternative was discounted and not taken forward.

Of the two build alternatives, it was concluded that there would be constructability issues to build a tunnel and its associated high costs would not deliver value for money. As such, the bridge alternative was taken forward and variations of this alternative were investigated.

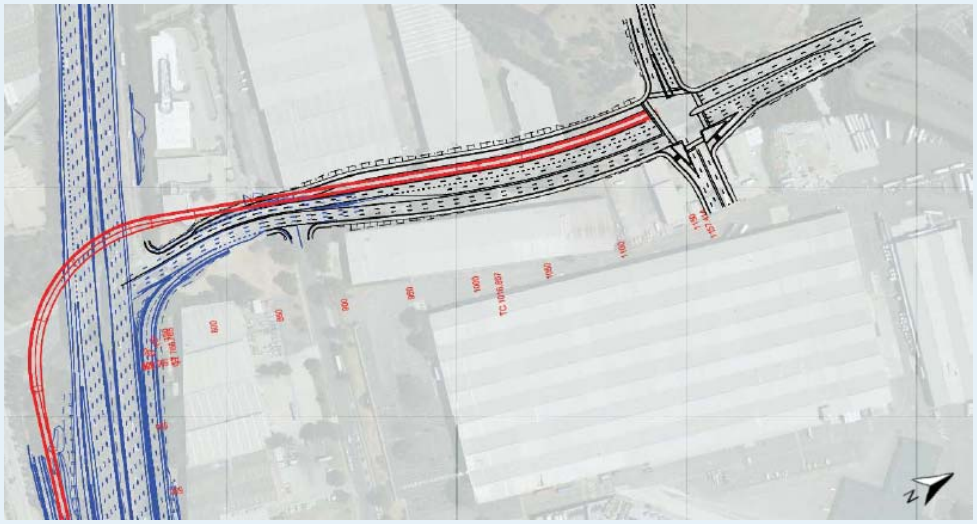
2.4.2 Options

In 2016, five bridge options were developed by Roads and Maritime, all of which provide a westbound off-ramp into Hill Road. Each option varied slightly in its design, however all options were developed to ensure they could:

- Be operational by early 2021
- Minimise their environmental impact
- Integrate with the urban design that would be adopted across the approved project and Carter Street priority precinct
- Minimise the amount of disruption to traffic on the M4 Motorway and Hill Road during construction
- Minimise impacts for adjacent property owners during construction.

Table 2-2 Options considered

Option	Description
Option 1: shallow curve bridge	A curved ramp that bridges over the M4 Motorway with a wide horizontal radius curve and lands centrally in Hill Road. 
Option 2: loop bridge	A ramp that bridges over Hill Road before looping towards Parramatta Road and under the existing M4 Motorway bridges to join Hill Road. 

Option	Description
Option 3: tight curve bridge (central landing)	A curved ramp on a tighter radius than Option 1 that bridges over the M4 Motorway and lands centrally in Hill Road. 
Option 4: tight curve bridge (western landing)	A curved ramp on a tighter radius than Option 1 that bridges over the M4 Motorway and lands on the western side of Hill Road. 
Option 5: tight curve bridge (central and western landing)	Similar to Option 3 except the proposed ramp divides into two ramps to land both centrally in Hill Road and on the western side of Hill Road. 

Following a workshop in May 2016 with Cumberland Council, City of Parramatta Council, the Sydney Olympic Park Authority (SOPA) and further investigations, Option 3 was selected as the preferred option due to the following reasons:

- It could be built without having a major impact on motorway traffic operations
- It would:
  - Not be prohibitively expensive to build when factoring the costs for introducing temporary night-time traffic management restrictions on the M4 Motorway
  - Minimise impacts on threatened habitat to the west of Hill Road
  - Relieve congestion and improve travel times into the Sydney Olympic Park Peninsula by providing additional network capacity and functionality
  - Support the development of the strategic growth areas
  - Be most cost-effective solution to build.

This option formed the basis of the original application for SEARs which were issued by DP&E in June 2017. Also in 2017, DPE undertook a review of the Carter Street Master Plan to make refinements to the plan generally and to consider the effects of the off ramp.

Roads and Maritime has worked closely with the DP&E Urban Renewal Team on the update of the Carter Street Master Plan. During this time, a number of constraints with Option 3 were identified including property acquisitions along Hill Road and their costs; relocation of major utilities and visual impacts associated with the Option 3 off-ramp.

As a result, Option 2 was revisited with a view to minimising property acquisition by using a section of Parramatta Road to connect to Hill Road. The option would result in improved constructability, costs and visual impacts; and improved access to the western portion of the Carter Street precinct.

In January 2018, Roads and Maritime convened a workshop with key stakeholders to review and re-evaluate the then preferred option (Option 3) and Option 2 against assessment criteria agreed at the first value management workshop and to reassess which option provided best value. The stakeholders at the workshop included Cumberland Council, DP&E, Parramatta City Council and Sydney Olympic Park Authority.

The workshop group recommended that Option 2 should be adopted as the new preferred option because the option:

- Scored significantly better from an environmental, community/stakeholder impact and constructability perspective
- Has less visual impact and it has better urban amenity
- Is a better urban design outcome for the Carter Street precinct
- Provides placemaking opportunities for the corridor and the Carter Street precinct
- Allows for greater integration with the existing landscape and road network
- Provides better connectivity (pedestrians, cyclists, motorists) both east/west and north/south
- Provides more flexibility for staging/deliverables. John Ian Wing Parade intersection can be delivered independently of the westbound off ramp part of the project
- Is simpler in its design and construction
- Has the least risk from a constructability point of view. It will cost less to construct and maintain and will be easier/safer to construct and maintain. The whole of life costs will be significantly less
- Allows for less disruption to the local road network during construction
- Provides the added functionality of being able to travel east on Parramatta Road from the off ramp.

3 Proposed modification description

3.1 The approved project

Table 3-1 summarises the key components of the approved project.

Table 3-1 Approved project components

Component	Aspects

Road widening	• Widening the existing motorway typically to four lanes in each direction between:
	  • Wentworth Street at Auburn and the Duck River, also at Auburn
	  • Junction Street at Auburn and Homebush Bay Drive.

Bridges and viaducts	• Building a new-two lane viaduct (raised road) for westbound traffic between Church Street at Parramatta and Wentworth Street at Granville • Reconfiguring the traffic lanes on the existing viaduct to create four eastbound lanes between Church Street and Wentworth Street • Building a new bridge over the Duck River.
Ramps	• Building a new westbound on-ramp from Homebush Bay Drive • Building a new eastbound on-ramp from Hill Road at Lidcombe • Widening and/or lengthening the existing ramps at Church Street, James Ruse Drive at Granville, Silverwater Road at Silverwater, Hill Road and Homebush Bay Drive.
Additional features	• Providing intelligent transport system infrastructure • M4 Motorway to the east of the Hill Road interchange • Installing tolling equipment and supporting infrastructure • Installing and modifying noise barriers • Building an off-road cycleway around the Homebush Bay Drive interchange • Re-grading and resurfacing the existing motorway.

3.2 The proposed modification

Roads and Maritime proposes to modify the approved project by:

- Building a new elevated westbound off-ramp connecting into the existing M4 exit stub to allow traffic to exit the M4 Motorway onto Parramatta Road
- Modifying Parramatta Road and Hill Road intersection to provide for a new signalised left turn slip lane onto Hill Road
- Upgrading the intersection at John Ian Wing Parade from a 3 way to a 4-way intersection in order to provide two new right turning lanes from northbound Hill Road into the new Carter Street precinct.
- Improving and widening the footpaths on Parramatta Road and Hill Road within the area of the proposed modification
- Widening the M4 Motorway eastbound off ramp to two lanes and providing traffic signals at the off-ramp intersection with Hill Road
- Changes to parking arrangements on Bombay Street on the southern approach to Parramatta Road to optimise the operation of the Hill Road and Parramatta Road intersection.

Ancillary work would include but not be limited to:

- Protecting, modifying and potentially installing utilities
- Installing and adjusting street furniture including signage and lighting
- Installing intelligent transport system infrastructure and tolling equipment on the off-ramp that is consistent with the M4 Motorway smart motorway technology
- Establishing locations for crane pads, site compounds and materials storage.

The proposed modification would be refined as part of the environmental assessment and concept design. The joint announcement in November 2015 (refer to Table 2-1) stated that $140 million has been secured for a westbound off-ramp.

3.3 Construction

The methods, activities and equipment used to build the proposed modification would be consistent with those used to upgrade the WestConnex M4 Widening project. The only notable difference would be identifying new compound sites to support building the off-ramp as the sites used to upgrade the M4 Motorway are either located a distance from the location of the project or would be no longer available.

The location and size of ancillary construction facilities would be developed as part of the concept design and modification environmental assessment report. Existing land use activities, potential environmental impacts and amenity impacts on the surrounding community would be taken into account when determining the appropriate size and location.

4 Environmental issues

This Chapter identifies the scope of environmental assessment based on a preliminary environmental assessment.

4.1 Key environmental issues

Key environmental issues are those that may have moderate or high actual or perceived impacts that need assessing in detail to determine the measures that should be introduced to mitigate and manage any resulting effects that would occur when building and operating the proposed modification.

This preliminary environmental assessment considered the key issues identified in the Director General's environmental assessment requirements issued for the approved project (DGRs for WestConnex – M4 Widening SSI 13-6148, DP&E, 2013), along with information from the approved project EIS, submissions report, and construction and operational environmental management plans.

The outcomes of the preliminary environmental assessment indicate the following key issues that would need assessing in detail:

- Traffic and transport
- Noise and vibration
- Visual amenity, built form and urban design
- Soils, water and waste
- Hydrology and flooding
- Biodiversity
- Historic (non-Aboriginal) heritage
- Air quality
- Socioeconomic, land use and property
- Cumulative impacts.

A number of other environmental issues were also identified, as outlined in section 4.11. These are typically routine in nature and are considered to be of less consequence taking into consideration the project scope, existing environment and the implementation of standard measures that are adopted and proven as effective when building and operating road projects. As such, they are unlikely to be key concerns to the environmental assessment.

Figure 4-1 shows the key environmental constraints and issues in the area as described further below.

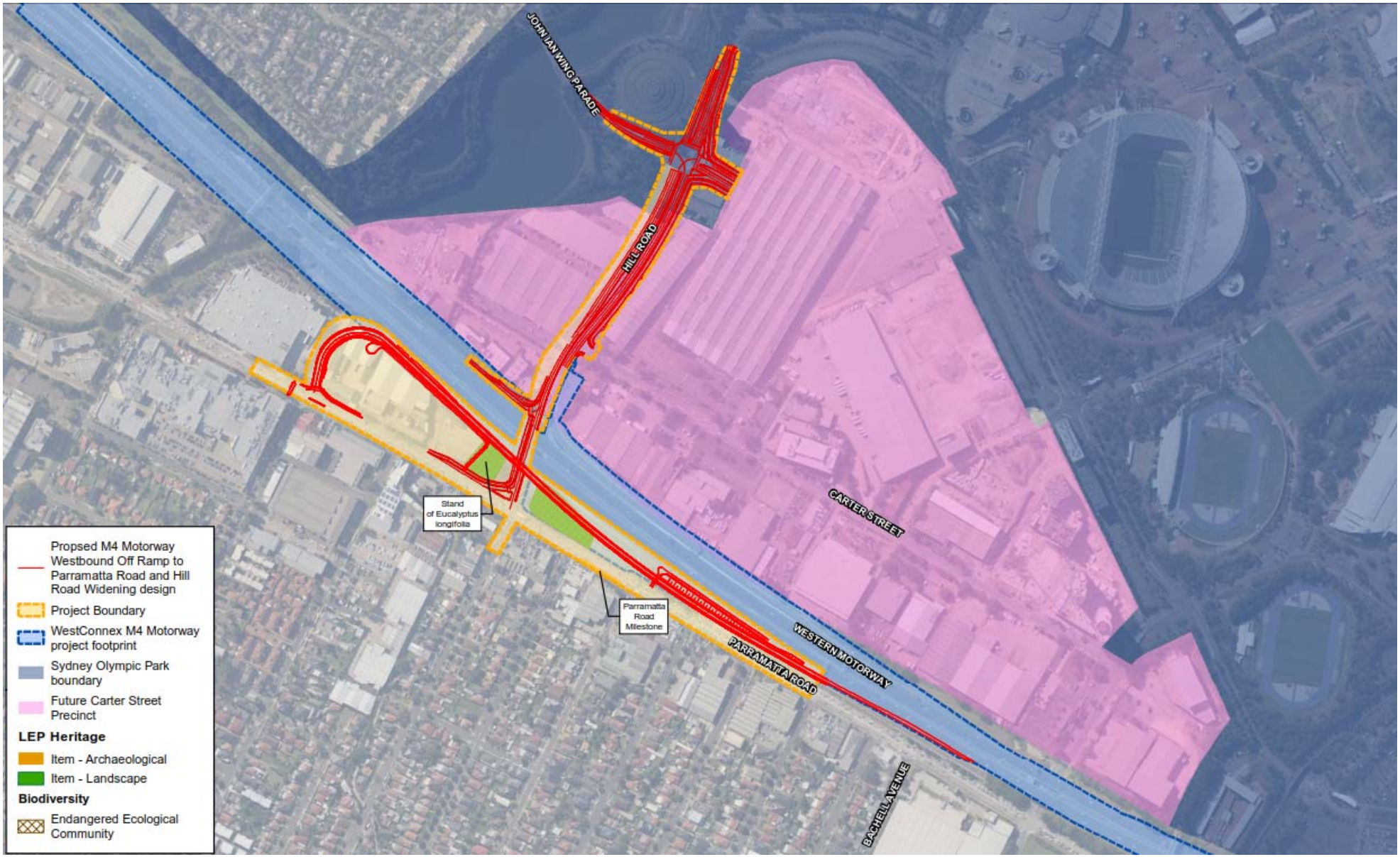


Figure 4-1 Key environmental constraints and issues

4.2 Traffic and transport

This section identifies the key traffic and transport issues associated with building and operating the proposed modification. It considers the effects on the operation of the M4 Motorway, Parramatta Road and Hill Road during construction, including effects on pedestrians, cyclists and public transport users. It then considers the benefits and effects on road users once the westbound off-ramp becomes operational.

4.2.1 Overview

Local network

The M4 Motorway is about 40 kilometres long and connects the Blue Mountains in the west with Parramatta Road in the east. The section of the M4 Motorway within the proposed modification footprint is located within an urban setting. It has recently been upgraded from three to four lanes as part of the approved project. An eastbound on-ramp has also been built from Hill Road to the M4 Motorway.

Table 4-1 describes the key roads in the area as also shown on Figure 4-1.

Table 4-1 Key roads in the area

Road	Characteristics
M4 Motorway	• Urban motorway • About 40 km long connecting the Blue Mountains and Parramatta Road • Four lanes in each direction • Operates with a 100 km/hr posted speed limit • Provides regional freight, recreational and commuter access into and out of Sydney • Up to 200,000 vehicles use the road every day.
Parramatta Road/Great Western Highway (A44)	• Urban highway • The Great Western Highway is about 200 km long connecting Bathurst and Sydney • Parramatta Road forms part of the Great Western Highway. It is about 23 km long and connects Parramatta and central Sydney • Two lanes in each direction, with no kerbside parking • Operates with a 60 km/hr posted speed limit • Provides local and regional freight, commercial, and commuter access into and out of Parramatta and Sydney • Up to 50,000 vehicles use the road every day.
Hill Road	• Arterial road • About 4 km long connecting Wentworth Point and Parramatta Road • Two lanes in each direction, with no kerbside parking • Operates with a 60 km/hr posted speed limit • Provides access into and out of the Sydney Olympic Park • Up to 31,000 vehicles use the road every day.

Road	Characteristics
Carter Street	• Local road • About 500 metres long connecting Birnie Avenue and Hill Road • One lane in each direction, with a wide kerb mainly allocated to time-restricted on-street parking • Operates with a 60 km/hr posted speed limit • Provides access to the commerce and industry adjacent to Carter Street • Up to 8,000 vehicles use the road every day.
John Ian Wing Parade	• Local road • About 560 metres long connecting Pereira Street and Hill Road • One lane in each direction with a wide kerb allocated to cyclists • Operates with a 50 km/hr posted speed limit • Provides access to the residential areas of Newington • Up to 7,500 vehicles use the road every day.
Local roads intersecting with Parramatta Road	• John Street currently has a right turn lane from Parramatta Road • Frances Street does not allow right turn traffic from Parramatta Road • Bombay Street does not allow right turn traffic from Parramatta Road.

Other characteristics

Table 4-2 describes the other characteristics of the local road network.

Table 4-2 Other traffic and transport characteristics

Road	Characteristics
Freight, commercial and heavy vehicle traffic	• The M4 Motorway and Great Western Highway carry a higher than average percentage of freight and commercial traffic • There is also a higher than average use of Hill Road by freight and commercial traffic.
Public transport	• There are bus stops on Parramatta Road (service 401) • Buses also travel along Hill Road and John Ian Wing Parade (service 525 and service 526) • Service 401 operates between Sydney Olympic Park Station and Lidcombe • Service 525 operates between Parramatta, Newington and Burwood • Service 526 operates between the Sydney Olympic Park Wharf, Newington and Strathfield.
Active transport	• There are footpath provisions on Parramatta Road and Hill Road, Carter Street, and John Ian Wing Parade • There are on-road marked cycle provisions on the M4 Motorway and John Ian Wing Parade. There is also a wider off-road cycle network in the Sydney Olympic Park.

4.2.2 Summary of issues

Construction

Key temporary traffic and transport issues associated with building the proposed modification are:

- Traffic disruption on the M4 Motorway, Parramatta Road, Hill Road and surrounding side streets potentially resulting in short-term travel time delays and increased journey inconvenience due to traffic management controls including, lane closures, speed restrictions, and diversions

- Access restrictions or delays to and from the commercial properties located on the north side of Parramatta Road between John Street and Hill Road, Lidcombe
- Access restrictions to businesses on the western side of Hill Road between the M4 and John Ian Wing Parade
- Access restrictions to Carter Street which will prevent vehicles travelling northbound on Hill Road turning right into Carter Street
- Footpath closures and diversions on Parramatta Road and Hill Road, however it is expected that only one of the footpaths would be closed at a time.

Operation

Key adverse and beneficial traffic and transport issues associated with operating the proposed modification are:

- Provision of improved access onto Hill Road from the M4 Motorway westbound, delivering travel time savings
- Better traffic access to Hill Road, with new traffic signals at the intersection of Hill Road and the M4 Motorway eastbound off-ramp to provide for traffic onto Hill Road
- Network provisions and improvements to cater for the 50,000 additional people that are expected to live and work in the area over the next 15 years as described in section 2.2
- Reduced delays and improved travel times in the local area
- Other changes to traffic volumes, intersection arrangements and network characteristics on the M4 Motorway, Parramatta Road, Hill Road, Carter Street, John Ian Wing Parade, Birnie Avenue and potentially other roads in the local area.

4.2.3 Proposed further assessments

A detailed traffic and transport assessment would be prepared to assess the following impacts and identify corresponding mitigation measures:

Construction

The assessment of potential temporary short-term construction traffic and transport impacts would consider:

- Road network performance, including the operation of the M4 Motorway, Parramatta Road and Hill Road while the off-ramp is being built
- Regional and local freight and commercial vehicle movements along the M4 Motorway, Parramatta and Hill Road while the proposed modification is being built, including access, delivery and patronage impacts to the businesses along Parramatta and Hill Road
- Bus service provisions, routes and journey reliability while the proposed modification is being built
- Access to and from the Sydney Olympic Park while an event is being held
- Kerbside provision restrictions such as the relocation/loss of bus stops and parking
- The use of footpaths and the inconvenience and delay of making detours
- Loss of on-road cycle facilities and connectivity to wider networks in the area
- Feasible and reasonable mitigation and management measures.

Operation

The assessment of potential long-term operational traffic and transport impacts would consider:

- Demand, travel times, and local road network performance comparing the situation between building and not building the off-ramp
- Function and performance of key roads, interchanges and intersections from building the off-ramp in terms of the level to which they will service traffic now and in the future

- Connectivity and impacts to pedestrian and cyclist facilities
- Impacts to strategic bus corridors/routes and patronage
- Impacts and benefits to the commercial properties along Parramatta Road and Hill Road, and to the wider freight and commercial community, including the changes introduced through developing the strategic growth areas
- Feasible and reasonable mitigation and management measures.

The assessment will also consider how the predicted population and employment increase discussed in section 2.2 will affect traffic, transport and access in the local area in response to building the off-ramp.

4.2.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise traffic and transport-related impacts as far as is feasible and reasonable. In addition, the mitigation measures of the approved project EIS would extend to cover the proposed modification. Where required, they would be modified or supplemented with the aim of further avoiding or minimising impacts. The mitigation would be based on typical management practice developed by Roads and Maritime, Austroads and other Government agencies. The key provisions would include:

- Working under a construction traffic management plan.

4.3 Noise and vibration

This section considers the construction noise and vibration impacts on adjacent sensitive receivers in the local area, as well as the long-term traffic noise impacts by introducing the proposed modification.

4.3.1 Overview

Ambient noise levels

The approved project EIS measured ambient and background noise levels in 2013 in the area around the proposal. The closest EIS monitoring location A2.1 was located at 135 Delhi Street, Lidcombe, near the intersection with Delhi Road and Parramatta Road and adjacent to the existing westbound on ramp to the M4. Background noise levels were measured at 52 dBA during the day and evening periods with night time levels measured at 47 dBA. The ambient noise environment was dominated by road traffic noise from the M4 Motorway and Parramatta Road with free-field measured levels of 60 dBA during the day and 55 dBA during the night. Refer to Appendix E to the approved project EIS.

The approved project EIS also included predictions of the future noise levels in the local area once the M4 Motorway was upgraded and operational under the approved project. Table 4-3 reports those predictions, as made at the residential property located at the monitoring location A2.1.

Table 4-3 Existing and future predicted worst case noise levels

Scenario	Road traffic noise level (dBA)	
	Day	Night
2014 (as measured)[1]	60	55
2017 (predicted M4 Widening only operating)[2]	62	57
2027 (predicted M4 Widening only operating)	62	56

Source WestConnex Delivery Authority, 2014

Notes:

1. Measured noise levels were free-field measurements. Road traffic noise is predicted as a façade noise level and may be up to 2.5 dB higher than a free-field measurement.
2. The approved project EIS predicted noise levels where only the M4W project was operational and when all WestConnex projects are operational (M4W, M4E, M4S and New M5).

The noise levels for the receiver at 135 Delhi Street reported in the approved project EIS were predicted to be less than 1 dB lower during the day and up to 1.4 dB lower during the night compared with if the approved project was not built. Road traffic noise levels are generally expected to be similar or slightly decrease in the local area once the approved project is operational, due to a number of factors including the reduction of traffic on the M4 Motorway due to tolls being reintroduced.

Noise and vibration sensitive receivers

The proposed modification would be built within the environment of the operational M4 Motorway and Parramatta Road. As such, there are a limited number of noise and vibration sensitive receivers that would be likely affected by the proposed modification. They comprise:

- Commercial properties along Hill Road and Parramatta Road
- Potential new residential properties along Hill Road
- Residents and businesses in Lidcombe directly to the south of Parramatta Road
- Proposed residential and recreation receivers in the Carter Street Precinct.

Appendix E of the approved project EIS grouped sensitive receivers into noise catchment areas (NCAs). Each NCA contained a representative number of similar receivers (i.e. commercial or residential properties). Table 4-4 describes the characteristics of the NCAs in the area local to the proposed modification footprint.

Table 4-4 Noise catchment area characteristics

NCA	Characteristics
NCA.A02_02N	• **Commercial receivers** north of the M4 Motorway between Birnie Avenue, Lidcombe and Haslams Creek, Lidcombe • Located north of the M4 Motorway capturing the commercial properties west and east of Hill Road and north and south of Carter Street.
NCA.A02_02S	• **Commercial receivers** south of the M4 Motorway between Bachell Avenue, Lidcombe and Haslams Creek, Lidcombe • Located north and south of Parramatta Road capturing the commercial properties along the Parramatta Road corridor.
NCA.A02_01	• **Residential receivers** south of the M4 Motorway between Bachell Avenue, Lidcombe and the canal to the west of Bombay Street, Lidcombe • Located south of Parramatta Road covering the residential properties of Lidcombe.
NCA.A02_03N	• **Residential receivers and isolated commercial receivers** north of the M4 Motorway between Haslams Creek, Newington and Stubbs Street, Silverwater • Located to the north of the M4 Motorway and west of Hill Road.

4.3.2 Summary of issues

Construction

Building the proposed modification would involve the use and operation of noise and vibration generating equipment and machinery during the day, evening and at night; particularly when building the main off-ramp structure along the M4 Motorway and the additional turning lanes into Hill Road. The off-ramp would also require the installation of piled foundations which could generate ground vibration and ground borne noise impacts on receivers close to the proposed modification footprint.

Some work alongside the M4 Motorway is expected to take place at night to avoid operational traffic impacts, especially during peak periods. Also, work on Hill Road would need to be timed to avoid major events at the Sydney Olympic Park where possible. As such, building the proposed modification could result in the following temporary short-term impacts:

- Airborne noise impacts affecting the amenity of local residents and workers through using equipment and machinery to build the proposed modification. The work may also affect people's enjoyment of the recreational wetlands in the Sydney Olympic Park north of John Ian Wing Parade
- Potential sleep disturbance for residents to the south in Lidcombe during night work such as piling and lifting work
- Vibration and ground borne noise impacts from piling the off-ramp foundations, which could potentially cause cosmetic damage to nearby buildings and structures.

Despite the rezoning of the land either side of Hill Road to high density residential as part of the Carter Street priority precinct (refer to Table 4-8), it is unlikely that any of these proposed premises would be completed and occupied while the proposed modification is being built. However, this would need to be confirmed when preparing the environmental assessment for the proposed modification.

Operation

The proposed modification would form part of the wider WestConnex M4 Widening project upgrade, which in turn would form part of the WestConnex scheme.

In the approved project EIS, the assessment considered how road traffic noise would impact sensitive receivers once the approved project was operational in 2017 as well as the additional combined effects on these receivers when the WestConnex scheme was fully operational in 2027. Similarly, he same considerations are relevant to the proposed modification and any new sensitive receivers in the local area that may be affected. Therefore, the key operational noise issues for the proposed modification are the noise traffic impacts and benefits on:

- Any receivers not previously affected by the approved project or WestConnex scheme
- Any receivers affected by the approved project together with cumulative impacts from the WestConnex scheme and by the proposed modification
- Impacts on proposed new residential developments in Carter Street.

4.3.3 Proposed further assessments

A detailed construction and operational noise and vibration impact assessment would be undertaken to determine the level of potential impact and to develop appropriate mitigation and management measures.

Construction

The construction assessment would:

- Identify noise and vibration sensitive receivers in the local area
- Establish specific noise management levels and vibration goals
- Identify and assess required out of hours work
- Assess airborne and ground-borne noise and vibration impacts from operating machinery and equipment, and construction traffic
- Identify feasible and reasonable mitigation and management measures.

Operation

The operational assessment would:

- Consider how the noise environment is affected by the redistribution of traffic on the local road network
- Compare how the revised traffic forecasts would affect road traffic noise compared to the predictions made in the approved project EIS
- Predict how road traffic noise is expected to change in the future without the development of the proposed modification
- Predict how the noise environment would change in the future once the proposed modification becomes operational
- Identify feasible and reasonable mitigation and management measures.

4.3.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise noise and vibration-related impacts as far as is feasible and reasonable. In addition, the mitigation measures of the approved project EIS would extend to cover the proposed modification. Where required, they would be modified or supplemented with the aim of further avoiding or minimising impacts. The mitigation would be based on typical management practice developed by Roads and Maritime, NSW Environment Protection Authority, and other national and international standards and guidelines. The key provisions would include:

- Working under a construction noise and vibration management plan
- Working under an operational environmental management plan that includes noise and vibration management practices
- Identifying where receivers are eligible for the consideration of noise treatments, which may take the form of new or modified noise walls along the M4 Motorway, low noise generating pavement (road surface), and/or the provision of architectural treatments.

4.4 Visual amenity, built form and urban design

This section considers the visual aspects and impacts on the amenity, receivers, built form, landscape character, and urban setting of the local area.

4.4.1 Overview

Landscape character

The proposed modification is located within the urban environment of western Sydney. The landscape of the area surrounding the M4 Motorway corridor can be characterised into a series of zones. The zones immediately around the proposed modification footprint are typically more commercial and industrial in character and therefore less sensitive to change and visual impact. The exception is the more valued residential character of Lidcombe, which makes it more sensitive to change and visual impact. However, this zone is set back away from the M4 Motorway corridor and separated from the proposed modification footprint by the commercial character of Parramatta Road.

Urban design

The Draft WestConnex Urban Design Framework (Roads and Maritime, 2013c) defined the built form objectives and provisions for the concepts of upgrading the M4 Motorway under the WestConnex scheme. As a result, the motorway has been upgraded to:

- Integrate sustainable principles into the planning and design while ensuring a natural-systems approach to planning and design was adopted
- Create a strong, simple, legible and inspiring integrated engineering, urban design and environmental solution
- Minimise impacts on the local community while responding to their concerns and issue through developing a responsive design outcome
- Transform spaces into places and encourage improved lifestyle opportunities
- Create a bold language that provides identity to the motorway with a high-quality design.

Landscaping and planting

Chapter 7 of Appendix F of the approved project EIS details the urban concept design and associated planting and landscaping strategy that is being introduced along the upgraded section of the M4 Motorway corridor. This is based on:

- Retaining the remnant and native vegetation within the corridor
- Planting batter slopes and areas beyond floodplains and creeks with (Cumberland Plain) woodland species
- Planting riparian/river flat forest species to reinforce creek and river lines
- Planting fig species at key locations to reinforce the existing planting and maintain local identity
- Planting indigenous shrubs on the batters, in narrow planting beds, and areas where trees cannot be planted close to the motorway
- Using native grasses and tussocks as a mass planting in key locations and as part of the median enhancements to improve overall setting and amenity
- Enhancing the medians to include streetscape improvements and the planting of eucalypts with an understorey of native shrubs, groundcover and/or tussocks.

4.4.2 Summary of issues

The proposed modification would change the amenity, urban environment and streetscape of Parramatta Road and Hill Road between the M4 Motorway and John Ian Wing Parade through the introduction of road widening and signalised intersection on the eastbound off-ramp. The proposed modification would allow traffic to exit the M4 Motorway onto Parramatta Road and may require the acquisition of businesses on the northern side of Parramatta Road between John Street and Hill Road, and on the eastern and western side of Hill Road between the M4 and John Ian Wing Parade.

The off-ramp would be built alongside the M4 Motorway westbound carriageway and would connect to Parramatta Road opposite John Street. The modification would also involve changes to the intersection of Parramatta Road and Hill Road, widening and signalising the M4 eastbound off-ramp to Hill Road and upgrading the Hill Road and John Ian Wing Parade intersection.

Construction

The following potential temporary landscape character and visual amenity impacts are likely to occur from building the proposed modification:

- Effects on the commercial environment through the possible acquisition of the properties on the northern side of Parramatta Road between John Street and Hill Road, Lidcombe and on the eastern and some section of the western side of Hill Road between the M4 and John Ian Wing Parade
- Effects on the amenity of Parramatta Road and Hill Road due to the road and construction work, including the use of barriers and fencing, traffic management controls, land clearance, demolition work, the use of equipment and machinery, and movement of construction vehicles and traffic delays
- The impact on commercial and residential receivers from the work activities needed to build the off-ramp close to the M4 Motorway, which is expected to be visible from Parramatta Road, and potentially, areas of Lidcombe. The visibility of the work would depend on the final chosen work methods
- Light spill impacts from undertaking work activities at night.

Operation

The following permanent landscape character and visual amenity impacts are expected from the proposed modification:

- Localised changes between the M4 Motorway and Parramatta Road through removal of mature trees and the vegetation buffer between the two roads
- Change to the visual character of Hill Road through the widening of the eastbound off-ramp and installation of new traffic signals and widening the intersection with Parramatta Road
- Impacts on the design relationship between Parramatta Road, Hill Road, the M4 Motorway and the existing and future built forms in the area.

The impact would take place within the context of an environment that is subject to transformation and future mixed-use development as part of the Carter Street priority precinct.

4.4.3 Proposed further assessments

A detailed visual amenity, built form and urban design assessment would be undertaken to determine the level of potential impact and to develop appropriate mitigation and management measures. The assessment would:

- Describe the urban and landscape setting and visual character of the local area in the context of the current commercial land uses and how this is expected to change in the future with the development of Parramatta Road as well as other nearby areas such as the Carter Street priority precinct
- Interpret the design to identify the visual aesthetic and urban design of the proposed modification accounting for the additional off-ramp in its setting of the M4 Motorway corridor
- Identify the visual impacts of building and operating the proposed modification during the day and at night (including lighting)
- Consider how the committed land use changes in the area may influence the character and setting of the proposed modification, and how the proposed modification can respond to these changes
- Consider the heritage and other social values of the local area to establish the potential sensitivity of receptors and the ability for the local community to adapt to the changes
- Identify feasible and reasonable mitigation and management measures.

4.4.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise visual amenity, built form and urban design impacts as far as is feasible and reasonable.

Also, ongoing consultation with Council, the community, and SOPA would help refine the proposed modification's urban design in the setting of the development of the Carter Street priority precinct, while also looking at its integration with the wider themes and strategies of the Draft WestConnex Urban Design Framework (Roads and Maritime, 2013c). The mitigation would be based on typical management practise developed by Roads and Maritime in its Bridge Aesthetic Guidelines (Roads and Maritime, 2012b), Noise Wall Design Guidelines (Roads and Maritime, 2012c), Landscape Guidelines (Roads and Maritime, 2012d) and Beyond the Pavement: Urban Design Policy Procedures and Design Principles (Roads and Maritime, 2014) to include:

- Implementing an urban design and landscape plan
- Using temporary hoardings and screens during construction
- Using best management practices to improve the amenity, appearance and tidiness of the area
- Using directed filtered site night lights to prevent spill and backscatter
- Developing coherent urban design themes between the M4 Motorway, Parramatta Road and Hill Road
- Integrating infrastructure elements into the existing landscape and urban environment that supports future development of the area.

4.5 Soil, water and waste

This section considers the potential impacts on the soil surface water and groundwater quality in the local area from building and operating the proposed modification. It considers the effects of disturbing and encountering contaminated land and asbestos, and the wider issues of waste and material management.

4.5.1 Overview

Geological and soil characteristics

The geology of the local area mainly comprises shales on top of sandstone, with the exception of creek lines where alluvial deposits are found. The composition of Blacktown and Glenorie soils in the area present a moderate-to-high erosion hazard, however west of Hill Road along Haslams Creek, the soils are locally disturbed responding to the areas industrial development and subsequent remediation (refer to section 4.8).

Acid sulphate soils and dryland salinity

The potential for acid sulphate soils exists across the majority of the proposed modification. However, analysis work undertaken in 2013 (WestConnex Delivery Authority, 2014) did not indicate any high probability occurrence areas within the proposed modification, with the subsurface identified as disturbed terrain to the West of Hill Road. The shallow brackish groundwater (refer to the groundwater heading below) presents a risk for encountering dryland salinity in the area.

Contaminated land

The area's industrial history of tanneries, brick manufacturing, munitions storage and landfilling has resulted in widespread contamination, which in part was remediated (cleaned-up) in the 1990s to build the Sydney Olympic Park. Current day commercial activities in the area also give rise to the potential release of contaminants into the local environment. Table 4-5 lists the contaminated land issues associated with the local area.

Table 4-5 Contaminated land issues

Location	Contaminated land issues
Haslams Creek	The alluvial sediments along Haslams Creek were chemically tested as part of the approved project and found to contain the following contaminants of concern: • Cadmium, copper, lead, mercury, nickel, zinc, benzo(a)pyrene and total polyaromatic hydrocarbons (PAH) exceeding the interim sediment quality guidelines (ISQG, low) • Lead and zinc exceeding the ISQG high • Asbestos containing materials (0.1 metres below surface) Note: none of the tested sediments were found to exceed the health impact limits (HILs).
Adjacent to Hill Road	Historic land uses: • Chemical manufacturing along Hill Road • Landfilling north of John Ian Wing Parade • Land remediation and leachate management north of John Ian Wing Parade • Excavation and backfill along Haslams Creek. Current land uses: • Commercial and industrial properties either side of Hill Road • Material stockpiling at properties along Hill Road • Vehicle repair and maintenance facilities along Hill Road • Operational licenced waste and recycling facilities to the north of the proposed

	modification footprint.

Water quality

The nearest watercourse to the proposed modification footprint is Haslams Creek (and its supporting tributary) and its estuarine and manmade wetlands to the north, and the Parramatta River. Haslams Creek tributary is located about 140 metres west at its closest point to the proposed modification footprint (ie near the offramp loop at the current industrial estate on Parramatta Road) as shown on Figure 4-2 (refer Section 4.6).

Within the context of the Parramatta River estuary, its water quality has been compromised through the area's current and historic industrial development. This has affected recreational use of the estuary's waters for activities such as swimming and fishing. Also, the concentrations of dioxins in the estuary has led to advisory restrictions on the consumption of fish and shellfish.

Chemical analysis of the water quality in the estuary undertaken to support the approved project confirmed exceedances of aquatic ecosystem health guideline limits. It is expected that the same poor water quality is present within Haslams Creek.

Groundwater

In 2014, groundwater was recorded at depths of between 0.1 metre and 14 metres below Australian height datum (AHD) across the local area. The groundwater chemistry was assessed as being broadly consistent across the local area, characterised as:

- Fresh to brackish, due to the shales in the area
- Having an oxidation-reduction potential.

There is also a recorded interaction between the groundwater and Haslams Creek, which is unlined in its reach adjacent to and north of Hill Road (Atlas of Groundwater Dependent Ecosystems, 2016). Non-potable groundwater was recorded as being present in the local area.

Wetlands

The nearest wetland to the proposed modification is located about 1.1 kilometres to the north of the M4 Motorway, associated with Sydney Olympic Park. This area contains groundwater dependent ecosystems and supports various threatened flora and fauna (refer to section 4.7). This wetland is supported and supplied by Haslams Creek.

Waste

The NSW *Protection of the Environment Operations Act 1997* legislates for the correct management, storage and disposal of waste. The Act and its supporting regulation are supplemented by the Waste Classification Guidelines (NSW EPA, 2014). Under the proposed modification, there is not expected to be any atypical volumes or types of waste generated during construction. However, there is the potential to expose and excavate soils that contain contaminants of concern and/or asbestos containing materials (refer to Table 4-6).

4.5.2 Summary of issues

Construction

The following potential soil, water quality, and waste impacts are likely to occur from building the proposed modification.

Soil and water quality

- Impacts on surface and groundwater quality (via stormwater drain, mobilisation and open excavation discharges) due to:
  - Fuel, oil or chemical spills/leaks as well as the discharge of other hazardous substances and dangerous goods from construction plant, equipment, and/or vehicle truck incidents
  - Dirty water runoff and sedimentation (via stormwater drain discharge)
- Generation and release of sulphuric acid from the exposure of potential acid sulphate soils, which could become bioavailable in the environment and affect local water quality
- Disturbance, mobilisation and release of heavy metals, PAHs and other contaminants of concern associated with current and legacy land uses in the area
- Encountering and mobilising additional asbestos containing materials that are present elsewhere along the M4 Motorway corridor
- Mobilisation and migration effects impacting the wetlands and their associated ecological dependencies in the Sydney Olympic Park.

Waste

- Potential for environmental impacts from poor waste handling, storage, stockpiling, transport, and disposal practices
- Mass (spoil) balance issues where there would be little opportunity to reuse excess spoil due to chemical or structural limitations leading to additional waste management issues, and the need to import extra fill material
- Soil contamination or water pollution from material disposal
- Social impacts such as amenity impacts and odour discharges associated with waste storage, transport, and disposal
- Traffic, air quality, noise, and greenhouse gas impacts associated with the transport of waste.

Operation

The following potential soil, water quality, and waste impacts are likely to occur once the proposed modification is operational.

Soil and water quality

Impacts to surface and groundwater quality (via stormwater drain discharges) due to:

- Increased road runoff from the new westbound ramp and the widened Hill Road and eastbound ramp. While the increase would be small, it would typically contain oils, greases, petrochemicals and heavy metals as a result of vehicle leaks, road wear, and atmospheric deposition
- Spills or leaks of fuels and/or oils from vehicle accidents, or from operational plant and equipment.

Waste

There are not expected to be any notable types or volumes of waste generated once the proposed modification is operational other than as a result of the small amounts of waste generated during maintenance and repair work.

4.5.3 Proposed further assessments

Soil and water

A desk-based assessment would be undertaken for the proposed modification to determine the potential impact associated with encountering, mobilising and managing contaminants. This would be used to develop appropriate mitigation and management measures. Field investigations would be required to determine the presence of asbestos contaminating materials and the level of potential impact. The assessment of potential soil and water quality impacts would:

- Identify soil, water and groundwater systems that may be impacted during construction
- Assess the risk of erosion and sedimentation in accordance with the Erosion and Sedimentation Management Procedure (Roads and Maritime, 2008)
- Assess the risk of accidental spills, encountering and/or remobilising contaminants and asbestos containing materials, and associated exceedances of public health and environmental water quality criteria, including those specified in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (the 'ANZECC guidelines', ANZECC/ARMCANZ, 2018)
- Identify feasible and reasonable mitigation and management measures.

Waste

A waste assessment would be prepared to consider:

- Opportunities for waste minimisation and reuse through design or construction planning
- A review of the likely waste streams and volumes generated from building the proposed modification
- A waste mitigation and management strategy for dealing with, sampling and classifying spoil and other materials excavated/generated during construction
- Feasible and reasonable mitigation and management measures.

4.5.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise soil, water quality and waste impacts as far as is feasible and reasonable. This would be supplemented by the use of standard mitigation controls and management measures that are introduced and common place on construction sites. They are proven to be effective in managing spills, erosion, sedimentation, and discharge risks. This would be supplemented by standard health and safety controls to protect workers and the public. The key mitigation provisions would include:

- Development and implementation of a construction soil and water management plan that includes an asbestos management plan
- Adoption of the principles of the waste hierarchy set out under the NSW *Waste Avoidance and Recovery Act 2001* during construction
- Development and implementation of a construction waste management plan.

4.6 Hydrology and flooding

This section considers the hydrology and flooding impacts associated with building and operating the proposed modification in the context of Haslams Creek and its associated floodplain.

4.6.1 Overview

Catchments and waterways

Haslams Creek is the main catchment in the area, with the main creek channel about 150 metres to the west of the proposed modification footprint. The catchment drains an area of about 17 square kilometres and is heavily urbanised with its reach upstream of Parramatta Road (i.e. south and south west of the proposed modification footprint) comprising a lined concrete channel. The creek is unlined to the north of Parramatta Road adjacent to Hill Road, while channel restoration work was undertaken around Homebush Bay to restore the natural environment.

A tributary of Haslams Creek extends through the proposed modification footprint, extending in a northern direction through the industrial estate, crossing Parramatta Road near Frances Street. The tributary is lined and extends through both commercial and residential land uses in Lidcombe.

Reach C is a secondary catchment to the east of Hill Road (refer to Figure 4-2).

Flooding

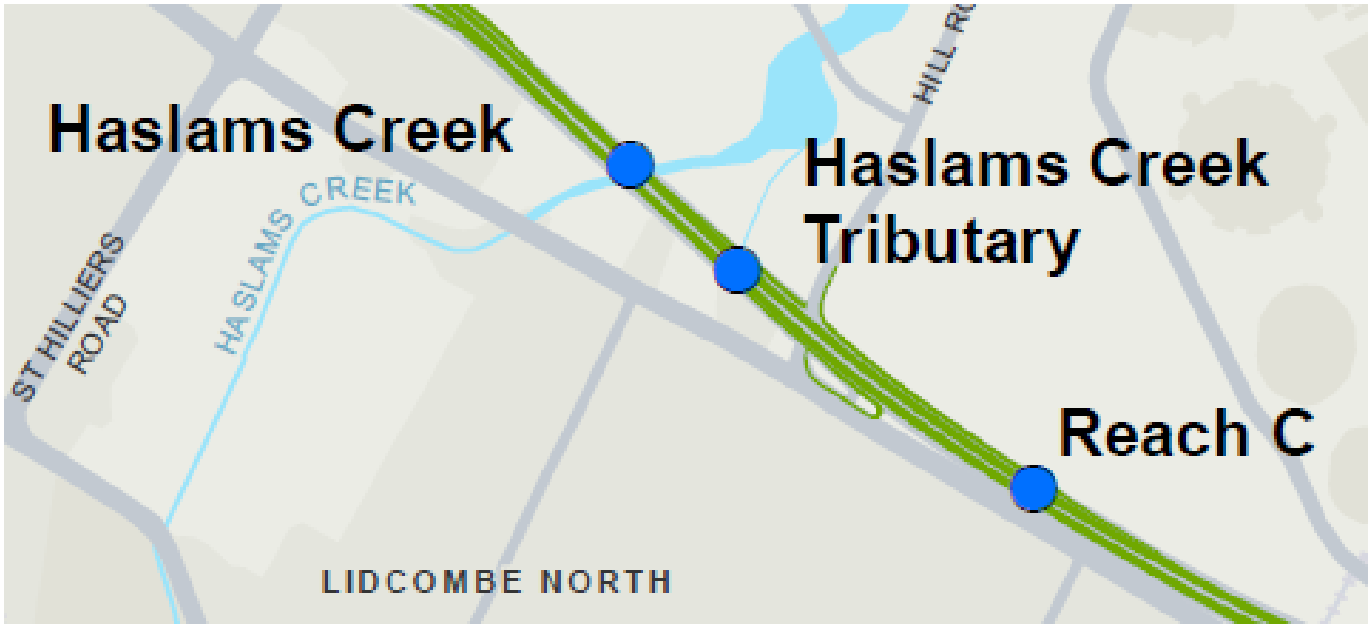
Table 4-6 shows the model-predicted flood risk in the area (WestConnex Delivery Authority, 2014). It refers to the annual exceedance probability (AEP) and the probable maximum flood (PMF) level. A five per cent and one per cent probability are associated with the AEP. This means that every year there is either a five or one per cent chance of the stated flood level being exceeded. As such, there is a five per cent chance that Haslams Creek would flood by more than 3.79 metres every year, while it predicted that the flood level would never exceed 7.15 metres.

In the approved project EIS it is predicted that the flood risk would be negligibly impacted from upgrading the M4 Motorway (i.e. the increase in the AEP/PMF was predicted to be between zero and 0.02 metres).

Table 4-6 Existing model-predicted flood levels in the area

Watercourse	5% AEP	1% AEP	PMF
Haslams Creek	3.79	3.97	7.15
Haslams Tributary	4.73	5.39	9.31
Reach C	10.51	10.87	12.11

Figure 4-2 shows the location of the above watercourses relative to Parramatta Road and Hill Road.



Source: WestConnex Delivery Authority, 2014

Figure 4-2 Watercourse locations

4.6.2 Summary of issues

Construction

Hydrology

The proposed modification would be built within the catchment of Haslams Creek, where there is an interaction between surface and the shallow groundwaters in the area (refer to section 4.5.1).

While groundwater would be likely encountered during the required excavation work, its scale and depth is unlikely to impede flows, affect characteristics or cause drawdown. As such, it is unlikely to impact the groundwater dependency of the wetlands in the Sydney Olympic Park or the physical characteristics (hydrology) of Haslams Creek or Reach C. However, any encountered groundwater would need managing, removing (dewatering), and disposing of/using for activities such as dust suppression and/or vegetation management.

Flooding

As the proposed modification is within the flood catchment of Haslams Creek, there is a slight risk for overland flooding due to stormwater drains backing up during heavy rainfall causing localised flooding. However, any flooding would be short-term only lasting for the time it would take for the drains to clear.

Operation

Hydrology

Under the proposed modification, there would be a small increased loss of vegetation in the area and a negligible increase in surface runoff. This is unlikely to notably affect stormwater runoff rates or discharge volumes.

The only notable in-ground structures would be the piled foundations supporting the piers for the off-ramp. These are unlikely to affect regional groundwater characteristics, flows, associated ecological dependencies, supplies or interactions with Haslams Creek.

Flooding

As confirmed under the approved project EIS, the upgrade of the M4 Motorway is predicted to have a negligible effect on flood risk in the area (refer to section 4.6.1). This is also expected to be true of the proposed modification as the increased runoff and stormwater loading and discharge would be marginal as the area is largely urbanised. Any increase could also be accommodated in the stormwater drainage design. As such, there is not expected to be any change to affluxes, flood volumes, or rates in the area.

4.6.3 Proposed further assessments

Geotechnical and groundwater investigations would be undertaken to inform design development. These investigations would identify the ground and groundwater conditions locally. This information would support the environmental assessment to confirm:

- Surface and groundwater hydrological characteristics in the area
- The interaction between the groundwater and Haslams Creek
- Current stormwater drainage and discharge arrangements along the upgraded M4 Motorway, Parramatta Road and Hill Road
- How construction activities would be managed and controlled using standard practice to prevent any dewatering impacts, or influence local supplies and characteristics
- The management processes to deal with heavy rainfall events and flood risks during construction
- That the flood risk potential in the area would be negligibly affected once the proposed modification was operational
- Feasible and reasonable mitigation and management measures.

4.6.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise hydrology and flood risk impacts. This would be supplemented by the implementation of standard mitigation controls and management measures that are introduced and common place on construction sites. They are proven to be effective in managing dewatering, flooding and stormwater discharge risks. The key mitigation provisions would include:

- Development and implementation of a soil and water management plan which would include procedures for dewatering
- Implementation of stormwater runoff management controls during construction.

4.7 Biodiversity

This section considers the potential impacts on the terrestrial biodiversity of the local area from building and operating the proposed modification.

4.7.1 Overview

Vegetation communities, key habitat and groundwater dependent ecosystems

Planted (amenity) vegetation dominates the local area comprising a wide range of exotic and native species. There are small remnant areas of vegetation, however urban development has altered their community and species composition and condition. Table 4-7 summarises the key communities, habitat and groundwater dependent ecosystems in the area.

Table 4-7 Key communities, habitat and groundwater dependent ecosystems

Community, habitat, and/or ecosystem (location)	Character
Shale gravel transition forest Endangered ecological community under TSC Act Moderate condition	The main remnant ecological feature in the area is a stand of shale gravel transition forest located to the south of the M4 Motorway, adjacent to the west and east of the Parramatta Road and Hill Road intersection (refer to the 'biodiversity item' on Figure 4-1). This community is dominated by an open canopy of wollybutt, white feather honeymyrtle and prickly-leaved pear. The community provides "moderate habitat value based on the site values present". The community is also likely to have a high level of groundwater dependency (WestConnex Delivery Authority, 2014).
Sydney Olympic Park wetlands Good condition	These wetlands were created as part of the area's redevelopment in the 1990s. They are groundwater and surface water dependent and contain a diversity of native terrestrial and aquatic species, including green and golden bell frog and golden orb spider.
Haslams Creek Moderate/poor condition	This comprises a Class 1 major key fish habitat in accordance with the Fisheries NSW Policy and the Guidelines for Fish Habitat Conservation and Management (NSW DPI, 2013). The habitat assessment and water quality measurements in the creek (refer to section 4.5.1) confirm the poor health of the ecosystem (WestConnex Delivery Authority, 2014). The riparian zones are fragmented, and there is little in-stream habitat, and high levels of siltation.

Threatened species

Within 10 kilometres of the proposed modification footprint there are:

- 13,375 records including 30 threatened fauna species protected under State and/or Commonwealth legislation
- 269 records of 17 threatened flora species protected under State and/or Commonwealth legislation
- The key threatened species in the local area are:
  - Grey headed flying fox flying, foraging over the area (WestConnex Delivery Authority, 2014)
  - Green and golden bell frog, located in the wetlands
  - Golden orb spider, located in the wetlands.

4.7.2 Summary of issues

Construction

The proposed modification footprint would result in the partial loss of an area of shale gravel transition forest located between the M4 Motorway and Parramatta Road and either side of Hill Road to support the off-ramp. The extent of loss would depend on the final design of the proposed modification. As shale gravel transition forest forms an endangered ecological community (EEC) listed under the NSW *Biodiversity Conservation Act 2016,* the significance of any impact would need assessing under the provisions of this legislation. None of the affected community meets the criteria for protection under the EPBC Act (WestConnex Delivery Authority, 2014). Other potential impacts include:

- Associated community and habitat loss from the removal of the amenity vegetation planting and shale gravel transition forest along the margins of the M4 Motorway, Parramatta Road and Hill Road
- Loss of urban street trees along the M4 Motorway, Parramatta Road and Hill Road
- Further reduction in connectivity between areas (wildlife corridors), resulting in increased habitat fragmentation
- Mortality and injury impacts
- Spread and import of noxious weeds and other invasive species
- Surface and groundwater quality impacts from spills, leaks, erosion and sedimentation, indirectly and remotely affecting Haslams Creek and the wetlands.

Operation

Once operational, it is not expected that the proposed modification would have any additional impact on the ecological values of the area. This is due to the high level of urban activity and disturbance (refer to section 4.5.1). While there are operational risks associated with stormwater runoff and accidental spills, these would be managed as part of the approved project and proposed modification's stormwater and water quality systems, except along Hill Road where new infrastructure would be built to ensure stormwater runoff is managed to prevent any operational impact on Haslams Creek or the associated wetlands in the Sydney Olympic Park.

4.7.3 Proposed further assessments

A detailed biodiversity assessment would be prepared following the Framework for Biodiversity Assessment (NSW OEH, 2014), the Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI, 2013), and if required, the NSW Biodiversity Offsets Policy for Major Projects (NSW OEH, 2014). Specifically, the assessment would:

- Identify and describe the flora and fauna species, habitat, populations and ecological communities (including groundwater dependent ecosystems) that occur or are considered likely to occur locally
- Assess the direct and indirect impacts on flora and fauna species, populations, ecological communities and their habitats, and groundwater dependent ecosystems
- Assess the significance of the impacts on species, ecological communities and populations listed and protected under State and Commonwealth legislation and groundwater dependent ecosystems that occur, or are considered likely to occur, locally
- Identify whether the proposed modification on its own or in combination with the approved project would be classified as a key threatening process in accordance with the listings under State and Commonwealth legalisation
- Identify feasible and reasonable mitigation and management measures.

4.7.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise biodiversity impacts as far as is feasible and reasonable. This would be supplemented using a mix of specific and standard mitigation controls and management measures. The key mitigation provisions would include:

- Controls to protect surface and groundwater quality as described in section 4.5.4
- Strategies to minimise the loss of the area of shale gravel transition forest
- Controls to minimise impacts to sensitive areas of shale gravel transition forest and the Sydney Olympic Park wetlands including clearance limits, exclusion zones, fencing, preclearance inspections and environmental work method statements
- Strategies to improve ecological diversity through landscape planting as part of the urban design strategy (refer to section 4.4.4).

4.8 Historic (non-Aboriginal) heritage

This section considers the impacts on the historic (non-Aboriginal) heritage values from building and operating the proposed modification.

4.8.1 Overview

History

The first access track between Sydney and Parramatta was built in the 1790s. This was quickly followed by the Parramatta Road that was built in 1792. By 1810 the road officially opened to traffic, becoming one of the colony's most important roadways. Over time, the road was extended west from Parramatta across the Blue Mountains to Bathurst, which led to its renaming as the Great Western Highway. While the Highway serviced development and access to areas adjacent to its corridor, by the 1960s it was clear that a new road was needed to provide a quick link west from Sydney. This led to the development of the F4 Western Freeway, which over the next two decades was built in stages to form its current 40 kilometre length. In 2013, the freeway was renamed as the M4 Motorway, and as of 2015, the section between Parramatta and Homebush has been upgraded and widened as part of the WestConnex scheme.

The historic (non-Aboriginal) development history of the local area south of the current-day M4 Motorway dates back to 1804 when Samuel Haslam owned grants around the creek (now Haslams Creek). Over the next 100 years, people settled in the area. Originally known for its necropolis (later known as Rockwood Cemetery), the adjacent suburb was eventually renamed Lidcombe in 1913 (in honour of the local major).

The area north of the current-day M4 Motorway was initially called the Flats and renamed the Newington Estate in 1807. Overtime, the waterlogged land was drained and reclaimed for industrial development including military activities. By the early-1990s, the land had become an effective wasteland at which point the Government identified its future use as the site of the 2000 Olympics leading to its remediation, clean-up and development.

Heritage and archaeology

There are two heritage items in the area (refer to Figure 4-1) both of which are of local value and protected under the Auburn Council local environmental plan 2010:

- A stand of shale gravel transition forest to the north the Parramatta Road between it and the M4 Motorway and west and east of the Hill Road intersection
- A milestone located on Parramatta Road.

The wider area is both heavily developed and there are good heritage records, which confirm that the only archaeological finds are associated with the immediate Haslams Creek river corridor. As such, there is not expected to be any potential archaeological remains within the proposed modification footprint.

4.8.2 Summary of issues

As noted in section 4.7.2, the proposed modification would result in the partial loss of an area of the shale gravel transition forest. As such, there would be a direct impact on a locally listed heritage item.

As for the milestone, its context on Parramatta Road and its setting within the environment of the M4 Motorway would be unaffected by the proposed modification. The level of disturbance across the area and its urban development history therefore limits the potential for discovering and/or impacting on undiscovered archaeology.

4.8.3 Proposed further assessments

A detailed historic (non-Aboriginal) heritage assessment would be undertaken to:

- Confirm the local and State heritage values in the area, including recorded items, potential archaeology and any conservation areas
- Describe the historic (non-Aboriginal) and archaeological heritage values relevant to the proposed modification
- Identify items that would be materially affected by the proposed modification
- Prepare a statement of heritage impact (SOHI) on the shale gravel transition forest, and any other discovered items that would be potentially impacted by the proposed modification
- Identify feasible and reasonable mitigation and management measures.

4.8.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise impacts on historic (non-Aboriginal) heritage values and archaeology as far as is feasible and reasonable. This would be supplemented by the use of a mix of specific and standard mitigation controls and management measures. The key mitigation provisions would include:

- Design measures to minimise impacts on the shale gravel transition forest
- Developing and implementing a construction heritage management plan to protect the values of the remnant shale gravel transition forest, milestone and any other values identified in the area
- Applying the Standard Management Procedure: Unexpected Heritage Items (Roads and Maritime, 2015e).

4.9 Socioeconomic, land use and property

This section considers the impact of how the proposed modification would impact and benefit the local community's amenity, landscape, land use, property, and environment. It also considers the social and economic impacts and benefits at the regional and State level from improving access into the Sydney Olympic Park Peninsula.

4.9.1 Overview

Socioeconomics

The proposed modification footprint is located in a commercial area that is dominated by warehousing and logistics businesses. This is supplemented by the retail and commercial land uses along Parramatta Road. The nearest residential communities are Lidcombe to the south of Parramatta Road, Newington to the west of Hill Road, and Wentworth Point at the end of Hill Road on the Sydney Olympic Park Peninsula.

While each community has its own profile and characteristics, the overall demographic, as described in the approved project EIS, comprise:

- A young transient population responding to the area's urban redevelopment and regeneration
- A high level of cultural diversity, with a high proportion of people being born overseas
- High levels of people with a need for assistance with self-help, mobility or communication
- Socioeconomically disadvantaged neighbourhoods, with low incomes, educational attainment, employment, and vehicle ownership
- Low levels of workforce participation and high unemployment relative to the State average.

These groups and characteristics make the community more vulnerable to change, including the effects of the proposed modification.

The area also holds the following socioeconomic characteristics:

- The attraction of people and business from across the region, State, nation and internationally for events that are held at Sydney Olympic Park
- Community services and infrastructure including educational, sports, recreational and leisure facilities associated with the Sydney Olympic Park including the wetlands adjacent to the proposed modification footprint
- Provision and distribution of goods and services associated with the businesses adjacent to Hill Road and Carter Street, and wider regional offices on the Sydney Olympic Park Peninsula
- Good transport access due to the proximity of the M4 Motorway.

Land use

The area's land use can be broadly categorised as:

- Transport infrastructure including Parramatta Road, the M4 Motorway and Hill Road
- Commercial land uses associated with Hill Road, Carter Street and Parramatta Road
- Residential land uses associated with Lidcombe south of Parramatta Road
- Recreational land uses associated with the Sydney Olympic Park and its wetlands to the north of the proposed modification footprint.

There is currently an expansion of transport infrastructure land uses in the area through the upgrade of the M4 Motorway. There is also a commitment to redevelop Carter Street as a mixed-use priority precinct that will include residential and commercial development and the provision of other social infrastructure such as open spaces and a new school (refer to Table 4-8).

4.9.2 Summary of issues

The proposed modification would likely result in both negative and beneficial socioeconomic, land use and property impacts.

Construction

The following potential temporary socioeconomic impacts are likely to occur from building the proposed modification:

- Traffic delays and increased journey times on Parramatta Road, Hill Road and the M4 Motorway as described in section 4.2.2
- Inconvenience for pedestrians and cyclists through diversions, detours and changed access arrangements, as described in section 4.2.2
- Inconvenience for the commercial businesses along Hill Road through delays entering and leaving their premises, as described in section 4.2.2, however economic impacts are not anticipated as the businesses would still be able to operate and function while the proposed modification is being built
- Road safety issues for motorists, cyclists, and pedestrians near construction work sites and reduced driver certainty due to changed road conditions, detours and diversions
- Amenity and health impacts affecting workers from businesses on Hill Road and Parramatta Road and potentially residents in the area from the proposed modification's visual, noise, vibration and air quality impacts during construction and operation; potentially extending to affect recreational users of the Sydney Olympic Park wetlands
- Effects on reliability and access to and from the facilities in the Sydney Olympic Park, particularly during peak periods (e.g. sporting events, concerts).

As well as these socioeconomic, land use and property impacts, the proposed modification also has potential to deliver socioeconomic benefits through additional construction jobs creation, and increased turnover for some businesses in the local area, particularly food and beverage outlets.

Operation

During operation, the proposed modification would deliver a number of benefits either directly or in combination with the approved project, which include:

- Improved direct access into the Sydney Olympic Park when travelling westbound from Sydney
- Improved network capacity to support up to 8,000 additional trips on Hill Road associated with expected growth in the area over the next 15 years
- Supporting the area's urban renewal through the development of the strategic growth areas
- Providing additional access points into and out of the Carter Street priority precinct
- Improved travel options for people to access and leave the Sydney Olympic Park Peninsula
- Reduced costs for vehicle owners as a result of shortening the journey into the Sydney Olympic Park when travelling westbound from Sydney
- Improved overall connectivity into and out of the west and northern parts of the Sydney Olympic Park by providing a four-way interchange at Hill Road.

Conversely, the proposed modification would result in the following long-term socioeconomic impacts:

- Loss of one commercial premises to allow for the connection of the off-ramp with Parramatta Road to the west of Hill Road
- Loss of open land/vegetation on the corner of Hill Road to allow for two left turn lanes from Parramatta Road to Hill Road
- Loss of partial acquisition of commercial properties on the eastern side of Hill Road between the M4 and John Ian Wing Parade

- Change to the visual amenity and urban setting of Hill Road through its widening and introduction of an off-ramp and removal of trees lining the motorway where the off-ramp will be required
- Changes to the area's wider amenity by widening the M4 Motorway as discussed in section 4.4.2.

4.9.3 Proposed further assessments

A detailed assessment would be undertaken to determine the socioeconomic, land use and property impacts resulting from the proposed modification. The assessment would be prepared in accordance with Environmental Planning and Impact Assessment Practice Note: Socio-Economic Assessment (Roads and Maritime, 2013a) to:

- Describe the social and economic profile of the communities and businesses in the local area
- Assess potential positive and negative impacts resulting from building and operating the proposed modification, which would include the cumulative impacts and benefits of the proposed modification forming part of the wider approved project
- Describe existing property and land use ownership within the local area and how this is expected to change as the Carter Street priority precinct is developed
- Assess direct and indirect property and land use impacts, again accounting for the committed future land use changes introduced under the Carter Street priority precinct
- Identify how the local community would be affected by the proposed modification, in addition to the wider effects on people's access into the Sydney Olympic Park during construction compared to the long-term improved access once the proposed modification is operational
- Identify feasible and reasonable mitigation and management measures.

4.9.4 Mitigation and management strategy

Development of the concept design and construction staging would seek to avoid or minimise negative socioeconomic, land use and property impacts and maximise positive impacts. The key mitigation provisions would include:

- Developing a robust engagement and consultation strategy building on work undertaken to date
- Ensuring work is timed to avoid and minimise impact on access to the Sydney Olympic Park when events are being held
- Ensuring property acquisition is in accordance with the Land Acquisition Information Guide (Roads and Maritime, 2014b) as provisioned under the NSW *Land Acquisition (Just Terms Compensation) Act 1991.*

Specific strategies and mitigation measures identified for noise and vibration, air quality, visual amenity, built form and urban design, and traffic and transport impacts would assist in managing socioeconomic related impacts.

4.10 Cumulative impacts

This section considers the combined impact of building the proposed modification at the same time in the same area as other committed and approved development. It also considers the cumulative effects of the operation of the approved project and proposed modification in combination with other committed and approved development in the area.

4.10.1 Overview

The proposed modification is in an area where there is a future development commitment in the form of the strategic growth areas. The supporting precinct and master plans allow for the following development commitments.

Table 4-8 Committed development in the area

Development	Committed provisions
Carter Street Precinct Planning Report 2018	• 52 hectare site • 5,500 new residential properties (mainly units and apartments) • 42,000 square metres of commercial and retail employment space • New primary school for up to 1,000 students • Proposed light rail stop and terminus.
Wentworth Point priority precinct Finalisation report 2014	• Four hectare site • Mixed use development • 2,300 new residential properties (mainly units and apartments) • New school • Amenity areas • Additional maritime facilities.
Sydney Olympic Park Peninsula Master plan 2018	• Development of a world-class sporting and event precinct, surrounded by more than 430 hectares of parklands • Provision of 34,000 jobs • New streets to improve access, provision for future light rail corridor and encouraging the use of public transport and other modes • A new high school is being investigated and new local parks • New buildings around the major venues • Haslams Precinct is part of the master plan. It is located next to the proposed modification footprint to the east of Hill Road. It is proposed to be developed primarily as a residential neighbourhood featuring apartment buildings up to seven storeys.
Parramatta Light Rail Stages 1 and 2	• Stage 1 is proposed between Westmead and Carlingford via Parramatta CBD and Camellia • Stage 2 is proposed to connect Parramatta CBD to Ermington, Melrose Park, Wentworth Point and Sydney Olympic Park • Noted to support development of the Sydney Olympic Park Peninsula • Preferred route for Stage 2 is to the north of the proposed modification footprint along Dawn Fraser Avenue, Australia Avenue and Hill Road.
M4 East Approved project	• About 6.5 km long, including a 5.5 km tunnelled section • Connects into the M4 Widening • Constructed started in March 2016

	• Mainline tunnelling work started in November 2016.

The precinct plans and master plan make reference to Hill Road as being a major access into and out of the area noting the reliance upon its use to help deliver the above development, which is expected to support up to an extra 8,000 vehicle trips every day as discussed in section 2.2.

Proposed modifications residual impact

Cumulative effects occur where values, receivers, and receptors are affected by the residual impacts of more than one project combining in each area over a given time period. They also include the concept of impact fatigue, where people are affected for a prolonged period from multiple overlapping projects.

4.10.2 Summary of issues

Potential cumulative impacts may occur at the local scale due to elements of committed projects being built or operating in the same location at the same time. Alternatively, the effects may occur over a regional scale where the changes deliver an indirect cumulative impact or benefit such as wider traffic and transport demand and distribution outcomes on the regional network. The projects in Table 4-8 may occur within the same area at the same time as the proposed modification. The cumulative impacts associated with the Carter Street priority precinct would be local (and potentially regional), while the cumulative impacts associated with Wentworth Point and the Sydney Olympic Park would be regional.

Construction

Potential cumulative impacts that may occur from the proposed modification being built at the same time as the above developments are as follows:

- Increased travel time delays and disruption on Hill Road through traffic controls implemented to build the proposed modification and Carter Street priority precinct
- Traffic disruption over a wider area through the increased extent of traffic management controls across the Olympic Park Peninsula
- Increased noise exposure due to the combined effects of construction equipment and machinery used to build the proposed modification and develop areas of the Carter Street priority precinct
- Impact fatigue from the extended amount of time the local community and receivers would be affected by construction work along Hill Road and in the wider area including the loss of amenity and prolonged noise, visual and air quality impacts
- Cumulative loss of remnant ecological values at the regional scale.

Operation

Potential cumulative impacts that may occur from the proposed modification operating at the same time as the above developments are as follows:

- Improved travel choice, travel times and access through the introduction of the proposed modification in combination with Parramatta Light Rail, and the other transport improvement proposed under the precinct and master plans
- Potential cumulative noise impacts from widespread network changes resulting from the above traffic improvements introduced by the proposed modification in combination with the precinct plans and master plans
- Wider amenity, urban setting, land use and visual changes across the area.

4.10.3 Proposed further assessments

A cumulative impact assessment would be undertaken to:

- Further review the range of committed and approved development that may occur in the same area at the same time as the proposed modification
- Identify the residual effects of building and operating the proposed modification and the residual effects of building and operating the other identified committed and approved development
- Consider where the residual effects overlap spatially (i.e. affect the same resources, receivers and values) or temporally (i.e. occur at the same time as the proposed modification is being built or becomes operational)
- Identify where there are potential combined cumulative impacts and assess how they will affect the assessed impacts of the proposed modification (i.e. either increase or decrease the likelihood and/or magnitude of impacts)
- Identify feasible and reasonable mitigation and management measures.

4.10.4 Mitigation and management strategy

Where relevant, coordination and consultation would be undertaken with proponents of other nearby developments to increase the overall awareness of project timeframes and impacts. This would include:

- Provision of regular updates on the detail of the construction programs, worksites and haul routes
- Identification of key potential conflict points with other construction projects
- Develop mitigation strategies in order to manage conflicts.

4.11 Other environmental issues

The 'other' environmental issues listed below are considered to be of lesser consequence taking into account the:

- Scope of the proposed modification
- Existing environment
- Implementation of standard and best practice management and mitigation measures.

It is considered unlikely that these would be key issues for the proposed modification. However, further assessment would be undertaken as part the environmental assessment to confirm this. Any environmental management and safeguard measures required to minimise and mitigate impacts would also be documented.

The non-key issues are:

- Aboriginal heritage
- Air quality
- Greenhouse gas and climate change.

4.11.1 Aboriginal heritage

Existing environment

The presence of Haslams Creek and Parramatta River suggests the local area would have once been suitable for Aboriginal occupation. However, a search of the Aboriginal heritage management database (AHIMS) in July 2016 confirmed the absence of any recorded items or objects locally. This is due to the area's urban development and expansion. Any areas are likely to have been covered by fill, damaged or destroyed. The same is true of the wider area, as evidenced through the assessment prepared to support the approved project EIS.

Potential impacts

With reference to the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (NSW DECCW, 2010) the proposed modification would:

- Be built within 200 metres of waters but within the confines of a previously disturbed area
- Not be located:
  - Within a sand dune system
  - On a ridge top, ridge line or headland
  - Within 200 metres below or above a cliff face
  - Within 20 metres of or in a cave, rock shelter, or a cave mouth.

Given the absence of any recorded Aboriginal heritage in the local area, supported by the fact that none of the above criteria are triggered, there is expected to be no Aboriginal heritage impact or potential for discovering subsurface archaeology.

Proposed further assessment

The absence of recorded Aboriginal heritage in the area in combination with the nature and location of proposed work removes the need to undertake any corresponding assessment to support the modification application.

Mitigation and management strategy

A precautionary approach would be applied during construction with the work managed under the Standard Management Procedure: Unexpected Heritage Items (Roads and Maritime, 2015e).

4.11.2 Air quality

Existing environment

The local air quality (air shed) is mainly affected by commercial, industrial and road traffic pollutants. NSW EPA monitors ambient air quality at Rozelle and Chullora, where data on representative traffic pollutants are collected; namely nitrogen dioxide (NO2), carbon monoxide (CO), and particulate matter (PM10). The monitored data confirm that the above pollutants are below the health and amenity guidelines set by the NSW EPA air quality assessment criteria and the National Environmental Protection (Ambient Air Quality) Measure (Commonwealth Government, 2003). The only recorded exceedances over the past few years relate to PM10 in the summer months which is attributed to bush fires in the Sydney air shed.

Potential impacts

Construction

While the work needed to build the proposed modification is expected to generate dust, and the use of equipment and construction vehicles is expected to result in air quality emissions, the impacts on the local community are expected to be minimal. This is due to the scale and duration of the work and the fact that the nearest residents are located away from the proposed modification footprint.

Operation

The proposed modification has the potential to result in traffic impacts on Hill Road due to changes in alignment, traffic volumes, speeds and the percentage of heavy vehicle traffic. Less likely, but still possible, is the proposed modification causing a change in traffic characteristics on other roads in the area. However, until further traffic assessment is undertaken, it is not possible to determine if the changes under the proposed modification would be sufficient to cause an appreciable change in local air quality.

Proposed further assessment

No construction assessment is proposed as the corresponding impacts are small scale, short term, common to all construction work, and they would be managed using standard mitigation measures that are proven to be effective.

Roads and Maritime's tool for roadside air quality (TRAQ) would be used to confirm if the traffic and road condition changes are notable and sufficient to result in an associated exceedance of health guidelines at the nearest receivers, accounting for the future land use changes on the Carter Street priority precinct. In the unlikely event that this confirms the risk for potential impacts, then more detailed modelling and assessment would be undertaken in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005).

Mitigation and management strategy

Standard measures would be used to manage dust dispersion and equipment emission during construction including:

- Maintaining equipment and vehicles to manufacturer's specifications
- Assessing activities during adverse weather conditions and modifying as required
- Minimising the area of exposed surfaces

- Implementing controls for dust suppression.

4.11.3 Greenhouse gas and climate change

Existing environment

Greenhouse gas emissions

While there are no local data on greenhouse gas emissions, national data confirm that in 2012 NSW produced 157 million tonnes of carbon dioxide equivalent (tCO_2^{-e}), about 14 per cent of which (22 million tCO_2^{-e}) was from the transport sector.

Climate change

Global climate change predictions vary across the scientific community. There is however broad consensus that 'extreme events' will become more frequent over time, leading to more prolonged dry periods, heavier and more-intense rainfall, higher winds and more extreme (hot and cold) temperatures, which need both mitigating and accommodating through built-in design resilience such as additional flood protection or pedestrian shading.

Potential impacts

Construction

Although building the proposed modification would temporarily generate an increase in greenhouse gas emissions, there is expected to be no long-term or residual effect.

Operation

Given the location of the proposed modification it lacks sensitivity to climate change other than in terms of potential flood impact considerations as described in section 4.6.2.

Proposed further assessment

The proposed modification's contribution to greenhouse gas emissions during construction and operation, both on its own and in combination with the M4 Motorway, would be quantified in the environmental assessment using Roads and Maritime's TRAQ. Discussions on the need to build climate change resilience into the design will form part of the mitigation and management strategy.

Mitigation and management strategy

Development of the concept design and construction staging would seek to minimise greenhouse gas emissions while accommodating climate change adaptation measures. The key mitigation provisions would include:

- Limits on energy consumption and use of renewable alternatives where feasible and reasonable
- Using reused and recycled materials where feasible and reasonable
- Using low embodied materials where feasible and reasonable
- Consideration of climate change resilience in the stormwater drainage design, pavement specifications, final planting specifications (focussing on drought tolerant species), and the urban design (to offer pedestrian and cyclist amenity).

5 Conclusion

Roads and Maritime is seeking approval to build a westbound off-ramp from the M4 Motorway to Parramatta Road. The proposed modification would include:

- Building an off ramp on the southern side of the M4 Motorway to allow traffic to exit the motorway onto Parramatta Road
- Modifying Parramatta Road and Hill Road intersection to provide a new signalised left turn slip lane onto Hill Road
- Improving the footpaths along Parramatta Road and Hill Road within the area of the proposed modification
- Widening the M4 Motorway eastbound off ramp to two lanes and providing traffic signals at the off ramp intersection with Hill Road
- Widening of Hill Road to include 2 northbound right turning lanes and upgrading the intersection at John Ian Wing Parade to provide a new approach
- Changes to parking on Bombay Street on the southern approach to Parramatta Road.

Roads and Maritime has formed the opinion that the work would form a modification to the approved WestConnex M4 Widening project (SSI-6148). Roads and Maritime is therefore planning to seek approval form the Minister for Planning to modify the terms and conditions of the approved project under section 115ZI (2) of the EP&A Act.

Key environmental issues identified for the proposed modification are:

- Traffic and transport
- Noise and vibration
- Visual amenity, built form and urban design
- Soils, water and waste
- Hydrology and flooding
- Biodiversity
- Historic (non-Aboriginal) heritage
- Air quality
- Socioeconomic, land use and property
- Cumulative impacts.

The modification report will include the following information to address the above key issues:

- A detailed description of the proposed modification including its components, construction activities, and staging
- A comprehensive assessment of the potential impacts on the key issues including a description of the existing environment, and an assessment of potential direct and indirect and construction, operation and staging impacts
- Description of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor potential impacts
- Issues raised by stakeholders, showing where and how they have been considered and addressed.

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13 22 13

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