Sydney Harbour Bridge
Southern toll plaza precinct upgrade
Review of environmental factors
NOVEMBER 2012
Roads and Maritime Services

Sydney Harbour Bridge – southern toll plaza precinct upgrade

Review of environmental factors
November 2012
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Date: 30 October 2012 ......................................................

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Executive summary

The proposal

Roads and Maritime Services (RMS) proposes to realign and resurface the traffic lanes on the Bradfield Highway, on the southern approaches to the Sydney Harbour Bridge and reconfigure access to the northern Sydney CBD.

RMS also proposes to remove the toll booths from the southern approaches to the Sydney Harbour Bridge. Electronic tolling became fully operational in 2009, which means the additional road lanes which facilitated manual tolling are no longer required.

Need for the proposal

Southbound traffic on the Bradfield Highway has been subject to a toll since the Sydney Harbour Bridge was opened in 1932. A cash toll was collected manually until 11 January 2009 when toll collection became fully automated.

Additional road lanes that facilitated manual tolling, but created complex traffic movements, are no longer required. Removal of the toll booths would enable traffic movements to be simplified and would reduce road safety hazards.

The proposal would improve the driver and passenger experience travelling between the Sydney Harbour Bridge and the Western Distributor or northern Sydney Central Business District (CBD) while minimising environmental and heritage impacts.

Options considered

RMS has considered three options for the proposed realignment and resurfacing of the traffic lanes on the Bradfield Highway. The options were evaluated through an iterative process, which considered a range of design and environmental criteria.

The options considered were:

1. Do nothing.
2. Realign and rationalise lanes in the southern toll plaza precinct including removal of toll booths.
3. Realign and rationalise lanes in the southern toll plaza precinct, reconfigure access to the northern Sydney CBD and the intersection of York and Grosvenor streets including removing toll booths.

Option 3 is the preferred option as it best meets the project objectives. Option 3 would simplify traffic movements to the greatest extent by:

- Removing the crossover between buses and general traffic.
Providing access to York Street via the eastern ramp and Grosvenor Street via the western ramp at all times for citybound traffic.

In addition, Option 3 would improve connectivity for buses by extending the Sydney Harbour Bridge bus lane to York Street. This would also support other transport projects under investigation by Transport for NSW (TfNSW) in the Wynyard precinct.

This option would also maximise the operational flexibility for lane management

Statutory and planning framework

The potential environmental impacts of the proposal have been identified through this review of environmental factors (REF) and will be assessed by RMS under Part 5 of the Environmental Planning & Assessment Act 1979 (EP&A Act).

Clause 94 of the Infrastructure State Environmental Planning Policy (SEPP) permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

In assessing the proposal, RMS will consider sections 111 and 112 of EP&A Act and Clause 228 of the Environmental Planning and Assessment Regulation 2000 (refer to Appendix B). Key agencies, in particular North Sydney Council have been consulted during design development and the environmental assessment process. Consultation will continue throughout detailed design and construction.

Community and stakeholder consultation

The southern toll plaza precinct upgrade is part of a program of work for the Sydney Harbour Bridge precinct, designed to improve and adapt the Sydney Harbour Bridge to the needs of a modern city, while preserving the beauty and character of the structure and its setting.

RMS has prepared a consultation strategy for the proposal, which is aimed at addressing the community’s and stakeholders concerns and information needs during the life of the proposal.

In accordance with RMS’ Procedure for Aboriginal Cultural Heritage consultation and Investigation (PACHCI), Sydney's Aboriginal Cultural Heritage Advisor was contacted about the proposal.

Environmental impacts

Construction of the proposal would have the potential to impact on the environment surrounding the southern approaches to the Sydney Harbour Bridge. There would be potential impacts on traffic on the bridge; air quality in the immediate vicinity of the work; noise and vibration impacts on local residents and impacts on the bridge’s heritage value. Potential impacts of the proposal on the visual amenity of the area are negligible and would make a positive contribution to the overall landscape character setting.

These potential environmental impacts would occur during construction and would be temporary and of a short duration only. There are some potential minor impacts to the heritage significance
of the bridge however this would be mitigated with adequate safeguards. The work would be staged to minimise the disruption to traffic flow during the construction period.

These potential environmental impacts would be avoided, mitigated or minimised during the construction period by the timely and accurate implementation of the recommended safeguards and management measures listed in this document.

Justification and conclusion

The proposal is justified on the basis of simplifying traffic movements and reducing road safety hazards for drivers. The removal of the toll booths from the southern plaza precinct would improve the visual amenity of the bridge, without impacting the structural integrity of the bridge and its approaches, and would reduce maintenance costs for RMS.

Display of the review of environmental factors

This REF is on display for comment between 5 November to 30 November 2012. You can access the documents in the following ways:

Internet

The documents will be available on the RMS website at:

Display

The review documents can be viewed at the following locations:

Roads and Maritime Services
Level 9, 101 Miller Street
North Sydney
Monday to Friday (8am to 5pm)

City of Sydney Council – One Stop Shop
Level 1, 456 Kent Street, Sydney
Monday to Friday (8am to 6pm)

North Sydney Council Chambers
200 Miller Street, North Sydney
Monday to Friday (9am to 5pm)

How can I make a submission?

To make a submission on the proposal, please send your written comments to:
Roads and Maritime Services project manager:
PO Box 609
Pymont NSW 2009
Email: sydney_harbour_bridge_projects@rta.nsw.gov.au
Submissions must be received by 30 November 2012.

Submissions should include:

a) Your name and address.

b) Submission identification: Sydney Harbour Bridge southern toll plaza precinct upgrade.

c) Your comments.

Privacy information

All information included in submissions is collected for the sole purpose of assisting in the assessment of this proposal. The information may be used during the environmental impact assessment process by relevant RMS staff and RMS contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, RMS will attempt to keep it confidential. However there may be legislative or legal justification for the release of the information, for example under the Government Information (Public Access) Act 2009 or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by that respondent. Identifying information would be kept confidential if specified by the respondent.

Any respondent may make a correction to the information that they have provided by writing to the same address as the submission was sent.

The information will be held by RMS Pyrmont Project Office, 71-79 Pyrmont Bridge Road, Pyrmont, NSW 2009.

What happens next?

Following the submissions period, RMS will collate submissions. Acknowledgement letters will be sent to each respondent. The details of submission authors will be retained and authors will be subsequently advised when project information is released.

After consideration of community comments, RMS will determine whether the proposal should proceed as proposed, or whether any alterations to the proposal are necessary. The community will be kept informed regarding the REF determination.

If the proposal is approved, RMS will proceed with final design and tenders would be called for construction of the project.

If you have any queries, please contact the RMS project manager on 1800 822 486.
Sydney Harbour Bridge – southern toll plaza precinct upgrade

Review of environmental factors

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1. Introduction

This chapter introduces the proposal and provides the context of the environmental assessment. In introducing the proposal, the objectives and proposal development history are detailed and the purpose of the report provided.

1.1 Proposal identification

Roads and Maritime Services (RMS) proposes to realign and resurface the traffic lanes on the Bradfield Highway, on the southern approaches to the Sydney Harbour Bridge and reconfigure access to the northern Sydney CBD, (the proposal). The proposal is aimed at simplifying traffic movements and reducing road safety hazards for the quarter of a million people including 27,000 bus passengers who use road transport to cross the Sydney Harbour Bridge daily.

The proposal would involve removal of the toll booths from the southern approaches to the Sydney Harbour Bridge where tolling operations have been undertaken since the bridge was opened to traffic in 1932. Electronic tolling became fully operational in 2009, which means the additional road lanes which facilitated manual tolling are no longer required. The proposal would also involve upgrading the traffic management systems to ensure greater efficiencies in traffic management.

This proposal has been made possible by a separate project to modernise and relocate the bridge tolling system to a location north of the bridge, which was determined under a separate environmental assessment (RMS, 2012). The proposal presents an opportunity to upgrade and rationalise the southern toll plaza precinct to simplify traffic movement on the bridge, improve operational flexibility, reduce road safety hazards, and to realise cost efficiencies for RMS.

Simplifying and rationalising the lanes would also support separate initiatives to improve bus travel-time reliability to Wynyard in the northern Sydney central business district (CBD).

The proposal site is generally located to the south of the Sydney Harbour Bridge. It incorporates the Bradfield Highway between Milsons Point and the southern bridge approaches, and sections of the Cahill Expressway, York, Grosvenor, Clarence and Kent streets. Additionally, signage would also be installed or upgraded at various locations on the Sydney Harbour Bridge and approaches within the CBD. Refer to Figure 1.1 for a map of the proposal site, and to Appendix A for site photographs.

The Sydney Harbour Bridge spans between Milsons Point in the north and Millers Point in the south. The southern bridge approach spans are located within the City of Sydney local government area (LGA).

The Sydney Harbour Bridge, sections of its approaches and curtilage areas are of State and National Heritage Significance, and are listed on the NSW State Heritage Register and the National Heritage Register.
Figure 1.1 Location plan
Key features of the proposal include:

- Removal of toll booth structures and associated redundant services and infrastructure.
- Improved bus connectivity to the CBD and bus readiness bays.
- Simpler traffic movements with fewer road safety hazards.
- Smoother road surface.
- A reconfigured intersection of York and Grosvenor streets.

The proposal is expected to take 18 months to construct, commencing in January 2013. Traffic lanes on and approaching the bridge would be temporarily closed as required. However during construction, the bridge would only ever be partially closed at any time.

The proposed construction process is described in Chapter 3.

1.2 Purpose of the report

This review of environmental factors (REF) has been prepared by Parsons Brinckerhoff on behalf of RMS. For the purposes of this proposal, RMS is the proponent and the determining authority under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented.

The description of the proposal and associated environmental impacts have been undertaken in context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the Threatened Species Conservation Act 1995 (TSC Act), the Fisheries Management Act 1994 (FM Act), and the Australian Government’s Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). In doing so, the REF helps to fulfil the requirements of section 111 of the EP&A Act that RMS examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Infrastructure under Part 5.1 of the EP&A Act.

- The significance of any impact on threatened species as defined by the TSC Act and/or FM Act, in section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement.

- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of Sustainability, Environment, Water, Population and Communities for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.
2. Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It provides a discussion of the options considered and the selection of the preferred option for the proposal.

2.1 Strategic need for the proposal

Every week day about 160,000 vehicles carry almost a quarter of a million people across the bridge. In the AM peak period (6am to 10am weekdays) 700 buses carry about 27,000 passengers into the city via the Sydney Harbour Bridge. In the same period, 14,000 cars carry about 16,000 people.

Southbound traffic on the Bradfield Highway has been subject to a toll since the Sydney Harbour Bridge was opened in 1932. A cash toll was collected manually until 11 January 2009 when toll collection became fully automated.

Additional road lanes that facilitated manual toll collection, but created complex traffic movements, are no longer required. Removal of the toll booths would enable the existing road lanes to be rationalised to simplify traffic movements and would also provide an improved visual experience for drivers and bridge users.

Realigning and resurfacing traffic lanes, removing the toll booths, reconfiguring access to the northern Sydney CBD and upgrading the traffic management systems would improve the driver and passenger experience travelling between the Sydney Harbour Bridge and the Western Distributor or northern Sydney CBD while minimising environmental and heritage impacts by:

- Simplifying traffic movements.
- Improving connectivity for buses.
- Improving operational flexibility for lane management on the bridge.
- Reducing road safety hazards.

The proposal is consistent with the strategic aims and directions of the following strategic planning documents, as discussed below.

Draft NSW Long Term Transport Master Plan

The draft Long Term Transport Master Plan, which was released by the NSW Government in September 2012, outlines a clear direction for transport in NSW over the next 20 years. It is underpinned by a record $13.1 billion investment in roads and transport in the NSW Government’s 2011–12 budget and $13.2 billion investment in the 2012–13 budget.

The draft plan examines the major challenges facing Sydney over the next 20 years. The draft plan outlines potential solutions for these challenges, and lists a set of actions for each solution.

The proposal is consistent with the draft plan’s key action to provide travel options that support and enhance the strength and success of the CBD.
NSW 2021 A Plan to Make NSW Number One

NSW 2021 A Plan to Make NSW No 1 (NSW Government, 2011) is the NSW Government’s strategic business plan, setting priorities for action and guiding resource allocation over the next 10 years. It sets out five strategies including: rebuild the economy; return quality services; renovate infrastructure; strengthen our local environment and communities and restore government accountability.

The goals, targets and actions in this plan set the priorities for funding, guiding decisions and focusing the day to day work of the public sector.

This proposal is particularly relevant to NSW 2021’s goal number 7 — Reduce Travel Times and goal number 10 — Improve Road Safety.

The proposal is aimed at simplifying traffic movements, improving connectivity for buses and reducing road safety hazards between the Sydney Harbour Bridge and the Western Distributor/northern Sydney CBD.

State Infrastructure Strategy 2012-2032

The State Infrastructure Strategy 2012-2032 (the Strategy) (Infrastructure NSW, 2012) is a 20-year strategy that supports the delivery and funding of infrastructure in NSW. The strategy links other state infrastructure plans such as the Metropolitan Plan for Sydney 2036 and subregional plans (of which one is the City of Sydney’s draft plan).

The Strategy identifies the need to improve the efficiency of the state’s road network, and to provide safer roads for the state’s motorists. The proposal is aimed at simplifying traffic movements, improving connectivity for buses and reducing road safety hazards between the Sydney Harbour Bridge and the Western Distributor/northern Sydney CBD. Therefore, it is consistent with the Strategy’s priorities.

Metropolitan Plan for Sydney

The Metropolitan Plan for Sydney (NSW Government, 2010) is an integrated long term planning framework for the sustainable management of Sydney’s growth and economic development. The plan identifies the CBD’s of Sydney and North Sydney as being the financial, economic and cultural heart of Sydney.

The proposal is consistent with the Metropolitan Plan as it would simplify traffic movements, improve connectivity for buses and reduce road safety hazards between Sydney Harbour Bridge and Western Distributor/northern Sydney CBD.

Sydney City Draft Subregional Strategy

The Sydney City Draft Subregional Strategy translates objectives of the NSW Government’s Metropolitan Strategy and the former state plan to the local level. The draft subregional strategy acts as a broad framework for the long term development of the area, guiding government investment and linking local and state planning issues. The 2031 vision for Sydney City includes improved global competitiveness, stronger economic links, improved and increasingly integrated transport systems, improved quality of the built environment and improved coordination of agencies to facilitate unified planning.

The proposal is consistent with the vision for Sydney, which recognises that the region’s economic growth is supported by efficient and safe traffic movements.
Sydney Harbour Bridge Conservation Management Plan

The RMS *Sydney Harbour Bridge Conservation Management Plan* provides a framework for the bridge's ongoing care and management, including decisions about its conservation, use and development, and to provide a reference for future applications for work to the bridge.

It sets out conservation policies and guiding principles to facilitate the conservation of the heritage values of the Sydney Harbour Bridge consistent with the maintenance and repair of the bridge as a publicly owned asset, and its ongoing use as the main vehicular crossing of Sydney Harbour.

The proposal is consistent with the policies and guiding principles set out in the Sydney Harbour Bridge Conservation Management Plan. As required by the conservation management plan, the design of the proposal has been clearly considered and planned to minimise the potential impacts on the bridge's heritage significance.

### 2.2 Existing road infrastructure

#### 2.2.1 Lane arrangements

The Bradfield Highway comprises road traffic lanes 1 to 8 on the Sydney Harbour Bridge and approaches and is an integral part of the Sydney road network linking the Warringah Freeway in the north and the Western Distributor in the south.

The Cahill Expressway diverges from lanes 7 and 8 on the Sydney Harbour Bridge and links the Warringah Freeway in the north and the Eastern Distributor in the south. The Cahill Expressway is defined from where it diverges from the bridge – north of this, the designation is lanes 7 and 8 of the bridge.

Figure 2.1 shows the existing lane arrangements in the AM peak. Figure 2.2 shows the existing lane arrangements outside the AM peak.
Figure 2.1  Existing traffic and bus movements in the AM peak (6am-10am weekdays)
Figure 2.2  Existing traffic and bus movements at all times except AM peak weekdays
To the south of the southern approach span, the Bradfield Highway widens from eight lanes to up 15 lanes at the toll plaza. The bridge has an eastern ramp from, and a western ramp to, the Sydney CBD via Grosvenor Street and York Street.

The Sydney Harbour Bridge bus lane (lane 7) provides access for bus lane users to the eastern ramp and the Western Distributor via its connection through the eastern-most toll booth.

The city end of lane 7 is a bus lane during peak times and can be used by all traffic outside peak periods to access the eastern ramp and the Western Distributor.

Northbound traffic approaches the Sydney Harbour Bridge via on-load ramps from:

1. The Cahill Expressway which provides access from the Eastern Distributor, the north-eastern part of the CBD and the eastern suburbs.
2. Kent, Clarence or Grosvenor streets which provide access from the Sydney CBD.
3. The Western Distributor which provides access from Anzac Bridge/Western Suburbs or the southern suburbs via Harris Street.

The carriageway widens on the western side near the Sydney Harbour Bridge Traffic Office where access between the bridge approaches and Upper Fort Street is available for authorised vehicles only. RMS is authorised to use this space for maintenance operations and temporary storage, and emergency services crews use the space for emergency services mustering for incident management.

2.2.2 Toll collection

The Sydney Harbour Bridge Toll Office is located on the eastern side of the toll plaza.

The Sydney Harbour Bridge Traffic Office is located on the western side of the toll plaza near Observatory Hill, and provides resources for managing the traffic network and incident response for the Sydney Harbour Bridge and surrounding network.

There are two banks of toll collection booths, one located adjacent to the Traffic Office and one adjacent to the Toll Office. These structures also contain electronic toll collection equipment, traffic monitoring cameras and various road related signs.

Southbound traffic on lanes 3 to 6 of the Bradfield Highway (depending on the number of lanes allocated to southbound traffic), diverges on approach to the toll booths, then merges and crosses over as motorists select one of up to three destination options:

1. Continue straight ahead to the Western Distributor for destinations such as Anzac Bridge/Western Suburbs or the southern suburbs via Harris Street.
2. Exit to the left for access to Grosvenor Street (24 hours) and York Street (non-AM peak). This is referred to as the eastern ramp.
3. Exit to the right for access to York Street (during the AM peak). This is hereafter referred to as the western ramp.
2.2.3 Traffic management

The speed limit on the Sydney Harbour Bridge and the Western Distributor is 70 kilometres per hour, reducing to 40 kilometres per hour in the vicinity of the toll booths.

RMS manages traffic flow on, and approaching the bridge using a lane management scheme to manage traffic on a congestion response basis.

The lane management scheme consists of electronic gantry signage and a network of remote controlled moveable medians located between the southern bridge abutment at Cumberland Street and Grosvenor Street. Changeable signage associated with the scheme is located at various points in the Sydney CBD and along the Warringah Freeway.

The moveable medians are used to allocate lanes for northbound traffic from the Western Distributor, Kent Street, Clarence Street, Grosvenor Street and the Cahill Expressway enabling RMS to configure the bridge to provide lane combinations varying from two northbound/six southbound lanes to five northbound/three southbound lanes.

The default lane configuration is four lanes each way. In the AM peak additional lanes are allocated for southbound traffic to optimise traffic flow. Typically this would consist of three northbound lanes with five southbound lanes. There is also an option to operate two northbound lanes with six southbound lanes depending on traffic conditions.

In the PM peak (3pm to 7pm weekdays) additional lanes are assigned to the northbound traffic to provide either four lanes each way or five northbound and three southbound lanes.

Under normal tidal flow traffic management arrangements:

- Lanes 1 and 2 are exclusively northbound.
- Lanes 3, 4 and 5 are reversible.
- Lane 6 is exclusively southbound to either the Sydney CBD or the Western Distributor.
- Lane 7 is a 24 hour southbound bus lane to the southern pylon. From the southern pylon to the approach to the toll gates, lane 7 is an AM peak and PM peak bus lane.
- Lane 8 is exclusively southbound and takes traffic via the Cahill Expressway to the north-eastern part of the CBD and the eastern suburbs. During off peak times, general traffic is permitted to change from lane 8 to lane 7 once it passes the southern pylon to access the Western Distributor, York Street or Grosvenor Street.

Traffic movements near the toll plaza are complex due to the three distinct destinations available for southbound traffic - York Street, Grosvenor Street and Western Distributor. Specifically the complexities are due to the:

- Requirement to use different ramps for various destinations depending on the time of day as well as the tidal flow operations.
- Integration of lane 7 (the bus lane) through the toll plaza.
- Need for traffic to cross several lanes in particular from lanes 7 and 8 to access the Western Distributor.
The eastern ramp provides three lanes for citybound traffic only. In the AM peak it provides two general traffic lanes for access to Grosvenor Street and a short section of bus lane to York Street on the right side between 6.30am to 9.30am Monday to Friday. At other times it provides citybound general traffic access to Grosvenor and York streets.

When the bridge is configured to provide four or more northbound lanes (e.g. outside the AM peak) the eastern ramp is the only option for citybound access to York Street.

Southbound traffic in lanes 3 to 6 and buses in lane 7 can exit to York Street or Grosvenor Street via the eastern ramp. This includes bus lane traffic in the AM and PM peaks and all traffic outside the peak periods.

Consequently the streams of traffic from lanes 5, 6 and 7 have cause to cross each other’s paths to reach their destinations of Grosvenor Street and York Street. This is a complex traffic movement and a potential safety hazard.

The western ramp is a reversible traffic flow ramp. In the AM peak, or when the bridge is configured to operate with five or more southbound lanes, it provides citybound access to York Street for general traffic. It is not used by northbound traffic at these times. At other times the western ramp provides access from Grosvenor Street to the Sydney Harbour Bridge for northbound traffic and is closed to southbound traffic.

### 2.2.4 Intersection of Grosvenor and York streets

The eastern ramp consists of three lanes on approach to the intersection of Grosvenor and York streets. In the AM peak the right lane is for bus lane users only while the two left lanes provide general traffic access to Grosvenor Street.

The western ramp is reversible. It provides access for general traffic to the northern Sydney CBD via York Street in the AM peak and northbound access to the Sydney Harbour Bridge at all other times.

Grosvenor Street has three lanes on approach to the intersection including:

- A left turn lane to York Street at all times.
- Two lanes that provide northbound access to the Sydney Harbour Bridge, except during the AM peak.

Clarence Street loops around to join York Street. Cyclist and pedestrian paths link to Kent Street and emerge between the Clarence Street loop road and the western ramp. The pedestrian crossing at Clarence Street loop road does not have signals.

Signalised pedestrian crossings exist across the eastern leg of Grosvenor Street and the southern leg of York Street.

### 2.2.5 Parking

Road space in the southern toll plaza precinct including central unoccupied areas and areas outside the toll office are used by staff associated with the tolling and maintenance/incidence response operations.
2.2.6 Cyclists and pedestrians

While the Sydney Harbour Bridge carries a cyclist path on its western side and a pedestrian path on its eastern side, there is no interaction with cyclists and pedestrians within the carriageway that forms the proposal. There would be a minor impact to cyclists and pedestrians during the construction of the proposal (refer to section 6.1)

2.3 Proposal objectives

The proposal's objectives are to improve the driver and passenger experience travelling between the Sydney Harbour Bridge and the Western Distributor or northern Sydney CBD while minimising environmental and heritage impacts by:

- Simplifying traffic movements.
- Improving connectivity for buses.
- Improving operational flexibility for lane management on the bridge.
- Reducing road safety hazards.

In defining the proposal, RMS is seeking to:

- Introduce a uniform speed zone between the Sydney Harbour Bridge and the Western Distributor with capacity to implement reduced (variable) speed limits where required as an extension of the existing variable speed limit zone across the Sydney Harbour Bridge.
- Eliminate costs associated with maintaining the southern toll booths.
- Improve the driving surface on the Bradfield Highway between the deck of the Sydney Harbour Bridge and the Western Distributor.
- Improve the urban landscape of the toll booths.
- Support initiatives planned by TfNSW to reduce congestion and improve reliability for buses accessing the CBD.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of the preferred option

The options described below were identified through the design development process and considered a range of design and environmental criteria which included:

- Predicted traffic and public transport benefits.
- Environmental impacts.
- Constructability.
- Asset maintenance.
- Flexibility in operation.
- Drivability.
- Traffic and incident management adaptability.

A preferred option was selected which performed best against these criteria and the proposal objectives.

### 2.4.2 Identified options

#### Option 1: Do nothing

The do nothing option would involve no work and therefore no changes to the existing lanes or toll booths on the Sydney Harbour Bridge. It would not meet the criteria listed in 2.4.1 either.

#### Option 2: Remove toll booths to rationalise and realign lanes in the southern toll plaza.

Option 2 would involve removing the southern toll booths and realigning and rationalising the traffic lanes in the immediate vicinity of the southern toll plaza. Option 2 in the AM peak is shown in Figure 2.3 and at all other times is shown in Figure 2.4.

The traffic lanes would be rationalised to transition between and the Sydney Harbour Bridge to suit the range of lane configurations used for management of traffic crossing the bridge and the:

- Western Distributor.
- Eastern and western ramps to the northern Sydney CBD.
Figure 2.3  Option 2 traffic and bus movements in the AM peak (6am-10am weekdays)
Figure 2.4  Option 2 traffic and bus movements at all times except AM peak weekdays
Bus lanes would remain the same.

All traffic lanes would provide similar access to the current arrangement under this option as described below.

- **Access from the Sydney Harbour Bridge main deck to:**
  - York Street (citybound) would continue to be directed to the western ramp during the AM peak on weekdays.
  - York Street (city bound) would continue to be directed to the eastern ramp outside the weekday AM peak.
  - Grosvenor Street (city bound) would continue using the eastern ramp at all times of the day.
  - Western Distributor (southbound) would continue to be provided at all times of the day.

- **Sydney Harbour Bridge bus lane users (buses, taxis, hire cars and motorcycles) would continue using the following access:**
  - Eastern ramp at all times of the day to access York Street or Grosvenor Street (citybound).
  - Southbound to the Western Distributor at all times of the day.

- **General traffic access would continue to be permitted outside peak periods from the Sydney Harbour Bridge lane 7 (the AM/PM bus lane) to:**
  - The northern Sydney CBD via Grosvenor Street.
  - The city centre via York Street.
  - Anzac Bridge/city south via the Western Distributor.

Lane configurations would be implemented to best manage the traffic to and from the Western Distributor, Cahill Expressway and the northern Sydney CBD via York, Clarence, Kent and Grosvenor streets.

**Option 3: Realign and rationalise lanes in the southern toll plaza precinct, reconfigure access to the northern Sydney CBD and the intersection of York and Grosvenor streets including removing toll booths.**

Option 3 would involve realigning and rationalising the traffic lanes between the Sydney Harbour Bridge and the Western Distributor, Grosvenor Street and York Street. The intersection of York and Grosvenor streets would be modified including widening of the eastern ramp approaching the intersection to provide an additional southbound lane to York Street over a distance of up to about 100 metres. This option would simplify traffic access and improve bus connectivity to the northern Sydney CBD. The option would also involve removing the southern plaza toll booths.

Option 3 in the AM peak using the split ramps is shown in Figure 2.5, in the AM peak using the western ramp is shown in Figure 2.6 and in the non-AM peak is shown in Figure 2.7.
Figure 2.5  Option 3 traffic and bus movements in the AM peak (split ramps)
Figure 2.6 Option 3 traffic and bus movements in the AM peak (western ramps)
Figure 2.7  Option 3 traffic and bus movements at all times except AM peak weekdays
The following traffic changes would be made:

- The citybound bus lane in lane 7 of the Sydney Harbour Bridge would be extended to York Street.

- An additional bus lane, bus readiness bays and a bus access lane would be established in the left lanes of the eastern ramp.

- There would be greater flexibility in lane operation through moveable medians and signs to assist with traffic management and lane closures.

Traffic lanes would provide access to the northern Sydney CBD and Western Distributor under this option as described below.

- Access from the Sydney Harbour Bridge main deck to:
  - York Street could be directed via either the eastern or via the western ramp in the AM peak.
  - York Street would continue to be directed via the eastern ramp outside the AM peak.
  - Grosvenor Street would be directed via the western ramp at all times of the day.
  - The Western Distributor (southbound) would continue to be provided at all times of the day.

- Access for Sydney Harbour Bridge bus lane users (buses, taxis, hire cars and motorcycles) to:
  - York Street or Grosvenor Street would be via the eastern ramp at all times of the day.
  - The Western Distributor (southbound) would continue to be provided at all times of the day.

- General traffic access from the Sydney Harbour Bridge lane 8 (via lane 7, the bus lane) to:
  - The northern Sydney CBD via Grosvenor Street would not be possible due to the lane configuration.
  - The city centre via York Street or to Anzac Bridge/city south via the Western Distributor would continue to be permitted only outside peak periods 6am to 10am and 3pm to 7pm weekdays.

All traffic movements northbound onto the Sydney Harbour Bridge would remain unchanged.

Lane configurations would continue to be implemented to best manage the traffic to and from the Western Distributor, Cahill Expressway and the northern Sydney CBD via Clarence, Kent and Grosvenor streets.
2.4.3 Analysis of options

Option 1: Do Nothing

The ‘do nothing’ option would not meet the proposal objectives of simplifying traffic movements, improving connectivity for buses, improving operational flexibility for lane management on the Sydney Harbour Bridge or reducing road safety hazards. It would not meet the criteria listed in 2.4.1 either.

Further it would require RMS to continue to fund ongoing maintenance of aging toll booths which would become redundant upon establishment of a new tolling point on the northern side of the Sydney Harbour Bridge.

This option would not generate any traffic management or noise impacts associated with construction or any heritage impacts on the bridge.

Option 2: Remove toll booths to rationalise and realign lanes in the southern toll plaza

This option would partially simplify traffic movements, remove the toll booths which are a physical road safety hazard, and improve operational flexibility for lane management on the Sydney Harbour Bridge.

However, it would not meet the proposal objectives of improving connectivity for buses nor remove the traffic and bus crossover road safety hazards. The option would also not meet or only partially meet the criteria set out in section 2.4.1 as described below:

- Not provide any traffic or public transport benefits.
- Have fewer potential environmental impacts than Option 3.
- Eliminate the cost and obligation for toll booth maintenance.
- Be most easily constructed.
- Not provide improved flexibility in operation to the same extent that Option 3 would.
- Improve legibility for road users (driveability) but to a lesser degree than Option 3.
- Improve traffic and incident management adaptability.

This option would retain the lane arrangements on the eastern ramp to the CBD where buses and vehicles must cross over to access York Street and Grosvenor Street respectively in the AM peak.

The long term safety benefits that would be gained by removing the traffic and bus lane crossover and extending the bus lane to York Street would not be realised.

Option 2 would have temporary and short-duration potential traffic impacts, air quality impacts, noise and vibration impacts and visual amenity impacts during construction and longer term minor heritage impacts.
**Option 3: Remove southern plaza toll booths and reconfigure the intersection of York and Grosvenor streets**

Option 3 would provide RMS with maximum operational flexibility for lane management on the Sydney Harbour Bridge through the use of existing and new moveable medians and realigned lanes.

Changes to northern Sydney CBD access via York and Grosvenor streets would result in the removal of the bus/general traffic crossover movements on the eastern ramp. This would improve connectivity for buses and eliminate that particular road safety hazard. Other bus lane users would still have access to the Western Distributor meaning there would still be some crossover movement with traffic exiting to the eastern ramp from the main deck of the bridge. However, volumes of traffic undertaking the crossover movement would be lower than current levels therefore resulting in safer operation than under Option 1 (current situation) or Option 2.

The southern toll booths are a road safety hazard; removing them would provide a safer road environment for all travellers using the bridge.

Some citybound bridge users would need to familiarise themselves with the changes to northern Sydney CBD and Western Distributor access. However the improved alignment combined with the absence of toll booths and upgraded signage on the Bradfield Highway would mitigate this change and simplify traffic movements for motorists.

Bus readiness bays would enable buses approaching the city to commence outbound services in the PM peak to stop as close as possible to Wynyard. This would improve service reliability by minimising any delay to buses entering the Wynyard Precinct while minimising the number of buses in the CBD.

Option 3 would satisfy the proposal objectives as well as the criteria listed in section 2.4.1. However as with Option 2 it would have temporary and short-duration potential traffic impacts, air quality impacts, noise and vibration impacts and visual amenity impacts during construction and longer term minor heritage impacts.

### 2.5 Preferred option

Option 3 is the preferred option because it would meet all the proposal objectives as well as the criteria listed in 2.4.1 and would:

- Simplify traffic movements by realigning and reducing the number of traffic lanes particularly southbound, removing the toll booths and improved signage.
- Improve connectivity for buses through removal of the bus/general traffic crossover on the eastern ramp and the provision of additional and continuous bus lanes.
- Improve operational flexibility for lane management on the bridge by removing the toll booths, simplifying the operation and increasing the capacity of the moveable median system, and introduction of variable speed limits and signage.
- Reduce road safety hazards including physical hazards such as the toll booths and operational hazards including the bus/general traffic weave on the eastern ramp and improve lane alignment.
- Eliminate toll booth maintenance costs.
Option 3 would simplify traffic movements to the greatest extent by:

- Removing the crossover between buses and general traffic.
- Providing access to York Street via the eastern ramp and Grosvenor Street via the western ramp at all times for citybound traffic.

In addition, Option 3 would improve connectivity for buses by extending the Sydney Harbour Bridge bus lane to York Street. This would also support other transport projects under investigation by TfNSW in the Wynyard precinct.

This option would also maximise the operational flexibility for lane management.
3. Description of the proposal

This chapter describes the proposal and provides descriptions of existing conditions, the design parameters including major design features, the construction method and associated infrastructure and activities.

3.1 The proposal

The proposal would involve, realigning and rationalising the traffic lanes between the Sydney Harbour Bridge and the Western Distributor/northern Sydney CBD removing the southern toll booths, reconfiguring the intersection of York and Grosvenor streets and widening the eastern ramp to York Street over a distance of up to about 100 metres. The key features of the proposal are shown in Figure 3.1.

The overall carriageway width would be reduced near the Sydney Harbour Bridge traffic office.

Bus lanes and facilities would be established to the east of the general traffic lanes on the eastern ramp. This would involve extending the Sydney Harbour Bridge bus lane to York Street and establishing an additional bus lane beside it.

Bus readiness bays would be established on the eastern side of the eastern citybound ramp. The bus readiness bays would enable buses approaching the city to commence outbound services in the PM peak to stop as close as possible to Wynyard. This would improve service reliability by minimising any delay to buses entering the Wynyard Precinct while minimising the number of buses in the CBD.

The intersection of York and Grosvenor streets would be reconfigured to enable general traffic access to the northern Sydney CBD via either the western ramp or the eastern ramp and to provide a signalised pedestrian crossing of Clarence Street on its approach to York Street.

General traffic movements northbound onto the Sydney Harbour Bridge would remain unchanged.

The proposal would provide flexibility in operation and includes devices such as variable message signs and moveable medians to assist with both planned and unplanned lane closures.

Traffic lanes would provide access to the northern Sydney CBD and Western Distributor under this option as described below.

- Access from the Sydney Harbour Bridge main deck to:
  - York Street could be directed via either the eastern or via the western ramp in the AM peak.
  - York Street would continue to be directed via the eastern ramp outside the AM peak.
  - Grosvenor Street would be directed via the western ramp at all times.
  - The Western Distributor (southbound) would continue to be provided at all times.
- Access for Sydney Harbour Bridge bus lane users (buses, taxis, hire cars and motorcycles) to:
  - York Street or Grosvenor Street would continue from the eastern ramp at all times.
  - The Western Distributor (southbound) would continue to be provided at all times.
- General traffic access from the Sydney Harbour Bridge lane 8 (via lane 7, the bus lane) to:
  - To the northern Sydney CBD via Grosvenor Street would not be possible due to the lane configuration.
  - To the city centre via York Street or to Anzac Bridge/city south via the Western Distributor would continue to be permitted only outside peak periods on weekdays.

Lane configurations for all users would be implemented to best manage the demand volumes to and from the Western Distributor, Cahill Expressway and the northern Sydney CBD via Clarence, Kent and Grosvenor streets.

Sydney Harbour Bridge workers park in the southern toll plaza precinct adjacent to the toll office. This capability would not be retained.

Construction would commence in January 2013 and the work undertaken in stages over an estimated 18 month period.
3.2 Design

3.2.1 Design objectives

The detailed design for the proposal would satisfy RMS road design objectives. Specifically it would:

- Alter the horizontal alignment, drainage, utilities and roadside furniture of the bridge.
- Introduce variable speed zone through the toll plaza precinct extending the variable speed zone on the Sydney Harbour Bridge.
- Improve capability for incident management on the corridor.
- Provide for road transport compliance.
- Simplify traffic movements.
- Reduce road safety hazards.
- Improve guidance and delineation.
- Rationalise and optimise the operational spaces servicing the bridge and adjacent freeway links while ensuring ongoing operational service requirements.
- Integrate design of southern toll plaza as part of this entrance to the city.
- Respond to the heritage and cultural context of the precinct.
- Enhance the driver, cyclist and pedestrian experience.
- Minimise the overall footprint of the existing road space and operational areas wherever practical.

There would be no substantial changes to the vertical alignment.

Cyclist and pedestrian facilities of the bridge would not be changed.
3.2.2 Engineering constraints

The proposal is constrained by the following:

- Abandoned tram tunnels, which are located beneath the road surface on the eastern side of the toll plaza.
- Heavy rail train tunnels on the western side between Milsons Point and Wynyard.
- Underground passageways to toll booths.
- Fixed abutments for the Western Distributor elevated roadway.
- The width of the carriageway, which confines the lane realignment and rationalisation on the Bradfield Highway to the road reserve.
- Exits to the city at York and Grosvenor streets.
- Live traffic under a dynamic lane management scheme.

3.3 Construction activities

3.3.1 Work methodology

The construction activities would include:

- Site and storage area establishment.
- Removal of planter boxes.
- Concrete pavement replacement.
- Construction of new concrete pavement.
- Installation of interim directional and regulatory signage.
- Upgrade drainage and underground services such as electricity and telecommunications.
- Construction of infill concrete sections and road pavement at toll booth access points.
- Relocation of closed circuit television cameras.
- Removal of toll booth structures and infrastructure.
- Upgrading of street lighting.
- Removal of redundant concrete traffic barriers, kerbs and medians.
- Installation of new concrete and/or steel traffic barriers, kerbs and medians to suit new alignment.
- Improvements to intersection of York and Grosvenor streets including traffic signals.
* Installation of pavement marking including coloured bus lanes and road symbols.
* Installation of new signage structures and signs.
* Road surface rehabilitation.
* Removal of redundant signage.
* Installation of in pavement lights for traffic delineation.
* Upgrade of existing electronic lane control system.
* Demobilisation from site.

### 3.3.2 Construction hours and duration

The upgrade work would commence in January 2013. Construction is estimated to take about 18 months.

The high traffic volumes on the Sydney Harbour Bridge and the complexity of implementing substantial changes to the lane management scheme is expected to require a considerable amount of work to be carried out at night and during periods of lower traffic volume.

Where possible, work would be undertaken during the standard working hours of:

- 7am to 6pm Monday to Friday.
- 8am to 1pm on Saturdays.
- No work on Sundays or public holidays.

However the work would need to be undertaken in such a way to minimise traffic disruptions, therefore the majority of activities would be conducted outside standard work hours. This could also include periods of continuous work over several days under extended lane closures.

For work required outside standard hours, the procedure contained in Practice Note vii of the *Environmental Noise Management Manual — Roadwork Outside Normal Working Hours* (RTA, 2001) would be followed. This would include notification of potentially affected residents.

### 3.3.3 Plant and equipment

Equipment used to resurface and remove the toll booths would generate noise and potentially vibration. Such equipment may include:

- Access platforms.
- Air driven hand tools.
- Asphalt profilers and asphalt pavers.
- Backhoe.
- Bobcat.
- 2-3 x mobile cranes.
- Excavator with hammer attachment.
- Line marking machines.
- Semi-trailer and bogies.
- Power hand tools.
- Vibrating machines.
- Generators.
- Light vehicles.
- Multi-tyre rollers.
- Suction sweepers.
- Smooth drum rollers.
- Temporary lighting towers.
- Compressor.
- Concrete drill and concrete saw.
- Containment screens.
- Electrical equipment.
- Jackhammer.
- Wacker plate compactor.
- Vibrating screed boards.
- Steel plates.
- Trucks (including tip trucks and concrete trucks).
- Water cart.
- Welding equipment.

### 3.3.4 Earthwork

The proposal includes laying new drainage infrastructure and excavation of pavement slabs of about 2000 square metres at varying depths which would involve use of plant items such as a bobcat, backhoe and/or excavator.

Other earthworks would be required at the York and Grosvenor streets intersection during which pavement construction and kerb realignment would be required.
A total of about 500 cubic metres of earthworks would be required.

### 3.3.5 Source and quantity of materials

All material would be purchased from RMS registered suppliers, in accordance with RMS specifications for the proposal. Procurement of materials would be in accordance with NSW Government procurement guidelines.

The proposal would require moderate quantities of materials including (but not limited to):

- 4000 tonne of asphaltic concrete.
- 1500 cubic metres of concrete.
- Structural steel.
- Reinforcing steel.
- Liquid fuels.
- Primers and paints.
- Sheet metal for signs.

These materials would be sourced from commercial suppliers.

### 3.3.6 Traffic management and access

It is estimated that during construction there would be about 25 truck and 15 light vehicle movements per shift to and from the site. Specific details of these movements would be identified through the traffic management plan.

Construction workers would park at the western approach to the Glebe Island Bridge (now out of service) or at the Sydney Harbour Bridge southern abutment car park in Cumberland Street and be transported to site in gang trucks to minimise on-site parking impacts.

Site supervisors and managers would use available on-street parking at non trafficable areas in the toll plaza road reserve in Upper Fort Street, or outside the Sydney Harbour Bridge toll office in Cumberland Street. Plant and equipment would be transported directly to site and stored within the road corridor only for the duration of work for which they are required.

Work would be staged with temporary traffic switches to create new work areas.

Maintenance on the Sydney Harbour Bridge is carried out by existing maintenance contractors for RMS. Specific requirements for this proposal would be incorporated into a traffic management plan (TMP).

A TMP would be developed for each stage of work. General traffic management measures would include:

- Traffic lanes on and approaching the Sydney Harbour Bridge would be temporarily closed on an as needs basis.
- RMS would seek to program work requiring multiple lane closures during periods of reduced traffic volumes. This would enable the major work tasks such as toll booth structure removal, construction and relocation of moveable medians, and drainage to be done with the least impact to the community.

- Other work would be at night or other approved times (day time work would be used where work does not impede traffic flow). This would include the remainder of work such as concrete median removal and construction, lighting tower installation, pavement construction and the intersection upgrade.

- The TMP would include consideration and allowance for daily lane management requirements.

- Where possible, traffic would be diverted to create a work zone free of traffic. The number of zones is yet to be defined however it would be planned to minimise disruption to traffic whilst maintaining the operability of the lane management scheme.

- Once an area is completed, traffic would be switched and a new work zone created. Fixed new infrastructure items (including concrete kerbs and medians, pivoting medians, light towers) would be installed in final positions where possible. This process would continue until all work is completed.

### 3.4 Ancillary facilities

Ancillary facilities, such as site compounds and storage areas, would be established at the following locations:

- Maintenance and emergency response area located on the eastern side of the southern toll plaza (at the location of the proposed bus readiness bays).

- Incident management area located on the western side of the southern toll plaza.

- Storage area on the western approach to the out of service Glebe Island Bridge, James Craig Road at Rozelle.

- Other areas, which can be isolated from traffic flow within the southern toll plaza.

Other temporary worksites may also be required and these would be located in the proposal site, as shown in Figure 3.1.

Road construction materials such as concrete and asphalt would be transported to site as required. Structures would be assembled and manufactured off-site where feasible at an appropriately approved licensed facility.

Demolished materials from the toll booths may need to be temporarily stored within the identified worksites if unable to be immediately removed from site due to time or loading restrictions.

Temporary storage of material (if required) would only occur within the site limits of the identified work sites or proposal footprint.

Figures 3.2 and 3.3 show the potential locations of temporary site compounds and storage areas.
3.5 Public utility adjustment

Public utilities would be retained, although some would be adjusted within the proposal area to accommodate the work, including new power and communications requirements for signs, moveable medians and lights. Utilities adjustments would be limited to those necessary to allow for construction of the intersection.

Adjustment of utilities would be required for work at the York and Grosvenor streets intersection.

3.6 Property acquisition

No property acquisition is required from any public or private landholder for this proposal. No land would be leased for the proposal.

3.7 Urban design

The proposal would apply urban design principles that improve the landscape character and visual amenity of the area (Government Architect’s Office, 2012). Infrastructure including signage, lighting and medians would be designed to reduce clutter on the carriageway. The integrity of the landscape settings and heritage items including the views to and from them would be maintained and achieved by:

- Locating new structures to maintain existing views to important landscape and heritage items.
- Minimise new structures such as gantries and signage so that they are visually recessive.
- Locate structures along the edge of the road corridor where they integrate with existing buildings and structures.
Figure 3.2 Site storage areas – southern toll plaza upgrade
Figure 3.3  James Craig Road at old Glebe Island Bridge, Rozelle
4. Statutory and planning framework

4.1 State Environmental Planning Policies

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State. To achieve this aim, the ISEPP permits certain infrastructure without the need for development consent from the relevant local council.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for road and road infrastructure facilities on the southern approaches to the Sydney Harbour Bridge, and is to be carried out on behalf of RMS, it can be assessed under Part 5 of the EP&A Act. Development consent from council is not required.

The proposal is not located on land reserved under the National Parks and Wildlife Act 1974 and does not affect land or development regulated by State Environmental Planning Policy No. 14—Coastal Wetlands, State Environmental Planning Policy No. 26—Littoral Rainforests, State Environmental Planning Policy (State and Regional Development) 2011 or State Environmental Planning Policy (Major Development) 2005.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in chapter 5 of this REF.

4.1.2 State Regional Environment Plan (Sydney Harbour Catchment) 2005

The Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (SREP Sydney Harbour Catchment) aims to protect, enhance and maintain the Sydney Harbour Catchment. This SEPP applies to land along the harbour foreshores, including part of the southern approach to the Sydney Harbour Bridge. The waters of Sydney Harbour are zoned W1 Maritime Waters. As outlined in section 4.1.1, the ISEPP allows for the proposed work to be undertaken without consent from the Sydney City Council.

Part 3, Division 2 requires RMS to consider a number of issues relating to the functioning of the harbour. These issues generally pertain to environmental impacts of the proposal and have been considered as part of the environmental assessment undertaken in this REF.
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| Biodiversity, ecology and environment protection    | • Neutral or beneficial effect on the quality of water entering the waterways.  
• The proposed work should protect and enhance terrestrial and aquatic species, populations and ecological communities, avoid any indirect impacts, and maintain ecological connectivity.  
• Development should protect and reinstate natural intertidal foreshore areas, including wetlands and riparian land. | Section 6.10 – Water quality impact assessment  
Section 6.8 – Biodiversity impact assessment  
Not applicable to this proposal. This proposal as described in section 3.1 of this document would not impact intertidal foreshore areas, wetlands or riparian land. |
<p>| Public access to, and use of, foreshores and waterways | • Public access to the harbour and its foreshores and waterways should be maintained at all times and for all purposes including for recreational purposes without adversely impacting on watercourses, wetlands, riparian lands or remnant vegetation. | Not applicable to this proposal. This proposal as described in section 3.1 of this document would not impact the public access to the harbours and its waterways and foreshores. |
| Maintenance of a working harbour                     | • The harbour is a working harbour and this vital function of the harbour should be maintained at all times during the construction period to the benefit of the NSW community and economy. | Not applicable to this proposal. This proposal as described in section 3.1 of this document would not impact the functioning of the working harbour. |
| Interrelationship of foreshores and waterways uses   | • The proposal should consider the interrelationship of foreshores and waterways uses and should avoid conflict between the various uses in the waterways and along the foreshore at all times. | Not applicable to this proposal. This proposal as described in section 3.1 of this document would not impact the public access to the harbours and its waterways and foreshores. |</p>
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<td>Maintenance, protection and enhancement of</td>
<td>• This sub-clause requires that any proposed development should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands, foreshores and tributaries.</td>
<td>The unique visual qualities of Sydney Harbour have been considered in each stage of planning for this proposal. The maintenance of the unique visual qualities of Sydney Harbour is an important aspect of the proposal. See chapter 2 of this document. The RMS has undertaken a Landscape Character and Visual Impact Assessment of the proposal. A copy is provided in Appendix G. The potential impacts to the unique visual qualities of Sydney Harbour are assessed in section 6.4 of this document.</td>
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<td>foreshores and waterways scenic quality</td>
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<td>Maintenance, protection and enhancement of</td>
<td>• The development should maintain, protect and enhance views and to and from public places, landmarks and heritage items.</td>
<td>RMS acknowledges that the Sydney Harbour Bridge is a landmark of immense importance to the people of NSW and the bridge is also registered as an item of State and National heritage significance. The RMS has undertaken a Landscape Character and Visual Impact Assessment of the proposal. A copy is provided in Appendix G. The RMS has undertaken a Heritage Impact Statement of the proposal. A copy is provided in Appendix F. The potential impacts to the unique visual qualities of Sydney Harbour are assessed in section 6.4 of this document. The potential impacts to the heritage values of the bridge, its approaches and its viaducts are assessed in section 6.3 of this document.</td>
</tr>
<tr>
<td>views</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boat storage facilities</td>
<td>• This sub-clause relates to development for the purposes of boat storage facilities.</td>
<td>Not applicable to this proposal.</td>
</tr>
</tbody>
</table>
4.2 Local Environmental Plans

4.2.1 Sydney Local Environment Plan 2005

The proposal is largely located on land zoned City Centre under the Sydney Local Environment Plan 2005; however, some areas around the foreshore are not included in this LEP and fall within the State Regional Environmental Plan (Sydney Harbour Catchment) 2005.

However, given that Clause 94 of ISEPP permits RMS, as a public authority, to carry out development on any land for the purpose of a road or road infrastructure facilities, without consent from the local council, the land use planning and zoning objectives of the LEP are not relevant to this proposal.

4.3 Other relevant legislation

4.3.1 Heritage Act 1977

The Sydney Harbour Bridge, its approaches and its viaducts are listed on the State Heritage Register (SHR). Under the Heritage Act 1977, an approval from the Heritage Council of NSW is required to alter items listed on the SHR.

An exemption may, however, be granted to allow designated work by certain persons (including government agencies). A number of specific exemptions have been granted and are applicable to work on the Sydney Harbour Bridge and approaches (NSW Government Gazette, 13 July 2007, number 91), including maintenance and minor repairs required for transport and services and functioning of the bridge, such as modifications to road and rail, pavement resurfacing, track laying, traffic management, and toll collection, and other infrastructure.

The proposal falls within these categories and as such would not require an approval under Heritage Act 1977. RMS has provided the Heritage Branch with a copy of the gazetted exemption for this proposal.

The proposal's potential impacts on the heritage value of the bridge are discussed and assessed in section 6.3 of this document.

4.3.2 Protection of the Environment Operations Act (PoEO)

The Protection of the Environment Operations Act 1997 (PoEO) enforces licences and approvals relating to air, water and noise pollution and waste management. Development requires a license under the Act should it meet the assessment criteria outlined in Schedule 1 of the EPA-licensed activities.

Section 35 of Schedule 1 lists road construction over three kilometres as a scheduled activity. As such an environmental protection license (EPL) would need to be obtained prior to construction. Since this proposal does not involve road construction over three kilometres an EPL would not be required on this basis.

However if greater than 200 kilograms of Category 1 or Category 2 trackable waste (such as asbestos) is to be transferred off-site at any one time an EPL under the Act would need to be obtained prior to commencement of construction.
4.4 Commonwealth legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) a referral is required to the Australian Government for proposed ‘actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix B and chapter 6 of the REF.

Sydney Harbour Bridge is listed as an item of national environmental significance as a National Heritage Place. The assessment of the proposal’s impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Accordingly, the proposal has not been referred to the Australian Government Department of Sustainability, Environment, Water, Population and Communities.

4.5 Confirmation of statutory position

All relevant statutory planning instruments have been examined for the proposal. It is concluded that ISEPP operates to remove the development consent requirements, thereby permitting assessment of the proposal under Part 5 of the EP&A Act.
5. **Stakeholder and community consultation**

This chapter discusses the consultation undertaken to date for the proposal and the consultation proposed for the future. The description contains the consultation strategy used and the issues raised by the community, the Aboriginal community and relevant government agencies and stakeholders.

5.1 **Consultation strategy**

The southern toll plaza precinct upgrade is part of a package of work for the Sydney Harbour Bridge precinct, which are initiatives designed to look after, improve and adapt the Sydney Harbour Bridge to the needs of a modern city, while preserving the beauty and character of the structure and its setting.

RMS has prepared a consultation strategy for the proposal (refer to Appendix C). The consultation strategy is aimed at addressing the community and stakeholder’s information needs with a multi-faceted community engagement and communications program. The program incorporates the following consultation products and activities:

- Letters to stakeholders and residents informing them of the proposal and program.
- Exhibition and display of this REF for stakeholder and community feedback.
- Advertising/marketing to raise awareness and inform drivers of changed traffic conditions, as and if required.

5.2 **Community involvement**

The community strategy for the proposal has identified key stakeholders such as local residents, road users and businesses. Specifically, the strategy incorporates letters to directly affected residents and businesses, the placing of proposal information on the RMS website, newspaper advertisements and signs on the bridge for motorists.

Furthermore, the local community and all interested stakeholders can make a submission on the exhibited REF, and issues raised will be considered and responded to in a submissions report.

5.3 **Aboriginal community involvement**

The proposal has been considered against the requirements of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (RMS, 2011) (PACHCI). This procedure is generally consistent with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW, 2010b). An outline of the procedure is presented in Table 5.1.
Table 5.1  RMS Procedure for Aboriginal cultural heritage consultation and investigation

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>An internal RMS assessment to determine whether a project is likely to affect Aboriginal cultural heritage.</td>
</tr>
<tr>
<td>Stage 2</td>
<td>A preliminary external assessment with limited stakeholder consultation to determine whether a project requires Part 6 approval from the NSW Office of Environment and Heritage under the <em>National Parks and Wildlife Act 1974</em>.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>If approval is required, Aboriginal community consultation and investigation.</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Cultural and archaeological assessments undertaken with the involvement of the Aboriginal community.</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Implementation of the assessment process.</td>
</tr>
</tbody>
</table>

The Aboriginal Cultural Heritage Adviser for RMS Sydney Region has considered the outcomes of the assessments referred to above and has agreed there is no requirement to proceed to Stage 2 of the PACHCI.

Aboriginal cultural heritage impacts are not expected as a result of the proposal (see section 6.7).

5.4  ISEPP consultation

Part 2 of ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Specifically, consultation with the local council is required under the following clauses of ISEPP, in the following circumstances:

- Clause 13, if the development has the potential to impact on council provided infrastructure or services, such as stormwater management services, traffic on roads in the LGA, sewerage systems, water usage, road and footpath excavations.

- Clause 14, if the development has the potential to cause a more than minor or inconsequential impact to a local heritage item (that is not also a State heritage item).

- Clause 15, if the development has the potential to impact flood liable land.

It was considered that the proposal would trigger Clause 13 of the ISEPP as it would have the potential to impact on council provided infrastructure or services, such as, traffic on roads in the LGA and road and footpath excavations.

It was further considered that the proposal would trigger Clause 14 of the ISEPP as it would have the potential to cause a more than minor or inconsequential impact to a local heritage item.

RMS wrote to City of Sydney and Sydney Harbour Foreshore Authority (SHFA) on 13 September 2012 seeking comments on the proposal by 5 October 2012.
As at 31 October 2012 RMS has not received any comments under the ISEPP consultation on the proposal from either City of Sydney or SHFA.

Table 5.2 Summary of ISEPP consultation with the City of Sydney Council and SHFA

<table>
<thead>
<tr>
<th>Clause</th>
<th>Impact</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cl. 13(1)(b) – traffic</td>
<td>The work may generate traffic flows that could affect the existing road system at the southern end of the bridge.</td>
<td>Nil</td>
</tr>
<tr>
<td>Cl. 13(1)(f) – road and footpath excavation</td>
<td>The work would involve upgrading the York and Grosvenor streets intersection.</td>
<td>Nil</td>
</tr>
<tr>
<td>Cl. 14</td>
<td>The work may cause more than a minor or inconsequential impact to a local heritage item (that is not also a State heritage item)</td>
<td>Nil</td>
</tr>
</tbody>
</table>

5.5 Government agency and stakeholder involvement

5.5.1 Sydney Harbour Bridge precinct stakeholder group

The community strategy for the proposal has identified key stakeholders, such as the Sydney Harbour Bridge precinct stakeholder group (see section 5.5); however, the strategy also provides for general community involvement.

Regular round table discussions to inform and consult the stakeholders on proposals specific to the area surrounding the Sydney Harbour Bridge precinct are facilitated by RMS. The proposal is one of a suite of projects being discussed at the round table meetings. The Sydney Harbour Bridge precinct stakeholder group is made up of the following members:

- City of Sydney Council.
- North Sydney Council.
- Sydney Harbour Foreshore Authority.
- Royal Botanic Gardens Trust.
- Sydney Business Chamber.
- Department of Planning and Infrastructure.
- Government Architects Office.
- Bridge Climb.
- Transport for NSW.
- Bicycle NSW.
- North Shore Bicycle Group.
- Housing NSW.
Luna Park.
- State Transit Authority.
- Fort Street Public School.
- Barangaroo Delivery Authority.
- National Trust of NSW.
- RailCorp.
- Conservatorium of Music.
- Pedestrian Council of Australia.
- Sydney Observatory.
- Office of Environment and Heritage.
- Historic Houses Trust.
- Observatory Hill Environmental Education Centre.

On 20 March 2012 RMS provided information on the proposed bridge tolling systems upgrade to the Sydney Harbour Bridge precinct stakeholder group. The key objectives of the proposal were presented along with a rough timeline and an overview of the approval process. Issues raised during the meeting are included in Table 5.3.

Table 5.3 also summarises issues raised during consultation with other key stakeholders for the proposal.

### Table 5.3 Summary of issues raised during consultation with stakeholders

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Issues presented or communicated</th>
<th>Where addressed in REF</th>
</tr>
</thead>
</table>
| City of Sydney | • Supports overall aims of the proposal.  
• The bridge is listed on the NSW State Heritage Register.  
• Toll booths on the approaches to the Sydney Harbour Bridge have a functional relationship solely with the operations of the bridge and once removed from that context their heritage significance would be diminished somewhat. | Noted.  
Section 6.3 |
| Sydney Harbour Foreshore Authority | • Provisions made for pedestrians and cyclists in the concept design  
• Provision of a bus layover.  
• Would the design affect heritage items in the area?  
• There needs to be consideration into the equity of north versus south tolling charges. | Heritage impact statement was prepared for the proposal and found the removal of the toll booths would have minimal impact.  
Section 6.3  
Section 6.1  
Section 6.1  
Section 6.3 |
| Sydney Harbour Bridge precinct stakeholder group | | Beyond the scope of this proposal |
5.5.2 Heritage Office

RMS met with Heritage Office on 26 March 2012 and 8 October 2012 to advise of any potential heritage impacts of the proposal. Heritage Office raised no objections or issues to the proposal.

This included informing Heritage Office of the tolling system upgrade project and proposed changes to the southern toll plaza precinct. This would involve changes within the State Heritage Register curtilage area adjacent to State Heritage Register items (such as Observatory Hill and the Sydney Harbour Bridge itself) which need to consider the sensitivity to existing views to and from those State Heritage Register items.

Heritage Office raised no objections or issues to the proposal.

5.6 Ongoing or future consultation

Ongoing consultation with the precinct stakeholder groups is proposed during the REF exhibition and subsequent stages of the proposal.

5.6.1 Display of the REF

This REF would be on display for comment at three locations (City of Sydney, North Sydney Council and the RMS North Sydney office) and would be available for download over the internet. Submissions would be accepted for a period of 28 calendar days.

5.6.2 Future consultation activities

Consultation would continue with council, potentially affected residents and business owners/operators, the community and other stakeholders throughout the design and construction phases of the proposal.

A range of communication tools would be used, including:

- Future media releases as required.
- Roundtable meetings with the Sydney Harbour Bridge precinct stakeholders, as outlined in Table 5.2.
- Letters to stakeholders and local residents and businesses informing them of the proposal and program.
- Meetings with NRMA and other relevant organisations not already briefed by the Sydney Harbour Bridge roundtable meetings.
- Variable message signs would be used to manage traffic changes during construction.
- Advertisements would also be placed in newspapers such as the Sydney Morning Herald, Daily Telegraph and North Shore Times to advise motorists of major traffic changes.
6. Environmental assessment

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guideline *Is an EIS required?* (DUAP, 1999) and *Roads and Related Facilities* (DUAP, 1996) as required under clause 228(1)(b) of the *Environmental Planning and Assessment Regulation 2000*. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* is also considered in Appendix B. Site-specific safeguards are provided to ameliorate the identified potential impacts.

6.1 Traffic

6.1.1 Existing environment

Road network

The Sydney Harbour Bridge is a critical element of Sydney’s orbital motorway system and a major part of Sydney’s infrastructure to provide rapid movement of general traffic and buses from either side of the harbour. The road network includes:

- The Gore Hill Freeway: a multi-lane dual carriageway between Lane Cove Tunnel, Lane Cove and the Warringah Freeway, Naremburn.
- The Bradfield Highway: road traffic lanes 1 to 8 on the Sydney Harbour Bridge and approaches.
- The Cahill Expressway.

In the citybound direction traffic can enter the Warringah Freeway at:

- Reserve Road Artarmon.
- Brook Street, Cammeray.
- Miller Street, Cammeray.
- Ernest Street, Cammeray.
- Falcon Street/Military Road, Neutral Bay.
- Mount Street, North Sydney.
- High Street, Kirribilli.
In the citybound direction traffic can exit the network at:

- Reserve Road Artarmon.
- Falcon Street, Neutral Bay.
- Alfred Street North, Kirribilli.

**Lane configurations**

There are eight traffic lanes on the Sydney Harbour Bridge. Lanes 1 to 6 comprise the Bradfield Highway and connect the Warringah Freeway to the Western Distributor and northern CBD. The Cahill Expressway diverges from lanes 7 and 8 on the Sydney Harbour Bridge and links the Warringah Freeway in the north and the Eastern Distributor in the south. Lanes 1 to 6 operate on a tidal flow basis which has flexible medians to allow changes to the lane directions depending on traffic volumes.

At the toll booths the Bradfield Highway widens from eight lanes to up to 15 lanes. The bridge has an eastern ramp and a western ramp to provide access to and from the northern Sydney CBD via Grosvenor Street and York Street, respectively.

In the AM peak the eastern ramp provides access to Grosvenor Street for general traffic and to York Street for bus lane users and the western ramp provides access to York Street for general traffic.

Outside the AM peak the eastern ramp provides access to Grosvenor Street and York Street for all traffic and the western ramp provides access to the Sydney Harbour Bridge for all traffic from Grosvenor Street.

The Sydney Harbour Bridge bus lane (lane 7) provides access for bus lane users to the eastern ramp and the Western Distributor via its connection through the eastern-most toll booth.

Southbound motorists entering, exiting or already on the network between Lane Cove and Kirribilli need to either change lanes, merge or diverge or a combination of these movements to get to their destination on the southern side of the Sydney Harbour Bridge (or Kirribilli).

Southbound traffic from the bridge has the following possible destinations:

- Eastern suburbs via Cahill Expressway.
- Northern Sydney CBD via Grosvenor Street or Cahill Expressway.
- City centre via York Street.
- City south, Darling Harbour, ANZAC Bridge via Western Distributor.

Traffic bound for the Western Distributor then chooses between ANZAC bridge and city south/Darling Harbour.

Motorists seeking any of these destinations are required to consider various lane configurations at different times of the day, negotiate heavy traffic flows and the existing toll booths. As a result, many lane changes and merges are made by motorists leading to congestion and inconsistent flow. This contributes to the number and types of crashes on the bridge and approaches (refer to crash data presented below).

The western ramp provides general traffic access to York St in the AM peak and northbound access from Grosvenor Street to the bridge outside the AM peak.
Northbound vehicles are required to merge prior to and within the southern toll plaza precinct to travel across the Sydney Harbour Bridge. This causes queuing and delays on all approach roads during AM and PM peak periods.

Traffic coming from different areas of the city is required to merge as follows:

- Grosvenor Street merges from two lanes into one (outside AM peak periods).
- Clarence Street merges with Grosvenor Street and/or Kent Street.
- Kent Street bus and traffic lanes merge.
- Cahill Expressway merges with Kent Street.
- Western Distributor merges with Grosvenor and Clarence streets.

**Speed limits**

The speed limit on the Sydney Harbour Bridge and the Western Distributor is 70 kilometres per hour, reducing to 40 kilometres per hour southbound through the toll plaza precinct.

**Traffic volumes**

Traffic volumes for the bridge for AM and PM peak periods are shown in Table 6.1. The traffic volumes are based on the Warringah Freeway Traffic Modelling Report 23 October 2012, provided in Appendix D.

For the purposes of this table, lanes 1 to 6 are referred to as Sydney Harbour Bridge and lanes 7 and 8 are referred to as the Cahill Expressway.

**Table 6.1 Existing (observed) peak hourly traffic volumes (vehicles/hour)**

<table>
<thead>
<tr>
<th>Location</th>
<th>SHB northbound</th>
<th>SHB southbound</th>
<th>Cahill Expressway southbound</th>
<th>Total southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AM peak</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07:00-08:00</td>
<td>NA*</td>
<td>5,174</td>
<td>2,585</td>
<td>7,759</td>
</tr>
<tr>
<td>08:00-09:00</td>
<td>NA*</td>
<td>5,404</td>
<td>2,610</td>
<td>8,014</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>NA*</td>
<td>3,842</td>
<td>1,883</td>
<td>5,725</td>
</tr>
<tr>
<td>TOTAL</td>
<td>NA*</td>
<td>14,420</td>
<td>7,078</td>
<td>21,498</td>
</tr>
<tr>
<td><strong>PM peak</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>6,255</td>
<td>2,764</td>
<td>2,009</td>
<td>4,773</td>
</tr>
<tr>
<td>17:00-18:00</td>
<td>6,973</td>
<td>3,030</td>
<td>2,367</td>
<td>5,397</td>
</tr>
<tr>
<td>18:00-19:00</td>
<td>6,720</td>
<td>2,492</td>
<td>1,970</td>
<td>4,462</td>
</tr>
<tr>
<td>TOTAL</td>
<td>19,948</td>
<td>8,286</td>
<td>6,346</td>
<td>14,632</td>
</tr>
</tbody>
</table>

*Note – data records for the northbound AM peak were not available due to corrupted data.
The AM peak volumes exceed 8,000 vehicles per hour (vehicles/hour) between 8am and 9am southbound.

The PM peak volumes approach 5,500 vehicles/hour between 5pm and 6pm southbound and 7,000 vehicles/hour between 5pm and 6pm northbound.

**Traffic conditions**

Currently, high traffic volumes and incidents can result in congestion on both approaches to the bridge during the AM and PM peak periods and other times. Southbound traffic flow to the bridge is constrained by lane changing and merging at a number of locations such as the approach to the southern toll plaza.

During the AM peak, it generally takes about six to 10 minutes to travel from the Gore Hill Freeway to the Western Distributor or northern Sydney CBD.

During the PM peak, it generally takes about six to 11 minutes to travel from the Gore Hill Freeway to the Western Distributor or northern Sydney CBD.

The Transport Management Centre (TMC) manages the lane configuration on and approaching the bridge and responds to congestion and incidents to optimise traffic flow at all times of the day.

**Bus services**

Currently up to 374 private and government bus services in the AM peak period use the Bradfield Highway to cross the bridge and drop passengers at Wynyard bus stops – this includes:

- Mosman 243-248, 249.
- Epping Rd/Lane Cove 251-2354,261,285-297.
- Pittwater L88, L90,E86-E89.
- Hillsbus (West) 607X-617X,M61.
- Hillsbus (East) 620-652X.
- Eastern Valley Way 204-206, 210, 272.
- M20, M30,M40.
- Bondi Junction 200.

Travel times for buses are based on average speeds derived from the system developed by RMS called the Public Transport Information and Priority System (PTIPS) which monitors bus travel times.

Travel time for buses southbound from Gore Hill Freeway to York Street in the AM peak is an average of about 14 minutes.

During the PM peak the travel times for buses along the same section of road is an average of about nine minutes.
Bus services from the Warringah Freeway to York Street have increased over the last few years since 2004 when data was collected, with some routes increasing timetabled services and new routes being introduced, in particular the MetroBus services. The decommissioning of manual collection and the automation of the tolls has meant that traffic moves at a higher and more constant flow through the toll booths, making it more difficult for buses to pass through gaps in traffic from the bridge’s main deck. The effect of these changes has been an increase in the travel time to the CBD in the AM peak period for bus travellers.

However in the PM peak there has been little change in bus services or travel time, as southbound is the off-peak direction in the evening and buses have historically not been constrained when entering York Street.

**Eastern ramp**

During the AM peak period, high volumes of bus traffic travelling from the Sydney Harbour Bridge bus lane (lane 7) to York Street cross high volumes of general traffic travelling to Grosvenor Street along the eastern ramp. Buses enter this ramp from the left side of the carriageway and exit on the right side, while general traffic from the main deck of the Sydney Harbour Bridge enter the ramp on the right side of the ramp, and exit on the left side.

The merge and crossover of traffic restricts the flow of buses and general traffic on the eastern ramp due to the short distance available (approximately 50 metres) for the high volume of traffic to cross over.

**Western ramp**

The western ramp is located between the southbound and northbound viaducts of the Western Distributor and connects the Sydney Harbour Bridge to the intersection of Grosvenor and York streets. In the AM peak the western ramp provides one-way access to the city centre via York Street for general traffic.

At all other times the western ramp provides one-way access from the Sydney CBD via Grosvenor Street and Clarence Street to the Sydney Harbour Bridge.

**Lane 7 access to northern Sydney CBD and Western Distributor**

Traffic from High Street can access the bridge directly via a ramp to lane 8 of the Sydney Harbour Bridge.

In non-peak periods traffic in lane 8 is permitted to change to lane 7 to the south of the southern pylon of the Sydney Harbour Bridge to access the northern Sydney CBD (either Grosvenor Street or York Street) via the eastern ramp or to the Western Distributor.

In peak periods traffic from High Street must access the northern Sydney CBD (either Grosvenor Street or York Street) or the Western Distributor via the lanes 3-6 of the Sydney Harbour Bridge. This means detouring via Arthur and Mount streets to join the Warringah Freeway.
York and Grosvenor Streets intersection level of service

Modelling of the intersection of York and Grosvenor streets was undertaken to establish the existing level of service and forecast the potential impacts of the proposal during the AM and PM peak periods. Refer to Warringah Freeway Traffic Modelling Report provided in Appendix D. Table 6.2 lists the various traffic movements at the intersection.

Level of service is a basic performance parameter used to describe the operation of an intersection. Levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues). Levels of service take into account factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, volume/capacity ratios, terrain types, proportion of heavy vehicles and road gradient (Austroads, 2009).

RMS considers a level of service of D or better to be acceptable.

Table 6.2 Modelled average hourly traffic flows at intersection of York and Grosvenor streets

<table>
<thead>
<tr>
<th>Location</th>
<th>AM Peak</th>
<th>PM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grosvenor St to SHB northbound via western ramp (reversible)</td>
<td>0</td>
<td>543</td>
</tr>
<tr>
<td>Southbound eastern ramp left into Grosvenor St</td>
<td>1229</td>
<td>555</td>
</tr>
<tr>
<td>Southbound western ramp to York St</td>
<td>822</td>
<td>0</td>
</tr>
</tbody>
</table>

The intersection currently performs at level of service B. The intersection layout allows for the following traffic movements:

- Left turn from eastern ramp southbound to Grosvenor Street at all times.
- Access from Grosvenor St to Sydney Harbour Bridge via western ramp outside the AM peak.
- Access for southbound traffic via the western ramp to York Street during the AM peak only.
- Access for southbound traffic via the eastern ramp to York Street outside the AM peak.

Parking and operational area

Currently there are provisions for parking for about 10 vehicles on the eastern side of the bridge and in the central area of the toll plaza precinct. The areas are used by maintenance staff and other bridge personnel to perform various functions, emergency services personnel and tow truck services in readiness for any emergency functions or breakdowns on the bridge.

The operational area near Observatory Park off Bradfield Highway on the western side, marked on Figure 3.1 is currently utilised by RMS for maintenance and other bridge activities as well as by emergency services as a holding area in case of emergencies and breakdowns.
Cyclist and pedestrian access

A cycleway currently crosses the bridge on the western side which cyclists access via Kent Street cycleway, across Clarence Street intersection then via a shared path running alongside the Bradfield Hwy on Upper Fort Street and a ramp onto the Bridge. It can also be accessed via stairs from Argyle Street to the cycleway and via Milsons Point.

A pedestrian only path is located on the eastern side of the bridge and is accessed via stairs from Cumberland Street.

There are signalised pedestrian crossings of Grosvenor Street and York Street.

There is an uncontrolled crossing of Grosvenor Street at Clarence Street linking the pedestrian underpass between Grosvenor Street and Kent Street to York Street and the northern Sydney CBD near Lang Park.

Crash history

Crash data on the Sydney Harbour Bridge was taken from the NSW Centre for Road Safety for the period 1 January 2001 to 31 December 2010. An analysis of the crash data is provided in Table 6.3 and a further breakdown of crash types is presented in Table 6.4.

Table 6.3 Accident data

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Injury crashes</td>
<td>194</td>
<td>52%</td>
</tr>
<tr>
<td>Non-casualty crashes</td>
<td>178</td>
<td>47.7%</td>
</tr>
<tr>
<td>Total</td>
<td>373</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4 Crash type

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nose to tail</td>
<td>209</td>
<td>56.0%</td>
</tr>
<tr>
<td>Lane change</td>
<td>53</td>
<td>14.2%</td>
</tr>
<tr>
<td>Hit object on road</td>
<td>22</td>
<td>5.9%</td>
</tr>
<tr>
<td>Fine weather</td>
<td>273</td>
<td>73.2%</td>
</tr>
<tr>
<td>During daylight</td>
<td>238</td>
<td>63.8%</td>
</tr>
<tr>
<td>On Weekdays</td>
<td>294</td>
<td>78.8%</td>
</tr>
</tbody>
</table>

The crash statistics indicate that lane changing or nose to tail makes up about 70 per cent of all crashes. The current traffic conditions including the presence of complex traffic movements and inconsistent speed limit and vehicle speeds may contribute to these types of crashes.
6.1.2 Potential construction impacts

Most construction activities would require the temporary closure of one or more traffic lanes and traffic diversions.

The majority of work would be carried out at night and on weekends when lanes can be closed without impacting peak period traffic. At other times, work would be carried out where it does not have an unacceptable impact on peak period traffic flow. This would include work such as concrete median removal and construction, lighting tower installation, pavement construction and the intersection upgrade.

RMS would seek to program major specialist work tasks requiring multiple lanes, partial or full carriageway closures during periods of reduced traffic volumes such as school holidays, weekends and at night to minimise the impact on the travelling community.

Partial or full carriageway closures may result in the need to implement detours or route closures. This would potentially impact the passage of emergency services, buses, oversized vehicles or vehicles carrying dangerous goods that are not permitted to use the Sydney Harbour Tunnel by increasing their travel time and distance. It would also potentially increase the volume of traffic on alternative routes and/or public transport.

Access would be maintained for emergency response vehicles. If a stage of the work restricts access from any approach to the Sydney Harbour Bridge alternative arrangements would be developed in consultation with the relevant emergency services.

RMS regularly conducts work on the Sydney Harbour Bridge that requires complex traffic management. A suite of traffic and transport management plans have been developed for such activities.

These plans would be implemented where appropriate and new plans developed for any activities that would not be covered by those plans.

A range of control measures would be used to manage traffic:

- Traffic control devices would be installed in accordance with the Traffic control at work sites manual (RTA, 2010) and Australian Standard 1742.3 (Manual of uniform traffic control devices).
- Road occupancy licences would be obtained prior to implementation of any lane closures.

It is estimated that during construction there would be about 25 truck and 15 light vehicle movements per shift to and from the site. Specific details of these movements would be identified through the traffic management plan.

The potential impacts on cyclists and pedestrians would be limited to roads on the southern side of the Sydney Harbour Bridge (Clarence Street, York Street, Grosvenor Street and Kent Street). A pedestrian access and management plan would be developed to address potential impacts.

Measures to communicate lane closures as well as cyclist, pedestrian and traffic impacts to stakeholders and the broader community would be included in the proposal’s communication plan. Appropriate signs would be used to advise motorists of work being undertaken and manage traffic through the worksite.
6.1.3 Potential operational impacts

The proposal would generally involve realigning and rationalising the traffic lanes between the Sydney Harbour Bridge and the Western Distributor/northern Sydney CBD, reconfiguring the intersection of York and Grosvenor streets and widening the eastern ramp to York Street. Refer to Figure 3.1.

A micro-simulation traffic model (Paramics) has been undertaken for the proposal by GHD. The model was used to forecast the potential impacts of the proposal on traffic between the Gore Hill Freeway and the Western Distributor. A report 'Warringah Freeway Traffic Modelling Report' on the model results is provided in Appendix D.

A model of the existing network based on various traffic data surveys undertaken in 2004, 2010 and 2011 was used to forecast the potential traffic impacts of the proposal as described in section 2.4 of this REF. Details of traffic survey data are included in the GHD report in Appendix D.

The traffic modelling undertaken for the proposal forecasts the following:

- General traffic travel times would decrease in the AM peak.
- Bus travel times would decrease in the AM peak.
- Bus reliability improvements in the AM peak.
- Minimal impacts on the operation of the Grosvenor/York Street intersection in the AM peak with no impacts in the PM peak.

Forecast traffic flow

Forecast traffic volumes that have been modelled for the proposal are shown in Table 6.5. For the purposes of this table, lanes 1 to 6 are referred to as Sydney Harbour Bridge and lanes 7 and 8 are referred to as the Cahill Expressway.

<table>
<thead>
<tr>
<th>Location</th>
<th>SHB northbound</th>
<th>SHB southbound</th>
<th>Cahill Expressway southbound</th>
<th>Total southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07:00-08:00</td>
<td>5,236</td>
<td>5,069</td>
<td>2,552</td>
<td>7,621</td>
</tr>
<tr>
<td>08:00-09:00</td>
<td>5,363</td>
<td>5,438</td>
<td>2,610</td>
<td>8,048</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>5,686</td>
<td>3,937</td>
<td>2,023</td>
<td>5,960</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16,285</td>
<td>14,444</td>
<td>7,185</td>
<td>21,629</td>
</tr>
<tr>
<td>PM Peak</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00-17:00</td>
<td>6,241</td>
<td>2,864</td>
<td>1,973</td>
<td>4,837</td>
</tr>
<tr>
<td>17:00-18:00</td>
<td>7,107</td>
<td>3,121</td>
<td>2,472</td>
<td>5,593</td>
</tr>
</tbody>
</table>
Sydney Harbour Bridge – southern toll plaza precinct upgrade

Review of environmental factors

<table>
<thead>
<tr>
<th>Location</th>
<th>SHB northbound</th>
<th>SHB southbound</th>
<th>Cahill Expressway southbound</th>
<th>Total southbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>18:00-19:00</td>
<td>6,891</td>
<td>2,573</td>
<td>1,849</td>
<td>4,422</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20,239</td>
<td>8,558</td>
<td>6,294</td>
<td>14,852</td>
</tr>
</tbody>
</table>

**General traffic movements AM peak**

Under the proposal, access to the northern Sydney CBD and city centre from the Sydney Harbour Bridge main deck could be provided in one of two ways by directing traffic via either the eastern or western ramp during the AM peak period.

Access to:
- York Street could be directed via either the eastern or via the western ramp.
- Grosvenor Street would be directed via the western ramp (at all times of the day).
- The Western Distributor would continue to be provided (at all times of the day).

These are shown in Figures 2.5 and 2.6

During the AM peak, it is forecast that it would take about 6 to 10 minutes to travel from the Gore Hill Freeway to the Western Distributor or northern Sydney CBD.

**General traffic movements PM peak**

Under the proposal access to the northern Sydney CBD and city centre from the Sydney Harbour Bridge main deck would be provided as follows:

Access to:
- York Street would be directed only via the eastern ramp outside the AM peak.
- Grosvenor Street would be directed via the western ramp (at all times of the day).
- The Western Distributor would continue to be provided (at all times of the day).

This is shown in Figure 2.7.

During the PM peak, it is forecast that it would take about 6 to 11 minutes to travel from the Gore Hill Freeway to the Western Distributor or northern Sydney CBD.

The modelling forecasts that there would be some moderate improvements to travel times of up to two minutes as a result of the proposal in both the AM and PM peaks in the southbound direction.

Traffic movements northbound onto the Sydney Harbour Bridge would generally remain unchanged.

**Lane 7 access to northern Sydney CBD and Western Distributor**

Under the proposal it would not be physically possible to cross from lane 7 to the western ramp at any time.
Under the proposal it general traffic would not be permitted to turn left from the eastern ramp to Grosvenor Street at any time. Therefore the only access to Grosvenor Street would be via the western ramp.

This means that traffic wishing to go from High Street, North Sydney to Grosvenor Street would be required to continue along High Street, turn right into Arthur Street then right into Mount Street then right onto Bradfield Highway and come across the bridge and then use to the western ramp to exit to Grosvenor Street at all times through the day.

An alternative would be for vehicles to continue to use the eastern ramp (as they do now), continue to York Street, turn left at Lang Road (or a subsequent road) then left or right at Grosvenor Street.

**Bus travel times**

Bus priority lanes and facilities would be established to the east of the general traffic lanes on the eastern ramp. This would involve extending the Sydney Harbour Bridge bus lane to York Street and establishing an additional bus lane beside it. Bus readiness bays and an associated bus access lane would also be established on the eastern edge of the ramp for use in the PM peak. See Table 6 of the modelling report in Appendix D.

**AM peak**

Travel times would improve by up to four minutes in the AM peak. The new lane configuration approaching the intersection of York and Grosvenor streets would provide buses the opportunity to pass those queuing along York Street between Grosvenor Street and Jamison Street.

Bus connectivity would be improved by extending the AM and PM bus lane on the Sydney Harbour Bridge towards York Street and removing the cross over with general traffic on the eastern ramp.

The forecast improvement in bus connectivity would support other transport projects under investigation by TfNSW in the Wynyard precinct.

**PM peak**

Bus travel times during the PM peak are not forecast to change noticeably. Establishing bus readiness bays would enable buses approaching the city to commence outbound services in the PM peak to stop as close as possible to Wynyard. This would improve service reliability by minimising delays to buses entering the Wynyard precinct while minimising the number of buses in the CBD.

**Intersection of York and Grosvenor streets**

The intersection of York and Grosvenor streets would be reconfigured to enable general traffic access to Grosvenor Street via the western ramp.

The proposed redirection of Grosvenor Street traffic to the western ramp would mean that the bus lane on the Sydney Harbour Bridge could be continued directly through to York Street without crossing over traffic lanes.

An analysis of the intersection of York Street and Grosvenor Street was undertaken using the SIDRA intersection modelling software to identify the potential impacts of the proposal on the level of service for the intersection. The analysis considers the intersection in isolation to the
network and does not take into account the effects of upstream or downstream queuing which may affect the flow of traffic to the intersection.

Table 6.6 shows the forecast level of service for the intersection under the proposed changes.

Level of service is a basic performance parameter used to describe the operation of an intersection. Levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues). Levels of service take into account factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, volume/capacity ratios, terrain types, proportion of heavy vehicles and road gradient (Austroads, 2009). A level of service of D or better is considered acceptable.

The model forecast that the intersection would operate at a level of service C in the AM peak and B in the PM peak which would be a minor degradation of level of service in the AM peak but still remain acceptable.

**Table 6.6 Level of service for intersection of York and Grosvenor streets under the proposal**

<table>
<thead>
<tr>
<th></th>
<th>AM peak</th>
<th></th>
<th>PM peak</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average delay (s)</td>
<td>LoS</td>
<td>Average delay (s)</td>
<td>LoS</td>
</tr>
<tr>
<td>Split ramps</td>
<td>32</td>
<td>C</td>
<td>27</td>
<td>B</td>
</tr>
<tr>
<td>Western ramps</td>
<td>35</td>
<td>C</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

The York Street/Grosvenor Street intersection would be optimised to manage queue lengths on the ramps to minimise the likelihood of traffic queuing back onto the Western Distributor.

Signal phase timings at this intersection would be adjusted to maximise priority for buses heading south on York Street to minimise the likelihood of traffic queuing back onto the Western Distributor.

**Improvements to safety**

Removal of the toll booths would lower the likelihood and severity of crashes by removing an hazard within the travel path of vehicles on the bridge. Although there would be some hazards reinstated as part of this work (such as a gantry support frame), this structure would be outside the designated travel path and would be protected by safety barriers.

Bus lane users in lane 7 of the Sydney Harbour Bridge would still be permitted to cross lanes (weave) to access the Western Distributor during peak periods. All traffic would be permitted to cross lanes (weave) to access the Western Distributor in non-peak periods.

The proposed 70 kilometres per hour speed zone would result in a potential safety benefit as it would be consistent with the speed zone on the Sydney Harbour Bridge and the Western Distributor.
The proposed speed limit increase has the potential to result in more severe crashes. However this would be mitigated by:

- The realignment of the lanes.
- The removal of road safety hazards.
- Improved delineation and way finding signage.
- Non-variable exit ramps to each of York and Grosvenor streets.
- A new road surface.

**Cyclists and pedestrians**

A new signalised crossing on the loop road connecting Clarence Street to York Street would improve access for cyclists and pedestrians between Kent St and York Street.

The existing crossings of York Street and Grosvenor Street would be retained in a similar form.

### 6.1.4 Safeguards and management measures

The following safeguards and management measures would be undertaken to avoid, minimise or mitigate the potential air quality impacts of the construction activities.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Traffic       | - A traffic management plan would be prepared for the proposal. The plan would detail specific arrangements for lane closures, traffic control and vehicle access. It would be consistent with the requirements of the RTA *Traffic Control at Worksites Manual*. Measures would include but not be limited to the following:  
  o Traffic control devices which would be installed in accordance with the *Traffic control at worksites manual* (RTA, 2010) and Australian Standard 1742.3 (Manual of uniform traffic control devices).  
  o Road occupancy licences which would be obtained prior to implementation of any lane closures.  
  o Specialist work tasks requiring multiple lanes, partial or full carriageway closures or other diversions, which would be undertaken during periods of reduced traffic volumes such as | Project manager and TMC | Pre-construction and construction |
6.2 Noise and vibration

A noise and vibration impact assessment for the proposal has been prepared by SLR Global Environmental Solutions, which is available in Appendix E. A summary of this follows in this section.

6.2.1 Existing environment

The study area as shown in Figure 6.1 is primarily a heavily trafficked road corridor and the main sources of noise are from the road and rail traffic using the bridge. The existing noise levels in the study area are generally high to very high depending on the time of day. Traffic volumes for the Bradfield Highway are presented in Table 6.1.
The proposal is surrounded by a wide range of commercial, urban, residential and industrial land uses. The tolerance of occupants to noise and vibration varies according to the type of land use and the activities performed within the affected premises. Receivers may be classified into the following categories:

- Sensitive receivers - residential & other (for example schools, museums, hospitals, places of worship, heritage items, recreation areas and parks).
- Commercial.
- Industrial.

More details regarding noise sensitive receivers in the study area are presented in Table 2 of the SLR report in Appendix E.

The proposal is surrounded by the Millers Point Conservation Area, which contains many heritage listed places and items. Older buildings, including heritage buildings, are particularly prone to vibration impacts.

Environmental noise monitoring was carried out over a minimum period of one week at three representative locations during July and August 2012 to characterise the existing ambient noise environment across the study area and to establish existing background noise levels. The noise monitoring locations are shown in Figure 6.1.
Figure 6.1 Sensitive noise receptors located in the vicinity of the proposal

Note: the red lines delineate the study area which is divided into a series of work areas defined for the noise impact assessment for the purpose of modelling (source: SLR 2012)
Background noise levels

The results of the unattended noise monitoring are summarised in Table 6.8. The rating background level (RBL) refers to the single overall background noise level measured in each relevant assessment period (day, evening or night), while LAeq refers to the average noise level evaluated over a 15 minute period and is used to assess the potential construction noise impacts.

Table 6.8  Summary of unattended noise logging and noise management levels

<table>
<thead>
<tr>
<th>Location (as per Figure 6.1)</th>
<th>Description</th>
<th>Daytime 7 am to 6 pm</th>
<th>Evening 6 pm to 10 pm</th>
<th>Night-time 10 pm to 7 am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>Noise Level (dBA)</td>
<td>RBL</td>
<td>LAeq</td>
<td>RBL</td>
</tr>
<tr>
<td>NM-S01 Level 5 Observatory Tower 168 Kent Street</td>
<td>69</td>
<td>72</td>
<td>67</td>
<td>70</td>
</tr>
<tr>
<td>NM-S02 Level 6 Science House 157 Gloucester Street</td>
<td>69</td>
<td>73</td>
<td>67</td>
<td>71</td>
</tr>
<tr>
<td>NM-S03 36 Cumberland Street</td>
<td>61</td>
<td>66</td>
<td>61</td>
<td>65</td>
</tr>
</tbody>
</table>

Note 1: Noise logging at 36 Cumberland Street (NM-S03) was conducted in 2007.

Attended ambient noise monitoring was also undertaken in 15 minute intervals at the same locations as the noise loggers to determine noise levels from the various noise sources in the vicinity including maximum noise levels. The ambient noise environment was dominated by general traffic on the Bradfield Highway and Western Distributor. The traffic noise level was typically between 71 dBA and 75 dBA with short term noise events up to 85 dBA due to loud vehicles such as buses, trucks, motorbikes and loud cars.

Bus readiness bays

Bus readiness bays are proposed as part of the Sydney Harbour Bridge southern toll plaza precinct upgrade on the eastern side of the eastern ramp between lane 7 and Grosvenor Street. It is proposed to provide bays for Wynyard services for up to 12 buses. The daytime, evening and night-time background levels for the bus bays would be equivalent to those at NM-S02 at 157 Gloucester Street as presented in Table 6.8.
6.2.2 Criteria

Construction noise criteria

The NSW Office of Environment and Heritage (OEH) identifies construction noise goals and suggested construction noise management strategies in the Interim Construction Noise Guideline (ICNG) (DECC, 2009). The guideline has been developed to assist with the management of noise impacts and provides recommendations for proposal noise goals for construction activities. The ICNG recommends standard hours for construction work as:

- Monday to Friday: 7am to 6pm.
- Saturday: 8am to 1pm.
- Sunday and public holidays: no work.

Where construction work is required outside these hours, this would need to be justified (for example the need to undertake work during periods of low traffic flow for highly congested areas) and additional noise mitigation and management measures would be applied as necessary.

Construction noise management levels (NML) are identified in the guideline for noise affected residential receivers as summarised in Table 6.9. Table 6.9 also identifies the measures needed when the criteria are exceeded. To assess sleep disturbance the night-time goal of RBL +15 dBA has been used.

Table 6.9 Noise management levels at residences

<table>
<thead>
<tr>
<th>Time of day</th>
<th>NML $L_{Aeq}$ (15 minute)</th>
<th>What to do when criteria are exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard hours</td>
<td>• RBL + 10 dB (noise affected)</td>
<td>• Apply all feasible and reasonable work practices to bring the level back to the NML</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Inform potentially impacted residents of the nature of the work, expected noise levels, duration and provide contact details</td>
</tr>
<tr>
<td>Standard hours</td>
<td>• 75 dBA (highly noise affected)</td>
<td>• Apply respite periods during noisy work and take into account:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o The times identified by the community as to when they are less noise affected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o If the community is prepared to accept a longer period of construction in exchange for restrictions on construction time.</td>
</tr>
<tr>
<td>Outside standard hours</td>
<td>• RBL + 5 dB (noise affected)</td>
<td>• Apply all feasible and reasonable work practices to bring the level back to the NML</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Where all feasible and reasonable practices have been applied and noise is more than 5 dB above the noise affected level, negotiation will be required with the community</td>
</tr>
</tbody>
</table>
The NMLs apply at any property boundary that is exposed to construction noise, at a height of 1.5 metres above ground level. In cases where the property boundary is more than 30 metres from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 metres of the residence. Table 4 of the SLR report in Appendix E sets out more details of the NMLs from the ICNG.

The ICNG also identifies NMLs for other sensitive land uses as presented in Table 6.10.

Table 6.10 ICNG – other sensitive land uses

<table>
<thead>
<tr>
<th>Land use</th>
<th>NML L\text{Aeq} (15 minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms at schools and other educational facilities</td>
<td>45 dBA (internal)</td>
</tr>
<tr>
<td>Hospital wards and operating theatres</td>
<td>45 dBA (internal)</td>
</tr>
<tr>
<td>Places of worship</td>
<td>45 dBA (internal)</td>
</tr>
<tr>
<td>Active recreation areas</td>
<td>65 dBA (external)</td>
</tr>
<tr>
<td>Passive recreation areas</td>
<td>60 dBA (external)</td>
</tr>
<tr>
<td>Community Centres</td>
<td>Depends on the intended use of the centre. Refer to the recommended “maximum” internal levels in AS2107 for specific uses.</td>
</tr>
</tbody>
</table>

**Ground-borne noise**

Ground-borne (or regenerated) construction noise can be present on construction projects where vibration from activities such as sawcutting and demolition of concrete pavement, kerbs, medians and traffic barriers can be transmitted through the ground and into the habitable areas of nearby buildings. Ground-borne noise occurs when this vibration in the ground and/or building elements is regenerated as audible noise within areas of occupancy inside the building.

The ICNG defines internal ground-borne noise goals for residential receivers as 40 dBA L\text{Aeq}(15 minute) during the evening (6pm to 10pm) and 35 dBA L\text{Aeq}(15 minute) during the night-time (10pm to 7am). The goals are only applicable when ground-borne noise levels are higher than airborne noise levels.

**Construction vibration criteria – human comfort**

*Assessing Vibration - a technical guideline* (DECC, 2006) provides guidance on disturbance to human occupants of buildings as a result of vibration. This document provides criteria which are based on the British Standard BS 6472-1992, *Evaluation of human exposure to vibration in buildings* (1-80Hz), and is recognised by OEH as the preferred standard for assessing the 'human comfort'. The vibration dose values recommended by the guideline are presented in Table 6.11.
<table>
<thead>
<tr>
<th>Location</th>
<th>Daytime (7am-10pm)</th>
<th>Night-time (10pm-7am)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preferred value</td>
<td>Maximum value</td>
</tr>
<tr>
<td>Critical areas</td>
<td>0.10</td>
<td>0.20</td>
</tr>
<tr>
<td>Residences</td>
<td>0.20</td>
<td>0.40</td>
</tr>
<tr>
<td>Offices, schools, educational institutions and places of worship</td>
<td>0.40</td>
<td>0.80</td>
</tr>
<tr>
<td>Workshops</td>
<td>0.80</td>
<td>1.60</td>
</tr>
</tbody>
</table>

### Construction vibration criteria – structural damage

The Australian Standard AS2187.2-2006 *Explosives – Storage, Transport and Use* provides guidance for the assessment of structural damage to buildings caused by vibration. This part of the standard is based on the British Standard 7385: Part 2 *Evaluation and measurement of vibration in buildings* and is used as a guide to assess the likelihood of building damage on commercial or residential properties from ground borne vibration including piling, compaction or other construction equipment. The vibration criteria levels from BS 7385 above which cosmetic damage might occur for residential and commercial structures is approximately 50 millimetres per second (mm/s).

### Operational noise criteria

The assessment of noise impacts for road projects is guided by the OEH New South Wales Road Noise Policy (RNP) (DECCW, 2011). The RMS provides additional information in the Environmental Noise Management Manual (ENMM) (RTA, 2001) to assist in the application of the criteria and the development of noise mitigation measures where required.

The criteria for the assessment of road traffic noise outlined in the RNP are supplemented with ‘interim approaches’ developed by RMS to implement the new policy provisions. These interim approaches outline how the provisions in the ENMM apply to the requirements of the RNP.

Under the RNP, road development is either classified as ‘new road’ or ‘redevelopment of an existing road’. Each road classification has base criteria for both day and night-time assessment periods. The consideration of a lower set of criteria for night-time in both cases is in recognition of the quality of the noise environment necessary for restful sleep.

The work associated with the proposal is entirely within the existing road alignment and therefore considered minor under the definition of the RNP and RMS’ ENMM. A full assessment against the criteria is therefore not required.
Additionally an assessment of the bus readiness bays was undertaken against the NSW Industrial Noise Policy (EPA, 2000) (INP) criteria. The INP criteria for industrial noise sources have two components:

- Intrusiveness criterion – RBL + 5 dBA
- Amenity criterion – based on criteria specific to lane use and associated activities.

The RNP criterion for ‘on-road transitways’ for daytime noise levels is 60dBA L_{Aeq(15hour)}.

Under the INP, recommended maximum LAeq noise levels from industrial sources for urban residential areas that would be applicable to the proposal are:

- Daytime – 65 dBA
- Evening – 55 dBA
- Night-time – 50 dBA.

Noise predictions at the nearest receiver locations for the bus bays are given in Table 6.8 corresponding to location S02.

### 6.2.3 Potential impacts

#### Construction noise

Predictive noise modelling was carried out at eight residences, three commercial hotels and five commercial office blocks in the immediate vicinity of the proposed work. The locations of these noise sensitive receivers are shown in Figure 6.1.

The predicted noise levels were assessed against the ICNG to identify any receivers which would experience noise levels in excess of the ICNG.

Noise levels likely to be experienced at receiver locations during particularly noisy construction activities are given in Table 6.12.

#### Table 6.12 Construction noise summary for noisy activities (dBA)

<table>
<thead>
<tr>
<th>Receiver ID</th>
<th>Day NML</th>
<th>Evening</th>
<th>Night</th>
<th>Day Exceedences</th>
<th>Evening</th>
<th>Night</th>
<th>Highly Noise Affected</th>
<th>Sleep Disturbance (RBL +15 dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-C-01</td>
<td>70</td>
<td>NA</td>
<td>NA</td>
<td>79</td>
<td>NA</td>
<td>NA</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-C-02</td>
<td>70</td>
<td>NA</td>
<td>NA</td>
<td>83</td>
<td>NA</td>
<td>NA</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-H-01</td>
<td>79</td>
<td>70</td>
<td>58</td>
<td>-</td>
<td>77</td>
<td>77</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-H-02</td>
<td>79</td>
<td>72</td>
<td>58</td>
<td>-</td>
<td>78</td>
<td>78</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-H-03</td>
<td>79</td>
<td>72</td>
<td>58</td>
<td>-</td>
<td>75</td>
<td>75</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-O-01</td>
<td>55</td>
<td>NA</td>
<td>NA</td>
<td>57</td>
<td>NA</td>
<td>NA</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>S-O-02</td>
<td>55</td>
<td>55</td>
<td>NA</td>
<td>67</td>
<td>67</td>
<td>NA</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>S-O-03</td>
<td>55</td>
<td>NA</td>
<td>NA</td>
<td>78</td>
<td>NA</td>
<td>NA</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-O-04</td>
<td>55</td>
<td>55</td>
<td>NA</td>
<td>81</td>
<td>81</td>
<td>NA</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>S-O-05</td>
<td>60</td>
<td>60</td>
<td>NA</td>
<td>-</td>
<td>-</td>
<td>NA</td>
<td>NA</td>
<td>N</td>
</tr>
</tbody>
</table>
**Review of environmental factors**

### Activity: pavement repairs – remove concrete pavement slabs

<table>
<thead>
<tr>
<th>Receiver ID</th>
<th>NML Day</th>
<th>NML Evening</th>
<th>NML Night</th>
<th>Exceedences Day</th>
<th>Exceedences Evening</th>
<th>Exceedences Night</th>
<th>Highly noise affected</th>
<th>Sleep disturbance (RBL +15 dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-R-01</td>
<td>71</td>
<td>66</td>
<td>55</td>
<td>-</td>
<td>-</td>
<td>NA</td>
<td>NA</td>
<td>N</td>
</tr>
<tr>
<td>S-R-02</td>
<td>71</td>
<td>66</td>
<td>55</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>S-R-03</td>
<td>79</td>
<td>72</td>
<td>57</td>
<td>-</td>
<td>-</td>
<td>73</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>S-R-04</td>
<td>79</td>
<td>72</td>
<td>57</td>
<td>78</td>
<td>78</td>
<td></td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>S-R-05</td>
<td>79</td>
<td>72</td>
<td>57</td>
<td>-</td>
<td>70</td>
<td></td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>S-R-06</td>
<td>71</td>
<td>66</td>
<td>55</td>
<td>-</td>
<td>59</td>
<td></td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>S-R-07</td>
<td>79</td>
<td>72</td>
<td>58</td>
<td>-</td>
<td>73</td>
<td></td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>S-R-08</td>
<td>79</td>
<td>72</td>
<td>58</td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

During construction the NMLs exceed the ICNG criteria and, due to the proximity of the work to many residential receivers, there would be exceedences of 75 dBA which would therefore be considered “highly noise affected” at these locations. Refer to Table 9 of Appendix E for more details regarding exceedences.

The higher NML exceedences are typically related to construction scenarios using noise intensive machinery such as concrete saws and rock-breakers in the vicinity of the adjacent receivers. It should be noted; however, that the presented predictions are for a worst case scenario, where the work is at the closest point to each assessment receiver. Given that the work is only likely to be adjacent to a particular receiver for a reasonably small percentage of the full duration of the work, the subsequent noise levels when work moves away from a particular location would be notably less than the levels presented.

An assessment of ground-borne noise was not deemed necessary given ground-borne noise levels from the work are likely to be more than 10 dB below any apparent internal noise level.
Vibration

The vibration assessment was undertaken for impacts on both structural elements of buildings as well as human discomfort levels. The major potential sources of vibration from the proposed construction activities are likely to be during concrete removal, when impact hammering is expected.

Vibration intensive works are likely to be required in certain sections of the proposal where existing concrete is required to be removed to facilitate lane reconfiguration. For each of the assessment receivers, Table 6.13 presents the potentially shortest distance to the nearest location which is likely to require concrete removal.

Table 6.13 Distance to closest vibration intensive construction work

<table>
<thead>
<tr>
<th>Receiver ID</th>
<th>Approximate distance (m)</th>
<th>Receiver ID</th>
<th>Approximate distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-01</td>
<td>40</td>
<td>O-05</td>
<td>25</td>
</tr>
<tr>
<td>C-02</td>
<td>20</td>
<td>R-01</td>
<td>&gt;100</td>
</tr>
<tr>
<td>H-01</td>
<td>50</td>
<td>R-02</td>
<td>&gt;100</td>
</tr>
<tr>
<td>H-02</td>
<td>25</td>
<td>R-03</td>
<td>&gt;100</td>
</tr>
<tr>
<td>H-03</td>
<td>&gt;100</td>
<td>R-04</td>
<td>30</td>
</tr>
<tr>
<td>O-01</td>
<td>&gt;100</td>
<td>R-05</td>
<td>&gt;100</td>
</tr>
<tr>
<td>O-02</td>
<td>70</td>
<td>R-06</td>
<td>&gt;100</td>
</tr>
<tr>
<td>O-03</td>
<td>40</td>
<td>R-07</td>
<td>&gt;100</td>
</tr>
<tr>
<td>O-04</td>
<td>55</td>
<td>R-08</td>
<td>45</td>
</tr>
</tbody>
</table>

Due to the complexity of vibration propagation through the ground, a guide to safe working distances for typical items of vibration intensive plant has been provided in Table 6.14. These are indicative only and would vary depending on particular items used. Heritage buildings in the area are generally offset by large distances from the proposed work, and it is predicted that vibration levels from the site would not affect these buildings. Due to the separation distance between the vibration generating works and the nearby receivers, the levels of vibration produced by the proposed construction activities is expected to be below the cosmetic damage criteria therefore it is not expected that any receivers would be impacted by the proposal.

Table 6.14 Recommended safe working distances for vibration intensive plant

<table>
<thead>
<tr>
<th>Plant Item</th>
<th>Rating/description</th>
<th>Safe Working Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cosmetic Damage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(BS 7385)</td>
</tr>
<tr>
<td>Small Hydraulic Hammer</td>
<td>(300 kg – 5 to 12 tonne</td>
<td>2 m</td>
</tr>
<tr>
<td></td>
<td>excavator)</td>
<td></td>
</tr>
<tr>
<td>Medium Hydraulic hammer</td>
<td>(900 kg – 12 to 18 tonne</td>
<td>7 m</td>
</tr>
<tr>
<td></td>
<td>excavator)</td>
<td></td>
</tr>
<tr>
<td>Plant Item</td>
<td>Rating/description</td>
<td>Safe Working Distance</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Large hydraulic hammer</td>
<td>(1600 kg – 18 to 4 tonne excavator)</td>
<td></td>
</tr>
<tr>
<td>Vibratory sheet piling</td>
<td>Sheet piles</td>
<td></td>
</tr>
<tr>
<td>Boring rig</td>
<td>&lt; 800 mm</td>
<td></td>
</tr>
<tr>
<td>Jackhammer</td>
<td>Hand held</td>
<td></td>
</tr>
</tbody>
</table>

**Operational noise**

The work associated with this proposal is entirely within the existing road alignment and therefore considered as ‘minor’ within the definition of the Road Noise Policy and the RMS’s Environmental Noise Management Manual, therefore a full assessment against the RNP criteria is not required (SLR 2012).

The removal of the toll booths and subsequent realignment of the bridge lanes and approaches would facilitate an increase in posted speeds from the current speed of 40 kilometres per hour to 70 kilometres per hour. Whilst this is an increase in posted speed, the current 40 kilometres per hour area is noted as only being applied at the toll booth plaza and is a relatively small section.

Predicted traffic volumes (on opening and in 10 years after opening) are anticipated to remain reasonably constant and any small degree of growth is not associated with the proposal.

It is predicted that there would be no change in operational noise levels between the opening and future assessment years due to the proposal.

**Bus readiness bays**

The operation of the bus readiness bays has been assessed against Road Noise Policy criteria as applied to bus transitways and against the Industrial Noise Policy (INP) criteria. The proposed use of the bus readiness area would be during PM peak hours only therefore only daytime criteria were considered. The RNP defines the criteria for existing residential land uses as LAeq (15 hour) 60 dBA.

Taking into account the predicted hourly bus volumes, the idle duration and the distance to the nearest receiver position, noise prediction levels at the nearest receiver locations are predicted to be 53 dBA during the day.

During use, the bus readiness bays would comply with the RNP on-road transitway criteria. The bays would also comply with the established INP criteria. Given that the existing LAeq noise level in the vicinity of the proposed bus readiness bay is higher than the predicted noise level from the proposed operation of the bus readiness bay, it is considered unlikely that idling buses would result in a major impact to the nearest receivers.
### 6.2.4 Safeguards and management measures

The safeguards and management measures outlined in Table 6.15 would be undertaken to mitigate environmental and human health impacts caused by noise and vibration during construction and/or operation/maintenance phases.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise and vibration</td>
<td>• A Construction Noise and Vibration Management Plan would be prepared, consistent with the requirements of the <em>Interim Construction Noise Guidelines</em>, addressing each major stage of the construction work and identifying the appropriate noise and vibration mitigation and management measures.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• Prior to commencing work, construction crews would be briefed at inductions or similar in order to create awareness of the locality of sensitive receivers and the importance of minimising noise emissions, especially during night-time work.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• Where possible, higher NML exceedance activities/locations would be considered to be undertaken during daytime and evening periods.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• Where possible, respite periods would be developed for noisy activities such as operation of the hydraulic hammer.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• Material would be placed carefully into trucks to minimise noise generation.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• Less noise-intensive equipment would be used, where reasonable and feasible.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• All equipment would be maintained and regularly inspected throughout the construction work.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• The affected community would be made aware of likely noisy activities and would be kept aware of the current and future construction work through a proactive communication strategy.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>• The 1800 number would be used for the project to take any community complaints and a procedure would be developed to ensure complaints are addressed promptly.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| Noise and vibration    | • Where possible, work would be undertaken during the standard working hours of:  
  o 7 am to 6 pm Monday to Friday  
  o 8 am to 1 pm on Saturdays                                                                                                                                            | Project manager | Construction     |
### Environmental safeguards

- No work on Sundays or public holidays.
- For work required outside standard hours, the procedure contained in Practice Note vii of the *Environmental Noise Management Manual — Roadwork Outside Normal Working Hours* (RTA 2001) would be followed. This would include notification of potentially affected residents.

### 6.3  Non-Aboriginal heritage

A Heritage Impact Statement (HIS) was prepared by Godden Mackay Logan (GML) for the proposal (GML, 2012), which details the potential impacts of the proposal on the heritage values of the bridge. A copy of the HIS is provided in Appendix F and a summary is provided below.

#### 6.3.1 Existing environment

There are a number of places and items of national, state and local heritage listing located in, and adjacent to, the study area in Figure 3.1. The study area comprises the Western Distributor and the Bradfield Highway between Grosvenor and Cumberland streets.

The Sydney Harbour Bridge comprises the arch, four granite-faced pylons, the railway line, the footpaths and roads that provide vehicular, cyclist and pedestrian access to the northern and southern approaches.

The tollbooths to be removed are located at the southern end of the bridge directly opposite the Toll House. The booths have been in operation since the 1950s and were upgraded to movable booths in the 1970s to serve those lanes that alternated between northbound and southbound traffic. The *Sydney Harbour Bridge Conservation Management Plan* (GML 2009) (CMP) assesses the southern toll plaza booths as having little heritage significance (GML, 2012).

The Sydney Harbour Bridge, sections of its approaches and curtilage areas are of State and National Heritage Significance, and are listed on the NSW State Heritage Register (SHR) and the National Heritage Register (NHR). The curtilage areas are defined in the CMP and include foreshore areas around the abutments of the bridge.
The bridge has been assessed as having National and State heritage significance because of its technical qualities as a world-standard bridge in scale, aesthetics and design features. The toll booths on the southern approach are outside the SHR and NHR curtilages; however, the proposed lane resurfacing and realignment work and the relocation of the directional signage would extend into both the NHR and SHR heritage curtilage.

An assessment of the heritage significance of the bridge is provided in Appendix F. A summary statement of national and state heritage significance and the conservation management plan is provided below.

**National Heritage values**

The Sydney Harbour Bridge is of outstanding heritage value as a feat of bridge engineering and construction. It is one of the widest, long spanning bridges in the world and is a symbol of national pride. The bridge forms a major element of one of the most internationally recognised views of Australia and the City of Sydney, which also comprises the Sydney Opera House, the harbour and its foreshore and the city skyline.

**State Heritage values**

The Sydney Harbour Bridge is an important visual element in the cityscape when viewed from many key points in the harbour. The bridge is a vital element in the city’s transportation network and is the main road and rail connection across Sydney harbour. The bridge also has strong associations with the families and descendants of the workers who built it.

**Conservation Management Plan**

The bridge’s heritage listing is supported by the CMP, and most of the proposal would take place inside the CMP curtilage.

The RMS Heritage and Conservation Register established under section 170 of the *Heritage Act 1977* lists the following structures in the study area:

- Sydney Harbour Bridge, its approaches and its viaducts.
- Sydney Harbour Bridge workshops collection.
- Sydney Harbour Bridge memorabilia collection.
- Sydney Harbour Bridge Southeast Pylon Museum Collection.

The followings items and structures are listed on RailCorp’s section 170 Heritage and Conservation Register, and are located in the study area:

- Sydney Harbour Bridge (Rail Property only).
- Sydney Harbour Bridge Approaches Concrete Underbridge.

Sydney Harbour Bridge, southern approaches and curtilage are also listed on Schedule 8 of the *Sydney Local Environmental Plan 2005*. 
In addition to the bridge, the following items and places are listed on Schedule 8 of the *Sydney Local Environmental Plan 2005*, and are located in, or adjacent to, the study area:

- The Millers Point Heritage Conservation Area, which contains many historic streetscapes including Argyle Street and Argyle Place; Windmill Street; Lower Fort Street and Trinity Avenue and the Observatory Hill Area.
- Lang Park, which is located on York Street between Grosvenor Street and Jamison Street.
- The National Trust Centre, 1001 Bradfield Highway.

The proposal would not impact the above listed items of local heritage significance.

### 6.3.2 Potential Impacts

The proposal would involve:

- Removal of the toll booths from southern toll plaza precinct, which date from the 1970s and have been assessed as having ‘little’ heritage significance value.
- Installation of new electrical directional signage to be fixed to existing gantries, which have no heritage significance value.
- Installation of new lighting.
- Realignment of the approach lanes.

The heritage significance of the Sydney Harbour Bridge has been graded by key bridge components including its setting and approaches (GML, 2012). The setting has been assessed as having exceptional heritage significance; while the toll booths in the southern approaches have been assessed as having little heritage significance.

While the movable and fixed toll booths are outside the SHR and NHR curtilages, their removal would have some physical impacts on the bridge’s identified significance, however the proposal would not involve any removal or intervention to fabric of high significance and would not affect the overall key attributes of the bridge including structural integrity, physical and visual character and the setting.

The associated lane resurfacing, realignment works and directional signage would extend into the SHR and NHR curtilages, as identified in the CMP. However, exemptions to undertake works including maintenance and minor repairs on the Sydney Harbour Bridge and its approaches do apply under the *Heritage Act 1977*. The installation of new electrical directional signage would have minimal visual or physical impact on the bridge because it would be fixed to the existing gantries.

The proposed realignment of the approach lanes is considered a relatively minor intervention to the bridge. The bridge approaches have been substantially modified in the past in response to traffic volume increases and improved traffic management methods. Although the proposal would result in minimal impacts, appropriate mitigation measures would be undertaken to record and interpret the fabric and process of toll collection so that the historic importance of this activity is not lost to future generations.
6.3.3 Safeguards and management measures

The safeguards and management measures to protect the historic importance of the bridge are listed in Table 6.16.

Table 6.16 Non-Aboriginal heritage safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Aboriginal heritage</td>
<td>• RMS would seek expressions of interest from interested parties to keep a representative sample of a toll booth (fixed and/or movable). RMS would continue to liaise with interested parties to ensure the sample(s) is/are preserved adequately.</td>
<td>Contractor project manager</td>
<td>After removal from Bradfield Highway</td>
</tr>
<tr>
<td>Non-Aboriginal heritage</td>
<td>• RMS would explore options for on-site interpretation of the toll booths.</td>
<td>Project manager</td>
<td>Prior to construction</td>
</tr>
<tr>
<td>Non-Aboriginal heritage</td>
<td>• The recommendations in the Sydney Harbour Bridge Toll Plazas Movable Heritage Salvage Survey (GML, 2008) would be implemented during the removal of movable heritage objects i.e. machinery and equipment associated with the toll booths from the Bradfield Highway.</td>
<td>Contractor project manager</td>
<td>Prior to construction</td>
</tr>
</tbody>
</table>
| Non-Aboriginal heritage | • All crew working on the site would be required to attend a toolbox talk that highlights the heritage significance of the bridge, the management measures in place to protect the heritage value.  
• Evidence of the toolbox talk and attendees would be documented. | Contractor project manager      | Prior to construction            |
| Non-Aboriginal heritage | • If unexpected archaeological finds are uncovered during construction all works must cease in the vicinity of the material and the RMS Unexpected Finds Procedure implemented. | Contractor project manager      | Construction                     |

6.4 Landscape and visual amenity

A landscape character and visual impact assessment was prepared by the NSW Government Architects’ Office in August 2012. A copy of the report is provided in Appendix G and is summarised below.

6.4.1 Existing environment

Landscape character

The landscape character is defined by the setting, built form, infrastructure and open space. As the proposal is located within close proximity to significant landmarks, the sensitivity of the landscape character to changes that affect these items and views to them would be high.
The study area is defined as the section of the Western Distributor and the Bradfield Highway between Grosvenor and Cumberland streets.

The landscape of the study area as shown in Figure 3.1 is dominated by the southern approaches of the bridge and the associated road network, which comprises the Bradfield Highway, the Western Distributor, the Cahill Expressway, York Street, Grosvenor Street, Kent Street and Clarence Street. The southern approach is a major gateway into the CBD from the north and is bordered by the Millers Point Heritage Conservation Area to the immediate west. Although modified by road infrastructure development, the study area’s landscape setting has very high cultural and scenic values. Furthermore, a number of important public spaces, landmarks and heritage items are located in the immediate vicinity of the study area. These include the Sydney Harbour Bridge, Sydney Harbour and Observatory Park which includes the Sydney Observatory and the National Trust of Australia, Lang Park, the Rocks and the Sydney Opera House.

Landscape views

The proposal is prominently located on a high point next to Observatory Hill. Observatory Hill provides for panoramic views to the north, west and east of the harbour and includes Sydney Harbour and the Sydney Harbour Bridge. From the west, the site is easily viewed from the Fort Street Primary School, the National Trust Centre, and the shared pedestrian cycle path along the Kent Street on-ramp onto the Bradfield Highway. Potential viewers from the east include both local residents and city workers, recreational users of the parklands, pedestrians and cyclists using and accessing the respective paths on the Sydney Harbour Bridge.

There are several infrastructure elements that make up the current visual quality of the road corridor and it has grown incrementally in time in response to changing and increasing demands including higher traffic volumes, higher safety and design standards and design travel speeds. For road users approaching the study area in both directions, the site is exposed to views to residential and commercial high rise buildings on Kent Street, Clarence Street, York Street, Cumberland Street and Gloucester Street. The road environment is characteristic of a major road corridor featuring a large number of structures including gantries, supporting signage, medians, kerbs and barriers to control traffic flow as well as the tolling booths located in the southern toll plaza.

6.4.2 Potential impacts

Landscape character impacts

Table 6.17 provides a summary of key aspects of the landscape setting of the study area and the potential impacts on them.

As the proposal would not result in an increase in the magnitude of the infrastructure, it would not affect the overall composition of the landscape setting. Instead, the removal of the toll booths could potentially improve the landscape character of the setting. Therefore, the magnitude of the impact of the proposal on the landscape character is considered negligible and would have the potential to make a positive contribution to the landscape character setting.
### Table 6.17 Potential impacts on key aspects of the landscape setting

<table>
<thead>
<tr>
<th>Landscape Character attribute</th>
<th>Description of the attribute</th>
<th>Description of impact by the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>The setting</td>
<td>• Important gateway function.</td>
<td>Potential to enhance the experience of the site with removal of clutter in the road corridor.</td>
</tr>
<tr>
<td></td>
<td>• High rise and low rise building including heritage listed.</td>
<td></td>
</tr>
<tr>
<td>Heritage</td>
<td>• Several items of heritage significance surround the study area.</td>
<td>No direct impact on heritage items surrounding the study area. Toll booths would be removed which is discussed further in section 6.3.</td>
</tr>
<tr>
<td>Open space network and vegetation</td>
<td>• High recreational value of nearby parklands and paths.</td>
<td>No impact on the recreational value of the parklands.</td>
</tr>
<tr>
<td></td>
<td>• High visual value of parklands.</td>
<td>Removal of toll booths would potentially improve the views to and from the parklands.</td>
</tr>
<tr>
<td></td>
<td>• Significant trees in Observatory Hill Park and Lang Park.</td>
<td>Hills Figs in adjoining open space would not be affected.</td>
</tr>
<tr>
<td>Spatial quality and views</td>
<td>• Generally open spatial character.</td>
<td>Removal of toll booths, signage and other structures would potentially improve views to and from significant heritage structures and open space</td>
</tr>
<tr>
<td></td>
<td>• Expansive sky and harbour views.</td>
<td></td>
</tr>
<tr>
<td>Pedestrian and cycle network</td>
<td>• Pedestrian and cycle paths adjoining the cycleway.</td>
<td>No impact on the pedestrian network.</td>
</tr>
<tr>
<td>The road corridor</td>
<td>• Significant road corridor width.</td>
<td>Removal of toll booths may result in improved visibility and way-finding.</td>
</tr>
<tr>
<td></td>
<td>• Freeway environment.</td>
<td></td>
</tr>
</tbody>
</table>

Visual impacts

The visual impact assessment has found that overall the proposal would have a beneficial impact on the majority of viewpoints due to the greater transparency of the proposal at ground level. Overall, this would improve views across the road corridor.

This proposal would be an improvement on the overall visual quality of the toll plazas area as there would be a simplified formation and arrangement of the road space and associated signage and lighting structures. The proposal also provides an opportunity to preserve two fig trees, which is discussed further in section 6.9 and improve the integration of the road infrastructure with the visual and historic significance of the study area.

The overall visual impact is considered negligible as the proposal would expect to perform better overall than the existing road layout from a visual point of view.

Table 6.18 provides a summary of key aspects of the landscape setting of the study area and the potential impacts on them.

**Table 6.18 Visual impact assessment**

<table>
<thead>
<tr>
<th>Viewpoint</th>
<th>Extent of impact</th>
<th>Nature of impact</th>
<th>Visual sensitivity</th>
<th>Magnitude of visual effect</th>
<th>Overall impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grosvenor Street, looking north</td>
<td>Views and the spatial qualities would not noticeably change. The installation of signage gantries may still obstruct views to the bridge.</td>
<td>N</td>
<td>H</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Kent Street, looking east</td>
<td>The toll booths would be replaced with signage gantries and would be less prominent when viewed from above. The proposed extent of red bus lane marking would have a negative visual impact but would be compensated for the removal of yellow pavement marking in front of the toll booths.</td>
<td>B</td>
<td>M</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Kent Street, looking north near the National Trust Centre</td>
<td>Views of the bridge would be improved by removing the toll booths and installing signage gantries resulting in an increased transparency through the plaza.</td>
<td>B</td>
<td>H</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Pedestrian /cycle bridge on Cahill Expressway loop (to access northbound carriageway)</td>
<td>Removal of the sliding toll booths (referred to as northern toll booths in the visual report) would result in opening the plaza up and improving views to the bridge.</td>
<td>B</td>
<td>H</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Upper Fort Street, looking south east</td>
<td>Most substantial impact would be installing new signage gantries. The greater transparency of the structure at ground level would improve the sense of openness of the plaza.</td>
<td>B</td>
<td>H</td>
<td>G</td>
<td>G</td>
</tr>
</tbody>
</table>
### Viewpoint | Extent of impact | Nature of impact | Visual sensitivity | Magnitude of visual effect | Overall impact
---|---|---|---|---|---
Observatory, looking east | Removal of toll booths would have a beneficial effect on this viewpoint. | B | H | G | G
Argyle Street, looking south within road corridor | Removal of sliding toll booth would improve views towards the National Trust but the signage gantry would partially obscure the view of the corridor along the Western Distributor. | B | H | G | G
Harbour Pedestrian Link, looking south | Removal of sliding toll booth would have a beneficial effect from this viewpoint. | B | H | G | G
Cahill Express Cycleway, looking northwest | Removal of sliding toll booth would have a beneficial effect from this viewpoint, improving views across the road corridor to the Observatory Hill Parklands. | B | H | G | G
Cahill Express Cycleway, looking southwest | Removal of sliding toll booth would have a beneficial effect from this viewpoint, increasing spatial openness and improving views towards the National Trust. | B | H | G | G
Cumberland Street, looking north | With the replacement of the southern toll booth with a signage gantry, the view would not be noticeably altered. | N | MH | G | G
Grosvenor Street, looking north from the path | The southern toll booth would be replaced by a signage gantry and would improve the viewpoint. The proposed extent of red bus lane marking would have a negative visual impact but would be compensated for the removal of yellow pavement marking in front of the toll booths. | B | M | G | G
Between the two existing tolling stations | Removal of the northern toll booths would result in opening the plaza up, improving views to the east and to the bridge, which are currently obscured. | B | H | G | G

Source: Sydney Harbour Bridge Southern Approach Landscape Character and visual assessment (Government Architect’s Office, 2012)

Key to Table
[1] A= Adverse, N= Neutral, B= Beneficial
6.4.3 Safeguards and management measures

Safeguards and management measures to protect, avoid, minimise or mitigate any potential impacts to the landscape character of the study area and the visual amenity of the bridge are listed in Table 6.19.

Table 6.19 Visual impact safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual amenity</td>
<td>- Where possible the design would minimise the footprint of the carriageway in order to maximise future opportunities for improvements to the public domain such as minimising widths of medians and lanes (where safe to do so), minimising the number of signs, gantries, light poles and other structures in the road.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>- Where possible the design would incorporate ideas to reduce clutter and ensure integration and consistency with existing elements such as signage, lighting and gantries and maximising the spacing (as far as possible) between structures.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>- Lighting would be designed and located to be consistent with existing lighting along the Western Distributor and the Sydney Harbour Bridge and to minimise light spill to areas within the road corridor.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>- New structures would be minimised in the visually sensitive toll plaza and located to maintain existing views and sight lines to important landscape and heritage items including the Sydney Harbour Bridge, the Observatory, the National Trust Centre, Sydney Harbour and the Sydney Opera House.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>- Where possible, new structures would be designed to be visually unimposing through minimising width and length and maximising their transparency and designing them to blend into the current bridge structure. Bridge steel grey would be chosen as the colour for structures where possible.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
</tbody>
</table>
### Visual amenity

- Structures and elements would be located as far as possible along the edges of the road corridor where they would integrate with existing buildings and structures to minimise the number of elements in the road corridor with the potential to obstruct views.

- Operational areas would be designed to be visually separated from travelling lanes to reduce the perceived width of the road corridor and reduce visibility of the clutter created as part of operations and storage of materials.

- Use of red bus lane marking would be minimised on the bridge where possible.

**Responsibility**

- Project manager Design

**Timing**

- Design

### 6.5 Hazard and risk

A hazardous materials (HAZMAT) survey of the southern toll booths was conducted by Parsons Brinckerhoff on 6 August 2012. A copy of the report is provided in Appendix H. The report's findings are summarised in this section.

#### 6.5.1 Existing environment

Table 6.20 describes the locations where asbestos contained in material was found during the HAZMAT survey. All of the asbestos containing material would be removed prior to demolition.

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner wall linings to all toll booths</td>
<td>Asbestos cement sheeting</td>
</tr>
<tr>
<td>Floor to all toll booths</td>
<td>Compressed asbestos cement sheeting</td>
</tr>
<tr>
<td>Wall cladding to north wall of toll booth 19</td>
<td>Asbestos cement sheeting</td>
</tr>
<tr>
<td>Window putty to all toll booths</td>
<td>Asbestos containing putty</td>
</tr>
<tr>
<td>Ceiling lining to North bound storage room extension</td>
<td>Asbestos cement sheeting</td>
</tr>
<tr>
<td>White expansion joint mastic to concrete barriers and foot paths</td>
<td>Asbestos containing mastic</td>
</tr>
<tr>
<td>Toll booth cabin 14</td>
<td>Presumed asbestos containing electrical board</td>
</tr>
</tbody>
</table>
The survey found no paint systems used on the bridge contained greater than one per cent (by weight) lead at the time of the inspection, as such the paint systems tested would not be classified as containing lead. The amount of dust present within the overhead canopy spaces along with the toll booth tested was found to be low. Following analysis of the dust, the risk associated with the lead content of the dust would be negligible.

Paint samples tested for zinc chromate provided results below the limit of detection for chromate. As such no zinc chromate paint has been identified during the survey.

No synthetic mineral fibre containing materials were identified at the time of the survey.

The survey found two potentially polychlorinated biphenyl containing light fittings which are described in Table 6.21.

Table 6.21 Polychlorinated Biphenyls (PCBs)

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canopy ceiling</td>
<td>Presumed PCB containing light fittings</td>
<td>Confirm presence of PCB containing capacitors and ballasts prior to removal of light fittings.</td>
</tr>
<tr>
<td>Toll booth ceilings throughout</td>
<td>Presumed PCB containing light fittings</td>
<td>Confirm presence of PCB containing capacitors and ballasts prior to removal of light fittings.</td>
</tr>
</tbody>
</table>

6.5.2 Potential impacts

The following potential hazards and risks would be associated with the proposal during construction:

- Accidents and spills of hazardous materials like fuels, oil, bitumen, etc.
- Potential for spills of hazardous material due to equipment malfunction.
- Potential environmental and human health hazards in the case of a crash involving vehicles transporting hazardous substances to or from the site.
- Human health risk and/or environmental contamination caused by uncontrolled release of HAZMATs like asbestos, or PCBs during the removal of the toll booth or other structures.
- Human health or environmental damages due to contaminated spoil/fill materials.
- Air contamination by hazardous dust or vapour emissions such as asbestos fibres.
- Emission of excessive noise and/or vibrations.
The types of hazardous substances that would be used within the site during construction may include (but are not limited to):

- Petrol fuels (Dangerous Goods Class 3, Packaging Group II).
- Diesel fuels (Dangerous Goods Class 3, Packaging Group III).
- Oils, greases and lubricants (not officially classified as dangerous goods).
- Bitumen (Dangerous Goods Class 3, Packaging Group II).
- Polyurea membrane material (no dangerous good).
- Waterproofing and primer chemicals.

None of these substances would be stored as part of the proposal but would be transported directly to and used within the construction site. Potential impacts to humans or the environment (soil, groundwater and air) are considered low. Environmental management measures as defined in the environmental management plan (EMP) would be implemented to reduce the risk to the environment, construction personnel and the public.

A hazardous materials removal control plan (HMRCP) (See Appendix H) would be implemented for handling asbestos containing materials and for the removal of asbestos from the toll booths and its appropriate handling and disposal:

### 6.5.3 Safeguards and management measures

Safeguards and management measures to protect, avoid, minimise or mitigate any potential impacts on environmental and human health impacts caused by hazardous materials used during construction and/or operation/maintenance phases.

#### Table 6.22 Hazard and risk safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard and risk</td>
<td>Air monitoring would be carried out by a licensed asbestos assessor with NATA accreditation in accordance with National Occupational Health and Safety Commission (NOHSC), Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003(2005)], NOHSC, Australia.</td>
<td>Contractor project manager</td>
<td>Pre- demolition</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>An occupational hygiene consultant, who would also be a licenced asbestos assessor with NATA accreditation, would carry out perimeter, personal and clearance air monitoring and inspections.</td>
<td>Contractor project manager</td>
<td>Pre- demolition</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>A Hazardous Materials Removal Control Plan would be developed and implemented.</td>
<td>Contractor project manager</td>
<td>Prior to demolition of toll booths</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• The removal of polychlorinated biphenyl containing light fittings would be implemented under advice from the occupational hygiene consultant.</td>
<td>Contractor project manager</td>
<td>Removal of the light fittings</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• The handling and use of dangerous goods would be undertaken in accordance with the <em>Occupational Health and Safety Act 2000</em> and the ‘Storage and Handling of Dangerous Goods Code of Practice’ (WorkCover NSW, 2005).</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• All hazardous substance transport would be undertaken in accordance with relevant legislation and codes, including the Road and Rail Transport (Dangerous Goods) (Road) regulation 1998 and the Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission, 2008).</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• Spill kits would be maintained on-site throughout the construction work.</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• As part of the site specific CEMP, a hazard and risk management plan, including an emergency response plan, would be prepared by a suitably qualified hazardous materials expert. All risk and hazard controls would be regularly inspected and maintained.</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• The disposal of asbestos and other hazardous material generated during the removal of toll booth and other structures would be performed by a contractor with a Class B asbestos removal licence.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• All hazardous material would be disposed of at a licenced landfill for asbestos containing waste material.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Hazard and risk</td>
<td>• Dust emission control measures would be applied in order to minimise the distribution of potentially contaminated spoil and fill.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.6  Air quality

6.6.1  Existing environment

The study area (refer to Figure 3.1) is situated on the southern approach of the Sydney Harbour Bridge. The study area incorporates the Bradfield Highway and sections of each of the Cahill Expressway, York, Grosvenor, Clarence and Kent streets. Therefore, existing air quality in the study area is heavily influenced by emissions from motor vehicles. Other influences are the prevailing weather and climatic conditions, and any emissions from surrounding industrial and commercial land uses.

The nearest NSW OEH/EPA air quality monitoring sites for the NSW Air Quality Index are located in Rozelle and Lindfield. A review of air quality monitoring data for these two sites shows that Sydney's air quality is highly variable. Historical data for Sydney shows that about 60 per cent of days fall into the very good to good range, 30 per cent fall into the fair category and 10 per cent of days fall in the poor and very poor range which relate to high ozone levels (OEH, 2012). The closest Bureau of Meteorology monitoring station to the Sydney Harbour Bridge is at Observatory Hill. Data from the Bureau of Meteorology (BoM, 2012) reports that the average annual rainfall recorded at Observatory Hill is 1213 millimetres. The average annual rainfall for December is 78 millimetres. June is the wettest month receiving 130 millimetres of rainfall on average, while September is the driest month receiving on average 69 millimetres.

According to the Bureau of Meteorology (BoM, 2012) the average annual wind speed ranges between about 10 kilometres per hour (at 9am conditions) to 16 kilometres per hour (at 3pm). Average wind speeds in December range from 9.8 kilometres per hour (at 9am) and 19.5 kilometres per hour (at 3pm).

6.6.2  Potential impacts

Construction

During construction, temporary impacts on air quality and odour may arise from the following:

- Generation of dust particles from construction activities including the following:
  - Removal of the existing toll booth structures and associated services and infrastructure on the Bradfield Highway.
  - Excavations to install drainage, and other services such as electricity and telecommunications.
  - Demolishing and constructing traffic barriers and kerbs from the southern toll booths through to Grosvenor Street.
  - Pavement repairs, construction and resurfacing between the southern abutment of the bridge, which is located at Cumberland Street, and Grosvenor Street.
  - Installation of signage in the CBD and in Milsons Point.
- Emissions (primarily diesel exhaust) from plant and machinery used on the construction site.
- Emissions of petrochemicals from construction traffic.
Operation

Operation of the PM peak bus layover would result in a transferral of vehicle emissions from the northern Sydney CBD to the bus layover area. However as this is not a traffic generating proposal it would not result in any noticeable air quality or odour impacts.

6.6.3 Safeguards and management measures

The following safeguards and management measures in Table 6.23 would be undertaken to avoid, minimise or mitigate the potential air quality impacts of the construction activities.

Table 6.23 Air quality safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Air quality  | • A Construction Environmental Management Plan (CEMP) would be developed for the site and would include air quality and odour management measures. The following measures would be included:  
  o All loaded trucks would be covered.  
  o Machinery would be turned off rather than left to idle when they are not in use.  
  o Stabilisation of all disturbed areas would be undertaken as soon as practicable to prevent or minimise wind-blown dust.  
  o All vehicles, including trucks entering and leaving the site would be maintained in accordance with the manufacturers’ specifications to comply with all relevant regulations.  
  o Construction activities would be modified during periods of high wind, if necessary.  
  o The work site would be maintained in a condition that minimises windblown or traffic generated dust.  
  o Sediment and erosion control structures would be inspected and maintained regularly.  
  o Any equipment for dust control would be maintained and available for use as required.  
  o Construction equipment would be properly maintained to ensure exhaust emissions comply with the Protection of the Environment Operations Act 1997 (POEO Act). | Project manager    | Pre-construction and construction |

| Air quality  | • Dust control measures, including wetting and (if required) engineering control methods would be applied in excavation areas in order to minimise dust emissions.  
  • Construction activities that may emit dust or volatile chemicals would be undertaken in the shortest time possible taking work quality and worker safety precautions into account. | Project manager    | Construction                  |
6.7 Aboriginal heritage

6.7.1 Existing environment

The proposal is located in a built urban environment (refer to Figure 6.1 for the study area). The bridge is elevated above the harbour foreshore and mainly comprises road corridor and the bridge deck. The proposal has little potential to support the presence of Aboriginal objects.

A search of the OEH Aboriginal Heritage Information Management System (AHIMS) was conducted on the 5 October 2012, with four records being returned which are listed in Table 6.24. There are no declared Aboriginal places near the Sydney Harbour Bridge.

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site name</th>
<th>Site feature</th>
<th>Distance from study area (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-6-0519</td>
<td>Moores Wharf artefact</td>
<td></td>
<td>320</td>
</tr>
<tr>
<td>45-6-1938</td>
<td>MSB Tower art (pigment or engraved)</td>
<td></td>
<td>320</td>
</tr>
<tr>
<td>45-6-1615</td>
<td>Bennelong Point artefact</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>45-6-0030</td>
<td>Dawes Point; Dawes Point park art (pigment or engraved)</td>
<td></td>
<td>400</td>
</tr>
</tbody>
</table>

6.7.2 Policy setting

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (OEH2010) provides a framework to assist individuals and organisations to exercise due diligence when carrying out activities that may harm Aboriginal objects and to determine whether an Aboriginal Heritage Impact Permit (AHIP) is required.

The due diligence process outlined in section 8 of the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (OEH 2010) has been considered and an application for an Aboriginal Heritage Impact Permit (AHIP) is not necessary in this case.

The requirements of the draft Procedure for Aboriginal Cultural Heritage Consultation and Investigation (RTA, 2011a) (PACHCI) have been applied to the proposal. Consultation with Aboriginal stakeholders is provided in Section 5.3. The PACHCI is generally consistent with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (OEH 2010).

In accordance with the PACHCI, the RMS Aboriginal Cultural Heritage Adviser for Sydney Region has considered the proposal and has agreed there is no requirement to proceed to Stage 2, which would involve a desktop assessment and site survey.

6.7.3 Potential impacts

The proposal would not affect any registered Aboriginal sites or declared Aboriginal places. There would be little disturbance of the ground surface which would be in areas which have already been disturbed and which do not contain natural features and therefore no potential impact on Aboriginal heritage.
6.7.4 Safeguards and management measures

The following safeguards and management measures in Table 6.25 would be undertaken to avoid, minimise or mitigate the potential Aboriginal heritage impacts of the construction activities.

Table 6.25 Aboriginal heritage safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboriginal heritage</td>
<td>• Should Aboriginal cultural heritage items be uncovered during construction, the RMS <em>Unexpected Archaeological Finds Procedure</em> (RMS 2012) would be followed. All work in the vicinity of the find would cease and the RMS Aboriginal Cultural Heritage Advisor and the Senior Environmental Officer would be contacted immediately. Works in the vicinity of the find would not recommence until clearance is received from those RMS officers and the OEH.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.8 Biodiversity

A desktop ecological assessment was undertaken on 27 August 2012. A preliminary arboricultural advice report was prepared by Tree Wise Men in August 2012 for RMS (see Appendix I) and investigated the likely impact of the proposal on two Hills Figs in the vicinity of the proposal.

6.8.1 Existing environment

The study area (as shown in Figure 3.1) consists predominantly of heavily disturbed and cleared land. No native plant species indigenous to the Sydney Basin Bioregion occur on site. No threat-listed species of plant or populations indigenous to the Sydney basin bioregion have been recorded on the site or determined to have a moderate or high likelihood of occurring within the site based on the habitat available.

Two non-indigenous native mature trees, *Ficus microcarpa var. hillii* which are located on a landscaped parcel of land in York Street near the intersection with Grosvenor Street; (refer to Photo 4 in Appendix A) and several juvenile Ficus species trees, which are planted in concrete pots, located on the medians on the Bradfield Highway. These trees are likely to provide habitat for only native animal species that can adapt to highly modified environments, such as common birds and bat species.
6.8.2 Potential impacts

The two mature *Ficus microcarpa var. hillii* located near York Street would be retained during the changes to the intersection of York Street and Grosvenor Street. The proposed work at the intersection may involve encroachment of the root zone of these trees and subject to the safeguards and management measures would likely survive the proposed construction activity.

6.8.3 Safeguards and management measures

The safeguards and management measures outlined in Table 6.26 would mitigate potential impacts to biodiversity.

Table 6.26 Biodiversity safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity</td>
<td>• An arborist with a minimum AQF level 5 qualifications would be engaged to monitor and report on the condition of the retained tree. The arborist would be present at any excavation or trenching in the vicinity of the tree.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>• A tree protection zone (TPZ) would be established (defined as the radial offset (metres) of twelve times (12X) trunk diameter at breast height).</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• A fence would be constructed to mark the TPZ boundary and provide adequate protection for the tree. The fence would be constructed of sturdy material.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If tree protection fencing cannot be installed, the trunk of the trees would be battened to avoid bark damage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Machinery and equipment would be kept out of the TPZ to limit the impact to the Hills Fig.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>• Adequate moisture levels would be maintained during the construction as directed by the arborist.</td>
<td>Project manager</td>
<td>During construction</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>• The potential for soil compaction and possible contamination of soil would be minimised by specifying access tracks for machinery and equipment at the construction site.</td>
<td>Arborist and project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>• Roots would be covered to buffer drying and concrete contamination during the works. If any roots require pruning this would be undertaken with the supervision of the Project Arborist.</td>
<td>Arborist and project manager</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
6.9 Waste management and resource efficiency use

6.9.1 Policy setting

The Waste Avoidance and Resource Recovery Act 2001 provides a framework for considering resource management options against the following priorities:

- Avoidance including action to reduce the amount of waste generated by households, industry and all levels of government.
- Resource recovery including reuse, recycling, reprocessing and energy recovery, consistent with the most efficient use of the recovered resources.
- Disposal including management of all disposal options in the most environmentally responsible manner.

The NSW Waste Reduction and Purchasing Policy (WRAPP) was initiated in 1997 to minimise waste generated across all government sectors and to help increase the market for materials containing recycled content. To achieve these objectives, NSW Government agencies are required to operate as ‘model' waste managers by:

- Avoiding the generation of wastes.
- Segregating wastes for re-use and recycling.
- Purchasing products with recycled content and/or low waste products, where they are both cost and performance competitive.

RMS’ contractors are also required to propose recycled-content materials where they are cost and performance competitive and are at least the environmental equivalent of the non-recycled alternatives.

Wastes generated during construction that do require disposal need to be classified and disposed of in accordance with the OEH/EPA Waste Classification Guidelines.

6.9.2 Potential impacts

The types of waste generated on this proposal, would result from the following construction activities:

- Concrete pavement replacement and new road pavement construction.
- Construction of new concrete pavement and concrete infill sections.
- Removal of planter boxes.
- Excavation for footings, trench for pipe and pit installation.
- Replacement of traffic control devices and signage.
- Removal of toll booth structures.
- Pavement removal and resurfacing.
- Putrescible and domestic waste.
- General demolition waste.

The anticipated waste streams and materials required for the proposal are stated in Table 6.27.

**Table 6.27 Anticipated waste streams**

<table>
<thead>
<tr>
<th>Waste</th>
<th>Classification¹</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavated natural material</td>
<td>General waste</td>
<td>Where reuse onsite is not possible, remove to a licensed facility for reuse / disposal. If the material is to be re-used it would need to be sampled and tested to meet the criteria and conditions attached to the EPA's ENM resource recovery exemption.</td>
</tr>
<tr>
<td>Asphalt pavement</td>
<td>General solid waste (non-putrescible)</td>
<td>Removal to a licensed facility for reuse/disposal, or may be re-used for road making in accordance with the EPA's Excavated Public Road Material Exemption or Asphalt Exemption.</td>
</tr>
<tr>
<td>Recovered aggregate</td>
<td>General solid waste (non-putrescible)</td>
<td>Removal to a licensed facility for reuse/disposal.</td>
</tr>
<tr>
<td>Removal of toll booths</td>
<td>Hazardous substances</td>
<td>Separate hazardous waste from other waste, see section 6.5.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove and store at a licensed landfill for asbestos contained waste material.</td>
</tr>
<tr>
<td>Unwanted waste chemicals, chemical packaging, drums or other containers</td>
<td>Hazardous waste</td>
<td>Removal for disposal to a licensed facility.</td>
</tr>
<tr>
<td>Oil absorbent material, oily rags from plant operation /maintenance, hydraulic fluid spills</td>
<td>General solid waste (non-putrescible)</td>
<td>Removal for disposal to a licensed facility.</td>
</tr>
<tr>
<td>Sanitary wastes, waste water</td>
<td>Liquid waste</td>
<td>Removal for disposal to a licensed facility.</td>
</tr>
</tbody>
</table>

If greater than 200 kilograms of Category 1 or Category 2 trackable waste (such as asbestos) is to be transferred off-site at any one time a licence under the Protection of the Environment Operation Act 1997 would need to be obtained prior to commencement of construction.

### 6.9.3 Safeguards and management measures

The safeguards and management measures outlined in Table 6.28 would mitigate potential impacts of waste management.
Table 6.28 Waste management and resource use safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste management and resource use</td>
<td>• The resource management hierarchy detailed by the Waste Avoidance Resource Recovery Act 2001 would be adopted.</td>
<td>Project manager and environmental manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Waste management and resource use</td>
<td>• A Waste Management Plan would be prepared and would include measures for handling, temporary storage, waste classification and off-site disposal of waste.</td>
<td>Project manager and environmental manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Waste management and resource use</td>
<td>• All pavements removed would be reused onsite where possible or removed by a waste contractor for beneficial reuse.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Waste management and resource use</td>
<td>• Waste destined for recycling or reuse would be stored separately and in a suitable location to avoid mixing with other materials/wastes.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| Waste management and resource use    | • All working areas would be monitored to ensure construction site and compounds are kept free of rubbish and cleaned up at the end of each working day.  
  • All waste and procurement practices would be reported as contractually required for RMS WRAPP Reporting. | Project manager and environmental manager | Construction |
| Waste management and resource use    | • Excavated material to be disposed off-site would be stored temporarily in a container and disposed at a licenced landfill according to the waste classification of the material. | Project manager and environmental manager | Construction |

6.10 Water quality

6.10.1 Existing environment

The Sydney Harbour Bridge is located within the Sydney Harbour catchment. Stormwater runoff from the bridge deck enters the harbour via bridge scuppers and other drainage structures. Stormwater runoff from the Bradfield Highway, Cahill Expressway and York Street would enter the harbour via stormwater drains in the road kerb and channel. The temporary stockpile site at the corner of James Craig Road and Sommerville Road is also located within the Sydney Harbour Catchment. The proposed stockpile site is currently grassed so that rainwater infiltrates into the ground and from there flows into Rozelle Bay.

Water quality in the catchments that drain to Sydney Harbour is relatively poor and flows are altered. Stormwater runoff from the urban catchment is generally not treated (except for gross pollutants). Common urban stormwater pollutants include gross pollutants and litter, sediment and suspended solids, nutrients, toxic organics, heavy metals and hydrocarbons.
6.10.2 Potential impacts

Water containing suspended solids has the potential to discharge into Sydney Harbour during the removal of the existing pavement. This could be associated with runoff from stockpiled materials during a storm or a period of sustained rainfall.

Accidental spills or discharge could be a risk to water quality. This could be in the form of fuel or oil spills from plant and equipment or vehicles (see section 6.5 Hazard and Risk).

Any waste material that may be produced as a result of the proposal would need to be stockpiled before being removed from the area. Runoff from stockpiled waste materials during a rain event is a potential source of water pollution unless appropriate safeguards are put in place.

6.10.3 Safeguards and management measures

The safeguards and management measures outlined in Table 6.29 would mitigate any potential water quality impacts.

Table 6.29 Waste quality safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quality</td>
<td>• Vehicles and plant would be properly maintained and regularly inspected for fluid leaks.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Water quality</td>
<td>• Prior to commencement of construction silt and sediment controls would be established for the temporary stockpile site. Controls would be managed in accordance with Managing Urban Stormwater, Soils and Construction Chapter 2D, Main Road Construction, DECCW, 2008 (Blue Book Chapter 2d). The controls would be checked by the RMS Environmental Officer, Sydney Region prior to construction. • Controls would be regularly checked and maintained throughout the work especially ahead of likely rain events.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>

6.11 Socio-economic and land use

6.11.1 Existing environment

The proposal is located in the City of Sydney Local Government Area. The southern part of the proposal is located in the western financial district of Sydney’s Central Business District (CBD). Figure 3.1 shows the study area.
The City of Sydney LGA covers about 26 square kilometres, located in the Sydney metropolitan area. The City of Sydney’s population is about 177,000 people (June 2009), an increase of nearly 10,000 (six per cent) from the last population census in 2006 (City of Sydney, 2012).

The City of Sydney LGA is densely urbanised. Its land is intensively used for a variety of purposes including residential and commercial use as well as tourist and cultural attractions, parks and open space. Residential development in the LGA is predominantly high density development. There are about 20,000 separate business establishments in the City of Sydney.

Beyond the study area’s southern boundary, Wynyard is an important transport hub connecting people with many of the CBD’s work places, commercial areas, recreational precincts, and other transport facilities.

There are signalised pedestrian crossings at Grosvenor and York streets and a pedestrian only path on the eastern side of the bridge which can be accessed via stairs from Cumberland Street. There is currently an uncontrolled crossing of Grosvenor Street at Clarence Street linking the pedestrian underpass between Grosvenor and Kent streets to York Street and the northern Sydney CBD.

A cycleway is located on the western side of Sydney Harbour Bridge which can be accessed via Kent Street cycleway and then the stairs at Argyle Street.

6.11.2 Potential impacts

The proposal has potential to have minor and temporary impacts on pedestrian and cyclist access during the construction. The traffic management plan would include measures to minimise these impacts including alternative access if required.

It is not anticipated that the proposal would directly impact local businesses or their accesses during construction or operation. The proposal would be scheduled to ensure any disruptions to any special events are avoided.

During construction there would be some increase in noise levels at nearby sensitive receivers. There would also be some air quality impacts however these would be relatively minor in association with the demolition of the toll booths. Safeguards would be implemented to minimise these impacts.

Tolling on the bridge has been in operation since the bridge opened in 1932. While the toll booths have been replaced, the toll points have remained relatively unchanged and are part of the cultural landscape. The proposal would remove the last link with manual tolling and impact the travel experience for motorists crossing the bridge. The driver and passenger experience would be improved by simplifying traffic movements and reducing road safety hazards between the Sydney Harbour Bridge and the Western Distributor or the northern Sydney CBD.

Stakeholders have generally supported the proposal during consultation undertaken to date.

Further details of socio-economic impacts of the proposal have been assessed in the following sections of the REF:

- Traffic and access – section 6.1.
- Noise and vibration – section 6.2.
• Visual amenity – section 6.4.
• Hazard and risk – section 6.5.
• Air quality – section 6.6.

The benefits of the proposal include:

• A safer road environment for drivers and passengers with simpler traffic movements and less road hazards.
• Better connectivity for users of the bus lane.
• Improved visual amenity and views of the bridge with less visual obstruction compared with existing arrangement.
• Improved access for pedestrians and cyclists across the loop road from Clarence Street to York Street.
• Preserving the associations with the Sydney Harbour Bridge through conservation of a toll booth.

6.11.3 Safeguards and management measures

The safeguards and management measures outlined in Table 6.30 would be undertaken to manage any socio-economic impacts.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-economic</td>
<td>• Access to businesses along Grosvenor Street and York Street would be retained during the kerbing and intersection work.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>• During construction, road users, pedestrians and cyclists would be informed in advance of changed conditions, including any likely disruptions to access.</td>
<td>Project manager and communication officer</td>
<td>Construction</td>
</tr>
<tr>
<td>Socio-economic</td>
<td>• Real-time information would be made available during the construction period through Variable Message Signs (VMS), the Live Traffic and 131 500 websites, and the media.</td>
<td>Project manager and communication officer</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.12 Greenhouse gas and climate change

6.12.1 Policy setting

NSW 2021 - A plan to make NSW number one (NSW Government 2011) sets the Government’s agenda for change in NSW. The plan includes a commitment to assist local government, business and the community to build resilience to future extreme events and hazards by helping them to understand and minimise the impacts of climate change. Actions to deliver on this target include:

- Complete fine scale climate change projections for NSW and make available to local councils and the public by 2014.
- Work with government agencies and universities to deliver improved climate projections for NSW and the ACT.

Other NSW 2021 goals and targets that will help tackle climate change include:

- Twenty per cent renewable energy by 2020.
- Assist business and households to realise annual energy savings of 16,000 Gigawatt hours (GWh) by 2020 compared to ‘business as usual’ trends.
- Support 220,000 low income households to reduce energy use by up to 20 per cent by June 2014.
- Increase the share of commuter trips made by public transport (including increasing the proportion of total journeys to work by public transport in the Sydney Metropolitan Region to 28% by 2016).
- Targets to increase walking and cycling.
- Planning policy to encourage job growth in centres close to where people live and to provide access by public transport.

6.12.2 Potential impacts

Climate change

There are a number of predicted effects of climate change. These include:

- Extreme temperature events, which could cause damage to transport infrastructure. An increase of 0.2 degrees Celsius (°C) to 1.6°C increase in average temperature has been predicted for the Sydney Metropolitan Area by 2030. This is within the design life of the proposal.
- Increased maintenance costs of infrastructure, as materials need to be replaced more often (possibly with more resilient products).
- Increased rainfall, which may exceed the capacity of the existing stormwater system, leading to flooding and associated damage to infrastructure and property. Average rainfall in the Sydney Metropolitan Area has been projected to change by between minus 13 per cent and plus seven per cent by 2030.

- More intense rainfall, which may increase damage to infrastructure in areas vulnerable to severe erosion and further pressure stormwater systems. Extreme rainfall in the Sydney Metropolitan Area has been projected to change by between minus three per cent and plus eight percent by 2030.

The impacts of climate change may be managed by adapting design standards where considered necessary to reduce the vulnerability of infrastructure to predicted effects. In this case the design parameters are relatively fixed and guided by the existing road infrastructure and its characteristics.

### Greenhouse gases emissions

Greenhouse gas emissions attributable to the proposal would be confined to the construction stage. Sources of contribution to emissions would include:

- Fuel used by vehicles, generators and other equipment.
- Embodied energy in the re-surfacing materials.
- Upstream emissions from fuel used. For all uses of energy, there are a number of sources of upstream emissions associated with supply. For transport fuels, these include emissions associated with extraction, production and transport of the specified fuel.

Given the nature and scale of the proposal, emissions would be relatively minor and would only be associated with energy use during material manufacture and fuel use during the work. Accordingly, the likely greenhouse gas emissions associated with the proposal have not been quantified.

### 6.12.3 Safeguards and management measures

The safeguards and management measures outlined in Table 6.31 would minimise any greenhouse gas emissions.

#### Table 6.31 Greenhouse gas emissions safeguards and management measures

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse gas emissions</td>
<td>- Vehicles and construction equipment would be properly maintained so as to achieve optimum fuel efficiency.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
<tr>
<td>Greenhouse gas emissions</td>
<td>- Where possible plant and equipment would be switched off when not in use.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.13 Summary of beneficial effects

The proposal's beneficial effects are:

- A safer road environment for drivers and passengers with simpler traffic movements and less road hazards.
- Better connectivity for users of the bus lane.
- Improved visual amenity and views of the bridge with less infrastructure on the bridge deck to impede views and visual amenity.
- Lower costs to maintain the Bradfield Highway.

6.14 Summary of adverse effects

There would be some adverse effects of the proposal. These adverse effects would be predominantly during the construction period and would be temporary and of short duration. These include:

- Increased disruption to traffic using the bridge during the construction period.
- Potential adverse air quality impacts as a result of demolition of the toll booths and pavements and kerbs.
- Noise and vibration impacts during construction would be experienced at local sensitive noise receptors including residences and hotels.
- Minor adverse impacts to the heritage significance of the bridge.
- Temporary adverse visual amenity effects during the construction period.
- Increased congestion of southbound traffic due to taxis using the main bridge deck to access the Western Distributor.

6.15 Cumulative effects

In terms of the cumulative environmental effects with other existing or future activities, RMS also proposes to modernise and relocate tolling systems to a location north of the bridge. That proposal involves the modification to the existing speed limit sign to the north of the bridge. It would not involve demolition, and the cumulative impact of the two proposals would be effectively managed through the implementation of appropriate safeguards and mitigation measures.

Other known or upcoming projects or events which may result in cumulative impacts with the proposal include:

- Northern toll plaza precinct upgrade.
- Sydney Harbour Bridge king post lift upgrade.
- Sydney Harbour Bridge internal pylon lift upgrade.
- Sydney Harbour Bridge road resurfacing.
- Sydney Harbour Bridge maintenance painting.
- Sydney Harbour Bridge special events (eg new year’s eve display).

The potential negative impacts are of a temporary nature. These impacts would include:
- A reduction in site accessibility and traffic impacts during construction
- Generation of additional noise during construction
- Minor alterations to heritage items.

Positive cumulative impacts would be experienced by motorists using the Sydney road network after work is completed. The proposal would contribute to:
- Simpler traffic movements.
- Safer travelling conditions.
- Improved travel times.

These projects would be assessed separately for their impacts and these would be managed through the implementation of appropriate safeguards.

There are no other known or upcoming projects that would result in cumulative impacts.
7. Environmental management

This chapter describes how the proposal will be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided with reference to environmental management plans and relevant Roads and Maritime Services QA specifications. A summary of site-specific environmental safeguards is provided as detailed in Chapter 6 and the licence and/or approval requirements required prior to construction are also listed.

7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A project environmental management plan (PEMP) and a contractors environmental management plan (CEMP) will be prepared to describe safeguards and management measures identified. These plans will provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The plans will be prepared prior to construction of the proposal and must be reviewed and certified by the RMS Environmental Officer, Sydney Region, prior to the commencement of any on-site work. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP would be developed in accordance with the specifications set out in the RMS QA Specification G36 – Environmental Protection (Management System).

7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed work on the surrounding environment.

The safeguards and management measures are summarised in Table 7.1.
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General</td>
<td>• All environmental safeguards would be incorporated within the following documents:</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Project Environmental Management Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Detailed design stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Contract specifications for the proposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Contractor’s Environmental Management Plan.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>General</td>
<td>• A risk assessment would be carried out on the proposal in accordance with the RMS Audit Pack and Operations and Services Directorate (OSD) risk assessment procedures to determine an audit and inspection program for the work. The recommendations of the risk assessment would be implemented.</td>
<td>Project manager and regional environmental staff</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A review of the risk assessment would be undertaken after the initial audit or inspection to evaluate if the level of risk chosen for the proposal is appropriate.</td>
<td></td>
<td>After first audit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Any work resulting from the proposal and as covered by the REF would be subject to environmental audit(s) and/or inspection(s) which may occur at any time in their duration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>General</td>
<td>• The environmental contract specification G36 – Environmental Protection (Management System) would be forwarded to the RMS Senior Environmental Officer for review at least 10 working days prior to the tender stage.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A contractual hold point would be maintained until the CEMP is reviewed by the RMS Senior Environmental Officer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>General</td>
<td>• The RMS Project Manager would notify the RMS Environmental Officer at least five days prior to work commencing.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>5</td>
<td>General</td>
<td>• All businesses and residences likely to be affected by the proposed work would be notified at least five working days prior to the commencement of the proposed activities.</td>
<td>Project manager</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>General</td>
<td>• Environmental awareness training would be provided, to all field personnel and subcontractors.</td>
<td>Contractor</td>
<td>Pre-construction and during construction as required.</td>
</tr>
</tbody>
</table>
| 7   | Traffic | • A traffic management plan would be prepared for the proposal. The plan would detail specific arrangements for lane closures, traffic control and vehicle access. It would be consistent with the requirements of the RTA Traffic Control at Worksites Manual (RTA, 2010). Measures would include but not be limited to:  
  o Traffic control devices which would be installed in accordance with the Traffic control at work sites manual (RTA, 2010) and Australian Standard 1742.3 (Manual of uniform traffic control devices).  
  o Road occupancy licences which would be obtained prior to implementation of any lane closures.  
  o Specialist work tasks requiring multiple lanes, partial or full carriageway closures or other diversions, which would be undertaken during periods of reduced traffic volumes such as school holidays, weekends and at night to minimise the impact on the travelling community.  
  o Details of pedestrian access to address potential impact on pedestrians. | Project manager and TMC | Pre-construction and construction |
<p>| 8   | Traffic | • Access would be maintained for emergency response vehicles. If a stage of the work restricts access from any approach to the Sydney Harbour Bridge alternative arrangements would be developed in consultation with the relevant emergency services. | Project manager and TMC | Construction                                |
| 9   | Traffic | • Temporary traffic diversions, clearways and road closures would be implemented during the work in accordance with TMC requirements.                                                                                     | Project manager and TMC | Construction                                |
| 10  | Traffic | • The community would continue to be informed of the future changed traffic conditions, changes to cyclist/pedestrian and the likely disruptions to access in accordance with the project communication strategy | Project manager and TMC | Construction                                |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Noise and vibration</td>
<td>• A Construction Noise and Vibration Management Plan would be prepared, consistent with the requirements of the Interim Construction Noise Guidelines, addressing each major stage of the construction work and identifying the appropriate noise and vibration mitigation and management measures.</td>
<td>Project manager</td>
<td>Pre-Construction</td>
</tr>
<tr>
<td>12</td>
<td>Noise and vibration</td>
<td>• Prior to commencing work, construction crews would be briefed at inductions or similar in order to create awareness of the locality of sensitive receivers and the importance of minimising noise emissions, especially during night-time work.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>13</td>
<td>Noise and vibration</td>
<td>• Where possible, higher NML exceedance activities/locations would be considered to be undertaken during daytime and evening periods.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>14</td>
<td>Noise and vibration</td>
<td>• Where possible, respite periods would be developed for noisy activities such as operation of the hydraulic hammer.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>15</td>
<td>Noise and vibration</td>
<td>• Material would be placed carefully into trucks to minimise noise generation.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>16</td>
<td>Noise and vibration</td>
<td>• Less noise-intensive equipment would be used, where reasonable and feasible.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>17</td>
<td>Noise and vibration</td>
<td>• All equipment would be maintained and regularly inspected throughout the construction work.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>18</td>
<td>Noise and vibration</td>
<td>• The affected community would be made aware of likely noisy activities and would be kept aware of the current and future construction work through a proactive communication strategy.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>19</td>
<td>Noise and vibration</td>
<td>• The 1800 number would be used for the project to take any community complaints and a procedure would be developed to ensure complaints are addressed promptly.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 20  | Noise and vibration     | • Where possible, work would be undertaken during the standard working hours of:  
  o 7am to 6pm Monday to Friday  
  o 8am to 1pm on Saturdays  
  o No work on Sundays or public holidays.                                                                                                               | Project manager | Construction     |
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Non-Aboriginal heritage</td>
<td>• For work required outside standard hours, the procedure contained in Practice Note vii of the <em>Environmental Noise Management Manual — Roadwork Outside Normal Working Hours</em> (RTA 2001) would be followed. This would include notification of potentially affected residents.</td>
<td>Contractor project manager</td>
<td>After removal from Bradfield Highway</td>
</tr>
<tr>
<td>22</td>
<td>Non-Aboriginal heritage</td>
<td>• RMS would seek expressions of interest from interested parties to keep a representative sample of a toll booth (fixed and/or movable). RMS would continue to liaise with interested parties to ensure the sample(s) is/are preserved adequately.</td>
<td>Contractor project manager</td>
<td>Prior to construction</td>
</tr>
<tr>
<td>23</td>
<td>Non-Aboriginal heritage</td>
<td>• The recommendations in the Sydney Harbour Bridge Toll Plazas Movable Heritage Salvage Survey (GML, 2008) would be implemented during the removal of movable heritage objects i.e. machinery and equipment associated with the toll booths from the Bradfield Highway.</td>
<td>Contractor project manager</td>
<td>Prior to construction</td>
</tr>
</tbody>
</table>
| 24  | Non-Aboriginal heritage | • All crew working on the site would be required to attend a tool box talk that highlights the heritage significance of the bridge, the management measures in place to protect the heritage value.  
• Evidence of the tool box talk and attendees would be documented. | Contractor project manager      | Construction                   |
<p>| 25  | Visual amenity           | • Where possible the design would minimise the footprint of the carriageway in order to maximise future opportunities for improvements to the public domain such as minimising widths of medians and lanes (where safe to do so), minimising the number of signs, gantries, light poles and other structures in the road. | Project manager                 | Design                        |
| 26  | Visual amenity           | • Where possible the design would incorporate ideas to reduce clutter and ensure integration and consistency with existing elements such as signage, lighting and gantries and maximising the spacing (as far as possible) between structures. | Project manager                 | Design                        |
| 27  | Visual amenity           | • Lighting would be designed and located to be consistent with existing lighting along the Western Distributor and the Sydney Harbour Bridge and to minimise light spill to areas within the road corridor. | Project manager                 | Design                        |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Visual amenity</td>
<td>• New structures would be minimised in the visually sensitive toll plaza and located to maintain existing views and sight lines to important landscape and heritage items including the Sydney Harbour Bridge, the Observatory, the National Trust Centre, Sydney Harbour and the Sydney Opera House.</td>
<td>Project manager</td>
<td>Design Construction</td>
</tr>
<tr>
<td>29</td>
<td>Visual amenity</td>
<td>• Where possible, new structures would be designed to be visually unimposing through minimising width and length and maximising their transparency and designing them to blend into the current bridge structure. Bridge steel grey would be chosen as the colour for structures where possible.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>30</td>
<td>Visual amenity</td>
<td>• Structures and elements would be located as far as possible along the edges of the road corridor where they would integrate with existing buildings and structures to minimise the number of elements in the road corridor with the potential to obstruct views.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>31</td>
<td>Visual amenity</td>
<td>• Operational areas would be designed to be visually separated from travelling lanes to reduce the perceived width of the road corridor and reduce visibility of the clutter created as part of operations and storage of materials.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>32</td>
<td>Visual amenity</td>
<td>• Use of red bus lane marking would be minimised on the bridge where possible.</td>
<td>Project manager</td>
<td>Design</td>
</tr>
<tr>
<td>33</td>
<td>Hazard and risk</td>
<td>• Air monitoring would be carried out by a licensed asbestos assessor with NATA accreditation in accordance with National Occupational Health and Safety Commission (NOHSC), Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC:3003(2005)], NOHSC, Australia.</td>
<td>Contractor project manager</td>
<td>Pre- demolition</td>
</tr>
<tr>
<td>34</td>
<td>Hazard and risk</td>
<td>• An occupational hygiene consultant, who would also be a licenced asbestos assessor with NATA accreditation, would carry out perimeter, personal and clearance air monitoring and inspections.</td>
<td>Contractor project manager</td>
<td>Pre- demolition</td>
</tr>
<tr>
<td>35</td>
<td>Hazard and risk</td>
<td>• A Hazardous Materials Removal Control Plan would be developed and implemented.</td>
<td>Contractor project manager</td>
<td>Prior to demolition of toll booths</td>
</tr>
<tr>
<td>36</td>
<td>Hazard and risk</td>
<td>• The removal of polychlorinated biphenyl containing light fittings would be implemented under advice from the occupational hygiene consultant.</td>
<td>Contractor project manager</td>
<td>Removal of the light fittings</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
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</tr>
<tr>
<td>37</td>
<td>Hazard and risk</td>
<td>• The handling and use of dangerous goods would be undertaken in accordance with the <em>Occupational Health and Safety Act 2000</em> and the ‘Storage and Handling of Dangerous Goods Code of Practice’ (WorkCover NSW, 2005).</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>38</td>
<td>Hazard and risk</td>
<td>• All hazardous substance transport would be undertaken in accordance with relevant legislation and codes, including the Road and Rail Transport (Dangerous Goods) (Road) regulation 1998 and the Australian Code for the Transport of Dangerous Goods by Road and Rail (National Transport Commission, 2008).</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>39</td>
<td>Hazard and risk</td>
<td>• Spill kits would be maintained on-site throughout the construction work.</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>40</td>
<td>Hazard and risk</td>
<td>• As part of the site specific CEMP, a hazard and risk management plan, including an emergency response plan, would be prepared by a suitably qualified hazardous materials expert. All risk and hazard controls would be regularly inspected and maintained.</td>
<td>Project manager</td>
<td>Construction and post construction</td>
</tr>
<tr>
<td>41</td>
<td>Hazard and risk</td>
<td>• The disposal of asbestos and other hazardous material generated during the removal of toll booth and other structures would be performed by a contractor with a Class B asbestos removal licence.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>42</td>
<td>Hazard and risk</td>
<td>• All hazardous material would be disposed of at a licenced landfill for asbestos containing waste material.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>43</td>
<td>Hazard and risk</td>
<td>• Dust emission control measures would be applied in order to minimise the distribution of potentially contaminated spoil and fill.</td>
<td>Project manager</td>
<td>Construction</td>
</tr>
<tr>
<td>44</td>
<td>Air quality</td>
<td>• A Construction Environmental Management Plan (CEMP) would be developed for the site and would include air quality and odour management measures. The following measures would be included:</td>
<td>Project manager</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o All loaded trucks would be covered.</td>
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<td></td>
<td></td>
<td>o Machinery would be turned off rather than left to idle when they are not in use.</td>
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<td></td>
<td></td>
<td>o Stabilisation of all disturbed areas would be undertaken as soon as practicable to prevent or minimise wind-blown dust.</td>
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<td>No.</td>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
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<td>--------------</td>
</tr>
</tbody>
</table>
| 45  | Air quality             | - Dust control measures, including wetting and (if required) engineering control methods would be applied in excavation areas in order to minimise dust emissions.  
- Construction activities that may emit dust or volatile chemicals would be undertaken in the shortest time possible taking work quality and worker safety precautions into account. | Project manager       | Construction |
<p>| 46  | Aboriginal heritage     | - Should Aboriginal cultural heritage items be uncovered during construction, the RMS <em>Unexpected Archaeological Finds Procedure</em> (RMS 2012) would be followed. All work in the vicinity of the find would cease and the RMS Aboriginal Cultural Heritage Advisor and the Senior Environmental Officer would be contacted immediately. Works in the vicinity of the find would not re-commence until clearance is received from those RMS officers and the OEH. | Project manager       | Construction |
| 47  | Biodiversity            | - An arborist with a minimum AQF level 5 qualifications would be engaged to monitor and report on the condition of the retained tree. The arborist would be present at any excavation or trenching in the vicinity of the tree. | Project manager       | Construction |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| 48  | Biodiversity                 | • A tree protection zone (TPZ) would be established (defined as the radial offset (metres) of twelve times (12X) trunk diameter at breast height).  
• A fence would be constructed to mark the TPZ boundary and provide adequate protection for the tree. The fence would be constructed of sturdy material.  
• If tree protection fencing cannot be installed, the trunk of the trees would be battened to avoid bark damage.  
• Machinery and equipment would be kept out of the TPZ to limit the impact to the Hills Fig.                                                                                                                                   | Project manager                       | Construction    |
<p>| 49  | Biodiversity                 | • Adequate moisture levels would be maintained during the construction as directed by the arborist.                                                                                                                                                                                                                                                   | Project manager                       | During construction |
| 50  | Biodiversity                 | • The potential for soil compaction and possible contamination of soil would be minimised by specifying access tracks for machinery and equipment at the construction site.                                                                                                                                                                                       | Arborist and project manager         | Pre-construction |
| 51  | Biodiversity                 | • Roots would be covered to buffer drying and concrete contamination during the works. If any roots require pruning this would be undertaken with the supervision of the Project Arborist.                                                                                                                                   | Arborist and Project manager         | Pre-construction |
| 52  | Waste management and resource use | • The resource management hierarchy detailed by the <em>Waste Avoidance Resource Recovery Act 2001</em> would be adopted.                                                                                                                                                                                                                      | Project manager and environmental officer | Pre-construction |
| 53  | Waste management and resource use | • A Waste Management Plan would be prepared and would include measures for handling, temporary storage, waste classification and off-site disposal of waste.                                                                                                                                                                        | Project manager                       | Construction    |
| 54  | Waste management and resource use | • All pavements removed would be reused onsite where possible or removed by a waste contractor for beneficial reuse.                                                                                                                                                                                                                                      | Project manager                       | Construction    |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Waste management and resource use</td>
<td>• Waste destined for recycling or reuse would be stored separately and in a suitable location to avoid mixing with other materials/wastes.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 56  | Waste management and resource use          | • All working areas would be monitored to ensure construction site and compounds are kept free of rubbish and cleaned up at the end of each working day.  
  • All waste and procurement practices would be reported as contractually required for RMS WRAPP Reporting. | Project manager and environmental manager        | Construction|
<p>| 57  | Waste management and resource use          | • Excavated material to be disposed off-site would be stored temporarily in a container and disposed at a licenced landfill according to the waste classification of the material. | Project manager and environmental manager        | Construction|
| 58  | Water quality                              | • Vehicles and plant would be properly maintained and regularly inspected for fluid leaks. | Project manager                                   | Construction|
| 59  | Water quality                              | • Prior to commencement of construction silt and sediment controls would be established for the temporary stockpile site. Controls would be managed in accordance with Managing Urban Stormwater, Soils and Construction Chapter 2D, Main Road Construction, DECCW, 2008 (Blue Book Chapter 2d). The controls would be checked by the RMS Environmental Officer, Sydney Region prior to construction. | Project manager                                   | Pre-construction|
| 60  | Water quality                              | • Controls would be regularly checked and maintained throughout the work especially ahead of likely rain events. | Project manager                                   | Pre-construction|
| 61  | Socio-economic                             | • Access to businesses along Grosvenor Street and York Street would be retained during the kerbing and intersection work. | Project manager                                   | Pre-construction|
| 62  | Socio-economic                             | • During construction, road users, pedestrians and cyclists would be informed in advance of changed conditions, including any likely disruptions to access. | Project manager and communications officer     | Construction|</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>Socio-economic</td>
<td>• Real-time information would be made available during the construction period through Variable Message Signs (VMS), the Live Traffic and 131 500 websites, and the media.</td>
<td>Project manager and communications officer</td>
<td>Construction</td>
</tr>
<tr>
<td>65</td>
<td>Greenhouse gas emissions</td>
<td>• Vehicles and construction equipment would be properly maintained so as to achieve optimum fuel efficiency.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
<tr>
<td>66</td>
<td>Greenhouse gas emissions</td>
<td>• Where possible plant and equipment would be switched off when not in use.</td>
<td>Site manager</td>
<td>Construction</td>
</tr>
</tbody>
</table>
7.3 Licensing and approvals

Table 7.2 Summary of licensing and approval required

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>If greater than 200 kilograms of Category 1 or Category 2 trackable waste is to be transferred off-site at any one time a licence under the Protection of the Environment Operation Act 1997 is required.</td>
<td>Prior to the commencement of construction.</td>
</tr>
</tbody>
</table>
8. Conclusion

This chapter provides the justification for the proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the proposal is in the public interest. The proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 Justification

The proposal is justified on the basis of simplifying traffic movements and reducing road safety hazards for drivers. The removal of the toll booth plazas would improve the visual amenity of the bridge, without impacting the structural integrity of the bridge and its approaches, and would reduce maintenance costs for RMS.

8.2 Objects of the EP&A Act

<table>
<thead>
<tr>
<th>Object</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.</td>
<td>The proposal would contribute to the improved management of motorists’ safety on the Sydney Harbour Bridge and approaches. In turn the proposal would promote the social and economic welfare of the community by contributing to the efficient and effective management of traffic flows and volumes on the Bradfield Highway.</td>
</tr>
<tr>
<td>5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.</td>
<td>The proposal would enhance an important piece of infrastructure, contributing to CBD access and connectivity especially for buses.</td>
</tr>
<tr>
<td>5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.</td>
<td>Public utilities would be retained although adjusted including power and communication. RMS would consult with utility providers prior to commencement of work.</td>
</tr>
<tr>
<td>5(a)(iv) To encourage the provision of land for public purposes.</td>
<td>The bridge provides transport for public purposes. This would not be decreased.</td>
</tr>
<tr>
<td>5(a)(v) To encourage the provision and co-ordination of community services and facilities.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.</td>
<td>Environmental issues have been considered as part of the assessment – refer in particular to section 6.8 Biodiversity.</td>
</tr>
<tr>
<td>5(a)(vii) To encourage ecologically sustainable development.</td>
<td>Ecologically sustainable development is considered in Sections 8.2.1 – 8.2.4 below.</td>
</tr>
<tr>
<td>Object</td>
<td>Comment</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5(a)(viii) To encourage the provision and maintenance of affordable housing.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.</td>
<td>Not relevant to the proposal.</td>
</tr>
<tr>
<td>5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.</td>
<td>The community consultation and notification program carried out in the lead up to preparing this REF is detailed in chapter 5. This REF will be on display and further consultation will be undertaken with the community if the proposal is determined to proceed.</td>
</tr>
</tbody>
</table>

8.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration for the proposal. This includes the effective integration of economic and environmental considerations in all decision-making processes.

In accordance with the *Environmental Planning and Assessment Regulation 2000*, the four principles of ESD, as set out in Schedule 2, are:

- The precautionary principle — where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for not implementing mitigation measures or strategies to avoid potential impacts.
- Inter-generational equity — the present generation should ensure that the health, diversity and productivity of the environment are equal to or better for the future generations.
- Conservation of biological diversity and ecological integrity — preserving biological diversity and ecological integrity requires that ecosystems, species and genetic diversity within species is maintained.
- Improved valuation and pricing of environmental resources — this principle established the need to determine economic values for services provided by the natural environment, such as the atmosphere’s ability to receive gaseous emissions, cultural values and visual amenity.

RMS is committed to providing its services in an environmentally responsible manner and managing or eliminating any risks that may lead to an adverse effect on the environment. Details of how the principles of ESD have been incorporated into the proposal are provided in Section 8.3.1 to 8.3.4 below.
8.3.1 The precautionary principle

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

When applying the precautionary principle public and private decisions should be guided by:

- Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment.
- An assessment of risk-weighted consequences of various options.

A precondition for the operation of the precautionary principle is that there are threats of serious or irreversible environmental damage. This REF has demonstrated that such threats are not present for the proposal.

Regardless, the proposal has sought to take a precautionary approach to minimise environmental impacts. This has also been applied in the development of safeguards and management measures. Best available technical information, environmental standards and measures have been used to minimise identified environmental risks of the proposal.

Planning for the proposal involved a risk assessment process that evaluated the environmental risks. Measures to avoid the risks identified were then factored into the construction planning for the proposal. These measures include:

- An iterative design process for the development and selection of options. The process involved an examination of physical constraints and opportunities by a large and diversely skilled team of staff and contractors.
- A consultation strategy, which is aimed at addressing the community’s and stakeholder’s information needs with a multi-faceted community engagement and communications program.
- A comprehensive environmental impact assessment of the preferred option supported by specialist studies of these aspects which were considered likely to be major sources of project risk. This assessment is documented in chapter 6 of this document.

8.3.2 Intergenerational equity

The principle of intergenerational equity upholds that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The proposal would benefit both existing and future generations in the following ways:

- It would remove an unnecessary hindrance to traffic flows across the Bradfield Highway, and therefore, improving motorist safety into the future.
- It would remove redundant infrastructure from the bridge which would have a minor heritage impact. Removing the toll booths would also have a social impact as it would remove the last link with manual tolling and change the travel experience for motorists crossing the bridge. The driver and passenger experience would be improved by simplifying traffic movements and reducing road safety hazards between the Sydney Harbour Bridge and the Western Distributor and the northern Sydney CBD.
The proposal has integrated short and long-term social, financial and environmental considerations so that any foreseeable impacts are not left to be addressed by future generations. Issues with potential long term implications such as the consumption of non-renewable resources, waste disposal and water quality have been avoided and/or minimised through construction planning and the application of safeguards and management measures described in section 7 of the REF.

8.3.3 Conservation of biological diversity and ecological integrity

The principle of biological diversity upholds that the conservation of biological diversity and ecological integrity should be a fundamental consideration.

The construction planning outcomes and safeguard and management measures described in this REF would minimise the impacts to the Hills Fig tree in York Street arising from the intersection widening work in this proposal (see section 6.8).

8.3.4 Improved valuation, pricing and incentive mechanisms

This principle upholds that environmental factors should be included in the valuation of assets and services, such as:

- Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement.

- The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.

- Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Environmental issues have been considered in the strategic planning for the proposal. The preservation of traffic and access, heritage and visual amenity values of the bridge are the primary reasons that justify the need for the proposal. The environmental goals of the proposal have been pursued in the most cost effective way through the construction planning process.

Mitigation measures for the avoidance, reuse, recycling and management of waste during construction and operation are to be implemented.
8.4 Conclusion

The proposed Sydney Harbour Bridge southern toll plaza precinct upgrade is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act.

The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the Threatened Species Conservation Act 1995 or Fisheries Management Act 1994 and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance under the EPBC Act.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on traffic and transport, visual amenity, noise to local residences and heritage. Mitigation measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve driver and passenger safety and would improve long-term visual amenity of the bridge. On balance the proposal is considered justified.
9. Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Andrée Zambolt  
Principal Environmental Scientist  
Parsons Brinckerhoff  
Sydney  

Date: 29 October 2012

I have examined this review of environmental factors and the certification by Andrée Zambolt and accept the review of environmental factors on behalf of Roads and Maritime Services.

Stephen Sherwin  
Project Manager  
Roads and Maritime Services Project Services Team 3  
Pyrmont  

Date: 30 October 2012
10. References


City of Sydney Council (2012) www.cityofsydney.nsw.gov.au

Department of Planning and Infrastructure (DoPI) (2011) Hazardous and Offensive Development Application Guidelines’, NSW


Infrastructure NSW (2012) First things first – the State Infrastructure Strategy 2012-2032


RTA (2010) *Traffic control at work sites manual, NSW*

RTA (2011a) *Procedure for Aboriginal Cultural Heritage Consultation and Investigation, NSW*

RTA, (2011b) *Environmental Incident Classification and Reporting Procedure, NSW*


Tree Wise Men (2012) *Preliminary Arboricultural Advice in Relation to Two Hills Figs at Southern Toll Plaza Sydney Harbour Bridge Sydney, Sydney*

WorkCover NSW (2005) *Storage and Handling of Dangerous Goods Code of Practice, NSW*
## Terms and acronyms used in this REF

<table>
<thead>
<tr>
<th>AHIMS</th>
<th>Aboriginal Heritage Information Management System</th>
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</thead>
<tbody>
<tr>
<td>AM peak</td>
<td>Peak period of daily traffic on weekdays between the hours of 6 am to 10 am</td>
</tr>
<tr>
<td>the bridge</td>
<td>Sydney Harbour Bridge</td>
</tr>
<tr>
<td>bus lane users</td>
<td>These include bus travellers, taxis and motorcycles</td>
</tr>
<tr>
<td>CCTV</td>
<td>Closed circuit television</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CEMP</td>
<td>Construction environmental management plan</td>
</tr>
<tr>
<td>ELCS</td>
<td>Electronic lane control system</td>
</tr>
<tr>
<td>EP&amp;A Act</td>
<td><em>Environmental Planning and Assessment Act 1979 (NSW)</em>. Provides the legislative framework for land use planning and development assessment in NSW</td>
</tr>
<tr>
<td>EPBC Act</td>
<td><em>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</em>.</td>
</tr>
<tr>
<td>GML</td>
<td>Godden Mackay Logan</td>
</tr>
<tr>
<td>Heritage Act</td>
<td><em>Heritage Act 1977 (NSW)</em></td>
</tr>
<tr>
<td>ISEPP</td>
<td>State Environmental Planning Policy (Infrastructure) 2007</td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Plan</td>
</tr>
<tr>
<td>NHR</td>
<td>National Heritage Register</td>
</tr>
<tr>
<td>NOHSC</td>
<td>National Occupational Health and Safety Commission</td>
</tr>
<tr>
<td>NPW Act</td>
<td><em>National Parks and Wildlife Act 1974 (NSW)</em></td>
</tr>
<tr>
<td>OEH</td>
<td>Office of Environment and Heritage</td>
</tr>
<tr>
<td>OHS</td>
<td>Occupational Health and Safety</td>
</tr>
<tr>
<td>PEMP</td>
<td>Project Environmental Management Plan</td>
</tr>
<tr>
<td>PM peak</td>
<td>Peak period of daily traffic on weekdays between the hours of 3 pm and 7 pm</td>
</tr>
<tr>
<td>POEO Act</td>
<td><em>Protection of the Environment Operations Act 1997</em></td>
</tr>
<tr>
<td>RMS</td>
<td>Roads and Maritime Services</td>
</tr>
<tr>
<td>REF</td>
<td>Review of Environmental Factors</td>
</tr>
<tr>
<td>SHR</td>
<td>State Heritage Register</td>
</tr>
<tr>
<td>SLR</td>
<td>SLR Global Environmental Solution</td>
</tr>
<tr>
<td>Split ramp</td>
<td>Ramp on either side of the carriageway taking separate exit traffic</td>
</tr>
<tr>
<td>SREP</td>
<td><em>Sydney Regional Environmental Plan</em></td>
</tr>
<tr>
<td>TSC Act</td>
<td><em>Threatened Species Conservation Act 1995 (NSW)</em></td>
</tr>
<tr>
<td>TfNSW</td>
<td>Transport for NSW</td>
</tr>
<tr>
<td>VMS</td>
<td>Variable Message Signs</td>
</tr>
<tr>
<td>WRAPP</td>
<td>Waste Reduction and Purchasing Policy</td>
</tr>
<tr>
<td>QA Specifications</td>
<td>Specifications developed by Roads and Maritime Services for use with roadwork and bridgework contracts let by Roads and Maritime Services</td>
</tr>
</tbody>
</table>