Epping Road widening between Essex Street and Blaxland Road, Epping

Review of environmental factors

November 2015
Roads and Maritime Services

Epping Road westbound widening between Essex Street and Blaxland Road at Epping

Review of Environmental Factors

November 2015
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Executive summary

The proposal

Roads and Maritime Services is proposing to widen Epping Road westbound between Blaxland Road and Essex Street and upgrade the Epping Road and Essex Street intersection (referred to as ‘the proposal’ for the purposes of this report).

The proposal is part of the NSW Governments’ Urban Activation Precincts Program to support future development in Epping town centre.

The key features of the proposal include:

- Widening the southern side of Epping Road by about 3.7 metres between Essex Street and Blaxland Road to provide an additional westbound lane. The additional westbound lane would function as a dedicated left turn lane into Blaxland Road
- Upgrading the intersection of Epping Road and Essex Street:
  - Widening on the north-eastern side of the intersection to provide an additional right turn lane into Epping Road westbound. This will provide two marked right turn lanes, and an unmarked left turn/through lane
  - Upgrade the intersection to provide traffic light controlled pedestrian crossings on all four approaches
- To widen 80 metres of the northern side of Epping Road east of Essex Street
- Building a raised median about 340 metres long along Epping Road, between Essex Street and Blaxland Road
- Constructing a raised median about 20 metres long on Essex Street north of Epping Road intersection
- Removal of the right turn movement from Epping Road to Essex Street in both directions
- Removal of the right turn movement from Langston Place into Epping Road westbound
- Removal of right turn movement from Forest Grove and Smith Street
- Providing a dedicated left turn lane from Essex Street onto Epping Road westbound
- Constructing a 1.2 metre wide pedestrian pathway on Epping Road
- Property adjustments
- Utility adjustments within the proposal site
- Temporary construction compounds and stockpile sites.

Need for the proposal

About 42,000 vehicles travel on Epping Road per day in the proposal area. It functions as an arterial road providing access to Epping to the west and surrounding residential and employment areas to the east. It is one of the main access roads to Epping town centre and provides a link between the north-western suburbs and the Hills district to the lower North Shore to Sydney’s central business district. While it mostly consists of six traffic lanes, the section of Epping Road between Blaxland Road and Essex Street has four traffic lanes and is currently congested in peak periods.
The Department of Planning and Environment, and Hornsby and Parramatta Councils are planning for continued growth and development in and around Epping town centre. The continued growth and development of the town centre, as proposed by the Epping Town Centre Study (JBA Planning 2010 and 2011) and the planning for the Epping Town Centre Priority Precinct, will result in an increase in traffic demand on major regional road links. In 2013, the Department of Planning and Infrastructure released the Epping Town Centre Structure Plan which confirmed that there would be significant growth in and around the town centre. A rezoning proposal to provide for this growth was finalised in March 2014.

The proposal is needed to improve traffic flows and fulfil the NSW Government commitment to address short and medium term regional traffic growth within the Epping Town Precinct. It will cater for the 80 per cent of Epping town through traffic as Sydney continues to grow and car use remains high.

**Proposal objectives**

The objectives of the proposal are to:

- Meet current and future traffic demands on Epping Road to the year 2026 and beyond
- Reduce travel times and congestion
- Improve the intersection performance
- Improve road safety for road users
- Improve pedestrian facilities
- Minimise impacts on the environment and properties
- Integrate with the current and future character of the area.

**Options considered**

Options considered for the proposal included:

**Option 0** – Do minimum

**Option 1** – Widening Epping Road to the north, transition east of Essex Street

**Option 2** – Widening Epping Road to the north, transition west of Essex Street

**Option 3** – Widening Epping Road to the south

The selection of the preferred option, to widen Epping Road to the south, took into account land use, environmental and economic factors and stakeholder input and is considered to best achieve the proposal objectives.

**Statutory and planning framework**

Clause 94 of State Environmental Planning Policy (Infrastructure) 2007 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 the purpose of a road and is to be carried out by Roads and Maritime, development consent from Hornsby Shire Council is not required. The proposal needs to be assessed under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). A review of environmental factors (REF) has been prepared as part of the assessment process.
Community and stakeholder consultation

Consultation with the local community potentially affected property owners, relevant government agencies and other stakeholders have been carried out since August 2014.

Roads and Maritime consulted with Hornsby Shire Council and the Department of Planning and Environment Urban Activation Precincts team in accordance with the requirements of ISEPP.

Roads and Maritime will continue to consult with the community and stakeholders throughout the development of the proposal.

Environmental impacts

The beneficial effects of the proposal would include:

- Upgrading Epping Road and the Essex Street intersection in accordance with the recommendations of the Epping Town Centre Study (JBA Planning 2011) and planning for the Epping Town Centre Urban Activation Precinct
- Providing some of the road improvements required as a prerequisite for future urban growth in the Epping town centre, as proposed by the Epping Town Centre Urban Activation Precinct Finalisation Report (Department of Planning 2013)
- Addressing congestion issues on Epping Road leading to improved efficiency and travel times
- Improved intersection performance
- Improved safety for road users.

The key potential adverse effects of the proposal would include:

- Temporary traffic impacts during construction, from increased heavy vehicle movements on the existing road network
- Temporary construction noise impacts
- Temporary disruptions to traffic flow and access during construction
- Potential to encounter contaminated material during construction works near the auto centre
- Full and partial property acquisition
- Demolition of the residential property at 36 Essex Street and 2 Forest Grove if compound location D is required
- Vegetation removal.

Adverse environmental effects would be minimised, managed and mitigated through the implementation of safeguards outlined in this review of environmental factors. These would include a construction noise and vibration management plan, biodiversity management plan, soil and water management plan and traffic management plan.

Justification and conclusion

The proposal is needed to improve traffic flows and access to the Epping town centre. The proposal is considered to be consistent with national, state and local strategies and plans as it would lead to improved efficiency and safety of the local road network.

While there would be some environmental impacts as a consequence of the proposal, they would be avoided or minimised wherever possible through design and site-specific safeguards.
The beneficial effects are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal.

The proposal is subject to assessment under Part 5 of the EP&A Act. This review of environmental factors 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. Therefore a referral to the Department of the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is necessary under the Environment Protection and Biodiversity Conservation Act 1999 is not required.

**Display of the review of environmental factors**

The review of environmental factors document can be accessed in the following ways during the display of the review of environmental factors:

**Online**


**Display locations**

Copies are available to view during the display period at the following locations:

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<td>Administration Centre, 296 Peats Ferry Road, Hornsby</td>
<td>8.30 am to 5.00 pm Monday to Friday</td>
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<tr>
<td>Epping Library</td>
<td>Chambers Court (off Pembroke Street), Epping</td>
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**How can I make a submission?**

To make a submission on the proposal, please send your written comments to our delivery partner GHD.

Email: community.input@ghd.com

Mail: Epping Town Centre C/O GHD

Reply Paid 85012

**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 Roads and Maritime Services staff and its contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, Roads and Maritime Services would 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 but not to any identifying information provided by other respondents if a respondent has indicated that the representation should be kept confidential.

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

The information would be held by the Roads and Maritime Services, 27-31 Argyle Street, Parramatta NSW 2150 and GHD, Level 15, 133 Castlereagh Street, Sydney NSW 2000.

**What happens next?**

Following the display period, Roads and Maritime will collate the submissions received and send an acknowledgement letters to each respondent. The details of submission authors will be retained and authors will be subsequently advised when project information is released.

After considering feedback Roads and Maritime will determine whether the proposal should proceed as proposed, or whether any alterations to the proposal are necessary. The community will be kept informed about the determination.

If the proposal goes ahead, Roads and Maritime proceeds with final design and tenders are called for construction of the proposal.

If you have any queries, please contact our delivery partner GHD on 1800 810 680.
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1. Introduction

1.1 Proposal identification

Roads and Maritime Services is proposing to upgrade about 500 metres of Epping Road, between Blaxland Road and about 80 metres east of Essex Street ("the proposal"). The proposal is located in the suburb of Epping, about 15 kilometres north-west of the Sydney central business district (refer to Figure 1-1).

Epping Road is one of the main access roads to Epping town centre. It extends for a distance of about 10 kilometres between Blaxland Road at Epping, and Longueville Road near the Pacific Highway at Lane Cove. While it mostly consists of six traffic lanes the section of Epping Road between Blaxland Road and Essex Street has four traffic lanes, and is congested in peak periods.

Continued growth and development of the Epping town centre, is proposed by the Epping Town Centre Urban Activation Precinct Finalisation Report, (DoP 2013) and the Epping Town Centre Study (JBA Planning 2011). This will result in an increase in traffic demand on major road links to the Epping town centre, including Epping Road. The proposal is needed to improve traffic flows and access to the centre to fulfil the commitments of the NSW Government, to improve the road network within and near the Epping town centre (DoP 2013).

1.1.1 Key features

The key features of the proposal are shown in Figure 1-2 and include:

- The key features of the proposal include:

- Widening the southern side of Epping Road by about 3.7 metres between Essex Street and Blaxland Road to provide an additional westbound lane. The additional westbound lane would function as a dedicated left turn lane into Blaxland Road

- Upgrading the intersection of Epping Road and Essex Street:
  - Widening on the north-eastern side of the intersection to provide an additional right turn lane into Epping Road westbound. This will provide two marked right turn lanes, and an unmarked left turn/through lane
  - Upgrade the intersection to provide traffic light controlled pedestrian crossings on all four approaches

- To widen 80 metres of the northern side of Epping Road east of Essex Street

- Building a raised median about 340 metres long along Epping Road, between Essex Street and Blaxland Road

- Constructing a raised median about 20 metres long on Essex Street north of Epping Road intersection

- Removal of the right turn movement from Epping Road to Essex Street in both directions

- Removal of the right turn movement from Langston Place into Epping Road westbound

- Removal of right turn movement from Forest Grove and Smith Street

- Providing a dedicated left turn lane from Essex Street onto Epping Road westbound

- Constructing a 1.2 metre wide pedestrian pathway on Epping Road

- Property adjustments

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Utility adjustments within the proposal site
Temporary construction compounds and stockpile sites.

It is anticipated that construction of the proposal would start in late 2016 and would take about 18 months to complete.

1.1.2 Location and context
The proposal is located within the Hornsby local government area and Roads and Maritime Sydney region. The study area surrounding the proposal includes a mix of residential, commercial and transport infrastructure land uses. The Epping town centre and Epping Station are located about 130 metres to the north-west of the western end of the proposal site.

Further information on the existing environment is provided in section 6.

1.2 Purpose of the report
This review of environmental factors (REF) has been prepared by GHD Pty Ltd (GHD) on behalf of Roads and Maritime Sydney Region. For the purposes of these works, Roads and Maritime 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 proposed works 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. Section 111 requires Roads and Maritime to 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 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 the environment of Commonwealth land and the need to make a referral to the Australian Government Department of the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.
The following definitions have been used in this report:

- The ‘proposal site’ refers to the area that may be directly impacted by the proposal, in which construction activities would occur, including the location of the construction compounds (refer to Figure 1-2).

- The ‘study area’ consists of land near to, and including, the proposal site. The study area is a wider area surrounding the proposal site, including land that has the potential to be indirectly impacted by the proposal. The study area varies as required for the environmental issue assessed.
Remove the right turn movement from Langston Place (southbound) into Epping Road (westbound).

Widen the northern side of Epping Road by approximately 3.7 m, to provide an additional westbound lane and central concrete median.

Construction of a raised median (approximately 340 metres).

Adjust line marking to provide dual right turn lanes from Essex Street (southbound) to Epping Road (westbound).

Widen the north eastern side of the intersection to provide an unmarked shared left turn through lane from Essex Street (southbound).

Widening on the south western side of the intersection to provide a left turn lane from Essex Street onto Epping Road.

Installing three new signalised pedestrian crossings at the intersection of Epping Road and Essex Street.

Removing the right turn movement from Epping Road to Essex Street in both directions.

Installing 80 metres of new signalised pedestrian crossings at the intersection of Essex Street north of Epping Road intersection.

Constructing a raised median about 20 metres long on Essex Street north of Epping Road intersection.

Widening 80 metres of the northern side of Epping Road east of Essex Street.

Constructing a 1.2 metre wide pedestrian pathway.

Widen the southern side of Epping Road by approximately 3.7 m, to provide an additional westbound lane and central concrete median.

Figure 1-2
Key features of the proposal
2. Needs and options considered

2.1 Strategic need for the proposal

2.1.1 Need for the proposal

Epping Road carries around 42,000 vehicles per day in the study area and functions as an arterial road providing access to Epping to the west and surrounding residential and employment areas to the east. It provides the link between the north-western suburbs and the Hills district to the lower North Shore to Sydney’s central business district. Epping Road is one of the main access roads to Epping town centre. For the most part, Epping Road consists of six traffic lanes. The section between Blaxland Road and Essex Street has four traffic lanes, and is congested in peak periods.

The Department of Planning and Environment, and Hornsby and Parramatta councils are planning for continued growth and development in and around the Epping town centre. The continued growth and development of the Epping town centre, as proposed by the Epping Town Centre Study and the planning for the Epping Town Centre Priority Precinct (described below), will result in an increase in traffic demand on major regional road links. The proposal is needed to improve traffic flows. The proposal fulfils the NSW Government commitment to address short and medium term regional traffic growth within the Epping town precinct. It also will cater for the 80 per cent of Epping town through traffic as Sydney continues to grow and car use remains high.

Planning for future growth and the need for infrastructure improvements in the Epping town centre

The importance of concentrating growth in areas with close proximity to public transport and employment is recognised by a number of NSW and Sydney’s key economic and urban development strategies, as noted in section 2.1.2. The Epping Town Centre Study was undertaken in 2010 and 2011 by Hornsby and Parramatta councils and the (then) Department of Planning and Infrastructure (JBA Planning, 2010 and 2011). The aim of the study was to:

- Explore the potential for the Epping town centre to accommodate increased residential and employment growth
- Inform future planning controls and infrastructure requirements to accommodate this growth.

The study proposed significant increases in residential density and employment growth in the Epping town centre. The study also identified a number of key issues associated with the existing road network in the vicinity of the centre, and identified the main improvements required.

In the 2012/13 State budget, the NSW Government announced funding for the road and intersection upgrades identified by the Epping Town Centre Study (JBA Planning 2011), to support the predicted growth in the Epping town centre.

The Urban Activation Precinct program (now called the Priority Precincts program) was also announced as part of the 2012/13 budget. The Epping town centre was announced as one of the first precincts for planning purposes. In 2013, the Department of Planning and Infrastructure released the Epping Town Centre Structure Plan which confirmed that there would be significant growth in and around the town centre, as a result of increased residential and commercial development as well as the additional connectivity provided by the North West Rail Link. A rezoning proposal to provide for this growth was finalised in March 2014.
2.1.2 Consistency with relevant strategic planning

The consistency of the proposal with relevant strategies and plans is summarised below.

**National Road Safety Strategy 2011-2020**

The *National Road Safety Strategy 2011-2020* (Australian Transport Council, 2011) aims to reduce death and serious injury on Australian roads. A target of this strategy is to reduce fatalities and crashes by at least 30 per cent between 2011 and 2020.

The proposal would contribute to achieving this target by upgrading Epping Road near the town centre; and improving traffic flow and the operation of key intersections. The proposal would involve the installation of a median and the removal of the right hand turns across through traffic and the installation of signalised pedestrian crossings. These features would improve safety along the corridor.

The proposal has been designed in accordance with Austroads road design guidelines and Roads and Maritime supplements for safe road operation. During construction, traffic management measures, such as reduced speed limits, would be implemented to ensure safe conditions for passing motorists and workers on-site.

**NSW 2021: A plan to make NSW number one**

*NSW 2021* (NSW Government, 2011) is a 10-year plan with goals and targets to build NSW’s economy; provide quality services; renovate infrastructure; restore government accountability; and strengthen the environment and communities. It lists a number of actions to achieve its goals and targets including:

- Reduce travel time
- Improve road safety
- Protect our natural environment.

The proposal would assist in achieving the goal of reducing travel times by increasing the capacity of Epping Road and reducing congestion.

The proposal would improve road safety by improving traffic flow and turning arrangements. The proposal has also been designed to minimise impacts on the natural environment as documented in this REF. The proposal is therefore consistent with *NSW 2021*.

**NSW Government State Infrastructure Strategy**

The *State Infrastructure Strategy* was released by the NSW Government (Department of Premier and Cabinet, 2012) following consideration of the recommendations provided by Infrastructure NSW. It sets out infrastructure projects and initiatives that the Government will prioritise for the short, medium and long term.

The strategy recognises the importance of the global economic corridor. It also recognises that major arterial roads across the wider Sydney road network will require improvement, and that there will be value in addressing peak hour congestion ‘hot spots’.

Although the proposal is not specifically listed in the strategy, it is considered to be consistent with the strategy.

**NSW Long Term Transport Master Plan**

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) provides a framework for addressing transport challenges across NSW over the next 20 years. The master plan is...
designed to guide the prioritisation of available funds to deliver maximum benefits to NSW. It integrates transport with wider land use planning, including the Metropolitan Strategy.

The proposal is consistent with the master plan as it supports one of the key measures for ‘congestion management across greater Sydney’s road network with targeted measures to reduce congestion, better use of existing road capacity and improve road safety’.

**A Plan for Growing Sydney (the Sydney Metropolitan Strategy)**

A *Plan for Growing Sydney*, which was released in December 2014, is the NSW Government’s 20-year plan for the Sydney metropolitan area. It provides direction for Sydney’s productivity, environmental management, and liveability; and for the location of housing, employment, infrastructure and open space.

One of the key directions noted by the plan (Direction 2.1) is to ‘accelerate housing supply across Sydney’. An action under this direction is to ‘accelerate new housing in designated infill areas (established urban areas) through the Priority Precincts and Urban Growth NSW programs’. The plan notes under this action that the Epping Town Centre is a Priority Precinct, and in these precincts “… the Government is working to match population growth with investment in infrastructure, providing new schools and recreation facilities alongside improvements to roads and public services.’

The continued growth and development of the Epping town centre will result in an increase in traffic demand on major regional road links. The proposal will improve traffic flows and access to the centre, and is therefore consistent with the Sydney Metropolitan Strategy.

*A Plan for Growing Sydney* notes that ‘Subregional planning is the link between the big picture planning directions set out in this Plan and detailed planning controls for local areas’. The plan sets the planning priorities for each subregion, along with the further investigations required to develop subregional plans. Further actions will be identified through the subregional planning process.

The study area for the proposal will be covered by the North Subregional Strategy. Priorities for the North Subregional Strategy noted by *A Plan for Growing Sydney* include:

- Improve transit connections throughout the Global Economic Corridor to better link centres and transport gateways
- Work with councils to identify suitable locations for housing and employment growth coordinated with infrastructure delivery (urban renewal) and train services, including around Priority Precincts, established and new centres, and along key public transport corridors including the North West Rail Link, the Western Line, the Cumberland Line, the Carlingford Line, the Bankstown Line and Sydney Rapid Transit
- Investigate potential future opportunities for housing in areas within walking distance of train stations.

The proposal is consistent with the sub regional planning priorities outlined above.

**Epping Town Centre Study**

The *Epping Town Centre Study* was prepared to explore the potential for the Epping Town Centre to accommodate increased residential and employment growth. The study concluded that there is opportunity for an additional 3,200 to 4,300 dwellings within the town centre.

The traffic study prepared as part of the study (GHD 2015b) (refer Appendix C) identified a number of issues with the existing road network, including substantial delays in peak times from traffic queuing at some intersections.
One of the key relevant strategies proposed by the study is: ‘Improved traffic flows - Upgrade of key intersections (Carlingford/Beecroft Road, Langston Place/Epping Road, Essex Street/Epping Road) and road alignment of Epping/Beecroft Roads to manage traffic queuing and improve movements’.

The NSW government announced funding in the 2012/13 State budget for the road and intersection upgrades identified by the town centre study. The funded projects included:

- Epping Road/Essex Street intersection
- Epping Road/Blaxland Road intersection
- Carriageway widening – Epping Road
- Carlingford Road/Beecroft Road intersection
- Widening of Bridge Street rail overpass - third west bound lane and pedestrian/cycle footbridges over the rail line.

The traffic study (GHD 2015b) (refer Appendix C) identified a heavy demand for afternoon peak in the westbound direction on Epping Road. The morning peak in the eastbound direction is not as heavily affected along this section of road. A widening of Epping Road to provide an additional westbound traffic lane would fulfil this requirement. The Bridge Street rail overpass is still in the process of design (not constructed yet and still proposed). The widening of the rail bridge will accommodate a third westbound lane and tie into the widening of the southern side of Epping Road to remove the existing bottleneck.

**Epping Town Centre Priority Precinct**

The Priority Precincts program applies to areas in NSW that the Minister for Planning considers have a wider social, economic or environmental significance for the community, or have redevelopment significance of a scale that is important for implementing the State’s planning objectives. The program has an urban renewal focus, with the aim being to deliver more homes in places with access to infrastructure, transport, services and jobs. The Epping Town Centre Priority Precinct, within which the proposal site is located, includes land within an 800 metre radius of Epping Station.

The rezoning proposal for the Epping Town Centre Priority Precinct, which involved rezoning existing land to provide for around 3,750 new homes, was exhibited in early 2013. Following the exhibition and submissions review process, the *Epping Town Centre Urban Activation Precinct Finalisation Report* (Department of Planning, 2013) was released in November 2013 and finalised in March 2014. The final report refers to the following intersection and road upgrades, which are considered to be a necessary prerequisite to development within the precinct:

- Essex Street/Epping Road intersection, with an additional right turn lane from Essex Street into Epping Road
- Widening Epping Road between Essex Street and Blaxland Road, including intersection works and removal of the right turn from Langston Place
- Carlingford Road/Beecroft Road intersection, provide additional right turn lanes from Beecroft Road into Carlingford Road.

The proposal site (in the vicinity of the intersection with Langston Place/Blaxland Road) is partly located within the town centre core identified by the structure plan. The structure plan provides for high density residential areas in the town centre core and medium density residential (maximum of eight storeys) and residential intensification areas adjacent to the town core.
(maximum of six storeys with a three storey maximum at the interface with low density residential areas).

The proposal is consistent with the *Epping Town Centre Urban Activation Precinct Finalisation Report* as it involves implementing two of the key actions.

### 2.2 Existing road and infrastructure

#### 2.2.1 Epping Road

In the study area, Epping Road has the following characteristics:

- Two-way sealed carriageway, about 12 metres wide, with two traffic lanes in each direction, each about three metres wide (see photo 2-1 and 2-2)
- A posted speed limit of 60 km/h
- Sign posted clearways on both sides
- Signalised four way intersections located at:
  - Essex Street, with a signalised pedestrian crossing across Epping Road on the west approach
  - Langston Place/Blaxland Road, with signalised pedestrian crossings across Langston Place, Epping Road and Blaxland Road
- Non signalised T-intersections located at Forest Grove and Smith Street
- Unmarked, parallel parking permitted during non-clearway periods
- Footpath on both sides of Epping Road, with a varying width between one and 1.2 metres
- Driveway access to properties directly onto Epping Road
- Road marked double white centreline
- Gutters, footpaths and verges with no road shoulders, provided along either side of the road
- One bus stop located on either side of the road.
The existing stormwater drainage network collects surface runoff within the carriageway. The network consists of a series of pits and pipes at the main intersections along Epping Road. This generally includes the following:

- A stormwater pipeline (diameter of 375/450 millimetres) with kerb inlet pits along the eastbound and westbound kerb and gutter of the Epping Road and Forest Grove intersection
- A stormwater pipeline (diameter of 375 millimetres) with kerb inlet pits along the eastbound and westbound kerb and gutter of the Epping Road and Essex Street intersection
- A stormwater pipeline (diameter of 375 millimetres) with kerb inlet pits along the eastbound and westbound kerb and gutter of Epping Road east of Essex Street.
Parking
Clearways currently exist along both sides of Epping Road. On-street parking is permitted along Epping Road during non-clearway periods. Further details are provided in section 6.1.

Bus services
Two bus services operate along the proposal site (Route M54 and 630). Two bus stops are located along Epping Road within the proposal site. Further details are provided in section 6.1

2.3 Proposal objectives
The objectives of the proposal are to:

- Meet current and future traffic demands on Epping Road to the year 2026 and beyond
- Reduce travel times and congestion
- Improve the performance of intersections
- Improve road safety for all road users
- Improve pedestrian facilities
- Minimise impacts on the environment and properties
- Integrate with the current and future character of the area.

2.4 Alternatives and options considered

2.4.1 Methodology for selection of preferred option
GHD Pty Ltd (GHD) was commissioned by Roads and Maritime Services NSW (RMS) to prepare a Concept Design Report (GHD 2014) for the westbound widening works between Essex Street and Blaxland Road intersections, Epping.

The RMS has engaged GHD to undertake an assessment of options to improve traffic flow westbound along Epping Road including upgrading the intersection of Epping Road / Essex Street. The objective of the works is to reduce peak period congestion as measured by increased travel speeds and increased volumes of traffic on this critical traffic corridor. More than a third of all traffic entering or traveling through Epping town centre travels westbound along Epping Road. The relocation of the right turn at Langston Place to Essex Street will add to the volume of westbound traffic travelling along this section of Epping Road. Therefore this proposal focuses on improvements to westbound traffic movements.

As part of this engagement, four principle options were developed. Each option was evaluated against the seven objectives listed in section 2.3, the strategic need, identified in section 2.1 and the following criteria:

- Integration with other proposed Epping Precinct transport projects
- Minimise impacts to land use
- Minimise impacts to the environment
- Ensure constructability of proposal
- Minimise cost of the proposed works.
2.4.2 Identified options

The options considered are described below:

**Option 0 – Do minimum**

The ‘do minimum’ option involves not undertaking the proposal and retaining the four-lane section between Essex Street and Blaxland Road. Routine road maintenance activities would be continued as required.

**Option 1 – Widening Epping Road to the north, transition east of Essex Street**

Option 1 involves widening the northern side of Epping Road between Langston Place/Blaxland Road and Essex Street to provide a third westbound lane. The three lanes would continue across Essex Street and transition to two lanes about 80 metres east of Essex Street.

**Option 2 – Widening Epping Road to the north, transition west of Essex Street**

Option 2 involves widening the northern side of Epping Road between Langston Place and Essex Street, to provide a third westbound lane. The three lanes would transition to two lanes about 80 metres west of Essex Street.

**Option 3 – Widening Epping Road to the south**

Option 3 involves widening the southern side of Epping Road between Blaxland Road and Essex Street, to provide an additional third westbound lane. The third lane would become a dedicated left turn to Blaxland Road.

2.4.3 Analysis of options

A review of each option against the proposal objectives and criteria outlined in section 2.3 and 2.4.1 is provided below. The proposed options are shown in Appendix B.

**Option 0** (do minimum) would not meet the objectives of the proposal. It would not respond to the current and future traffic demand generated by development in the Epping Town Centre Priority Precinct. Further detail is provided in Table 2-1.

### Table 2-1 Analysis of Option 0 against proposal objectives and criteria

<table>
<thead>
<tr>
<th>Objective / criteria</th>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet current and future traffic demands on Epping Road to the year 2026 and beyond</td>
<td>No</td>
<td>No improvements to existing traffic movements. It would not respond to the future traffic demand generated by development in the Epping Town Centre Priority Precinct.</td>
</tr>
<tr>
<td>Reduce travel times and congestion</td>
<td>No</td>
<td>No change to the existing infrastructure would mean that congestion during peak periods would continue between Blaxland Road and Essex Street. This would progressively worsen travel times in future years.</td>
</tr>
<tr>
<td>Improve the performance of intersections</td>
<td>No</td>
<td>Intersection performance would decline as a result from increased traffic demand and no change to the existing infrastructure.</td>
</tr>
<tr>
<td>Improve road safety for all road users</td>
<td>No</td>
<td>There would be no improvement to road user safety if there are no changes to the existing road infrastructure</td>
</tr>
<tr>
<td>Improve pedestrian facilities</td>
<td>No</td>
<td>No change to the existing infrastructure would mean that pedestrian facilities will not meet the need of</td>
</tr>
</tbody>
</table>
**Objective / criteria** | **Summary outcome** | **Analysis of objective or criteria**
--- | --- | ---
Minimise impacts on the environment and properties | Yes | No change to the existing infrastructure would mean that the impact to the environment and properties would be limited to the minimal activities associated with routine road maintenance.
Integrate with the current and future character of the area | No | No change of infrastructure would retain the existing character of the road but would not consider the future changes to the Epping Town Centre Priority Precinct.

**Criteria**

<table>
<thead>
<tr>
<th>Objective / criteria</th>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with other proposed Epping Precinct transport projects</td>
<td>No</td>
<td>The existing alignment would not integrate with proposed changes to transport infrastructure through other projects proposed in the Epping area.</td>
</tr>
<tr>
<td>Minimise impacts to land use</td>
<td>Yes</td>
<td>Impacts to existing land use would be limited to the minimal activities associated with routine road maintenance.</td>
</tr>
<tr>
<td>Minimise impact to the environment</td>
<td>Yes</td>
<td>Impacts to the existing environment during construction and operation would be limited to the minimal activities associated with routine road maintenance.</td>
</tr>
<tr>
<td>Ensure constructability of proposal</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Minimise costs of proposal</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Option 1** (widening Epping Road to the north, transition east of Essex Street) would reduce westbound traffic congestion particularly at the Langston Place/Blaxland Road intersection and at the Essex Street intersection. Option 1 was considered to have minimal impact to existing utilities. Option 1 was not considered to be feasible as it would not tie in with the proposed future widening of the Bridge Street rail overpass, which is proposed to accommodate a third westbound lane. Further detail is provided in Table 2-2.

**Table 2-2 Analysis of Option 1 against proposal objectives and criteria**

<table>
<thead>
<tr>
<th>Objective / criteria</th>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet current and future traffic demands on Epping Road to the year 2026 and beyond</td>
<td>Yes</td>
<td>Widening Epping Road to the north would improve the network capacity east of Blaxland Road.</td>
</tr>
<tr>
<td>Reduce travel times and congestion</td>
<td>Yes</td>
<td>Widening Epping Road to the north does not consider the future widening at Bridge Street rail overpass and therefore would still expect congestion within the road network.</td>
</tr>
<tr>
<td>Improve the performance of intersections</td>
<td>Yes</td>
<td>Upgrading the existing infrastructure would improve the performance of the intersection by allowing for a greater capacity of traffic.</td>
</tr>
<tr>
<td>Improve road safety for all road users</td>
<td>Yes</td>
<td>Road safety would improve as a result of the changes made to the existing road infrastructure.</td>
</tr>
<tr>
<td>Improve pedestrian facilities</td>
<td>Partially</td>
<td>Pedestrian facilities would be improved at the intersection of Epping Road and Essex Street.</td>
</tr>
</tbody>
</table>
### Objective / criteria

<table>
<thead>
<tr>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Properties along Epping Road would be impacted by the road widening and require adjustment.</td>
</tr>
<tr>
<td>Partially</td>
<td>Widening Epping Road to the north would impact the existing character of the area however will not integrate with future widening at Bridge Street rail overpass.</td>
</tr>
</tbody>
</table>

### Criteria

| Integration with other proposed Epping Precinct transport projects | No | The proposed widening of Bridge Street rail overpass is only feasible on the south side as there would be insufficient vertical clearance for trains if the bridge is widened on the north side. Widening of Epping Road to the north therefore would not tie in with any future changes to the bridge. |
| Minimise impacts to land use | No | There would be impacts to existing land use from the partial acquisition of properties on the north side of Epping Road due to the road widening. |
| Minimise impact to the environment | No | There would be construction impacts from noise, dust and visual disturbance. There would be impacts to the existing environment during operation resulting from the partial acquisition of properties on the north side of Epping Road resulting in social and economic impacts from loss of garden amenity / private parking spaces, and changes to the landscape and visual amenity of the road corridor. |
| Ensure constructability of proposal | Yes | There would be no significant constructability issues. |
| Minimise costs of proposal | Yes | This option would not have any non-standard cost implications. |

**Option 2** (widening Epping Road to the north, transition west of Essex Street) would reduce westbound traffic congestion, particularly at the key intersections. This option was considered to have minimal impact to existing utilities as the majority of utilities are contained on the southern side of Epping Road. Option 2 was not considered to be feasible as it would not tie in with the proposed widening of the Bridge Street rail overpass. Further detail is provided in Table 2-3.

### Table 2-3 Analysis of Option 2 against proposal objectives and criteria

<table>
<thead>
<tr>
<th>Objective / criteria</th>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet current and future traffic demands on Epping Road to the year 2026 and beyond</td>
<td>Partially</td>
<td>Widening Epping Road to the north would improve traffic movement between Blaxland Road and Essex Street.</td>
</tr>
<tr>
<td>Reduce travel times and congestion</td>
<td>Partially</td>
<td>Widening Epping Road to the north would improve westbound traffic between Blaxland Road and Essex Street. Improvement to congestion is unlikely as traffic along Epping Road will be required to merge into two lanes prior to travelling through either intersection.</td>
</tr>
<tr>
<td>Improve the performance of intersections</td>
<td>Partially</td>
<td>Upgrading the existing infrastructure would improve the performance of the intersection by allowing for a greater capacity of traffic.</td>
</tr>
<tr>
<td>Objective / criteria</td>
<td>Summary outcome</td>
<td>Analysis of objective or criteria</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Improve road safety for all road users</td>
<td>Yes</td>
<td>Road safety would improve as a result of the changes made to the existing road infrastructure.</td>
</tr>
<tr>
<td>Improve pedestrian facilities</td>
<td>Partially</td>
<td>Pedestrian facilities would be improved at the intersection of Epping Road and Essex Street.</td>
</tr>
<tr>
<td>Minimise impacts on the environment and properties</td>
<td>No</td>
<td>Properties along the north side of Epping Road would be impacted by the road widening and require adjustment.</td>
</tr>
<tr>
<td>Integrate with the current and future character of the area</td>
<td>Partially</td>
<td>Widening Epping Road to the north would impact the existing character of the area however it would not integrate with future widening at Bridge Street rail overpass.</td>
</tr>
</tbody>
</table>

### Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Summary outcome</th>
<th>Analysis of criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with other proposed Epping Precinct transport projects</td>
<td>No</td>
<td>The proposed widening of Bridge Street rail overpass is only feasible on the south side as there would be insufficient vertical clearance for trains if the bridge is widened on the north side. Widening of Epping Road to the north therefore would not tie in with any future changes to the bridge.</td>
</tr>
<tr>
<td>Minimise impacts to land use</td>
<td>No</td>
<td>There would be impacts to existing land use from the partial acquisition of properties on the north side of Epping Road due to the road widening.</td>
</tr>
<tr>
<td>Minimise impact to the environment</td>
<td>No</td>
<td>There would be construction impacts from noise, dust and visual disturbance. There would be impacts to the existing environment during operation resulting from the partial acquisition of properties on the north side of Epping Road resulting in social and economic impacts from loss of garden amenity / private parking spaces, and changes to the landscape and visual amenity of the road corridor.</td>
</tr>
<tr>
<td>Ensure constructability of proposal</td>
<td>Yes</td>
<td>There would be no significant constructability issues.</td>
</tr>
<tr>
<td>Minimise costs of proposal</td>
<td>Yes</td>
<td>This option would not have any non-standard cost implications.</td>
</tr>
</tbody>
</table>

**Option 3** (widening Epping Road to the south) would reduce westbound traffic congestion, particularly at the key intersections. Option 3 would impact on a number of existing utilities as the majority of utilities are contained on the southern side of Epping Road. Option 3 was selected as the preferred option as it would tie in with the proposed widening of the Bridge Street rail overpass. Further detail is provided in Table 2-4.
# Table 2-4 Analysis of Option 3 against proposal objectives and criteria

<table>
<thead>
<tr>
<th>Objective /criteria</th>
<th>Summary outcome</th>
<th>Analysis of objective or criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meet current and future traffic demands on Epping Road to the year 2026 and beyond</td>
<td>Yes</td>
<td>Widening Epping Road to the south would improve traffic movement along Epping Road and accommodate the future traffic demand generated by development in the Epping Town Centre Priority Precinct.</td>
</tr>
<tr>
<td>Reduce travel times and congestion</td>
<td>Yes</td>
<td>Changes to the existing infrastructure would reduce travel times and congestion. Further improvements would be expected following the widening of Bridge Street rail overpass.</td>
</tr>
<tr>
<td>Improve the performance of intersections</td>
<td>Yes</td>
<td>Upgrading the existing infrastructure would improve the performance of the intersection by allowing for a greater capacity of traffic.</td>
</tr>
<tr>
<td>Improve road safety for all road users</td>
<td>Yes</td>
<td>Road safety would be improved as a result of the changes made to the existing road infrastructure.</td>
</tr>
<tr>
<td>Improve pedestrian facilities</td>
<td>Partially</td>
<td>Pedestrian facilities would be improved at the intersection of Epping Road and Essex Street.</td>
</tr>
<tr>
<td>Minimise impacts on the environment and properties</td>
<td>No</td>
<td>Properties along Epping Road would be impacted by the road widening and require adjustment.</td>
</tr>
<tr>
<td>Integrate with the current and future character of the area</td>
<td>Yes</td>
<td>Widening Epping Road to the south would impact the existing character of the area but would integrate with future widening of Bridge Street rail overpass.</td>
</tr>
<tr>
<td><strong>Criteria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integration with other proposed Epping Precinct transport projects</td>
<td>Yes</td>
<td>The proposed widening of Bridge Street rail overpass is only feasible on the south side as there would be insufficient vertical clearance for trains if the bridge is widened on the north side. Widening of Epping Road to the south would therefore tie in with any future changes to the bridge.</td>
</tr>
<tr>
<td>Minimise impacts to land use</td>
<td>No</td>
<td>There would be impacts to existing land use from the partial acquisition of properties on the north side of Epping Road due to the road widening.</td>
</tr>
<tr>
<td>Minimise impact to environmental</td>
<td>No</td>
<td>There would be construction impacts from noise, dust and visual disturbance. There would be impacts to the existing environment during operation resulting from the partial acquisition of properties on the north side of Epping Road resulting in social and economic impacts from loss of garden amenity / private parking spaces, minor heritage impacts and changes to the landscape and visual amenity of the road corridor.</td>
</tr>
<tr>
<td>Ensure constructability of proposal</td>
<td>Yes</td>
<td>There would be no significant constructability issues.</td>
</tr>
<tr>
<td>Minimise costs of proposal</td>
<td>Yes</td>
<td>This option would not have any non-standard cost implications.</td>
</tr>
</tbody>
</table>
2.5 **Preferred option**

The preferred option is option 3, which would involve widening Epping Road to the south by about 3.7 metres between Essex Street and Blaxland Road to provide an additional westbound lane and a left turn into Blaxland Road. This option would have similar impacts to option 1 and 2 relating to land use and potential environmental impacts. The new carriageway for option 3 however, would tie in with the proposed works to the Bridge Street rail overpass immediately to the west of the proposal site.

2.6 **Design refinements**

During design development the following design refinements were investigated through intersection modelling (SIDRA), vehicle turning movements and traffic flow modelling, and later adopted as part of the concept design:

- Extending the 0.5 metre wide raised centre median along Epping Road between Essex Street and Blaxland Road to remove the right turn movements into and out of properties along Epping Road, and into and out of Smith Street and Forest Grove. This change to the median would improve traffic flow and reduce rear-end collisions by preventing vehicles from waiting on Epping Road to turn right into private properties, and into Smith Street and Forest Grove.

- Removing a proposed 0.5 metre wide centre median on Essex Street to the south of Epping Road from the design in order to maintain the right turn movement from Essex Street northbound onto Epping Road.

- Removing the right turn movement from Epping Road into Essex Street in both directions to reduce the risk of rear end collisions by preventing vehicles waiting at the intersection to turn right.

- Constructing a raised median about 20 metres long on Essex Street north of Epping Road intersection.
3. **Description of the proposal**

3.1 **The proposal**

The proposal is to upgrade about 500 metres of Epping Road, between Blaxland Road and around 80 metres east of Essex Street and upgrading the intersection of Essex Street and Epping Road.

The key features of the proposal are shown in Figure 1-2 and include:

- Providing an additional westbound lane by widening the southern side of Epping Road by about 3.7 metres between Essex Street and Blaxland Road. The additional westbound lane would function as a dedicated left turn lane into Blaxland Road

- Upgrading the intersection of Epping Road and Essex Street:
  - Widening on the north-eastern side of the intersection to provide an additional right turn lane into Epping Road (westbound). This would provide two marked right turn lanes, and an unmarked left turn/through lane
  - Widening on the south-western side of the intersection to provide an additional left turn lane from Essex Street onto Epping Road (westbound)
  - Removing the right turn movement from Epping Road to Essex Street in both directions
  - Providing three new traffic light controlled pedestrian crossings

- Removing the right turn movement from Langston Place into Epping Road in the westbound direction for all traffic

- Widening 80 metres of the northern side of Epping Road east of Essex Street

- Constructing a raised median (about 340 metres long) along Epping Road, between Langston Place/Blaxland Road and just west of Essex Street. This would restrict access from Epping Road to Forest Grove and Smith Street, and to residential properties along this section of Epping Road, to left-in and left-out only

- Constructing a raised median about 20 metres long on Essex Street north of Epping Road intersection

- Constructing a 1.2 metre wide pedestrian pathway on Epping Road

- Property adjustments

- Utility adjustments within the proposal site

- Temporary construction compounds and stockpile sites.

3.2 **Design**

A description of the concept design is provided below and is illustrated on Figure 1-2. Detailed concept design plans are included in Appendix B. The design would be further refined during the detailed design phase.
3.2.1 Design criteria

The concept design was prepared in accordance with a Design Management System certified under AS/NZS ISO 9001:2008 Quality Management Systems – requirements, and with reference to:

- Beyond the Pavement - Roads and Traffic Authority of NSW urban design policy, procedure and design principles (RTA, 2009).

The design criteria for the proposal are summarised in Table 3-1.

**Table 3-1 Design criteria**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carriageway</td>
<td>Five lane divided (two existing lanes eastbound, three lanes westbound, of which one lane is new, divided by a 0.5 m concrete median)</td>
</tr>
<tr>
<td>Proposed posted speed</td>
<td>60 km/h</td>
</tr>
<tr>
<td>Lane widths</td>
<td></td>
</tr>
<tr>
<td><em>Epping Road</em></td>
<td>1 x 3.5 m westbound kerb side traffic lane</td>
</tr>
<tr>
<td></td>
<td>2 x 3 m westbound traffic lanes</td>
</tr>
<tr>
<td></td>
<td>Eastbound traffic lanes matching existing widths and surface level.</td>
</tr>
<tr>
<td><em>Essex Street (north of Epping Road)</em></td>
<td>2 x 2.7 m northbound traffic lanes</td>
</tr>
<tr>
<td></td>
<td>2 x 3 m right turn lanes</td>
</tr>
<tr>
<td></td>
<td>1 x 3 m shared left turn and through lane.</td>
</tr>
<tr>
<td><em>Essex Street (south of Epping Road)</em></td>
<td>1 x 2.7 m shared right turn and through lane.</td>
</tr>
<tr>
<td></td>
<td>1 x 2.7 m shared left turn and through lane.</td>
</tr>
<tr>
<td></td>
<td>1 x 3 m additional left turn lane</td>
</tr>
<tr>
<td></td>
<td>Southbound traffic lanes matching existing widths and levels.</td>
</tr>
<tr>
<td>Median width</td>
<td>0.5 m</td>
</tr>
<tr>
<td>Minimum horizontal curve radii</td>
<td>104 m</td>
</tr>
<tr>
<td>Design vehicles for turning at intersections</td>
<td>12.5 m rigid truck (Essex Street)</td>
</tr>
<tr>
<td></td>
<td>19 m semi-trailer (Langston Place/Blaxland Road)</td>
</tr>
<tr>
<td>On road cycleway</td>
<td>No</td>
</tr>
<tr>
<td>Allowance for B-doubles</td>
<td>No (through Epping Road only)</td>
</tr>
<tr>
<td>Shared footpath and cycleway</td>
<td>No</td>
</tr>
<tr>
<td>Footpath</td>
<td>1.2 m wide path within a 3.5 m verge</td>
</tr>
<tr>
<td>Cross drainage</td>
<td>1 in 100 year average recurrence interval (ARI)</td>
</tr>
<tr>
<td>Pavement drainage</td>
<td>1 in 10 year ARI</td>
</tr>
</tbody>
</table>
3.2.2 Engineering constraints

The engineering constraints to the design and construction of the proposal include:

- Minimising property acquisition along Epping Road and Essex Street
- Consideration of existing surface levels at the Essex Street/Epping Road intersection
- Existing underground utilities, in particular the existing optic fibre, gas and electrical services and overhead electrical services and associated structures
- Maintaining drive-way access to existing properties along Epping Road and Essex Street
- Maintaining bus stops
- Taking into account heritage listed buildings in the vicinity of the proposal site (described in section 6.7).

3.2.3 Major design features

The proposal involves widening the existing four lane carriageway to a five lane divided carriageway, resulting in the provision of three traffic lanes in the westbound direction and two traffic lanes in the eastbound direction. Epping Road would be widened on the north side east of Essex Street to allow for the creation of an extra lane in the westbound direction (i.e. the beginning of the westbound widening). The tie-in would be approximately 80 metres long east of Essex Street before tying back into the existing road.

Between Blaxland Road and Essex Street, the proposal would involve widening the southern side of Epping Road to accommodate an additional westbound lane. Along Essex Street (north of Epping Road), the proposal would involve widening the eastern side of Essex Street to accommodate a left turn (to Epping Road eastbound) and through lane and widening the south-western side of Essex Street to accommodate the left turn onto Epping Road (westbound).

The main design features of the proposal are described below and are illustrated on Figure 1-2.

**Horizontal and vertical alignment**

The horizontal alignment of the proposal would follow the existing road alignment with widening up to 4.5 metres depending on the section of the proposal.

Between Blaxland Road and Essex Street, the existing horizontal alignment would remain the same, however the existing corridor would be widened by 3.7 metres to the south to suit the additional westbound lane.

In the vicinity of the Essex Street, the horizontal alignment of Epping Road would be shifted to the north. The northern side of Epping Road would be widened by up to 3.7 metres to suit the additional westbound lane.

The existing horizontal alignment along Essex Street would remain the same. The eastern side of Essex Street (north of Epping Road) would be widened by 2.6 metres to suit the dedicated left turn lane. The western side of Essex Street (south of Epping Road) would be widened by 2.3 metres to accommodate the dedicated left turn to Epping Road.

The vertical alignment would meet the existing vertical profile. The additional pavement would be an extension of the existing road vertical and horizontal cross-falls. The existing pavement in the vicinity of the works would be milled and re-sheeted to assist the vertical and horizontal transitions from the existing road pavement.
Typical cross sections

Epping Road

The typical cross section of Epping Road within the proposal site would consist of two lanes in the eastbound direction and three in the westbound direction, separated by a 0.5 metre wide raised concrete median. Figure 3-1 shows a typical cross section 20 metres west of Forest Grove, which includes:

- A 3.5 metre wide footway/verge on the southern side of the road
- A 3.5 metre wide westbound kerb side traffic lane
- Two three metre wide westbound traffic lanes
- A 0.5 metre wide raised concrete median
- Two eastbound traffic lanes matching existing widths and surface levels.

Figure 3-1 Typical cross section on Epping Road, 20 metres west of Forest Grove

Essex Street

Figure 3-2 shows a typical cross section along Essex Street, 30 metres north of Epping Road, which includes:

- A 3.5 metre wide footway/verge
- Two three metre wide northbound traffic lanes
- A three metre wide southbound right turn lane
- A three metre wide southbound shared right turn and through lane
- A three metre wide southbound left turn lane.
Tie-ins

At the start and end points of the proposal site, the work would be tied in to the existing alignment of Epping Road, Essex Street and Blaxland Road. Activities to tie the proposal into the existing alignment would include pavement work to create consistent levels between existing and new surfaces, and minor adjustments to the kerb and gutter. The extent of tie-in work would be determined during detailed design. The footpath would be extended to the limit of works along Epping Road and Essex Street to maintain connectivity between the proposal and existing pathways. East of Essex Street, Epping Road would be widened on the northern side and tied into existing conditions. The tie-in would be approximately 80 metres long.

3.2.4 Intersections

General

Lane widths at the Essex Street intersection would be adjusted to suit the proposed turning lanes and westbound widening (generally between 3 and 3.5 metres wide). The existing lane widths at the Langston Place/Blaxland Road/Epping Road intersection would remain unchanged. Descriptions of each of the intersections to be upgraded as part of the proposal are provided below.

The existing T-intersections of Forest Grove and Smith Street would be converted to a left-in and left-out only intersection.
**Essex Street intersection**

The existing intersection would be modified to include:

- Dual westbound right turning lanes from Essex Street to Epping Road on the northern approach to Epping Road
- Widening on the south-western side of the intersection to provide an additional left turn lane from Essex Street onto Epping Road (westbound)
- An unmarked shared left and through turn from Essex Street to Epping Road in the eastbound direction
- Three new signalised pedestrian crossings on the northern, eastern and southern sides of the intersection
- Removal of right turn movements from Epping Road into Essex Street in both directions
- Additional Epping Road westbound through lane

The proposed intersection arrangement is illustrated in Figure 3-3 below. Figure 1-2 shows this intersection overlain on an aerial photo.

![Essex Street intersection diagram](image-url)
**Forest Grove intersection**

The existing T-intersection would be restricted to left-in and left-out only by constructing a 0.5 metre wide raised concrete median along Epping Road. The proposed intersection arrangement is illustrated in Figure 3-4.

**Smith Street intersection**

The existing T-intersection would be restricted to left-in and left-out only by constructing a 0.5 metre wide raised concrete median along Epping Road. The proposed intersection arrangement is illustrated in Figure 3-4.

**Langston Place/Blaxland Road intersection**

The existing intersection would be modified to include:

- Removing the dual right turn movement from Langston Place to Epping Road in the westbound direction
- Providing a dedicated left turn lane to Blaxland Road in the southbound direction from Epping Road
- Dual westbound through lanes on Epping Road.

The proposal would not impact the rail corridor to the west of the proposal area. The proposed intersection arrangement is illustrated in Figure 3-5. Figure 1-2 shows the intersection overlain on an aerial photo and its location adjacent to the rail corridor. The intersection changes do not alter the existing arrangement of the rail corridor or enter rail property.
3.2.5 Drainage

The proposal would involve upgrading the existing stormwater drainage system to manage the increase in pavement drainage flows along Epping Road and Essex Street.

The proposal would increase the catchment of the existing road drainage network by about 1,800 square metres. It would involve relocating the existing inlet pits to the new kerb. This would include:

- Reconstructing about seven existing stormwater kerb inlet pits as buried junction pits
- Installing a new 200 metre long, 375 millimetre diameter wide stormwater pipeline, and 12 new stormwater kerb inlet pits, at the following locations:
  - Proposed southern kerb line of Epping Road between Blaxland Road and Smith Street (about 110 metres of 375 millimetre diameter stormwater pipeline)
  - Proposed southern kerb line of Epping Road between Smith Street and Essex Street (about 70 metres of 375 diameter millimetre stormwater pipeline)
  - Intersection of Epping Road and Forest Grove
  - Intersection of Epping Road and Essex Street.

Figure 3-5 Langston Place/Blaxland Road Intersection
3.2.6 Pedestrian facilities

Footpaths are situated on the northern and southern sides of Epping Road and the eastern and western sides of Essex Street. The following footpaths would be adjusted to tie into the existing footpath network in the study area and replace footpaths removed due to the widen road carriageway:

- A 40 metre long section of 1.2 metres wide footpath would be provided along the northern side of Epping Road, west of the Essex Street/Epping Road intersection
- A 350 metre length of footpath 1.2 metres wide along the southern side of Epping Road, between the Essex Street/Epping Road and Langston Place/Blaxland Road/Epping Road intersections
- A 80 metre length of footpath 1.2 metres wide along the northern side of Epping Road, east of Essex Street
- 35 metres of footpath 1.2 metres wide along the eastern side of Essex Street, north of Epping Road.
- 20 metres of footpath 1.2 metres wide along the western side of Essex Street, south of Epping Road.

Signalled pedestrian crossings would be slightly relocated at the Langston Place/Blaxland Road intersection. New pedestrian crossings would be provided at the Essex Street and Epping Road intersection on the northern, eastern and southern sides of the intersection.

3.2.7 Bus facilities

There would be no change to existing bus services or facilities.

3.2.8 Property access

The proposal would maintain driveway access to all existing properties along Epping Road and Essex Street. Property adjustment plans would be created in consultation with the affected property owner during the detailed design phase, which may include adjustments to property driveways to suit the new road levels.

As a result of the proposed concrete central median along Epping Road, access to properties from Epping Road would be limited to left-in and left-out. A short length of raised median on Essex Street north of Epping Road is also proposed for the same reason.

3.2.9 Other design features

Lighting

All lighting for the proposal would be in accordance with Australian Standard 1158: Lighting for roads and public spaces. The street lighting design would be undertaken during the detailed design phase.

Parking restrictions

Existing parking restrictions would be unaffected by the proposal. Existing parking restriction signage and line marking would be adjusted to suit the new pavement and kerb and gutter along Epping Road and Essex Street.

Retaining walls

Retaining walls may be required at the front property boundary for a number of properties located on the southern side of Epping Road due to the level difference between the properties.
and Epping Road, and on the western side of Essex Street. If retaining walls are required, these would not exceed 1.2 metres in height.

Property adjustment plans detailing the required adjustments and the requirement for any retaining walls would be created in consultation with the affected property owner during the detail design phase. Further information is provided in section 3.6.

**Urban and landscape design**

A landscape character, visual impact and urban design assessment was prepared by GHD for the proposal (refer to Appendix J). The following urban design objectives and principles have been developed for the proposal:

- Maintain the fundamental elements which define the character of the local area and the experience of the road user
- Enable the sensitive integration of the proposal into the landscape context
- Maximise safety of road and path users.

Those objectives and associated principles were developed into a set of more specific recommendations for design strategies and initiatives relating to:

- Construction activity and storage
- Retention of visually important vegetation
- Tree planting opportunities along the footpath
- Lighting and signage
- Emphasising land use and character zones.

These principles and design features have been integrated into the concept design and would be considered further in the detailed design phase of the proposal.

**3.3 Construction activities**

**3.3.1 Work methodology**

**General methodology**

Construction activities would be guided by a construction environmental management plan (CEMP) to ensure work is carried out to Roads and Maritime specifications within the specified work area. Detailed work methodologies would be determined during detailed design and construction planning.

The proposal is anticipated to involve the following general work methodology and sequencing:

- Establishment of temporary fencing and protection of environmentally sensitive areas as identified in this REF and the construction environmental management plan (CEMP)
- Installation of temporary erosion and sediment controls
- Establishment of construction compound site/s
- Install traffic controls
- Utility relocations
- Vegetation clearing and grubbing
- Stripping, stockpiling and management of topsoil and unsuitable material
• Earthworks preparation
• Demolish existing pavement and road structures
• Bulk earthworks and building demolition
• Construction of retaining walls, if required
• Drainage work
• Pavement and median construction
• Sub-grade preparation and pavement work
• Landscaping
• Installation of permanent traffic control signals
• Finishing work including installation of pavement marking, signposting, and street lights
• Removal of construction compound and site tidy up.

Construction phases

The following describes the indicative construction phases. The final work methodology for the proposal would be refined and determined during the detailed design phase.

Site establishment

Site establishment would include:
• Mobilise to site
• Setting up the compound/s
• Service location and protection
• Installing traffic and pedestrian management measures including temporary traffic signs, barricades, etc
• Identifying sensitive areas as defined by the REF and the CEMP
• Marking trees that would need to be removed or trimmed, and any ‘no-go’ areas
• Undertaking any additional surveys and investigations
• Installing temporary erosion, sediment and water quality controls, including silt fences and protection around existing stormwater drainage inlets.

Utility relocations and property adjustments

• Remove existing fences required as part of property adjustments
• Construct retaining walls, new fences, driveways and accesses etc, as required, as part of the property adjustments
• Protect existing utilities or relocate utilities to the new footpath reservation.

Earthworks and drainage

• Clear and grub vegetation, including the removal and/or trimming of planted/exotic vegetation
• Excavate and fill to the road formation levels, including boxing out for new pavement
• Dispose of unsuitable and/or surplus material from the proposal site
- Install new drainage lines, pits and subsoil drains to connect into the existing drainage lines within the road formation.

**Pavement works**
- Install new kerb and gutter including driveway crossings to dwellings
- Install new raised concrete median
- Construct new pavement, including placing and compacting select fill, sub base and asphalt wearing surface
- Mill and re-sheet existing westbound carriageway on Epping Road and Essex Street within the limit of works
- Adjust the existing traffic lights at the intersection of Epping Road and Blaxland Road and at the intersection of Epping Road and Essex Street
- New line and symbol markings, including placement of reflective pavement markers to suit new works
- Construct a new concrete footpath.

**Finishing and landscaping**
- Install new street lights
- Rehabilitate disturbed areas and landscape in accordance with the landscaping plan
- Line marking and sign posting
- Decommissioning of compound sites including activities to stabilise soils at the Compound D site
- Final site clean-up.

### 3.3.2 Workforce

The construction workforce is expected to fluctuate, depending on the stage of construction and associated activities. The workforce would be expected to peak at about 100 personnel per day. On either side of this peak period, daily workforce numbers would fluctuate between about 40 and 60 personnel at any given time during the construction period.

The final number of construction workers would be determined by the construction contractor.

### 3.3.3 Working hours and duration

Construction is anticipated to commence in late 2016 and would take about 18 months to complete, weather permitting.

It is anticipated that construction would be largely carried out during standard construction working hours in accordance with the *Interim Construction Noise Guideline* (DECC 2009):

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

Night and weekend work would also be required, subject to permitted road occupancy licences and construction staging. Night works would be necessary to minimise traffic disruptions on two major road corridor and disturbance to surrounding businesses. The following activities are likely to be undertaken outside standard construction working hours:
- Mill and re-sheeting of existing pavement
- Placement of asphalt
- Intersection and tie-in activities
- Line marking.

Any work undertaken outside of standard working hours would be in accordance with the Interim Construction Noise Guideline and the RTA Environmental Noise Management Manual (RTA 2001a): Practice Note vii – Road works outside normal working hours.

Prior advice would be given to the community if any work is planned to be undertaken outside standard construction hours.

### 3.3.4 Plant and equipment

A range of plant and equipment would be used during construction. The final equipment and plant requirements would be determined by the construction contractor. An indicative list of plant and equipment that would be used for each construction phase is provided in Table 3-2

**Table 3-2 Indicative construction plant and equipment**

<table>
<thead>
<tr>
<th>Construction phase</th>
<th>Plant and equipment</th>
</tr>
</thead>
</table>
| Establishment                       | • Trucks  
• Cranes  
• Clearing and grubbing equipment ie chainsaws and chippers |
| Utility relocations and property adjustments | • Excavators  
• Dump trucks  
• Cranes  
• Concrete pumps  
• Welding equipment  
• Concrete saws  
• Light vehicles  
• Concrete trucks  
• Generators  
• Oxy-cutting equipment |
| Earthworks and drainage             | • Excavator  
• Jackhammers  
• Dump trucks  
• Compactors  
• Water carts  
• Concrete trucks  
• Generators  
• Bulldozers  
• Boring machines  
• Graders  
• Profilers  
• Vibrating rollers  
• Concrete pumps  
• Welding equipment |
3.3.5 Source and quantity of materials

The proposal would involve earthworks along the proposal site. The estimated quantities of materials associated with earthworks are provided in Table 3-3.

Table 3-3 Indicative earthwork volumes

<table>
<thead>
<tr>
<th>Material</th>
<th>m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoil (removal)</td>
<td>1000</td>
</tr>
<tr>
<td>Imported select fill</td>
<td>2000</td>
</tr>
</tbody>
</table>

Earthwork requirements would be confirmed during detailed design. It is likely that about 2000 cubic metres of pavement, gravel and select materials would be required. Materials would be sourced from appropriately licensed facilities. Wherever possible, materials would be sourced from commercial suppliers in nearby areas. None of the materials proposed to be used are considered to be in short supply.

Surplus material that cannot be used on-site would be classified in accordance with the Waste Classification Guidelines (DECCW, 2009) and disposed of at an approved materials recycling or waste disposal facility.

The amount of water that would be required during construction is unknown at this stage. The amount would depend on material sources and methodologies applied by the contractor. It is proposed that water would be obtained from Sydney Water’s water supply network.
3.3.6 Traffic management and access

Vehicle movements

Construction of the proposal would generate heavy vehicle movements. These heavy vehicle movements would mainly be associated with:

- Delivery of construction materials
- Spoil removal
- Delivery and removal of construction equipment and machinery.

Light vehicle movements would be required for the movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

Construction vehicles would access the site via arterial roads wherever possible. About 10 heavy vehicles would be required on-site per day, resulting in around 40 heavy vehicle movements in and out of the site per day. In addition, small vehicles would be required to transport staff, resulting in up to 35 small vehicle movements in and out of the site per day (assuming that some crew members would catch public transport and/or share vehicles with other crew members).

Workers vehicles are expected to park on the local streets around the site (eg Forest Grove). Workers would also be encouraged to travel to the site via public transport. Some provision for parking may be available within the selected compound site.

Traffic management

Where possible, the proposed construction work would be programmed to minimise impact on traffic. Standard traffic management measures would be employed to minimise short-term traffic impacts expected during construction.

A detailed traffic management plan would be prepared in accordance with the Traffic Control at Work Sites Manual Version 4 (RTA, 2010), RMS Specification G10 – Control of Traffic (RTA 2006) and approved by Roads and Maritime before implementation. The traffic management plan would provide details of the traffic management to be implemented during construction to ensure traffic flow on the surrounding network is maintained where possible.

Works to and in the vicinity of bus stops would be undertaken in consultation with the bus operators. No changes to bus services are anticipated.

Road and lane closures

Construction staging would be designed to ensure maintenance of traffic flow throughout the construction period. Temporary lane closures would be required to facilitate construction activities. These would be managed in accordance with the traffic management plan.

Some impacts to footpaths along Epping Road, Blaxland Road and Essex Street would be experienced, however provision for safe pedestrian access across the construction area would be maintained at all times during construction.

Access to businesses within the proposal site would be maintained. Pedestrian routes would be managed to suit construction activities. These routes would be coordinated with the stages of construction to ensure safe access.
3.4 Ancillary facilities

3.4.1 Site compounds and stockpile sites

One or more compound sites would be required for the proposal. Four possible site options have been identified to date, as outlined below in Table 3-4.

3.4.2 Selection of the preferred compound site

The compound site options are outlined in Table 3-4 and are shown in Figure 1-2.

The site options were identified based on the following criteria:

- Availability of the property for use as a compound site
- Minimal site preparation/clearing required
- Location and proximity to the construction site
- Size of the site
- Ease of access and nominated traffic route from the compound site to the construction site
- Future use of the land.

The final compound site location/s would be selected during detailed construction planning.

Activities required for site establishment and decommission

Various activities/works would be required to establish the site/s prior to the commencement of construction, and to decommission the site/s once construction of the proposal is complete.

The preferred site/s would be securely fenced with temporary fencing prior to use as a compound site. Signage would be erected advising the general public of access restrictions.

Upon completion of the construction work, the temporary site compound, work area and stockpiles would be removed, and the site/s would be cleared of all rubbish and materials. The site would be reinstated to accommodate its’ existing use or as required by the property owner.

The site-specific activities that would be required at each site to use it as a site compound (if it is selected as the preferred option/s) are summarised in Table 3-4.

Activities during construction

The construction compound would typically include a combination of demountable offices, meal rooms, toilets/showers, parking facilities, secure and bunded storage areas for site materials, including fuel and chemicals. The compound site would also typically allow for lay down areas, equipment storage, maintenance sheds, chemical/fuel stores and stockpile of earth and construction materials.

The compound site/s would also be the nominated stockpile area. Stockpiling near residential properties would be avoided wherever possible to avoid potential dust and erosion impacts. Stockpiles would be required to store materials such as spoil, stripped topsoil, excavated rock and building materials. Stockpile areas would be managed in accordance with the Roads and Maritime’s Stockpile Site Management Procedures (RTA 2011).

Site layouts would be developed during detailed design and upon selection of the compound site/s location.
<table>
<thead>
<tr>
<th>Site</th>
<th>Address and Lot</th>
<th>Current use, access and key features</th>
<th>Surrounding land uses</th>
<th>Site area</th>
<th>Activities/works required at site to use it as a compound site</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2 Epping Road Lot 1 DP 1192833</td>
<td>Automotive garage (Tuffys Auto Centre)</td>
<td>Commercial building to the north Residential building to the south and east Railway line to the west.</td>
<td>Lot area: 1214 m² Area to be leased for compound: to be agreed with land owner</td>
<td>The compound would be accessed from Epping Road and Blaxland Road. Removal of minor service station infrastructure (signage). Fencing and compound site signage provided where required.</td>
</tr>
<tr>
<td>B</td>
<td>36 Essex Street Lot 5 DP 1033683</td>
<td>One residential property owned by Roads and Maritime</td>
<td>Residential properties on all sides</td>
<td>Lot area: 701 m² Area to be used for the compound: 701 m²</td>
<td>The compound would be accessed from Epping Road and Essex Street. Fencing and compound site signage provided where required. Removal of garden plants and minor trimming of vegetation for access. Tree protection fencing for vegetation not being removed.</td>
</tr>
<tr>
<td>C</td>
<td>38 Essex Road Lot 20 DP 10385</td>
<td>One residential property owned by Roads and Maritime</td>
<td>Residential properties on all sides Located within the Essex Street Conservation Area</td>
<td>Lot area: 803 m² Area to be used for the compound: 803 m²</td>
<td>The compound would be accessed from Epping Road and Essex Street. The house would be used for an office and staff facilities. Removal of garden plants and minor trimming of vegetation for access on the north side of the property where Epping Road is widened. Tree protection fencing for vegetation not being removed.</td>
</tr>
<tr>
<td>D</td>
<td>2 and 4 Forest Grove Lot 10, 11 and 12 DP 10385</td>
<td>Two existing (vacant) residential properties Two driveways from Forest Grove Garden plants, shrubs and planted trees</td>
<td>Residential properties to the north and east Public park to the south Area used as a compound area to the west (former bowling greens)</td>
<td>Lot area: 2273 m² Area to be leased for compound: 2273 m²</td>
<td>The compound would be accessed from Forest Grove. Fencing and signage provided where required. 2 Forest Grove may require demolition to provide space for the compound site. Demolition of this property is a condition of the land holder for the use of the land as a compound site. 4 Forest Grove residential building may be used as a site office. Removal of garden plants at the front of the properties, potential removal of some trees to provide access into the site. Tree protection fencing for vegetation not being removed. Widening of the entrance to allow access by construction vehicles.</td>
</tr>
</tbody>
</table>
Figure 3-6
Potential compound site locations
3.5 Public utility adjustments

Consultation with public utility authorities was undertaken as part of the development of the concept design to identify and locate existing utilities and incorporate utility authority requirements for relocations and/or adjustments. Consultation is discussed further in section 5.

Preliminary investigations have indicated that a number of utilities would require relocation or adjustment as part of the proposal. This would be undertaken in consultation with the utility authorities.

Electrical distribution lines, telecommunication lines, water mains, gas mains, optic fibre and traffic infrastructure would require relocation or adjustment as part of the proposal. All utility relocations would be restricted to the proposal area as shown in Figure 1-2.

Overhead and Underground utility adjustments may cause an outage of the affected service for a period of time. Construction will be sequenced to minimise the duration and impact of outages and will be undertaken in accordance with the guidelines of the relevant utility.

3.5.1 Overhead utility adjustments

Anticipated overhead utility alterations include:

- Relocating associated aerial cables on Ausgrid poles, including Optus and Telstra cables through installing new poles and cables in equivalent locations in the proposed widened road reserve on the south side on Epping Road and on the northern side of the road if required.
- Adjusting overhead line tensions within 100 m of the listed affected assets.

Council was issued with a statutory notification on 4 March 2015 in accordance with the requirements of the Electricity Supply Act 1995. The notification response period closed on 14 April 2015. Council requirements noted on the response received 23 March 2015 have been incorporated into the design and/or noted on the drawings, along with verbal clarifications of the Council requirements dated 10 September 2015 (Danny Fitzpatrick, Hornsby Shire Council to Andrew Baird, GHD).

3.5.2 Underground utility adjustments

The anticipated underground utility adjustments are outlined below.

**Electrical Cables**

There are existing Ausgrid Low Voltage cables crossing under Epping Road near the Blaxland Road/Langston Place intersection. These cables will need to be replaced to suit the proposed road widening. Road crossing signals will be relocated to be adjacent to the new crossing location.

**Gas main**

Relocating the Jemana gas main which is located under the current road reserve/footpath to an equivalent location in the proposed widened road reserve/footpath:

- Along the southern side of Epping Road (from Essex Road intersection on the east to the Blaxland Road intersection on the west, for about 340 metres).
• Along the western side of Essex Street, south of the Epping Road intersection (adjacent to property 38 Essex Street for about 30 metres).

• Along the northern side of Epping Road (adjacent to the property 36 Essex Street for about 50 metres) crossing Essex Street and continuing north along the eastern side of Essex Street (adjacent to property 43 Essex Street for about 50 metres).

**Telecoms**

Relocation of Optus optical fibre conduits which are currently located under the southern side of Epping Road road reserve/footpath. The impacted conduits will be relocated to an equivalent location in the proposed widened road reserve/footpath.

Relocation of Telstra underground network infrastructure, currently located in existing road reserve/footpath, which would be affected by the proposed widening, in the following locations:

• From the eastern verge of Essex Street (adjacent to property 43 Essex Street for about 50 metres) crossing Epping road (adjacent to the property 36 Essex Street for about 50 metres), to equivalent locations in the new road reserve/footpath.

• From the north east corner to the south east corner of the Langston Place / Blaxland Road / Epping Road intersection (in total about 30 metres will require alteration).

• Along the south side of Epping Road, between Langston Place / Blaxland Road intersection and Essex Street intersection (for about 340 metres).

**Traffic infrastructure**

• Roads and Maritime traffic signal equipment, such as loop detectors, control boxes, cable runs, and traffic signal posts and associated lanterns, would be upgraded or relocated to suit the proposed intersection configuration at the Epping Road and Essex Street intersection and the Epping Road, Langston Place and Blaxland Road intersection.

**Underground water infrastructure**

• Relocation of water main affected by the proposed widening, along the road reserve/footpath on the east side of Essex Street in the proximity with Epping Road intersection, to the equivalent location in the new road reserve/footpath along the east side of Essex Street.

• Relocation of water main affected by the proposed road widening, along the road reserve/footpath on the north side of Epping Road in the proximity of with Essex Street intersection, to the equivalent locations in the new road reserve/footpath on the north side of Epping Road.

• Relocation of water main affected by the proposed road widening, along the road reserve/footpath of the west side of Forest Grove in the proximity with Epping Road intersection, to the equivalent location under the new road reserve/footpath.

• Relocation of water main features affected by the proposed road widening, along the eastern road reserve/footpath of Blaxland Road in the proximity with the Epping Road intersection, to the equivalent location outside of the new road reserve/footpath.

• Adjustment of a sewer maintenance hole at the south west corner of Epping Road and Essex Street intersection currently located within the road reserve/footpath. Its position will not change but following the completion of the proposal, its location will be within the new road carriageway. Its current level will be adjusted to match the proposed road level within the new road carriageway.
3.6 Property acquisition and adjustments

The proposal would require partial acquisition and related property adjustments of 14 properties and the total acquisition of one property.

Properties impacted by partial acquisition/adjustments are listed in Table 3-5 and are shown Figure 3-7. The property adjustments include relocating property boundary fencing, driveway adjustments and loss of roadside trees and landscaped areas and would be carried out as part of the works. The extent of property acquisitions would be refined and confirmed during detailed design in consultation with the property owners.

All except one of the properties that would be impacted by partial acquisition or adjustment are residential properties. Acquisition of residential properties would involve frontage strip acquisitions up to about 3.0 metres wide.

Tuffy’s Auto Centre on the corner of Epping Road and Blaxland Road would be affected by partial acquisition. Acquisition would involve a strip acquisition about 30 metres in length and about 3.0 metres wide.

One property within the study area (36 Essex Street) has historically been owned by Roads and Maritime and has not been acquired as part of this proposal.

Property adjustment plans would be developed during detailed design in consultation with the property owners. All land acquisitions would be conducted in accordance with the Roads and Maritime Land Acquisition Policy and compensation would be based on the requirements of the Land Acquisition (Just Terms) Compensation Act 1991.

Table 3-5 Property acquisition required for the proposal

<table>
<thead>
<tr>
<th>Address</th>
<th>Lot and DP</th>
<th>Acquisition type</th>
<th>Current land use</th>
<th>Approximate area of existing property (m²)</th>
<th>Acquisition area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Epping Road</td>
<td>Lot 1 DP 1192833</td>
<td>Partial</td>
<td>Commercial</td>
<td>1197</td>
<td>140</td>
</tr>
<tr>
<td>4 Epping Road</td>
<td>SP 16921</td>
<td>Partial</td>
<td>Residential</td>
<td>1508</td>
<td>112</td>
</tr>
<tr>
<td>6 Epping Road</td>
<td>Lot B DP 308840</td>
<td>Partial</td>
<td>Residential</td>
<td>1522</td>
<td>111</td>
</tr>
<tr>
<td>8 Epping Road</td>
<td>Lot 5 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>980</td>
<td>74</td>
</tr>
<tr>
<td>10 Epping Road</td>
<td>Lot 6 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>998</td>
<td>74</td>
</tr>
<tr>
<td>12 Epping Road</td>
<td>Lot 1 DP 203492</td>
<td>Partial</td>
<td>Residential</td>
<td>1020</td>
<td>51</td>
</tr>
<tr>
<td>14 Epping Road</td>
<td>Lot 2 DP 203492</td>
<td>Partial</td>
<td>Residential</td>
<td>1592</td>
<td>113</td>
</tr>
<tr>
<td>16 Epping Road</td>
<td>Lot B DP 327784</td>
<td>Partial</td>
<td>Residential</td>
<td>1020</td>
<td>74</td>
</tr>
<tr>
<td>18 Epping Road</td>
<td>Lot 9 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>1132</td>
<td>85</td>
</tr>
<tr>
<td>20 Epping Road</td>
<td>Lot 16 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>957</td>
<td>70</td>
</tr>
<tr>
<td>22 Epping Road</td>
<td>Lot 17 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>904</td>
<td>69</td>
</tr>
<tr>
<td>Address</td>
<td>Lot and DP</td>
<td>Acquisition type</td>
<td>Current land use</td>
<td>Approximate area of existing property (m²)</td>
<td>Acquisition area (m²)</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>------------------</td>
<td>------------------</td>
<td>------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>24 Epping Road</td>
<td>Lot 18 DP 10385</td>
<td>Partial</td>
<td>Residential</td>
<td>890</td>
<td>67</td>
</tr>
<tr>
<td>38 Essex Street</td>
<td>Lot 20 DP 10385</td>
<td>Total</td>
<td>Residential</td>
<td>803</td>
<td>803</td>
</tr>
<tr>
<td>41 Essex Street</td>
<td>Lot 4 DP 103865</td>
<td>Partial</td>
<td>Residential</td>
<td>922</td>
<td>42</td>
</tr>
<tr>
<td>43 Essex Street</td>
<td>Lot 1 DP 430745</td>
<td>Partial</td>
<td>Residential</td>
<td>877</td>
<td>96</td>
</tr>
</tbody>
</table>

If compound A or D are required for the works, these sites will be leased from the landowner for the duration of the construction period.

Two properties may require demolition due this proposal. These are listed in Table 3-6.

**Table 3-6 Properties potentially requiring demolition**

<table>
<thead>
<tr>
<th>Address</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 Essex Street (lot 5 DP 1033683)</td>
<td>This property is historically owned by Roads and Maritime. This property lies within the footprint of the road widening and would require demolition. Any land remaining outside of the road corridor would be turfed. Any future development of this lot would be assessed under a separate assessment process.</td>
</tr>
<tr>
<td>2 Forest Grove (lot 10 DP 10385)</td>
<td>This property may require demolition to provide space for Compound site D. Demolition is a condition of the land holder for the use of the land as a compound site. Any future development of this lot would be assessed under a separate assessment process.</td>
</tr>
</tbody>
</table>
Properties requiring property acquisition
4. **Statutory and planning framework**

4.1 **Overview**

The EP&A Act provides the statutory basis for planning and environmental assessment in NSW. The Act provides the framework for environmental planning and development approvals, and includes provisions to ensure that the potential environmental impacts of a development are assessed and considered in the decision making process. As noted below, the proposal is subject to assessment under Part 5 of the EP&A Act. The planning and assessment framework for the proposal is outlined in the following sections.

4.2 **State Environmental Planning Policies**

The only state environmental planning policy that applies to the proposal is *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP), as outlined below.

4.2.1 **State Environmental Planning Policy (Infrastructure) 2007**

ISEPP aims to facilitate the effective delivery of infrastructure across the State. ISEPP clarifies the consent arrangements for certain infrastructure projects.

Clause 94(1) 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 infrastructure facilities and is to be carried out by Roads and Maritime Services, it can be assessed under Part 5 of the Environmental Planning and Assessment Act 1979. 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 (Transitional Major Projects) 2005*.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities before the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in section 5.4.3 of this REF.

4.3 **Local Environmental Plans**

4.3.1 **Hornsby Local Environmental Plan 2013**

The *Hornsby Local Environmental Plan 2013* (the LEP) applies to land within the Hornsby local government area. The proposal site is located within or adjacent to a number of different land use zones (refer Table 4-1). Table 4-1 also lists the objectives that apply to each zone, and summarises the consistency of the proposal with these objectives.

The zone provisions provide that the proposal would be permitted with consent or would be prohibited, depending on the zone. Clause 5.12 of the LEP states that “…this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under *State Environmental Planning Policy (Infrastructure) 2007*.”
As the proposal is permitted without consent under ISEPP (refer section 4.2.1), the consent requirements of the LEP do not apply.

### Table 4-1  LEP zone objectives

<table>
<thead>
<tr>
<th>Zone</th>
<th>Objectives</th>
<th>Consistency with objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2 Low Density Residential</td>
<td>To provide for the housing needs of the community within a low density residential environment.</td>
<td>The proposal involves the upgrade of an existing land use, which meets the access and transport needs of the community. The proposal is consistent with the objectives of this zone.</td>
</tr>
<tr>
<td></td>
<td>To enable other land uses that provide facilities or services to meet the day to day needs of residents.</td>
<td></td>
</tr>
<tr>
<td>R4 High Density Residential</td>
<td>To provide for the housing needs of the community within a high density residential environment.</td>
<td>The proposal involves the upgrade of an existing land use, which meets the access and transport needs of the community. It provides an important route for public transport (buses) and would improve access to the Epping town centre. The proposal is consistent with the objectives of this zone.</td>
</tr>
<tr>
<td></td>
<td>To provide a variety of housing types within a high density residential environment.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To enable other land uses that provide facilities or services to meet the day to day needs of residents.</td>
<td></td>
</tr>
<tr>
<td>B2 Local Centre</td>
<td>To provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area.</td>
<td>The proposal involves the upgrade of an existing land use, which meets the access and transport needs of the community. There are no impacts to public transport availability. The works will improve access to employment opportunities in Epping town centre. The proposal is consistent with the objectives of this zone.</td>
</tr>
<tr>
<td></td>
<td>To encourage employment opportunities in accessible locations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To maximise public transport patronage and encourage walking and cycling.</td>
<td></td>
</tr>
<tr>
<td>SP2 Infrastructure (Classified Road)</td>
<td>To provide for infrastructure and related uses.</td>
<td>The proposal involves the upgrade of existing infrastructure, and is consistent with the objectives of this zone.</td>
</tr>
<tr>
<td></td>
<td>To prevent development that is not compatible with or that may detract from the provision of infrastructure.</td>
<td></td>
</tr>
</tbody>
</table>
4.4 **Other relevant legislation**

Other NSW environmental legislation that is relevant to the approval and/or assessment of the proposal is considered in Table 4-2.

Prior to works commencing and following any demolition, hazardous materials surveys and a soil contamination assessment for lead paint, asbestos and from underground fuel storage infrastructure relating to the Auto Centre site would be required. Remediation would be undertaken if identified contamination poses a risk to human health or the environment.

When the works compound is no longer required, site assessment would be required to assess the risk posed by contamination (if any) introduced during use of the works compounds. Remediation would be undertaken if contamination poses an unacceptable risk to human health or the environment under the proposed land use scenario.
<table>
<thead>
<tr>
<th>Act</th>
<th>Potential approval requirement for road infrastructure</th>
<th>Relevance to the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of the Environment Operations Act 1997 (POEO Act)</td>
<td>An environment protection licence (EPL) is required for scheduled activities or scheduled development work. Road construction is a scheduled activity if it results in four or more traffic lanes (not including bicycle lanes or lanes used for entry or exit), where the road is classified or proposed to be classified as a main road for at least three kilometres of its length in the metropolitan area.</td>
<td>As it does not meet this definition, the proposal is not considered to be a scheduled activity under Schedule 1 of the POEO Act and therefore an EPL is not required for construction or operation.</td>
</tr>
<tr>
<td>Contaminated Land Management Act 1997 (CLM Act)</td>
<td>The CLM Act establishes a process for investigating, managing and remediating contaminated land. The Office of Environment and Heritage (OEH) exercises its powers under the CLM Act to regulate any site contamination that poses a significant risk of harm to current or approved land uses. This includes maintaining a register of contaminated sites and determining the remediation requirements.</td>
<td>The Auto Centre (former service station) site is a potentially contaminated site which has been notified to the EPA, however a contamination investigation (GHD 2015b) (refer section 6.3) has not identified significant contamination in the area required for partial acquisition. Hazardous materials surveys and a soil contamination assessment would be required. Remediation would be undertaken where necessary.</td>
</tr>
<tr>
<td>Heritage Act 1977</td>
<td>Approval under section 57(1) for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. An excavation permit under section 139 to disturb or excavate any land containing or likely to contain a relic.</td>
<td>The proposal would not impact on any items listed on the State heritage register, and no approvals under section 57(1) are required. An area of moderate archaeological potential at the corner of Blaxland Road and Epping Road would be impacted by the proposal. As a result of the existing levels of site disturbance, there is minimal likelihood that unknown items of historic significance or relics would be present. An exception permit under section 139 would be required for works in this area. Potential impacts on locally listed heritage items are considered in section 6.7.</td>
</tr>
<tr>
<td>Threatened Species Conservation Act 1995 (TSC Act)</td>
<td>The TSC Act lists threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If a significant impact is likely, an assessment of significance that addresses the requirements of section 5A of the EP&amp;A Act must be completed.</td>
<td>The proposal site has been cleared in the past and subject to previous disturbance. The proposal would not result in any impacts to listed flora, fauna or communities, and a species impact statement is not required.</td>
</tr>
<tr>
<td>Noxious Weeds Act 1993</td>
<td>Under Part 3 Division 1 of the Act, all private landowners, occupiers, public authorities and Councils are required to control noxious weeds on their land.</td>
<td>Noxious weeds were identified within the study area and would be managed in accordance with the requirements of the Act. Further information is provided in section 6.5.</td>
</tr>
</tbody>
</table>
4.5 Commonwealth legislation

4.5.1 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 A and chapter 6 of the REF.

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 the Environment.

4.6 Confirmation of statutory position

The proponent and determining authority for the proposal is Roads and Maritime. Clause 94 of the ISEPP provides that the proposal may be carried out without the need for development consent. The proposal is therefore subject to assessment and determination under Part 5 of the EP&A Act. Consent from Council is not required.
5. **Stakeholder and community consultation**

5.1 **Consultation strategy**

A communications and community involvement strategy was developed by GHD in consultation with Roads and Maritime. The strategy guides consultation activities for the proposal, as well as the separate Carlingford Road/Beecroft Road intersection improvement project. The strategy describes the approach to providing information about both projects and seeking community input to the design and assessment process.

The overall objective of the consultation process is to ensure that key stakeholders and the broader community are aware of the project and are given the opportunity to express their views.

A summary of the consultation undertaken to date is provided in the following sections. Further information is provided in the in the *Consultation report project 2* (GHD 2015a) in Appendix N which is available on Roads and Maritime’s website.

5.2 **Key stakeholders**

As an input to the consultation strategy, GHD conducted a community scan to identify relevant stakeholders and develop a project database. The key stakeholders include:

- Roads and Maritime Services
- Hornsby Shire Council
- Department of Planning and Environment - Urban Activation Precincts team
- Local residents (those within the 2121 postcode area)
- Community groups (Epping Civic Trust)
- Local business owners and operators
- Local schools (Epping Public and Arden Anglican School)
- Sydney Trains and local bus operators
- Utility providers including Ausgrid, Jemena, Endeavour Energy, Sydney Water, Optus and Telstra.

5.3 **Consultation tools and activities**

Consultation with the community and stakeholders about the project has been ongoing since August 2014. It has involved the following activities:

- A community information 1800 phone line, email and postal address were established to allow the community to provide feedback on the project
- Information on the project has been placed on the Roads and Maritime website, including background information, preliminary design, and project updates
- Distribution of two community updates in August and December 2014 to 6,500 households and businesses in the study areas for the project. The community updates invited the community and stakeholders to provide feedback on the project
• A door knock was carried out on 18 August 2014 of about 60 directly affected property owners to provide information about the project, encourage comments, and canvas potential issues from directly affected landowners
• A door knock was carried out on 5 December 2014 to deliver the project updates and seek feedback from directly affected property owners
• Face to face meetings with a property owner was undertaken as part of the land acquisition process
• Meetings have been held with Hornsby Shire Council and Department of Planning and Environment - Urban Activation Precincts team
• Meetings were also held with Hillsbus, Sydney Buses, Epping Public School and Arden Anglican School
• Preparation of a community consultation report to outline the findings of preliminary community consultation, placed on the Roads and Maritime website.

5.4 Consultation outcomes

5.4.1 Key issues raised by the community

Roads and Maritime has considered all feedback from the community during the design process for the project. A total of 218 comments were received from community members and stakeholders comprising about 783 individual matters. This included one petition signed by 38 individuals and submissions from Epping Before and After School Care Association, Epping Public School P & C Association, Arden Anglican School, Hornsby Shire Council and Hillsbus. Of the 783 comments received most related to:

• Traffic and access (about 55 per cent, or 431 comments)
• Project (about 26 per cent, or 201 comments)
• Safety (about 12 per cent, or 97 comments).

The key issues raised by the community are provided in Table 5-1 below with the location of where the issue is discussed within this REF. A full description of the response to each issue from Roads and Maritime is provided the Consultation report project 2 (GHD 2015a) in Appendix N.
<table>
<thead>
<tr>
<th>Sub-category</th>
<th>Issue</th>
<th>Where considered within the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic and access</td>
<td>Widening of Epping Road will create bottlenecks</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td></td>
<td>Proposal favours through-traffic without considering resultant local congestion and access</td>
<td>Appendix N Consultation Report Project 2(GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>The raised central median from Langston Place to Essex Street would increase travel times</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned about congestion around Dence Park and East Blaxland Road and the existing roads capacity as a result of this proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concern relating to proposed increased density in the area including:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned about the existing on-street parking on Essex Street and resulting congestion problems with a left hand turn bay from Essex Street onto Epping Road westbound</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Epping Road/Blaxland Road/Langston Place intersection is currently congested</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Support proposal for improving traffic flow on or adjacent to Epping Road near the Epping Town Centre</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appearance of proposed Epping Road widening will be detrimental and may affect footpaths and letterboxes</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td></td>
<td>The existing pedestrian lights at Essex Street and Epping Road are sufficient</td>
<td>Appendix N Consultation Report Project 2(GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>Please confirm all pedestrian crossings at Essex Street intersection are proposed to be light controlled as these are supported</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removal of the ramp on the eastern side of Epping Station was used by cyclists, families with prams and people with mobility scooters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It will become increasingly important for people to cross the major roads without disrupting traffic flow, specifically crossing Epping Road from Langston Place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No pedestrian crossings at the roundabout</td>
<td></td>
</tr>
<tr>
<td>Property access</td>
<td>General concern regarding property access</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td></td>
<td>Concerned that peak hour traffic queues make accessing properties on Essex Street and Forest Grove challenging</td>
<td>Appendix N Consultation Report Project 2(GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>Reducing the length of the raised median would allow for access by emergency vehicles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned about property access during construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency vehicles may not be able to locate the property if access arrangements are changed</td>
<td></td>
</tr>
<tr>
<td>Sub-category</td>
<td>Issue</td>
<td>Where considered within the REF</td>
</tr>
<tr>
<td>--------------</td>
<td>-------</td>
<td>----------------------------------</td>
</tr>
</tbody>
</table>
| Restriction of right turn from Langston Place onto Epping Road westbound | Concerned about increased congestion and resultant safety issues in other areas particularly Essex Street, Epping Public School, Pembroke roundabout and Pembroke Street  
Generally concerned about the removal of the right turn from Langston Place into Epping Road  
Removes one of the few access points to the area  
Concerned that access out of North Epping has not been considered  
Traffic connectivity and traffic flow will be affected including bus routes and the delivery of goods. This will also increase travel time.  
Concerns regarding access via Leighton Street  
Supports proposal to ban right turn from Langston Place onto Epping Road westbound | Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)  
Appendix N Consultation Report Project 2(GHD 2015a) |
| Removal of right turns to and from Forest Grove at Epping Road | Increased traffic in other areas related to the removal of a right turn at Forest Grove  
Please provide detail to justify that the removal of the right turn into Forest Grove will alleviate traffic  
General concern for the removal of right turn into Forest Grove  
Please provide justification for safety issues associated with this intersection  
Turning at Forest Grove provides the best visibility  
Access for local residents in Forest Grove will be affected  
Supportive of the removal of right turn at Forest Grove | Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)  
Appendix N Consultation Report Project 2(GHD 2015a) |
| Restriction of right turns from Epping Road to Essex Street in both directions | Restricting right turns from Epping Road into Essex Street in both directions will limit connectivity and increase congestion and travel time  
Concerned about congestion resulting from not allowing right turn into Essex Street eastbound and impacts on Blaxland Road and Epping Road intersection  
Restricting right turn at Essex Street westbound will cause more congestion at the Pembroke Street intersection, which is already congested  
General concern regarding banned right turns into Essex Street  
Either the right turn at Essex Street or at Forest Grove should be retained  
Should be a dedicated right turn into Essex Street from Epping Road  
Alternate access via Crandon Street is dangerous  
To travel eastbound on Epping Road from south Essex Street it will be necessary to cross Epping Road and turn left at the Pembroke Street intersection | Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)  
Appendix N Consultation Report Project 2(GHD 2015a) |
<table>
<thead>
<tr>
<th>Sub-category</th>
<th>Issue</th>
<th>Where considered within the REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcategory</td>
<td>I support the removal of right hand turns into Essex Street from Epping Road in either direction as there are ample opportunities to achieve these turns. Right turn going west could be removed as there is an alternative at Pembroke Street. I support the widening of Essex Street to accommodate the expected population surge in the Epping Town Centre.</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment). Appendix N Consultation Report Project 2 (GHD 2015a).</td>
</tr>
<tr>
<td>Restriction of right turns to and from Smith Street at Epping Road</td>
<td>Restricting right turns from Epping Road into Smith Street will limit connectivity, increase travel time and cause congestion. Supportive of the removal of right turn at Smith Street.</td>
<td>Appendix N Consultation Report Project 2 (GHD 2015a).</td>
</tr>
<tr>
<td>Request for more information</td>
<td>Request for further information on a variety of topics.</td>
<td>Information is provided directly to respondents as part of the consultation process and is reported in the Community consultation report Project 2 (GHD 2015c). Appendix N Consultation Report Project 2 (GHD 2015a).</td>
</tr>
<tr>
<td>Inadequate consultation</td>
<td>Concerned that insufficient time has been provided to respond, previously provided feedback which has not been responded to and some stakeholders have not been consulted with.</td>
<td>Information is provided directly to respondents as part of the consultation process and is reported in the Community consultation report Project 2 (GHD 2015c). Appendix N Consultation Report Project 2 (GHD 2015a).</td>
</tr>
<tr>
<td>Environment</td>
<td>Air quality</td>
<td>Concerns about pollution and air quality as a result of the proposal.</td>
</tr>
<tr>
<td>Noise</td>
<td>Concerned about the noise impacts associated with the widening of Epping Road. Changes that bring more traffic around Dence Park will increase noise in the area.</td>
<td>Section 6.2 (Noise and vibration) and Appendix D (Noise and vibration assessment).</td>
</tr>
<tr>
<td><strong>Sub-category</strong></td>
<td><strong>Issue</strong></td>
<td><strong>Where considered within the REF</strong></td>
</tr>
<tr>
<td>-----------------</td>
<td>------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Project</strong></td>
<td>Changes will reduce amenity and increase noise for local residents and school students</td>
<td>Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Outside project scope</td>
<td>Concern about congestion at the Epping bridge and alternative railway crossings Pembroke Street and Essex Street roundabout and the M2</td>
<td>Not covered within this REF Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Alternatives</td>
<td>Various comments relating to alternative options were received.</td>
<td>Section 2.4 (Alternatives and options considered) Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Property Acquisition</td>
<td>Impacts of Epping Road widening on properties Did not receive information regarding the sale of property Concerned that changes between the first and second consultation rounds will affect property acquisition Concerned about the acquisition of property to allow for the provision of a future left turn slip lane on the corner of Epping Road and Essex Street</td>
<td>Section 3.6 (Property acquisition and adjustments) Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Project Cost</td>
<td>Concerned about the amount of money spent on projects that do not address congestion or community needs Concerned that the proposal will not address the future growth of the area Intended objectives of the proposal will not be addressed Widening Epping Road only as far as Essex Street is inadequate Supportive of the projects aims to address the outcomes of the 2011 traffic study and suggests project implementation order Concerned about the practicality of widening Epping Road Concerned about pedestrian lights at Epping and Essex Street intersection - there are already traffic lights at this intersection</td>
<td>Section 2 (Needs and options considered) Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Safety</td>
<td>Concern relating to school safety Pick up and drop off to Arden Anglican School on Oxford Street will be impacted by the increased traffic on local roads</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td>Sub-category</td>
<td>Issue</td>
<td>Where considered within the REF</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bushfire safety</td>
<td>Concerned about bushfire safety and access during the event of a fire</td>
<td>Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>General concern regarding bushfire</td>
<td>This proposal has been developed in accordance with the recommended short to medium-term (2026) infrastructure improvements detailed in the Epping Town Centre Transport Study Outcomes Report (July 2011). No further discussion is provided within this REF. Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td>Motorist safety</td>
<td>Does not believe that there are many accidents within the area</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td></td>
<td>Raise median strip would improve road safety for vehicles</td>
<td>Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>Merging of three lanes down to two lanes could cause safety concerns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety concerns regarding the widening Epping Road, including the safety of the median strip along Epping Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned about the increasing number of drivers who wish to turn right at Essex Street from Epping Road, which is already difficult and dangerous</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned that there will be more accidents as a result of removing right turns at Essex Street in both directions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Encourages motorists to attempt dangerous right hand turns on a bend beyond Essex Street at Crandon Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area would become more dangerous due to increased traffic on the local roads</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Will speed humps be installed to slow traffic?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current speed limits around the school are not complied with</td>
<td></td>
</tr>
<tr>
<td>Sub-category</td>
<td>Issue</td>
<td>Where considered within the REF</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Pedestrian and cyclist safety</td>
<td>Concerned about pedestrians crossing on Essex Street and increased traffic</td>
<td>Section 6.1 (Traffic and access) and Appendix C (Traffic and transportation impact assessment)</td>
</tr>
<tr>
<td></td>
<td>Intersection of Oxford and Essex Street is of safety concerns for pedestrians</td>
<td>Appendix N Consultation Report Project 2 (GHD 2015a)</td>
</tr>
<tr>
<td></td>
<td>Proposed modification to Epping Road will force traffic onto residential streets causing danger to school students walking to and from school</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased congestion will impact on pedestrian safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Median strip along Epping Road might tempt pedestrians to cross</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The proposal will increase safety risks for pedestrian travelling on the footpaths on Epping Road for people egressing from properties along Epping Road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concerned with cyclist safety associated with the removal of the right turn at Langston Place and resultant extended cohabitation with vehicles</td>
<td></td>
</tr>
</tbody>
</table>
5.4.1 Response to issues raised by the community and stakeholder groups

A summary of the key issues raised by the community and stakeholder groups during the consultation process is provided in Table 5-1 together with a response to how they are addressed. Further information on the issues raised and detailed responses to the issues are provided in Appendix N and the Consultation Report Project 2 (GHD 2015a).

5.4.2 Aboriginal community involvement

A preliminary assessment was undertaken by Roads and Maritime based on Stage 1 of the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI). A summary of the preliminary assessment is provided in Appendix H. The assessment concluded that the Aboriginal cultural heritage potential of the study area is low due to past disturbance. A PACHCI clearance letter (Appendix H) was issued by Roads and Maritime Aboriginal cultural heritage advisor confirming that the proposal could proceed without further consultation.

5.4.3 ISEPP consultation

Clauses 13 to 16 of the Infrastructure SEPP specify the requirements for consultation with councils and other public authorities for infrastructure development carried out by or on behalf of a public authority. Consultation is required in relation to specified development (clause 16) or development that impacts on:

- Council related infrastructure or services (Clause 13)
- Local heritage (Clause 14)
- Flood liable land (Clause 15).

The ISEPP consultation requirements are considered in Table 5-2.

As the proposal has the potential to impact on local heritage, consultation in accordance with ISEPP was undertaken with Hornsby Shire Council. A letter was sent to Council’s representative on 18 September 2015 providing information on the proposal and requesting input in terms of the identification of any issues or concerns. Copies of the heritage assessment and statement of heritage impacts (refer Appendix I) undertaken for the proposal were also provided to Council in accordance with Clauses 13 and 14 of ISEPP. A response had not been received at the time of completion of the REF.

Table 5-2 ISEPP consultation

<table>
<thead>
<tr>
<th>Consultation required with council under clauses 13-16 of the Infrastructure SEPP</th>
<th>Required for this proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause 13-15</td>
<td></td>
</tr>
<tr>
<td>Are the works likely to have a substantial impact on the stormwater management services which are provided by council?</td>
<td>No</td>
</tr>
<tr>
<td>Are the works likely to generate traffic to an extent that will strain the existing road system in a local government area?</td>
<td>No</td>
</tr>
<tr>
<td>Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?</td>
<td>No</td>
</tr>
<tr>
<td>Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?</td>
<td>No</td>
</tr>
</tbody>
</table>
### Consultation required with council under clauses 13-16 of the Infrastructure SEPP

<table>
<thead>
<tr>
<th>Question</th>
<th>Required for this proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?</td>
<td>No</td>
</tr>
<tr>
<td>Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?</td>
<td>Yes there will be excavation of a footpath and road that is more than minor works. The proposal is described in section 3.</td>
</tr>
<tr>
<td>Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?</td>
<td>No</td>
</tr>
<tr>
<td>Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than minor or inconsequential?</td>
<td>Yes there is a conservation area within the study area and areas of low and moderate archaeological potential. A statement of heritage impact (Artefact Heritage 2015) (refer Appendix I) has been completed and consultation undertaken with council. The proposal will take place within a portion of Essex Street heritage conservation area listed on the Hornsby LEP (2013) and will impact the areas of archaeological potential, however only minor impacts have been identified.</td>
</tr>
</tbody>
</table>

### Clause 16

<table>
<thead>
<tr>
<th>Question</th>
<th>Required for this proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the works adjacent to a national park, nature reserve or other area reserved under the National Parks and Wildlife Act 1974?</td>
<td>No</td>
</tr>
<tr>
<td>Are the works adjacent to a declared aquatic reserve under the Fisheries Management Act 1994?</td>
<td>No</td>
</tr>
<tr>
<td>Are the works adjacent to a declared marine park under the Marine Parks Act 1997?</td>
<td>No</td>
</tr>
<tr>
<td>Are the works in the Sydney Harbour Foreshore Area as defined by the Sydney Harbour Foreshore Authority Act 1998?</td>
<td>No</td>
</tr>
<tr>
<td>Do the works involve the installation of a fixed or floating structure in or over navigable waters?</td>
<td>No</td>
</tr>
<tr>
<td>Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional facility or group home in bush fire prone land?</td>
<td>No</td>
</tr>
</tbody>
</table>
5.5 Government agency and stakeholder involvement

Roads and Maritime consulted with Hornsby Shire Council and the Department of Planning and Environment during development of the detailed design. Key issues raised at these meetings are summarised in Table 5-3.

In addition Council was issued with a statutory notification on 4 March 2015 in accordance with the requirements of the *Electricity Supply Act 1995*. The notification response period closed on 14 April 2015. Council requirements noted on the response received 23 March 2015 have been incorporated into the design, along with verbal clarifications of the Council requirements dated 10 September 2015 (Danny Fitzpatrick, Hornsby Shire Council to Andrew Baird, GHD).

Table 5-3 Government agency and stakeholder consultation

<table>
<thead>
<tr>
<th>Council consultation</th>
<th>Issues raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hornsby Council - meeting was held on 30 October 2014</td>
<td>• Council requested information on the landscaping element of the proposal. Council was advised that landscaping would be a like-for-like replacement.</td>
</tr>
<tr>
<td></td>
<td>• Council’s requested that the Hornsby Council landscape strategy for the area to be taken into account. Council was advised that this would be considered by Roads and Maritime.</td>
</tr>
<tr>
<td>Department of Planning and Environment (DoPE), Urban Activation Precincts team (UAPT) – meeting was held on 6 November 2014</td>
<td>• DoPE requested further details on the construction program. Council was advised that it was unlikely that construction would commence before September 2015</td>
</tr>
<tr>
<td></td>
<td>• DoPE advised that UAPT were receiving enquiries relating to the project from the community and asked whether it would be possible for UAPT to be copied in on responses to community queries. Council was advised that this would be discussed with the contractor.</td>
</tr>
</tbody>
</table>

This REF will be placed on public display to provide the community and stakeholders with the opportunity to comment.

Following public display, submissions will be collated and a submissions report prepared (if required) to address any issues raised by the community and stakeholders. The submissions report will be made available to the public via the Roads and Maritime website. The community and stakeholders will be informed of any major design changes that are required to address concerns raised. In addition, the following consultation activities will be undertaken as required:

- Meetings with Hornsby Shire Council and other relevant stakeholders, including government agencies, utility providers, bus operators, schools, adjacent landowners and community stakeholders
- Providing project updates to the local community during the construction planning phase and construction period
- Updating the Roads and Maritime project webpage.
6. **Environmental assessment**

6.1 **Traffic and access**

6.1.1 **Overview**

This section summarises the results of the traffic and transport assessment undertaken by GHD as an input to the REF. The full report is provided in Appendix C.

The traffic and transport assessment involved:

- Review of existing traffic conditions including the existing transport and accessibility conditions and the existing road network performance
- Site visits to gain an understanding of current traffic and transport conditions
- Review and analysis of traffic count data provided by Roads and Maritime for a permanent count site located on Epping Road, at Terrys Creek Bridge. Data reviewed was for the period between January 2011 and June 2014
- Traffic modelling for intersection performance (queues, delays and level of service) and network operation analysis
- Provision of mitigation measures to manage traffic during construction and operation, where required.

A detailed description of the methodology is provided in Appendix C.

6.1.2 **Existing environment**

*Existing road network*

A description of the characteristics of Epping Road including its facilities is provided in section 2.2 and a description of the intersections is provided in Table 6-1.

Within the proposal site, the roads which intersect Epping Road are described in Table 6-1.

Figure 6-1 shows the local road network and bus stops within the study area.
### Table 6-1 Intersections within the proposal site

<table>
<thead>
<tr>
<th>Road</th>
<th>Road features</th>
<th>Existing intersection features</th>
</tr>
</thead>
</table>
| Langston Place      | A short section of road (about 140 metres) located between Pembroke Street to the north and Epping Road to the south.  
The road has a two-way sealed carriageway, around 12 metres wide with one traffic lane in each direction.  
Half hour parking is permitted on the western side of the road shoulder during peak periods.  
The road shoulder also serves as a taxi zone.  
On-street parallel parking is provided on the eastern side of the road during similar periods. | Langston Place and Blaxland Road intersect with Epping Road via a four-way signalised intersection located just to the east of the rail corridor.  
Signalised pedestrian and zebra crossing facilities are located across Langston Place at the intersection with Epping Road.  
A signalised pedestrian crossing is also located on the eastern approach across Epping Road.  
The Bridge Street rail overpass is located immediately to the west of the intersection. |
| Blaxland Road       | A longer road (about 4.8 kilometres long) between Lane Cove Road to the south-east and Epping Road to the north.  
The road has a two-way sealed carriageway, around 18 metres wide with three traffic lanes in the northbound and two in the southbound direction.  
No parking is permitted along both sides of the road within the study area. | As noted above, Langston Place and Blaxland Road intersect with Epping Road via a four-way signalised intersection located just to the east of the rail corridor.  
A signalised pedestrian crossing is located across Blaxland Road at the intersection with Epping Road. |
| Smith Street        | A short road (about 200 metres long) located between Pembroke Street to the north, and Epping Road to the south.  
The road has a two-way sealed carriageway, around 10 metres wide with one traffic lane in each direction.  
Informal parallel parking is provided on both sides of the road. | Forms a give-way T-intersection with Epping Road.  
No formal pedestrian crossing facilities are located across Smith Street apart from pram ramps. |
| Forest Grove        | A short road (about 370 metres long) located between Epping Road to the north, and Maida Road to the south.  
The road has a two-way sealed carriageway, around 10 metres wide with one traffic lane in each direction.  
Informal parallel parking is provided on both sides of the road. | Forms a give-way T-intersection with Epping Road.  
No formal pedestrian crossing facilities are located across Forest Grove apart from pram ramps. |
| Essex Street        | A longer road (about 1.1 kilometres long) located between Pembroke Street to the north and Albuera Road to the south.  
The road has a two-way sealed carriageway, around 10 metres wide with generally one traffic lane in each direction.  
Informal parallel parking is provided on both sides of the road. | Essex Road intersects with Epping Road via a four-way signalised intersection.  
A signalised pedestrian crossing is located on the western approach across Epping Road. |
Figure 6-1
Existing road network
Traffic volumes

The classification of roads within the study area can be used as an indication of the functional role each road plays with respect to the volume of traffic they carry. Roads and Maritime has developed a set of road hierarchy classifications which indicates typical nominal average annual daily traffic (AADT) volumes for various classes of roads.

The traffic count data shows that Epping Road experiences the highest traffic flow during the weekdays, with an average of 41,689 two-way vehicle movements per day. This shows that Epping Road functions as an arterial road.

Analysis of the traffic count data found that the peak hours occur during the following periods:

- Weekday morning peak hour between 7.30 – 8.30 am
- Weekday evening peak hour between 5.30 – 6.30 pm
- Saturday peak hour between 12.30 – 1.30 pm.

Table 6-2 shows the average daily two-way traffic volumes and Table 6-3 shows the peak hour volumes and proportion of heavy vehicles on the key roads in the study area.

Table 6-2 Average daily traffic flows in the study area

<table>
<thead>
<tr>
<th>Road section</th>
<th>Direction</th>
<th>Weekdays (Vehicles per day)</th>
<th>Weekends (Vehicles per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epping Road, east of Langston Place</td>
<td>Eastbound</td>
<td>17,415</td>
<td>15,618</td>
</tr>
<tr>
<td></td>
<td>Westbound</td>
<td>18,190</td>
<td>16,163</td>
</tr>
<tr>
<td>Beecroft Road, north of Epping Road</td>
<td>Northbound</td>
<td>27,836</td>
<td>26,297</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>27,259</td>
<td>25,929</td>
</tr>
<tr>
<td>Essex Street, north of Epping Road</td>
<td>Northbound</td>
<td>1,929</td>
<td>1,453</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>2,792</td>
<td>2,338</td>
</tr>
<tr>
<td>Langston Place, north of Epping Road</td>
<td>Northbound</td>
<td>8,134</td>
<td>9,429</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>4,230</td>
<td>5,093</td>
</tr>
<tr>
<td>Blaxland Road, south of Epping</td>
<td>Northbound</td>
<td>8,192</td>
<td>9,635</td>
</tr>
<tr>
<td></td>
<td>Southbound</td>
<td>6,994</td>
<td>7,310</td>
</tr>
</tbody>
</table>
Table 6-3 Peak hour traffic volumes

<table>
<thead>
<tr>
<th>Road section</th>
<th>AM peak (7.30-8.30 am)</th>
<th>PM peak (5.30–6.30 pm)</th>
<th>Saturday peak (12.30–1.30 pm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total vehicles</td>
<td>% Heavy vehicles</td>
<td>Total vehicles</td>
</tr>
<tr>
<td>Epping Road, east of Beecroft Road</td>
<td>4,427</td>
<td>2%</td>
<td>4,193</td>
</tr>
<tr>
<td>Epping Road, east of Langston Place</td>
<td>2,968</td>
<td>2%</td>
<td>2,944</td>
</tr>
<tr>
<td>Epping Road, east of Smith Street</td>
<td>2,906</td>
<td>2%</td>
<td>2,921</td>
</tr>
<tr>
<td>Epping Road, east of Forest Grove</td>
<td>2,878</td>
<td>2%</td>
<td>2,477</td>
</tr>
<tr>
<td>Epping Road, east of Essex Road</td>
<td>2,728</td>
<td>2%</td>
<td>2,221</td>
</tr>
<tr>
<td>Epping Road, north of Crandon Road</td>
<td>2,719</td>
<td>2%</td>
<td>1,975</td>
</tr>
<tr>
<td>Blaxland Road, south of Epping Road</td>
<td>1,114</td>
<td>3%</td>
<td>826</td>
</tr>
<tr>
<td>Langston Place, south of Cambridge Street</td>
<td>732</td>
<td>1%</td>
<td>644</td>
</tr>
<tr>
<td>Forest Grove, south of Epping Road</td>
<td>58</td>
<td>5%</td>
<td>463</td>
</tr>
<tr>
<td>Essex Street, south of Epping Road</td>
<td>406</td>
<td>0%</td>
<td>506</td>
</tr>
<tr>
<td>Essex Street, south of Pembroke Street</td>
<td>516</td>
<td>1%</td>
<td>586</td>
</tr>
<tr>
<td>Essex Street, north of Pembroke Street</td>
<td>336</td>
<td>0%</td>
<td>325</td>
</tr>
<tr>
<td>Essex Street, south of Brucedale Ave</td>
<td>410</td>
<td>2%</td>
<td>565</td>
</tr>
</tbody>
</table>

Intersection performance

The performance of the road network is largely dependent on the operating performance of intersections which form critical capacity control points on the road network. The level of service is the standard measure used to assess the operational performance of the network and intersections. There are six levels of service, ranging from level of service A to level of service F. Level of service A represents the best performance, and level of service F the worst. A level of service D or better is considered to be an acceptable level of service.

SIDRA intersection modelling was undertaken for each intersection within the study area. The results of the modelling are presented in full in Appendix C and are summarised in Table 6-4.

The SIDRA results indicate that the Smith Street/Epping Road and Forest Grove/Epping Road intersections currently operate at a LoS F, which is caused by vehicles being unable to turn right into Epping Road due to insufficient gaps between traffic. This however is an unrealistic representation of current traffic conditions, as SIDRA is not able to model gaps created by upstream and downstream signals; or drivers allowing traffic to turn in congested locations. No major delays were observed at Smith Street and Forest Grove during the site inspections.

All other intersections currently operate at an acceptable LoS during peak periods. The overall network performance during AM and PM peak periods operates at a LoS E, which is an accurate representation of existing conditions, with high levels of congestions observed along Epping Road.
Table 6-4  Summary of 2014 surveyed traffic flows

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Morning peak</th>
<th>Afternoon peak</th>
<th>Weekend peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average delay (s)</td>
<td>Level of service</td>
<td>Average delay (s)</td>
</tr>
<tr>
<td>Langston Place/Epping Road</td>
<td>37</td>
<td>C</td>
<td>45</td>
</tr>
<tr>
<td>Smith Street/Epping Road</td>
<td>140+</td>
<td>F</td>
<td>140+</td>
</tr>
<tr>
<td>Forest Grove/Epping Road</td>
<td>140+</td>
<td>F</td>
<td>97</td>
</tr>
<tr>
<td>Essex Street/Epping Road</td>
<td>21</td>
<td>B</td>
<td>41</td>
</tr>
<tr>
<td>Oxford Street/Pembroke Street</td>
<td>11</td>
<td>A</td>
<td>11</td>
</tr>
<tr>
<td>Pembroke Street/Essex Street</td>
<td>7</td>
<td>A</td>
<td>7</td>
</tr>
<tr>
<td>Network summary</td>
<td>28</td>
<td>E</td>
<td>31</td>
</tr>
</tbody>
</table>

Notes: when delays are in excess of 140 seconds, delays are increased exponentially in the SIDRA model.

Crash history

Roads and Maritime supplied crash statistics for roads within the study area over a five year period between (July 2009 and June 2014). In summary, the crash data review identified the following:

- A total of 125 crashes were recorded within the study area. These crashes involved 134 light vehicles and five heavy vehicles
- Five pedestrian crashes were recorded, of these all involved pedestrians crossing the carriageway.

The main crash clusters within the study area are located as follows:

- Epping Road/Langston Place/Blaxland Road intersection
- Epping Road/Smith Street and Epping Road/Forest Grove intersections
- Epping Road/Essex Street intersection
- Epping Road/Pembroke Street intersection.

Car parking

Clearways exist along both sides of Epping Road in the proposal site. Parking and stopping is restricted during the following periods:

- Monday to Friday, 6.00 to 10.00 am
- Monday to Friday 3.00 to 7.00 pm.

During non-clearway periods, on-street parking is permitted along Epping Road. About 31 unmarked parallel parking spaces are available on the northern side of Epping Road, while 13 spaces are available along the southern side.

Public transport

Epping train station is located about 150 metres to the north west of the proposal site. Epping Station is served by Sydney Trains T1 North Shore, Northern and Western Line.

Eastbound and westbound bus stops (2121214 and 212126) are located on the northern and southern sides of Epping Road in the study area. Bus routes 288, 290, 295 and 140 provide services to Epping Station via Pembroke Street and do not access Epping Road in the study area.
Bus routes 630 and M54 access Epping Road in the study area. Buses on route M54 operate with a 10 minute frequency during week day peak periods, every 20 minutes during the weekday peak. Route 630 provides a week day service only at a 30 minute interval.

**Pedestrian and cycle facilities**

Footpaths are located along both sides of Epping Road, providing a continuous link for pedestrians. No pedestrian crossing facilities exist across Smith Street, Forest Grove or Essex Street (north and south of Epping Road).

There are no existing bicycle routes in the study area. The closest bicycle route commences from Terrys Creek and continues along Pembroke Street. It ends at the signalised intersection of Langston Place and Pembroke Street.

### 6.1.3 Potential impacts

**Construction**

**Heavy vehicle generation**

Heavy vehicle traffic would be generated mainly by the following activities:

- Delivery of construction materials
- Spoil removal
- Delivery and removal of construction equipment and machinery
- Movement of construction personnel, including contractors, site labour force and specialist supervisory personnel.

Construction activities would generate about 80 heavy vehicle movements per day. These heavy vehicle movements are likely to be spread through the day. For the assessment of the potential traffic impacts it was assumed that 10 per cent, or four, vehicle movements would occur during the peak hour.

Construction vehicles would access the site via Epping Road wherever possible. Given that Epping Road already carries high volumes of traffic it is not anticipated that the construction traffic would impact on the functioning of Epping Road, as the additional construction traffic would be within the range of daily variation in traffic on these routes.

**Light vehicle generation**

As noted in section 3.3.3, construction would generate about 70 light vehicle movements per day. The workforce arrival and departure periods represent the peak construction traffic generation periods. Based on this estimate, construction traffic would be within the daily traffic variation on the road network.

**Property access**

Potential impacts associated with construction of the proposal would include access disruptions for residential and commercial properties directly fronting Epping Road and Essex Street in the proposal site. Vehicular access to properties would be restricted for short periods during construction works. As the proposal would be constructed progressively, this would minimise the duration of time that driveways would be impacted. Potential impacts would be managed through the development of a construction traffic management plan (refer to section 6.1.4). Pedestrian access to properties would be maintained at all times.
However in the instance where workers do drive to the compound site, they should be advised of parking on the eastern side of Forest Park, along Forest Grove, or along the southern section of Forest Grove. This would reduce the demand for parking on the northern section of Forest Grove, due to the possibility of displaced parking from the southern side of Epping Road during construction. A total of 25 angled parking spaces can be found east of Forest Park.

The final traffic management and access arrangements would be determined by the construction contractor and detailed as part of the final staging plan for the proposal. Access to properties would be maintained during construction and temporary property access would be provided to residences where required. The management of property access would be.

**Pedestrian access**

Pedestrian access would be maintained, however temporary diversions would be required around work areas. Potential impacts to pedestrians would be managed with the implementation of measures listed in section 6.1.4.

**Parking**

During construction, parking would not be permitted along the south side of Epping Road during non-clearway periods. This would reduce the availability of on-street parking by about 13 vehicle parking spaces.

On-street parking would be available on Forest Grove.

Limited parking is expected to be available at compound sites and on the surrounding road network. Workers would be encouraged to use public transport to access the proposal site.

**Public transport**

There would be minimal impacts to bus services operating within the study area. Bus detours would not be required. The westbound bus stop (bus stop ID number 212126) would need to be temporarily relocated during construction. Potential impacts on public transport would be mitigated with the implementation of the mitigation measures provided in section 6.1.4.

**Operation**

**Future intersection performance**

Traffic modelling was undertaken to assess the potential operational performance of key intersections within the study area. The following scenarios were modelled:

- 2016 - without the proposal
- 2016 - with the proposal
- 2026 - without the proposal
- 2026 - with the proposal.
The results of the modelling are presented in full in Appendix C and are summarised in Table 6-5 and Table 6-6. The results of the modelling indicate that:

- For 2016 without the proposal:
  - The network would operate at LoS F during the AM peak and LoS D during the PM peak period

- For 2016 with the proposal:
  - The network would operate at LoS E during both the AM and PM peak periods

- For 2026 without the proposal:
  - The network would operate at LoS F during both the AM and PM peak periods
  - The Langston Place/Epping Road intersection would at LoS F during the AM and PM peak, with an average delay of greater than 200 seconds and 132 seconds respectively
  - The Essex Street/Epping Road intersection would operate at LoS E during the AM peak and LoS B during the PM peak, with an average delay of 45 seconds and 36 seconds respectively

- For 2026 with the proposal:
  - The network would operate at LoS F during the AM peak and LoS E during the PM peak
  - The Langston Place/Epping Road intersection would operate at LoS F during the AM and PM peak, with an average delay of 142 seconds and 144 seconds respectively
  - The Essex Street/Epping Road intersection would operate at LoS F during the AM peak and LoS B during the PM peak, with an average delay of 105 seconds and 28 seconds respectively.

- The modelling results indicate that the proposal would improve the operation of the Smith Street and Forest Grove intersections with Epping Road, by banning right turn movements. The operation of these intersections would improve from LoS F under the ‘do minimum’ conditions to LoS D or better with the proposal in 2026

- The intersection modelling results for the Essex Street/Epping Road intersection indicate that providing an additional left turn bay at the Essex Street (south) approach would have very little impact to the operation of the intersection compared to the proposed ‘upgrade’ scenario

- The modelling results indicate that the proposal would result in acceptable impacts to the operation of the Oxford Street/Langston Place/Pembroke Street and Pembroke Street/Essex Street intersections. These intersections are expected to continue to operate at a satisfactory LoS C or better during the AM and PM peak periods in 2026 following the proposed upgrade.
Table 6-5 Intersection performance 2016

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2016 without the proposal</th>
<th>2016 with the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Morning peak</td>
<td>Evening peak</td>
</tr>
<tr>
<td>Average delay (seconds)</td>
<td>Level of service</td>
<td>Average delay (seconds)</td>
</tr>
<tr>
<td>Langston Place/Epping Road</td>
<td>134</td>
<td>F</td>
</tr>
<tr>
<td>Smith Street/Epping Road</td>
<td>140</td>
<td>+</td>
</tr>
<tr>
<td>Forest Grove/Epping Road</td>
<td>140</td>
<td>+</td>
</tr>
<tr>
<td>Essex Street/Epping Road</td>
<td>39</td>
<td>C</td>
</tr>
<tr>
<td>Oxford Street/Pembroke Street</td>
<td>13</td>
<td>A</td>
</tr>
<tr>
<td>Pembroke Street/Essex Street</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>Network Summary</td>
<td>81</td>
<td>F</td>
</tr>
</tbody>
</table>

Note: when delays are in excess of 140 seconds, delays are increased exponentially in the SIDRA model. SIDRA is not able to accurately model gaps created by upstream and downstream signals and vehicles drivers allowing traffic to turn in congested locations.

Table 6-6 Intersection performance 2026

<table>
<thead>
<tr>
<th>Intersection</th>
<th>2026 without the proposal</th>
<th>2026 with the proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Morning peak</td>
<td>Evening peak</td>
</tr>
<tr>
<td>Average delay (seconds)</td>
<td>Level of service</td>
<td>Average delay (seconds)</td>
</tr>
<tr>
<td>Langston Place/Epping Road</td>
<td>140</td>
<td>+</td>
</tr>
<tr>
<td>Smith Street/Epping Road</td>
<td>140</td>
<td>+</td>
</tr>
<tr>
<td>Forest Grove/Epping Road</td>
<td>140</td>
<td>+</td>
</tr>
<tr>
<td>Essex Street/Epping Road</td>
<td>45</td>
<td>E</td>
</tr>
<tr>
<td>Oxford Street/Pembroke Street</td>
<td>16</td>
<td>B</td>
</tr>
<tr>
<td>Pembroke Street/Essex Street</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>Network Summary</td>
<td>163</td>
<td>F</td>
</tr>
</tbody>
</table>

Note: when delays are in excess of 140 seconds, delays are increased exponentially in the SIDRA model. SIDRA is not able to accurately model gaps created by upstream and downstream signals and vehicles drivers allowing traffic to turn in congested locations.
Impacts on local roads and access

The proposal would result in changes to existing turning operations. The right turn movement from Langston Place to Epping Road would be removed. As such, vehicles that currently make a right turn at the intersection would have to follow an alternate route via Pembroke Street and Essex Street before turning right at the upgraded intersection at Essex Street/Epping Road. The alternate route is indicated by the purple lines in Figure 6-2.

This has the potential to result in an increase in motorists diverted to the Essex Street/Pembroke Street and Epping Road/Essex Street intersections during peak hours.

Figure 6-2 Alternate routes to west of Epping Road (yellow and purple routes)

With the installation of the proposed raised concrete median, motorists travelling in the westbound direction from the northern side of Epping Road (from properties and Smith Street) would no longer be able to make a right turn onto Epping Road to travel westbound. Similarly, motorists travelling in the eastbound direction from the southern side of Epping Road (from properties and Forest Grove) would no longer be able to make a right turn onto Epping Road.

Alternate routes which could be adopted for motorists travelling from the northern side of Epping Road in the westbound direction are indicated by the yellow lines in Figure 6-2. Alternate routes for motorists travelling in the eastbound direction from the southern side of Epping Road are shown in Figure 6-3. Residents to the east of Forest Grove would be likely to use the route indicated by the blue lines. Residents to the west of Forest Grove would be likely to use the route indicated by the orange lines.
Alternate routes to access properties fronting Epping Road are shown in Figure 6-4. Vehicles would no longer be able to access properties by making a right turn on Epping Road. Access to properties on the southern side of Epping Road is indicated by the green lines, and access to properties on the northern side of Epping Road is indicated by the pink lines.
A summary of the extra distance motorists would have to travel once construction is complete is provided in Table 6-7 and Table 6-8. Further detail is provided in Appendix C.

**Table 6-7 Extra distance travelled**

<table>
<thead>
<tr>
<th>Proposed route</th>
<th>Current shortest route (m)</th>
<th>Future route (m)</th>
<th>Extra distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple Route – 1</td>
<td>300</td>
<td>1,300</td>
<td>1,000</td>
</tr>
<tr>
<td>Yellow Route – 2</td>
<td>300</td>
<td>980</td>
<td>680</td>
</tr>
<tr>
<td>Orange Route – 3</td>
<td>150</td>
<td>1,300</td>
<td>1,150</td>
</tr>
<tr>
<td>Blue Route – 4</td>
<td>100</td>
<td>1,000</td>
<td>900</td>
</tr>
<tr>
<td>Green Route – 5 (Properties west of Forest Grove)</td>
<td>130</td>
<td>1,100</td>
<td>970</td>
</tr>
<tr>
<td>Green Route – 5(2) (Properties east of Forest Grove)</td>
<td>350</td>
<td>1,200</td>
<td>850</td>
</tr>
<tr>
<td>Pink Route – 6</td>
<td>450</td>
<td>850</td>
<td>400</td>
</tr>
<tr>
<td>Navy Blue Route – 7</td>
<td>820</td>
<td>1,200</td>
<td>380</td>
</tr>
<tr>
<td>White Route – 8</td>
<td>430</td>
<td>570</td>
<td>140</td>
</tr>
</tbody>
</table>
### Table 6-8  Forecast travel times – AM peak

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Route</th>
<th>2016 (h/min/sec)</th>
<th>2026 (h/min/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do minimum</td>
<td>Upgrade</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>Epping Road (east) to Carlingford Road</td>
<td>0:05:01</td>
<td>0:04:19</td>
</tr>
<tr>
<td>B</td>
<td>A</td>
<td>Carlingford Road to Epping Road (east)</td>
<td>0:27:45</td>
<td>0:28:34</td>
</tr>
<tr>
<td>A</td>
<td>C</td>
<td>Epping Road (east) to Beecroft Road</td>
<td>0:05:09</td>
<td>0:04:32</td>
</tr>
<tr>
<td>C</td>
<td>A</td>
<td>Beecroft Road to Epping Road (east)</td>
<td>0:29:26</td>
<td>0:17:37</td>
</tr>
<tr>
<td>D</td>
<td>C</td>
<td>Norfolk Road to Beecroft Road</td>
<td>0:05:34</td>
<td>0:05:45</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>Beecroft Road to Norfolk Road</td>
<td>0:27:05</td>
<td>0:17:05</td>
</tr>
<tr>
<td>C</td>
<td>E</td>
<td>Beecroft Road to Brucedale Avenue</td>
<td>0:26:02</td>
<td>0:18:50</td>
</tr>
</tbody>
</table>

### Table 6-9  Forecast travel times – PM peak

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Route</th>
<th>2016 (h/min/sec)</th>
<th>2026 (h/min/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do minimum</td>
<td>Upgrade</td>
</tr>
<tr>
<td>A</td>
<td>B</td>
<td>Epping Road (east) to Carlingford Road</td>
<td>0:15:49</td>
<td>0:12:46</td>
</tr>
<tr>
<td>B</td>
<td>A</td>
<td>Carlingford Road to Epping Road (east)</td>
<td>0:12:50</td>
<td>0:10:51</td>
</tr>
<tr>
<td>A</td>
<td>C</td>
<td>Epping Road (east) to Beecroft Road</td>
<td>0:14:51</td>
<td>0:12:00</td>
</tr>
<tr>
<td>C</td>
<td>A</td>
<td>Beecroft Road to Epping Road (east)</td>
<td>0:05:12</td>
<td>0:04:18</td>
</tr>
<tr>
<td>D</td>
<td>C</td>
<td>Norfolk Road to Beecroft Road</td>
<td>0:05:21</td>
<td>0:05:53</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>Beecroft Road to Norfolk Road</td>
<td>0:04:14</td>
<td>0:03:53</td>
</tr>
<tr>
<td>C</td>
<td>E</td>
<td>Beecroft Road to Brucedale Avenue</td>
<td>0:04:57</td>
<td>0:05:00</td>
</tr>
</tbody>
</table>

**Parking**

The proposal would not impact the number of existing informal on-street parking spaces within the proposal site. Existing formal parking restrictions would also be unaffected. Existing parking restriction signage and line marking would be adjusted to suit the new pavement and kerb and gutter along Epping Road and Essex Street (refer to section 3.2.9).

**Public transport**

The proposal and the associated traffic diversions would not impact existing bus routes within the study area. The proposed reduction in travel times resulting from the proposal has the potential to improve bus service reliability.

**Pedestrians**

Footpaths would be adjusted to tie into the proposal. Signalised pedestrian crossings would also be slightly relocated at the Langston Place/Blaxland Road/Epping Road intersection and new pedestrian crossings provided at the Essex Street and Epping Road intersection (refer to section 3.2.6).
Positive impacts

The proposal would result in the following positive traffic and transport impacts:

- Reduced traffic congestion under predicted future traffic conditions as a result of additional westbound road capacity
- Reduced queue lengths in the westbound direction
- Improves pedestrian safety at the Epping Road and Essex Street intersection
- Altered phasing at the Epping Road and Essex Road intersection would improve efficiency for Epping Road through traffic.

6.1.4 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on traffic and access.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to properties</td>
<td>Residents and businesses would be notified of any specific impacts to property access and arrangements required during construction during detailed design.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Traffic</td>
<td>A detailed traffic management plan would be prepared in accordance with <em>Traffic Control at Work Sites</em> (RTA 2010) and Specification G10 - <em>Control of Traffic</em>. The plan would be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>The traffic management plan would include measures such as:</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>• Safe access points to work areas from the adjacent road network</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Safety barriers where necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Temporary speed restrictions when necessary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maintaining adequate sight distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Displaying prominent warning signage</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minimise the use of local roads by construction vehicles</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The plan would be reviewed when complaints are received.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consultation</td>
<td>Consultation would be undertaken with local bus operators before and during construction.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Community</td>
<td>The community would be kept informed about construction through advertisements in the local media and by prominently placed advisory notices or variable message signs.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
### Impact, Environmental safeguards, Responsibility, Timing

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestion and safety</td>
<td>Traffic control would be provided to manage and regulate traffic movements during construction. For example, construction and delivery vehicles entering or leaving the site compound and/or stockpile sites would use arterial roads. These movements would be restricted to non-peak traffic periods.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Access to properties</td>
<td>Property access would be maintained at all times, where practicable.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Parking</td>
<td>Construction workers would be advised to use public transport since there are limited parking spaces at the potential compound sites.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Workers are to be advised on suitable alternative parking locations including the eastern side of Forest Park, along Forest Grove, or on the southern side of Forest Grove.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
<tr>
<td>Traffic operation</td>
<td>Right turn ban signs would be clearly displayed at Langston Place, Smith Street and Forest Grove.</td>
<td>Roads and Maritime</td>
<td>Operation</td>
</tr>
</tbody>
</table>

### 6.2 Noise and vibration

#### 6.2.1 Overview

This section summarises the results of the noise and vibration assessment undertaken by GHD and provided in Appendix D. The assessment was undertaken in accordance with the following guidelines:

- *Road Noise Policy* (RNP) (DECCW, 2011)
- *Noise Criteria Guideline* (NCG) (RMS, 2014)
- *Noise Mitigation Guideline* (NMG) (RMS, 2014)

With respect to the *Road Noise Policy*, the works along Epping Road and Essex Street are not intended to increase the traffic carrying capacity of the overall road or to accommodate a significant increase in heavy vehicle traffic. Hence, the proposal is considered as minor works for the purposes of this noise assessment.

The assessment involved:

- Identifying sensitive receivers
- Undertaking unattended day and night-time background noise monitoring
• Establishing the noise and vibration assessment criteria
• Modelling of construction noise using the Computer Aided Noise Abatement model (CadnaA)
• Assessing the potential construction noise and vibration impacts by comparing the predictions with the criteria
• Assessing the potential for operational noise impacts
• Providing mitigation measures, where required.

**Traffic Data**

Traffic data for the baseline year 2014 was obtained from traffic counts undertaken by Skyhigh Traffic. Traffic data for the future years 2016 and 2026 was based on the AM and PM peak demands calculated as part of the GHD traffic assessment (refer section 6.1). The future average annual daily traffic (AADT) data required for the noise assessment has been calculated based on the modelled peak period data. Therefore predicted future daily traffic volumes are conservative values. The heavy vehicle percentages for the current year were calculated from Skyhigh traffic counts undertaken in the area and are expected to remain the same for future years.

**Sensitive receivers**

The dominant influence on ambient noise within the proposal site is road traffic along Epping Road and rail operations. Sensitive receivers include residential and commercial buildings along and in the vicinity of the proposal site. Although commercial receivers are not considered to be sensitive receivers for operational noise, construction noise criteria apply to commercial receivers during construction. Sensitive receivers identified within the study area are listed in Appendix D and are shown in Figure 6-5. These include 91 numbered receivers in total affected by operational noise comprising:

- All properties on Epping Road between Blaxland Road intersection and Crandon Road intersection
- All properties on Smith Street
- All properties on Essex Street between Pembroke Street to opposite Brucedale Avenue
- Properties at the north end of Forest Grove.

Figure 6-5 also shows the receivers potentially affected by construction noise.

**Background noise levels**

Background noise monitoring was undertaken from 2 September to 11 September 2014 at 36 Essex Street and from 14 September to 21 September, 2014 at 10 Epping Road (refer to Figure 6-5). A summary of the noise monitoring results is provided in Table 6-10.
### Table 6-10  Noise monitoring results

<table>
<thead>
<tr>
<th>Location</th>
<th>Rating background level[^2] $L_{A90(15min)}$ (dB(A))</th>
<th>$L_{Aeq(period)}$ ambient noise levels (dB(A))</th>
<th>Road traffic noise descriptors[^2] (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day Evening Night Day Evening Night</td>
<td>$L_{Aeq(15hr)}$</td>
<td>$L_{Aeq(9hr)}$</td>
</tr>
<tr>
<td>L1 36 Essex Street (R27)</td>
<td>56 54 34 70 68 65</td>
<td>71 (weekday)</td>
<td>67 (weekday)</td>
</tr>
<tr>
<td>L2 10 Epping Road (R08)</td>
<td>48 45 35 68 67 64</td>
<td>71 (weekday)</td>
<td>66 (weekday)</td>
</tr>
</tbody>
</table>

Notes:  
1. The rating background level (RBL) is the overall single figure background noise level for each assessment period. The RBL was calculated in accordance with the *Industrial Noise Policy* (EPA, 2000) 90\(^{th}\) percentile method.  
2. Measurement in free field. Road traffic noise descriptors include a +2.5 dB(A) correction

### 6.2.2  Noise and vibration criteria

#### Construction noise criteria

Construction noise criteria were developed in accordance with the *Interim Construction Noise Guideline* (DECC, 2009) for each identified sensitive receiver. Standard hours defined in the *Interim Construction Noise Guideline* as:

- Weekdays 7 am to 6 pm
- Saturday 8 am and 1 pm
- Sunday and public holidays 8 am to 6 pm

The following definitions are used for outside standard hours:

- ‘Day’ is defined as 7 am to 8 am Monday to Friday and 1 pm to 6 pm on Saturday
- ‘Evening’ is defined as 6 pm to 10 pm every day
- ‘Night’ is defined as 10 pm to 7 am Monday to Saturday, and 10 pm to 8 am on Sunday and public holidays.

For recommended standard hours:

- The ‘noise affected level’ represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq(15min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and duration, as well as contact details
- The ‘highly noise affected level’ represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority may require respite periods by restricting the hours that very noisy activities can occur, taking into account:
  - Times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences

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80 | GHD | Roads and Maritime Services - Epping Road westbound widening between Essex Street and Blaxland Road at Epping, 21/23388
- If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

For outside recommended standard hours:

- A strong justification would typically be required for works outside the recommended standard hours
- The proponent should apply all feasible and reasonable work practices to meet the noise affected level
- Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

The noise management levels that apply to sensitive receivers during construction are presented in Table 6-11.

### Table 6-11 Proposal specific construction noise management levels

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Construction noise management level, $L_{Aeq(15\text{min})}$ (dB(A))</th>
<th>Sleep disturbance criteria $L_{\text{Amax}}$ (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During standard construction hours</td>
<td>Outside standard construction hours</td>
</tr>
<tr>
<td></td>
<td>Noise affected level</td>
<td>Highly noise affected level</td>
</tr>
<tr>
<td>Commercial</td>
<td>70</td>
<td>-</td>
</tr>
<tr>
<td>Residential receivers (except 34, 36, 38, 43 and 47 Essex Street)</td>
<td>58</td>
<td>75</td>
</tr>
<tr>
<td>Residential receivers (34, 36, 38, 43 and 47 Essex Street)</td>
<td>66</td>
<td>75</td>
</tr>
</tbody>
</table>

Note: Assuming that partially open windows provide a typical 10 dBA reduction in noise from outside to inside the building.

**Sleep disturbance**

The noise management level for sleep disturbance for the proposal is an external noise limit of 65 dB(A) $L_{\text{Amax}}$. This is based on the Road Noise Policy recommended maximum internal noise levels of 55 dB(A) $L_{\text{Amax}}$ and a 10 dB(A) reduction in noise from outside the building.

The Road Noise Policy acknowledges that one or two noise events per night with maximum external noise levels of 65 to 70 dB(A) are unlikely to significantly affect health and wellbeing.

**Construction vibration criteria**

**Human comfort criteria**

Human comfort vibration criteria have been set with consideration to Assessing Vibration: A Technical Guideline and British Standard (BS) 6472 – 1992, Guide to Evaluation of Human
Exposure to Vibration in Buildings (1 Hz to 80 Hz) which is recognised by the Office of Environment and Heritage as the preferred standard for assessing the ‘human comfort’. Table 6-12 summarises the BS 6472 human comfort peak vibration criteria and intermittent vibration dose values for the frequency range of 1 Hz to 80 Hz.

British Standard (BS) 5228.2 – 2009, *Code of Practice for noise and vibration control on construction and open sites: Part 2 Vibration* recognises that higher vibration levels are tolerable for short-term construction projects as undue restriction on vibration levels can substantially prolong construction works and result in greater annoyance. The guidance values recommended by BS 5228.2 are presented in Table 6-13.

**Table 6-12 Human comfort vibration limits from 1 Hz to 80 Hz**

<table>
<thead>
<tr>
<th>Receiver type</th>
<th>Period¹</th>
<th>Continuous vibration (mm/s Peak²)</th>
<th>Intermittent vibration dose value (m/s(^{1.75}))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Preferred</td>
<td>Maximum</td>
</tr>
<tr>
<td>Residential</td>
<td>Day</td>
<td>0.28</td>
<td>0.56</td>
</tr>
<tr>
<td>Residential</td>
<td>Night</td>
<td>0.20</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Notes:  
1. Day is between 7am and 10pm and night is between 10pm and 7am  
2. Based on sinusoidal vibration sources.

**Table 6-13 Guidance on effects of vibration levels (BS 5228.2)**

<table>
<thead>
<tr>
<th>Vibration level</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14 mm/s</td>
<td>Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.</td>
</tr>
<tr>
<td>0.3 mm/s</td>
<td>Vibration might be just perceptible in residential environments.</td>
</tr>
<tr>
<td>1.0 mm/s</td>
<td>It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.</td>
</tr>
<tr>
<td>10 mm/s</td>
<td>Vibration is likely to be intolerable for any more than a very brief exposure.</td>
</tr>
</tbody>
</table>

**Structural damage criteria**

Table 6-14 presents the German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of vibration on structures* minimum safe levels of vibration at different frequencies for commercial, residential buildings.

Based on DIN 4150-3, a measured value exceeding those listed in Table 6-14 “…does not necessarily lead to damage; should they be significantly exceeded, however, further investigations are necessary.”
### Table 6-14  Guideline values for short term vibration on structures

<table>
<thead>
<tr>
<th>Line</th>
<th>Type of structure</th>
<th>Guideline values for velocity, (mm/s)</th>
<th>1 Hz to 10 Hz</th>
<th>10 Hz to 50 Hz</th>
<th>50 Hz to 100 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Buildings used for commercial purposes, industrial buildings, and buildings of similar design.</td>
<td></td>
<td>20</td>
<td>20 to 40</td>
<td>40 to 50</td>
</tr>
<tr>
<td>2</td>
<td>Dwellings and buildings of similar design and/or occupancy.</td>
<td></td>
<td>5</td>
<td>5 to 15</td>
<td>15 to 20</td>
</tr>
<tr>
<td>3</td>
<td>Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (eg listed buildings under preservation order).</td>
<td></td>
<td>3</td>
<td>3 to 8</td>
<td>8 to 10</td>
</tr>
</tbody>
</table>

Note: At frequencies above 100 Hz the values given in this column may be used as minimum values.

**Traffic noise criteria**

Traffic noise criteria for sensitive receivers from the *Road Noise Policy* (DECCW, 2011) are presented in Table 6-15.

According to the *Road Noise Policy*, if the road traffic noise increase is within 2 dB(A) of current levels then the objectives of the Road Noise Policy are met and no specific mitigation measures are required.

### Table 6-15  Construction traffic noise criteria

<table>
<thead>
<tr>
<th>Type of development</th>
<th>Day 7am to 10pm (dB(A))</th>
<th>Night 10pm to 7am (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing residence affected by additional traffic on arterial roads generated by land use developments</strong></td>
<td>60 $L_{eq}(15hr)$</td>
<td>55 $L_{eq}(9hr)$</td>
</tr>
<tr>
<td><strong>Existing residence affected by additional traffic on local roads generated by land use developments</strong></td>
<td>55 $L_{eq}(1hr)$</td>
<td>50 $L_{eq}(1hr)$</td>
</tr>
<tr>
<td><strong>School classrooms</strong></td>
<td>Internal noise level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 $L_{Aeq}(1hr)$ (When in use)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Places of worship</strong></td>
<td>Internal noise level</td>
<td>Internal noise level</td>
</tr>
<tr>
<td></td>
<td>40 $L_{Aeq}(1hr)$ (When in use)</td>
<td>40 $L_{Aeq}(1hr)$ (When in use)</td>
</tr>
<tr>
<td><strong>Open space (active use)</strong></td>
<td>External noise level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60 $L_{Aeq}(15hr)$ (When in use)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Open space (passive use)</strong></td>
<td>External noise level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>55 $L_{Aeq}(15hr)$ (When in use)</td>
<td>-</td>
</tr>
</tbody>
</table>
**Operational noise criteria**

With respect to the NCG, the works along Epping Road and Essex Street are not intended to increase the traffic carrying capacity of the overall road or to accommodate a significant increase in heavy vehicle traffic. Hence, the proposal is considered as minor works for the purposes of this noise assessment. This has been confirmed by Roads and Maritime.

The NCG recommends the application of the existing road criteria “where minor works increase noise levels by more than 2.0 dBA relative to the existing noise levels at the worst affected receiver”. The target noise abatement levels for existing roads not subject to redevelopment are presented in Table 6-16. These noise levels are considered applicable at residences in the study area where noise levels increase by more than 2.0 dBA.

No road traffic noise criteria are prescribed for commercial premises.

**Table 6-16 Road traffic noise assessment criteria for residential receivers**

<table>
<thead>
<tr>
<th>Road category</th>
<th>Assessment criteria (external)</th>
<th>Receivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day (7 am to 10 pm)</td>
<td>Night (10 pm to 7 am)</td>
</tr>
<tr>
<td>Freeway/Arteria/sub-arterial roads</td>
<td>$L_{Aeq(15hr)}$ 60</td>
<td>$L_{Aeq(9hr)}$ 55</td>
</tr>
<tr>
<td>Local road</td>
<td>$L_{Aeq(1hr)}$ 55</td>
<td>$L_{Aeq(1hr)}$ 50</td>
</tr>
</tbody>
</table>

6.2.3 Potential impacts

**Construction noise**

Construction activities would result in a short-term increase in localised noise levels, particularly for residences close to the proposal site. Noise impacts may be associated with the following construction activities:

Operation of equipment for the following construction activities:

- Site establishment
- Utility relocations
- Earthworks and drainage adjustments
- Pavement works
- Finishing and landscaping
- Movement of construction vehicles and machinery.

The following activities are likely to be undertaken outside standard construction working hours:

- Milling and re-sheeting of existing pavement
- Placement of asphalt
- Intersection and tie-in activities
- Line marking.

Significant noise-generating equipment that would be used during construction and predicted noise levels are listed in Table 6-17.
### Table 6-17  Construction plant and equipment sound power levels, dB(A)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Sound power level dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt paver</td>
<td>108</td>
</tr>
<tr>
<td>Piling (bored)</td>
<td>111</td>
</tr>
<tr>
<td>Compressor</td>
<td>101</td>
</tr>
<tr>
<td>Compactor</td>
<td>113</td>
</tr>
<tr>
<td>Concrete saw(^2)</td>
<td>117</td>
</tr>
<tr>
<td>Concrete truck and pump</td>
<td>108</td>
</tr>
<tr>
<td>Crane</td>
<td>104</td>
</tr>
<tr>
<td>Dozer</td>
<td>108</td>
</tr>
<tr>
<td>Excavator</td>
<td>107</td>
</tr>
<tr>
<td>Generator</td>
<td>99</td>
</tr>
<tr>
<td>Grader</td>
<td>110</td>
</tr>
<tr>
<td>Jack hammer(^2)</td>
<td>121</td>
</tr>
<tr>
<td>Vibratory roller(^2)</td>
<td>108</td>
</tr>
<tr>
<td>Truck/ Road marking machine/ water cart</td>
<td>107</td>
</tr>
<tr>
<td>Welding equipment</td>
<td>105</td>
</tr>
<tr>
<td>Milling machine(^2)</td>
<td>111</td>
</tr>
</tbody>
</table>

**Notes:**
1. *Italic* text indicates construction plant equipment expected to be used during standard and outside of standard construction hours.
2. The *Interim Construction Noise Guideline* identifies several activities as particularly annoying to sensitive receivers including concrete saws, vibratory rollers, rock breakers and bitumen milling or profiling. A +5 dB(A) penalty has been applied to the predicted levels for these equipment to factor this into the assessment.

### Noise impacts during recommended standard construction hours

The predicted worst case construction noise levels at sensitive receivers are shown in Appendix D (Appendix D Figures 5-1 to 5-10) for ten different construction activities. Construction noise levels are predicted to exceed the construction noise management levels at the majority of sensitive receivers during all construction stages. Figure 6-5 provided a noise contour showing the extent of potential construction noise impacts.

Construction equipment would travel along the road corridor however, and noise from equipment would be attenuated with distance. Hence, the worst case noise levels would only occur at sensitive receivers for a short period of time. Noise mitigation measures detailed in section 6.2.4 would be implemented where feasible and appropriate.

### Noise impacts outside of recommended standard construction hours

Some construction activities for the proposal would be undertaken outside of standard construction hours between the hours of 10 pm to 6 am. The works are required outside of standard construction hours to minimise traffic impacts and would be classified as “Works for which it can be demonstrated that there is a need to operate outside the recommended standard hours” as per the *Interim Construction Noise Guideline* (DECC, 2009).

The following activities are likely to be undertaken outside standard construction hours:
- Mill and re-sheeting of existing asphalt
- Placement of asphalt
Intersection and tie-in activities

Construction noise levels are predicted to exceed the noise management levels at all sensitive receivers during construction activities scheduled outside of recommended standard construction hours. A noise contour for receivers impacted by concrete sawing during construction during recommended standard hours are shown in Appendix D (Appendix E). Noise contours for outside of recommended standard houses extend beyond the entire project area and have not been included.

The mitigation measures detailed in section 6.2.4 would be implemented where feasible and appropriate to reduce noise impacts. However, it is unlikely that implementation of all noise measures would reduce noise levels to below the noise affected construction noise management level outside of recommended construction hours. Therefore the consultation and procedural requirements of the *Environmental Noise Management Manual Practice fact sheet No. 2- Noise management and Night Works, practice note 7.* (RTA 2001a).should be implemented.

**Sleep disturbance**

For heavy machinery, $L_{\text{Amax}}$ noise level events are typically 8 dB(A) greater than the $L_{\text{Aeq}}$ noise level at maximum power. $L_{\text{Amax}}$ construction noise levels at relevant sensitive receivers for works occurring outside of standard construction would typically be 8 dB(A) higher than those provided in Table 6-17.

There is potential for sleep disturbance impacts, with consideration to the *Road Noise Policy* sleep disturbance levels, if construction activities occur during the night-time period.

The construction contractor would prepare an out-of-hours works procedure as part of the construction noise and vibration management plan for the project which includes how activities outside of the recommended standard construction hours are managed.

**Construction compound**

As noted in section 3.4.1, a temporary construction compound would be required during construction. Noisy activities at the compound would be minimal and limited to establishing the site compound and construction vehicle movements entering and leaving the compound. Predicted noise levels from equipment during the establishment of the proposed construction compound are provided in Table 6-18.

The construction compound would typically include a combination of demountable offices, meal rooms, toilets/showers, parking facilities, secure and bunded storage areas for site materials, including fuel and chemicals.

Some construction equipment (e.g. excavator, crane, trucks and generators) may be required to set up the construction compound. Worst case noise levels for compound site operation have been used to assess potential compound noise impacts. These are:

- Compound site establishment (2 weeks program) Sound power level 119 LAeq dB
- Compound operation (18 month program) Sound power level 114 LAeq dB

Noise contours showing the level of noise impacts to receivers are shown in Appendix D, figures 5-1 to 5-10. Although noise levels may be higher during the establishment period, these will only last for two weeks. Potential impacts are expected to be minimised due to the short-term nature of noisy activities at the compound. Mitigation measures and safeguards detailed in section 6.2.4 would be implemented where feasible and reasonable to reduce noise impacts.
**Construction traffic**

Relatively low levels of traffic would be generated during construction (refer section 3.3) compared to the existing situation, and no significant noise impacts are predicted.

**Construction vibration**

Safe buffer distances for typical vibration generating equipment are provided in Table 6-18.

**Table 6-18  Buffer distances to comply with vibration criteria**

<table>
<thead>
<tr>
<th>Plant item</th>
<th>Buffer distances to comply with vibration criteria (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Human comfort (m)</td>
</tr>
<tr>
<td>Milling machine</td>
<td>20</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>10</td>
</tr>
<tr>
<td>Double drum vibratory roller</td>
<td>80</td>
</tr>
<tr>
<td>4-tyre roller</td>
<td>10</td>
</tr>
<tr>
<td>Compactor</td>
<td>70</td>
</tr>
<tr>
<td>Dozer</td>
<td>40</td>
</tr>
<tr>
<td>Excavator</td>
<td>20</td>
</tr>
<tr>
<td>Grader</td>
<td>20</td>
</tr>
</tbody>
</table>

**Human comfort**

There is the potential that vibration levels could be intrusive where vibratory rolling or compacting is proposed within 80 metres of sensitive receivers.

**Potential for building damage**

As shown in Table 6-18, the expected magnitude of ground vibrations should not be sufficient to cause damage to buildings within 10 metres of the works for most activities and within 16 metres of the works during vibratory rolling. Houses directly fronting the proposal site may be impacted by vibration from vibratory rollers or compactors approaching the criteria level and should be assessed once detailed construction methodologies are known.

The building damage vibration criterion for heritage buildings is much more stringent. Heritage structures identified in the study area include:

- 47 Essex Street, Epping
- 42 Essex Street, Epping
- Essex Street conservation area: Extending along both sides of Essex Street between Epping Road and Abuklea Road.

There is potential that these heritage structures could exceed the building damage criteria (3 to 10 millimetres per second) when vibration intensive activities such as vibratory rolling and compacting are planned within the buffer distances. Mitigation measures provided in section 6.2.4 would be implemented to minimise the potential for vibration impacts.
**Operation**

The day and night-time predicted receiver noise levels and façade noise maps for the ‘without the proposal’ and ‘with proposal’ for year 2016 and year 2026 are detailed in Appendix D, including the road traffic criteria calculated with consideration to the *Noise Criteria Guideline* (RMS, 2014).

Noise levels are predicted to increase by more than 2.0 dBA and exceed the noise criteria at the following 10 sensitive receivers during the day and night time periods:

- 20C, 26, 26A, 30, 41 and 43 Essex Street
- 28 and 30 Pembroke Street
- 1B Ormonde Avenue
- 1 Crandon Road.

Noise levels are predicted to increase by more than 2.0 dBA and exceed the noise criteria at the following six sensitive receivers during the night time period only:

- 28 and 30 Pembroke Street
- 20C, 41 and 43 Essex Street
- 1 Crandon Road

Residences experiencing exceedances to the *Noise Criteria Guideline* (RMS, 2014) road traffic noise assessment criteria would be considered for mitigation measures, of which the most appropriate for these receivers is at-property noise mitigation measures.

### 6.2.4 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential noise and vibration impacts.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational noise</strong></td>
<td>Detailed design would consider at-property treatments for sensitive receivers predicted to exceed the <em>Noise Mitigation Guideline</em> (RMS 2014)</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| **Construction noise and vibration** | A construction noise and vibration management plan would be prepared as part of the construction environmental management plan. This plan would include, but not be limited to:  
  - A map indicating the locations of sensitive receivers including residential properties  
  - Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of *Interim Construction Noise Guidelines* (DECC 2009)  
  - A risk assessment to determine potential risk for activities likely to affect receivers (for activities undertaken during and outside of standard working hours)
  - Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements | Construction contractor | Pre-construction and construction |
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| • A process for assessing the performance of the implemented mitigation measures  
• A process for documenting and resolving issues and complaints  
• A process for updating the plan when activities affecting construction noise and vibration change  
• Identify in toolbox talks where noise and vibration management is required | Construction contractor | Pre-construction and construction |
| An out of hours procedure would be prepared and include as a minimum:  
• Background levels for noise criteria in accordance with the Interim Construction Noise Guideline (DECC, 2009)  
• Locations of the works  
• Locations of sensitive receivers  
• Predicted noise levels  
• Communications plan | Construction contractor | Pre-construction and construction |
| Management measures where works are unable to comply with Interim Construction Noise Guideline (DECC 2009) and the Environmental Noise Management Manual Practice fact sheet No. 2 - Noise management and Night Works. (RTA 2001a). Where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures should be considered where feasible and reasonable. Measures may include:  
• Consultation / specific Notifications  
• Monitoring  
• Alternative accommodation | Construction contractor | Pre-construction and construction |
| Construction compounds | Construction compounds would be laid out to maximise the distance of noise sources and loading areas from residences with solid structures (sheds etc) placed between residences and noise sources, where possible. | Construction contractor | Pre-construction and construction |
| Construction noise from machinery and equipment | All equipment would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and would be appropriately maintained to ensure optimum running conditions with periodic monitoring. Noise-emitting plant would be directed away from sensitive receivers where possible. Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the proposal site. Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all construction vehicles and mobile plant regularly used on site. | Construction contractor | Construction |

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<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Construction noise from inappropriate practices | Site inductions would be provided to train staff on ways to minimise construction noise impacts on-site. Responsible working practices include:  
• Avoid the use of outdoor radios during the night-time period  
• Avoid shouting and slamming of doors  
• Where practical, operate machines at low speed or power and switched off when not being used rather than left idling for prolonged periods  
• Minimise reversing  
• Avoid dropping materials from height and avoid metal to metal contact on material. | Construction contractor | Construction |
| Construction vibration | Where non-vibration inducing construction methods are impractical, the following principles from the Assessing Vibration: A Technical Guideline (DEC 2006) would be utilised to assist with minimisation of adverse reactions from the community:  
• Confining vibration generating operations to the least vibration sensitive part of the shift which could be when the background disturbance is highest  
• Determining an upper level for vibration impact also considering what is achievable using feasible and reasonable mitigation | Construction contractor | Construction |
|  | Compliance vibration monitoring would be undertaken when vibration generating activities occur within the structural damage buffer distances as described in DIN 4150-3 classifications. | Construction contractor | Construction |
|  | Building condition surveys should be undertaken when vibration generating activities occur within the structural damage buffer distances as described in DIN 4150-3 classifications. | Construction contractor | Construction |
| Noise and vibration impacts and appropriate complaints handling | The local community would be contacted and informed of the proposed work, location, duration of work, and hours involved. The contact would be made a minimum five days before work starts. The Environmental noise management manual (RTA 2001) Practice note 7 would be followed for road works outside normal working hours. | Construction contractor and Roads and Maritime | Pre-construction and construction |
|  | A complaints management procedure would be put in place, with a mechanism for responding to complaints. | Construction contractor | Construction |
|  | Attended compliance noise or vibration monitoring would be undertaken to confirm the predicted noise or vibration levels upon receipt of a complaint in accordance with the Interim Construction Noise Guideline (DECC 2009). | Construction contractor | Construction |
### 6.3 Soils, topography and geology

#### 6.3.1 Existing environment

**Topography, geology and soils**

The topography of the study area is gently undulating with elevations ranging between 78 and 102 metres above sea level.

A review of the *Soils Landscapes of Sydney 1:100,000 Sheet* (Chapman and Murphy 1989) indicates that the proposal site is located on the Glenorie soil landscape. The geology of the Glenorie Soil Landscape is characterised by undulating to rolling low hills on Wianamatta Group shales.

Soils are shallow to moderately deep red with brown podzolic soils on crests; moderately deep red and brown podzolic soils on upper slopes; deep yellow podzolic soils on lower slopes and gleyed podzolic soils along drainage lines. Soil limitations include high soil erosion hazard potential, localised impermeable highly plastic subsoils and moderately reactive soils (Chapman and Murphy 1989).

A targeted contamination investigation (GHD 2015) across the proposal footprint between Blaxland Road and Essex Street, noted that the subsurface conditions across the site generally consisted of a fill layer of concrete and/or asphalt layer overlaying gravelly sand, underlain by residual layers of gravelly clay and/or clay to the maximum borehole depth of 6.0 metres below ground level, with shallow sandstone encountered at one borehole location. This assessment is provided in Appendix M.

**Salinity**

Salinity potential mapping (DIPNR 2003) indicates that there is a low potential for salinity to occur within the proposal site.

**Acid sulphate soils**

The Australian Soil Resource Information System was searched on 7 April 2015. The results of the search indicate that the proposal site has a low to extremely low probability of containing acid sulphate soils.

**Contamination**

The NSW Environment Protection Authority’s Contaminated Lands Register was searched on 7 April 2015 (for the Hornsby LGA). No listed contaminated sites were identified within the vicinity of the proposal site. A service station site located 400 metres to the north of the proposal site is a potentially contaminated site which has been notified to the EPA. The EPA is currently assessing the nature and extent of potential contamination within the site. There may also be a

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction noise during night works</td>
<td>• Avoid the use of equipment which generates impulsive noise</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Avoid dropping materials from a height</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid metal-to-metal contact on equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Schedule truck movements to avoid residential streets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Avoid mobile plant clustering near residences and other sensitive land uses.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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potential for contamination associated with the rail line along the western boundary of the site, although the proposal does not impact directly land within the railway corridor.

A targeted contamination investigation (GHD 2015) was undertaken for the proposal, which included the Tuffy’s Auto Centre site (a former service station). Ten boreholes were drilled for the purpose of combined geotechnical and contamination assessment along Epping Road and Essex Street. A further three bores were drilled at on the northern boundary of Tuffy’s Auto Centre. A groundwater well was installed within borehole number 13 (located on the south side of Epping Road in front of property 4 Epping Road) for groundwater monitoring purposes.

A summary of the results is provided below, the full report is provided in Appendix M:

- Concentrations of the majority of analytes reported below detectable concentrations across all soil sampling locations. Heavy metals and total recoverable hydrocarbons (TRH) showed low levels of detection. Overall, all concentrations were reported below the selected investigation levels appropriate for the protection of construction / intrusive maintenance workers and ongoing land use under a commercial / industrial setting.
- No asbestos fragments or fibres in were detected.
- Analysis of groundwater samples indicated levels of copper and zinc that exceeded the adopted screening criteria. It is likely that these minor exceedances are indicative of background concentrations.
- There is potential for fill material to have been used during levelling/construction of the road ways. There is a potential risk that fill materials may contain unexpected contaminated material, which may be exposed during the proposed construction works.

Contamination and hazardous materials such as asbestos and lead paints may be found within the buildings located within compound B and D.

6.3.2 Potential impacts

Construction

Topography, geology and soils

As discussed in section 3.3.5, about 1000 cubic metres of material would be excavated for the proposal and 2000 cubic metres of fill material would be imported. Certified fill material imported from off-site would be sourced from certified suppliers to avoid the potential for contaminated fill to be imported.

Most of the proposal would be constructed within the existing road corridor, with minor earthworks required for the construction of footpaths and road widening activities. The proposal would not result in any significant changes to local topography.

Erosion and sedimentation

The proposal would involve minor excavations, clearing and grubbing of vegetation and stockpiling of spoil for the construction of pathways and road widening activities. An estimated 1000 cubic metres of spoil would be removed from the site during construction.

If unmanaged, the proposal could result in erosion and impacts to downstream water quality via the existing stormwater network. Further detail on water quality impacts is provided in section 6.4.
Potential erosion and sedimentation impacts are considered to be moderate due to the following:

- Excavations would be limited to the areas for road widening, footpath, property adjustments and associated utilities
- The exposure of soil and stockpiling of spoil would be temporary and short-term in duration as the proposal would be staged, therefore limiting the duration of exposed surfaces
- Temporary stabilisation or revegetation/rehabilitation works would be undertaken to reduce the extent of disturbed surfaces
- Localised erosion and sediment control measures would be implemented to minimise the volume of sediment transported from disturbed areas. This would include the preparation and implementation of a soil and water management plan.

**Contamination**

Although there is considered to be minimal potential for widespread contamination to occur in the proposal site, there is potential for contaminated soil to be encountered at Tuffy’s Auto Centre (formally a service station). Excavation works, including construction of the widened road, installation of drainage and underground utility adjustments would be required within the property boundary which has the potential to expose contaminated material. Potentially contaminated material may also be encountered from the ingress of groundwater or exposure of material causing release of odours.

Overall, the results of the majority of samples (refer Appendix M) fell below the applicable criteria for general solid waste, with minor exceedances reported for lead and nickel. Two samples of lead exceeding the general solid waste guideline were reported. Additionally, two samples exceeded the general solid waste (no leaching) guidelines for nickel. Based on these results, the material would exceed the threshold for general solid waste and would be classified as restricted solid waste. It is noted that these are marginal exceedances, and further analysis through Toxicity Characteristic Leaching Potential (TCLP) would likely reduce this classification to general solid waste.

There is potential for fill material to have been used during levelling/construction of the existing Epping Road and Essex Street hence there is a potential risk of encountering unexpected contaminated material during the proposed construction works. Excavated material encountered during the road construction may contain the following contaminants:

- Heavy metals
- Total recoverable hydrocarbons (TRH)
- Benzene, toluene, ethylbenzene, xylene (BTEX)
- Polycyclic aromatic hydrocarbons (PAH)
- Asbestos.
- Volatile organic compounds (VOCs)
- Methyl tert-butyl ether (MTBE)

The site investigation (refer Appendix M) concluded that further detailed waste classification will be required prior to any offsite disposal. Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils would be classified in accordance with the NSW EPA *Waste Classification Guidelines* (2014) (refer to section 6.12).
An approach to managing any unexpected contaminated material that may be uncovered would be specified in the construction environmental management plan.

Soil contamination could occur as a result of any accidental spills or leaks of fuels, oils and other chemicals from equipment and vehicles during construction. To avoid this potential impact, fuels and chemicals would be managed in accordance with the management measures provided in section 6.3.3.

Management and disposal of the following contaminants may be required following demolition of residential properties:

- Hydrocarbons (TRH, BTEX),
- Solvents and pesticides
- Asbestos within building materials
- Synthetic mineral fibres.

Prior to works commencing and following any demolition, hazardous materials surveys and a soil contamination assessment for lead paint, asbestos and from underground fuel storage infrastructure relating to the Auto Centre site would be required. Remediation would be undertaken if identified contamination poses a risk to human health or the environment.

When the works compound is no longer required, site assessment would be required to assess the risk posed by contamination (if any) introduced during use of the works compounds. Remediation would be undertaken if contamination poses an unacceptable risk to human health or the environment under the proposed land use scenario.

**Operation**

Operation of the proposal is not likely to result in any significant impacts on soils, landscape, topography or geology. The risk of soil erosion during operation would be minimal as all areas impacted during construction would be sealed or rehabilitated and landscaped to prevent soil erosion from occurring.

### 6.3.3 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on traffic and access.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion and sedimentation</td>
<td>A soil and water management plan (SWMP) will be prepared as part of the construction environmental management plan in accordance with the requirements of Roads and Maritime Services contract specification G38 prior to the commencement of construction. The SWMP will also address the following:</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
|                               | - Roads and Maritime Services Code of Practice for Water Management, and Erosion and Sedimentation Procedure
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The SWMP would detail the following as a minimum:</td>
<td></td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>• Identification of catchment and sub-catchment areas, high risk areas and sensitive areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sizing of each of the above areas and catchment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The likely volume of run-off from each road sub-catchment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Direction of flow of on-site and off-site water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Separation of on-site and off-site water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• The direction of run-off and drainage points during each stage of construction</td>
<td></td>
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<tr>
<td></td>
<td>• Dewatering plan which includes process for monitoring, flocculating and dewatering water from site (ie sediment basin and sumps)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• A mapped plan identifying the above</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Include progressive site specific Erosion and Sedimentation Control Plans (ESCPs). The ESCP is to be updated at least fortnightly</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• A process to routinely monitor the BOM weather forecast</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. These controls are to be shown on the ESCPs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contamination</td>
<td>A Contamination Management Plan (CMP) would be prepared in accordance with the Contaminated Land Act 1997 and relevant EPA Guidelines. This would be reviewed by RMS Senior Environment Officer and RMS Land Management Specialist prior to the commencement of works.</td>
<td>Construction contractor and Roads and Maritime Services</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td></td>
<td>An incident emergency spill plan would be developed and incorporated into the construction environmental management plan. The plan would include measures to avoid and manage spillages of fuels, chemicals, and fluids onto any surfaces or into stormwater inlets and an emergency response procedure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Completion of a hazardous materials surveys and a soil contamination assessment for lead paint, asbestos following building demolition and from underground fuel storage infrastructure</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------</td>
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</tr>
<tr>
<td>relating to the Auto Centre.</td>
<td>Procedure would be prepared and implemented to manage any lead paint or asbestos identified following building demolition.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td></td>
<td>Upon closure of the works compound, site assessment would be undertaken to assess the risk posed by contamination (if any) introduced during use of the works compounds and remediation undertaken as required.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Erosion and sedimentation</td>
<td>Erosion and sediment control measures would be implemented and maintained (in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)). to:</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>• Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reduce water velocity and capture sediment on site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minimise the amount of material transported from site to surrounding pavement surfaces.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Divert clean water around the site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erosion and sedimentation</td>
<td>Erosion and sediment controls would be implemented before any construction starts and inspected regularly, particularly prior to and after a rainfall event of 10 mm or greater (including clearing of sediment from behind barriers) and records kept and provided on request. Maintenance work would be undertaken as needed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Site stabilisation of disturbed areas would be undertaken progressively as stages are completed.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All stockpiles would be designed, established, operated and decommissioned in accordance with Roads and Maritime Services’ Stockpile Management Procedures (RTA 2011).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Controls would be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Any material transported onto pavement surfaces would be swept and removed at the end of each working shift.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Excess spoil</td>
<td>Excess spoil not required or able to be used for backfilling would be stockpiled in a suitable location before being reused or removed from the site, and disposed of at an appropriately licensed facility.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Contamination of soils</td>
<td>A fully equipped emergency spill kit would be kept on-site at all times.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
### Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If an incident (eg spill) occurs, the RMS’s Environmental Incident Classification and Management Procedure would be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>All staff would be inducted about incident and emergency procedures and made aware of the location of emergency spill kits.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Machinery would be checked daily to ensure there is no oil, fuel or other liquid leaking from the machinery.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Any fuel, oils or other liquids stored on site would be stored in an appropriately sized impervious bunded at least 120% larger than the greatest container and in an area least 50 metres away from water bodies.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils should be classified in accordance with the NSW EPA <em>Waste Classification Guidelines (2014)</em></td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.4 Hydrology, water quality, flooding and drainage

6.4.1 Existing environment

**Hydrology, drainage and flooding**

The proposal site and surrounding area has been highly modified by urban development and contains no natural waterways. The existing drainage system is an urban stormwater system, comprising road gutters draining to underground pipes and culverts (refer to section 2.2). The stormwater system is designed to convey flows in a manner that minimises flooding of roads during rainfall. The Hornsby Shire Council (Hornsby Shire Council 2013a) LEP does not identify the study area as flood prone. There are no known flooding issues within the study area and surrounds.

The site is located at the top of a gentle spur, with a slight slope downwards towards the east north-east and a low ridgeline south west of the site. Surface water flow is expected to follow local topography until it is intersected by local roads where it would then into stormwater drainage systems.

The closest watercourse to the proposal site is Terrys Creek, which has a drainage line about 750 metres north east of the proposal site and another 370 metres south east of the site. Terrys Creek flows into Lane Cove River about 2.2 kilometres north east of the proposal site and comprises *type 1 highly sensitive fish habitat and class 2 moderate key fish habitat* (refer section 6.5.2). However, due to the high density urban environmental surrounding the site, surface water is expected to enter the stormwater drainage system prior to discharge (GHD 2015b).

**Surface water quality**

The water quality of Terrys Creek is influenced by urban runoff and associated pollutant inflows. The creek is also affected to varying degrees by overflows from the sewerage system, which
generally follows the creek lines. Water quality typically deteriorates after rain due to inflows of urban stormwater and overflows from the sewerage system, with high levels of nutrients, turbidity and faecal coliforms. The creek nevertheless supports important aquatic and riparian ecosystems and adds to the natural values of surrounding bushland areas (Hornsby Shire Council, 2012).

Hornsby Shire Council undertakes water quality monitoring on an unnamed tributary of Terrys Creek. The 2012 water quality results indicate that the water quality in the creek is rated as ‘fair’ in relation to the physical and chemical condition, excellent for bacterial contamination, and ‘poor’ for water bugs and microscopic plant life (Hornsby Shire Council, 2012).

**Groundwater**

Existing groundwater borehole records were reviewed on 21 August 2014 using the Natural Resource Atlas. The results of the review identified that twelve groundwater bores are located within 390 metres of the proposal site. On average, the standing groundwater level within the boreholes was observed at a depth of 7.5 to 10 metres below ground level.

A targeted contamination investigation (GHD 2015) included a groundwater monitoring well at the site of Tuffys Auto Centre. Field measurements reported only slightly acidic, saline conditions and no visual or odour evidence of contamination were noted. Concentrations of the majority of analytes reported below detectable concentrations across all soil sampling locations. Concentrations of some heavy metals, including copper and zinc, reported an exceedance of the adopted screening criteria. It is likely that these minor exceedances are indicative of background concentrations (GHD 2015). Overall, all concentrations were reported below the selected investigation levels appropriate for the protection of construction / intrusive maintenance workers and ongoing land use under a commercial / industrial setting.

6.4.2 Potential impacts

**Construction**

**Hydrology and flooding**

Construction activities have the potential to result in local changes to overland flow regimes and the obstruction of drainage inlets resulting in temporary localised flooding. To minimise the potential for localised flooding along the road and erosion during construction, it would be necessary to plan, implement and maintain measures aimed at intercepting any concentrated flow and diverting it toward the existing piped stormwater drainage system.

The implementation of the mitigation measures provided in section 6.4.3 would minimise the potential for flooding impacts.

**Water quality**

The construction phase of the proposal has the potential to result in impacts on local water quality of Terrys Creek through:

- Construction activities with a moderate risk of erosion including bulk earthworks, vegetation removal, construction of property boundary arrangements, stockpiling and trenching for utilities
- Erosion of soil and sedimentation through stormwater runoff and transport of eroded sediments to local receiving waterways
- Accidental spills of fuels, oils or other chemicals from construction vehicles or equipment. Contaminants could enter the local stormwater system and be transported to nearby
waterways. This impact can be managed through mitigation measures and therefore the risk to water quality is low

- Risk of alkaline runoff from concrete work and washout areas
- Potential leaching from contaminated material at the auto centre site.

As discussed in section 6.4.3 the impact of construction activities on the quality of runoff discharging to the receiving drainage lines would be minimised by implementing an effective soil and water management plan. The likelihood of adverse impacts on water quality would be further reduced by the implementation of mitigation measures in sections 6.3.3 and 6.4.3.

**Groundwater**

In the event that dewatering of excavations is required, it is only likely to be superficial and associated with managing local and recent rainfall at the proposal site. If groundwater is encountered during construction, it would be pumped out into a contained area, tested, and if necessary treated, before re-use, discharge or disposal.

**Operation**

**Hydrology and flooding**

The proposal would not significantly alter surface hydrology in the vicinity of the proposal site. Appropriate drainage to accommodate stormwater flows has been incorporated into the design of the proposal. The area of new pavement required for the proposal is about 1800 square metres. The downstream stormwater infrastructure is expected to have sufficient capacity to cater for the increase in runoff as a result of the increase in impervious surfaces of the proposal.

The proposal would not alter the topography of the locality or result in any changes to surface drainage pathways. Appropriate road drainage mechanisms have been incorporated into the design of the proposal. Drainage is designed to accommodate stormwater flows generated from the upgraded road sections, as well as the existing roads and landscape features that contribute to local flows. As a result, the operation of the proposal would have no adverse impacts on drainage or hydrology.

**Water quality**

The operation of the proposal would have no substantial impacts on downstream water quality. The downstream receiving waterways are impacted by runoff from urban areas, including roadways under the existing situation. The proposal constitutes widening of sections of existing roads catchments and incorporates appropriate road drainage. As such, it would not have a substantial influence on either the quality or quantity of inflows to waterways.

6.4.3 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on water quality and hydrology.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedimentation and contamination of surface water</td>
<td>Erosion, sedimentation and contamination measures identified in section 6.3.3 would be implemented.</td>
<td>Roads and Maritime and construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Contamination of surface water</td>
<td>All fuels, chemicals, and liquids would be stored at least 50 metres away from the existing stormwater drainage system and would be stored in an impervious bunded area within the compound site.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.5 Biodiversity

6.5.1 Overview

This section summarises the results of the biodiversity assessment undertaken by GHD for the proposal. The biodiversity assessment involved:

- A desktop review to identify threatened flora and fauna species, populations and ecological communities listed under the Threatened Species Conservation Act 1995 (NSW) (TSC Act) and Fisheries Management Act 1994 (NSW) (FM Act), and matters of national environmental significance (MNES) listed under the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC Act) that may be affected by the proposal. Database records relevant to the study area and locality (i.e. within a 10 kilometre radius of the study area) were reviewed in July 2014 prior to field investigations and included:
  - The Commonwealth Department of the Environment (DoE) Protected Matters Search Tool (PMST) online database, for all MNES that may occur within the locality (DoE, 2014)
  - Office of Environment and Heritage (OEH) Wildlife Atlas database (licensed) for records of threatened species, populations and endangered ecological communities listed under the TSC Act that have been recorded within the locality (OEH, 2014)
  - Noxious weed declarations for Hornsby LGA (DPI 2014)
- Review of aerial photographs of the potential compound sites located on private land not accessible during the field survey to identify any ecological constraints
- A field survey of the study area conducted on 4 August 2014 to describe the existing environment and assess the conservation significance of vegetation and flora and fauna habitats present
- An arborist assessment of 2-4 Forest Grove (potential compound site D) (Appendix G)
- An assessment of the impacts of the proposal on flora and fauna and the likely significance of impacts on threatened biota and migratory species listed under the TSC and EPBC Acts.

For the purpose of the biodiversity assessment, all publicly accessible areas that may be impacted by the proposal were surveyed during the field survey. The potential compound locations were not surveyed as they are either hardstand areas or located on private property.
6.5.2 Existing environment

Flora

Vegetation within the study area consists of two planted street trees, roadside verges and gardens (mown lawns and hedges, scattered planted ornamental shrubs and trees and perennial herbaceous species in garden beds) as shown in Photo 6-1.

![Photo 6-1 Garden adjacent to Epping Road](image)

There is no intact native vegetation within the study area or adjacent to the study area. There are two large Turpentine (*Syncarpia glomulifera*) trees which may be remnant, however the landscape context in which they occur and the distance to any intact native vegetation means that for the purpose of this assessment, they are not considered to comprise part of a native vegetation type/community. These trees are located on the property boundary of a private residence and over-hang the adjacent road verge (refer to Photo 6-2).

There are two planted street trees within the study area (refer to Figure 6-6):

- Paperbark (*Melaleuca* species) on the southern side of Epping Road, which is about five metres tall (refer to Photo 6-3)
- Bottlebrush (*Callistemon* species) which is about two metres tall on the southern side of Epping Road.

Street trees within the study area have been heavily pruned as part of maintenance of safe distances from overhead power lines. No hollows were identified within the street trees.
Photo 6-2 Turpentine trees within the study area

Photo 6-3 Planted street tree within the study area
A species list of flora recorded within the study area during the field survey is provided in Appendix E. Given that the majority of species within the study area are horticultural cultivars, many have not been identified beyond genus level.

**Compound locations**

The potential compound sites consist of either exotic grassland or are hardstand areas and do not contain native vegetation. The sites have minimal biodiversity value and would not support habitat for threatened or migratory biota listed under the TSC Act or EPBC Act.

An arborist assessment was undertaken of the residential properties at 2-4 Forest Grove (refer Appendix G) as this site may be used as compound site D.

A Blueberry Ash (*Elaeocarpus reticulatus*) tree which is listed as indigenous to Hornsby LGA occurs in the rear garden of 4 Forest Grove. Other small indigenous trees within the site include tree ferns: One *Cyathea australis*, growing in a shrub border in 2 Forest Grove, and several *Dicksonia antarctica*, growing under the canopies of the two Japanese Maples in 4 Forest Grove. An indigenous hemi-epiphyte, *Ficus rubiginosa*, has colonized the stem of a palm in 2 Forest Grove. Other trees within the site, including street trees in front of 2 Forest Grove are Australian native species but are not indigenous to the Hornsby LGA. All other tree specimens in both properties are exotic ornamentals. Exotic trees, shrub and climber species have also self-recruited, especially in Lot 2 Forest Grove.

The trees provide habitat for a range of common and widespread birds typical of urban parks and gardens, including the House Sparrow *Passer domesticus*, Spotted Turtle-dove *Streptopelia chinensis*, Rainbow lorikeet *Trichoglossus haematodus*, Pied Butcherbird *Cracticus nigrogigularis*, Australian Magpie *Gymnorhina tibicen* and New Holland Honeyeater *Phylidonyris pyrrhoptera* recorded during the tree assessment.

During the tree survey, searches were carried out in all trees for hollows, nests or scratches. No hollows were recorded.

**Threatened ecological communities**

Database searches identified 28 threatened ecological communities listed under the TSC Act and/or EPBC Act as potentially occurring in the locality of the study area (refer Appendix F).

No plants or vegetation consistent with a threatened ecological community listed under the NSW TSC Act or Commonwealth EPBC Act occur in or adjacent to the study area.

**Threatened flora species**

The desktop review identified 46 threatened flora species listed under the TSC Act and/or EPBC Act previously recorded or predicted to occur in the locality. The results of the desktop database searches and the consideration of likelihood of occurrence are provided in Appendix F. No threatened plants are likely to occur in the study area given the highly modified environment and lack of suitable habitat. There are no previous records of threatened flora species within the study area itself (OEH, 2014). The majority of records are associated with Lane Cove National Park, located about 1.5 kilometres to the north-east and 1.3 kilometres to the north of the study area.
**Groundwater dependant ecosystems**

The Atlas of Groundwater Dependant Ecosystems (BoM, 2014) indicates that no groundwater dependant ecosystems are present within the study area.

**Noxious and environmental weeds**

Ten noxious weeds were recorded within the study area during the field survey. These species and their corresponding control classes and requirements under the NW Act are indicated in Table 6-19. All of the species recorded were observed in private gardens. Some species were pruned and maintained such as Ochna (*Ochna serrulata*) which is planted as hedging along the boundary of several properties.

**Table 6-19 Noxious weeds recorded in the study area**

<table>
<thead>
<tr>
<th>Name</th>
<th>Control Class</th>
<th>Control Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>African Olive (Olea europaea subsp. africana)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</td>
</tr>
<tr>
<td>Camphor Laurel (Cinnamomum camphora)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</td>
</tr>
<tr>
<td>Cat’s Claw Creeper (Macfadyena unguis-cati)</td>
<td>3</td>
<td>The plant must be fully and continuously suppressed and destroyed</td>
</tr>
<tr>
<td>Climbing Asparagus Fern (Asparagus plumosus)</td>
<td>2</td>
<td>The plant must be eradicated from the land and that land must be kept free of the plant</td>
</tr>
<tr>
<td>Ground Asparagus (Asparagus aethiopicus)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</td>
</tr>
<tr>
<td>Lantana (Lantana camara)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</td>
</tr>
<tr>
<td>Ochna (Ochna serrulata)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</td>
</tr>
<tr>
<td>Broad-leaved Privet (Ligustrum lucidum)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</td>
</tr>
<tr>
<td>Small-leaved Privet (Ligustrum sinense)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</td>
</tr>
<tr>
<td>Turkey Rhubarb (Acetosa sagittata)</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</td>
</tr>
</tbody>
</table>

**Fauna and fauna habitats**

The study area comprises a highly modified urban residential environment with minimal fauna habitat values including private gardens, mown lawns, two planted street trees, and roadside verges fragmented by fencing, buildings and the existing road network. Many of the gardens are well maintained, with evidence of regular pruning and landscaping activities and lack the floristic and structural diversity required to provide important foraging, shelter and nesting habitat for native fauna.
The two street trees and garden vegetation would provide foraging resources for some common and widespread species, typical of urban parks and gardens, such as Noisy Miners (*Manorina melanocephala*). Small common reptiles such as Sunskinks (*Lampropholis* spp) are also likely to occur in gardens in the study area. There are no hollow-bearing trees to provide denning or nesting habitat for hollow-dependent native fauna. No nests or dreys (possum nests) were identified within trees or shrubs within the study area. Each of the street trees within the study area has rough bark which can be used as temporary or diurnal roosts by microbats. However, their presence immediately adjacent to Epping Road and the associated ongoing light and noise pollution is likely to mean that they are not used as diurnal or temporary roosts by any native microbat species.

There are no wetlands or drainage lines within the study area to provide habitat for native fauna reliant on aquatic or riparian environments.

The habitat value of the study area for native fauna is further reduced by ongoing disturbance as a result of:

- Light and noise pollution generated by traffic along Epping Road and intersecting streets within the study area
- The presence of generalist, aggressive native fauna species such as Noisy Miners (*Manorina melanocephala*)
- The presence of domestic cats and dogs within residences along Epping Road, Forest Grove, Essex Street, and Smith Street.

It is possible that the Grey-headed Flying-fox (*Pteropus poliocephalus*) a threatened species listed under the TSC and EPBC Act could forage in garden and street trees on occasion, in response to specific fruiting or flowering events. However, the small number of trees to be removed would not comprise important habitat for this wide-ranging and highly mobile species.

Terry’s Creek is located about 750 metres to the north east and 370 metres to the south east of the study area. Riparian and aquatic habitat in Terry’s Creek was recently assessed by GHD ecologists as part of field surveys for a water infrastructure project (GHD 2013). The study area for this previous assessment included reaches of Terry’s Creek immediately up and downstream of Epping Road (GHD 2013).

The sensitivity of key fish habitat and the functionality of Terry’s Creek was classified according to the Policy and guidelines for fish habitat conservation and management (DPI 2013) and with reference to the description of aquatic habitat provided in GHD (2013). According to the DPI (2013) guidelines key fish habitat is classified separately according to: habitat quality and sensitivity; and the functionality of habitat for fish passage.

Terry’s Creek comprises:

- Type 1 - highly sensitive fish habitat, because it includes freshwater habitat that contains in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants; and
- Class 2 - moderate key fish habitat, because it is a named permanent or intermittent creek with clearly defined bed and banks with semi-permanent to permanent waters in pools. Freshwater aquatic vegetation is present. Fish were observed inhabiting the area.

Aquatic habitat was also compared with known habitat requirements of threatened aquatic fauna known to occur in the region according to Department of Primary Industries threatened species profiles (DPI 2015). Terrys Creek provides suitable habitat for a wide range of aquatic invertebrates potentially including Adams Emerald Dragonfly (*Archaeophya adamsi*), which is known from small creeks with gravel or sandy bottoms, in narrow, shaded riffle zones with moss
and rich riparian vegetation (DPI 2015). The study area also contains broadly suitable habitat for at least two species of threatened fish however no threatened freshwater fish are known to occur in the Lane Cover River catchment (DPI 2015).

**Habitat connectivity**

The study area is completely isolated from any intact native vegetation by existing roads and residential development.

There are a series of parks and reserves along Terry’s Creek that contain extensive tracts of intact, native vegetation; however none of these are contiguous with the study area or connected in any way to the highly modified environments within the study area. Lane Cove National Park occurs to the north and east of the study area and provides a substantial habitat corridor through the locality. The proposal would not result in any impacts to this habitat corridor.

Vegetation within the study area may be used as occasional foraging habitat or stepping stones by more mobile, common species typical of urban parks and gardens but does not provide habitat for species that require larger, contiguous patches of native vegetation.

**Threatened fauna species**

The desktop review identified 97 threatened fauna species listed under the TSC Act and/or EPBC Acts previously recorded or predicted to occur in the locality. There are no previous records of threatened fauna species within the study area (OEH, 2014); the majority of records are associated with Lane Cove National Park to the north and east of the study area.

No threatened fauna species were detected during the field survey. There are no specific habitat resources for any threatened species within the study area that would result in a significant impact if removed or modified. The Grey-headed Flying-fox may potentially forage in gardens or street trees when flowering; however this vegetation represents marginal habitat at best, given the landscape context, limited extent and existing levels of disturbance and proximity to Epping Road. Any impacts to garden vegetation within the study area would not result in a significant impact on this highly mobile, opportunistic species.

The majority of species recorded or predicted by the database searches would occur within the various parks and reserves within the locality of the study area, associated with Terry’s Creek and Lane Cove National Park. An assessment of the likelihood of occurrence of previously recorded and or predicted threatened fauna species is provided in Appendix F. None of the predicted threatened fauna species would rely upon habitats within the study area for any part of their lifecycle, and the study area would not constitute important habitat for any threatened fauna species given the highly modified nature of the area, absence of intact native vegetation and the location next to a busy road.

**Migratory species**

Database searches identified 40 migratory bird species listed under the EPBC Act as potentially occurring in the locality. No migratory species listed under the EPBC Act were observed during the field survey.

The gardens and street trees in the study area do not comprise important habitat for listed migratory species and would not support an ecologically significant proportion of any migratory species, as defined in the significant impact assessment criteria for migratory species (DoE 2013) (refer to Appendix F).
6.5.3 Potential impacts

Construction

The proposal would be undertaken on land which has been previously modified and contains no native vegetation and minimal habitat resources for native fauna. Consequently, the potential for impacts on native flora and fauna, and in particular threatened biota is very low as discussed below.

Vegetation clearing

No intact native vegetation would be impacted by the proposal. The proposal would result in the removal of up to two planted street trees, mown lawn, and a range of predominantly exotic horticultural species, as well as a number of noxious weeds from adjoining gardens.

The potential construction compound sites have been selected on the basis of existing cleared areas, the majority of which are hardstand areas with no vegetation present.

Habitat removal and fragmentation

The clearing of two street trees and garden vegetation would not result in habitat removal or fragmentation of existing habitat as vegetation that may be impacted in the study area provides minimal habitat for common and widespread native fauna species typical of urban parks and gardens. The vegetation within the study area does not provide suitable habitat for fauna species reliant on intact native vegetation, including the majority of woodland and forest birds, forest owls, terrestrial or arboreal mammals, native frogs and reptiles.

Fauna mortality

Construction of the proposal may result in injury to small opportunistic fauna which may reside in garden vegetation within the proposal site. The species most likely to be affected are Sunskinks and other small reptiles. These species are widespread and abundant and therefore any potential losses of individuals are unlikely to impact upon any ecologically significant proportion of local populations. More mobile fauna such as common native birds such as Noisy Miners (Manorina melanocephala), Rainbow Lorikeets (Trichoglossus haematodus) or Pied Currawongs (Strepera graculina) are unlikely to be affected by construction activities.

Introduction/spread of weeds and edge effects

The proposal is unlikely to result in the introduction or spread of weeds or edge effects given the highly modified urban context of the study area, the absence of intact native vegetation and the existing levels of infestation by exotic species and noise and light associated with Epping Road and surrounding urban development.
Figure 6-6
Vegetation and noxious weeds within the study area
2-4 Forest Grove

If compound D is used for the proposal, this would require the removal of all trees within 2 Forest Grove, including the street trees at the front of the property to provide access into the site. The residential building at 4 Forest Grove would be used as a site office and therefore no vegetation removal or trimming would be required.

No tree species which are listed as indigenous to Hornsby LGA occur in Lot 2. Some native Australian trees would require clearing. There are however planted species, with a maximum age of around 60 years.

Clearing of vegetation from Lot 2 would result in the removal of a wide range of invasive weed species, including Bamboo, English Ivy, Asparagus, Moth Vine, Cassia, Cotoneaster and Mickey Mouse Plant.

Operation

The study area is already of limited habitat value for most native species and no additional adverse impacts on native species are anticipated as a result of the operation of the proposal. Given the existing infrastructure within the study area, the proposal is unlikely to result in the risk of vehicle collisions with native fauna given the study area does not intersect any fauna movement corridors.

Key threatening processes

A key threatening process (KTP) is defined under the TSC Act as an action, activity or proposal that:

- Adversely affects two or more threatened species, populations or ecological communities
- Could cause species, populations or ecological communities that are not currently threatened, become threatened?

There are currently 38 KTPs listed under the TSC Act, eight listed under the FM Act and 20 listed under the EPBC Act. A number of KTPs are listed under more than one Act. Given the lack of native vegetation and important habitats within the study area, and the highly modified landscape context in which it occurs, no KTPs are relevant to the proposal.

Assessment of significance

The study area does not contain any important breeding, roosting or nesting habitat for threatened or migratory biota listed under the TSC Act, FM Act or EPBC Act. The proposal is unlikely to result in a significant impact on any threatened or migratory biota (or their habitats) listed under the TSC or EPBC Act. As such, no assessments of significance in accordance with Section 5A of the EP&A Act are required.
6.5.4 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on biodiversity.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts to flora and fauna</td>
<td>Biodiversity management measures would be included within the construction environmental management plan. Measures would include (but not necessarily be limited to) the following: • Fauna handling and vegetation removal would be in accordance with the Roads and Maritime Services’ Biodiversity Guidelines 2011 (RTA 2011a) • Trees to be retained would be protected during construction, where appropriate • Content of toolbox talks and records of attendance • Compliance with Roads and Maritime Services’ Biodiversity Guidelines 2011 (RTA 2011a).</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Potential for spread of exotic or invasive species, or spread of pathogens that may be harmful to native biota.</td>
<td>Declared noxious weeds are to be managed according to requirements under the Noxious Weeds Act 1993 and Guide 6 (Weed Management) of the RTA Biodiversity Guidelines 2011.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Impacts to threatened fauna</td>
<td>If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the RTA Unexpected Threatened Species Find Procedure in the RTA Biodiversity Guidelines 2011 – Guide 1 (Pre-clearing process).</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Erosion and sedimentation impacts</td>
<td>Erosion and sedimentation mitigation measures would be implemented to minimise any erosion and sedimentation impacts.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.6 Aboriginal cultural heritage

6.6.1 Existing environment

A search of the Office of Environment and Heritage Aboriginal Heritage Information Management System was undertaken on 7 April 2015 for a 200 metre radius of the proposal site. The search results indicated that no known Aboriginal objects or places are located in the search area. The preliminary assessment concluded that the Aboriginal cultural heritage potential of the study area is severely reduced due to past disturbance.
6.6.2 Potential impacts

The natural landscape of the proposal site has been substantially modified as a result of cutting, levelling and filling for the construction of Epping Road and surrounding development. As such, the proposal would impact on an area which has previously been highly disturbed and exhibits low Aboriginal archaeological potential. No listed or registered Aboriginal sites are located within the proposal site and none were observed during field surveys for the proposal. Furthermore, due to the highly disturbed nature of the proposal site, it is unlikely that previously unrecorded Aboriginal objects or sites would be uncovered during construction. The proposal is not anticipated to have any impact on Aboriginal cultural heritage.

The Roads and Maritime Aboriginal cultural heritage advisor granted a PACHCI clearance letter for the proposal site (including compound locations) allowing the works to proceed without further assessment (see Appendix H).

6.6.3 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on Aboriginal heritage.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboriginal heritage item encountered during work</td>
<td>In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work would cease in the affected area and Roads and Maritime’s Environment Officer, Sydney Region and the Roads and Maritime Aboriginal Cultural Heritage Officer, would be contacted for advice on how to proceed. The Roads and Maritime Services Standard Procedure ‘Unexpected Heritage Finds 2015’ would be followed in the event a potential artefact is uncovered.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.7 Non-Aboriginal heritage

6.7.1 Overview

This section summarises the results of the non-Aboriginal heritage assessment and statement of heritage impacts prepared by Artefact Heritage as an input to the REF. The full report is provided in Appendix I.

The heritage assessment included:

- A desktop search of relevant statutory and non-statutory registers and schedules on 5 August 2014 to identify any items of non-Aboriginal heritage significance in the proposal site
- An inspection of the proposal site on 17 July 2014 to assess listed heritage items and identify any unlisted heritage items that may be affected by the proposal. A photographic record of items of heritage and historic value was also kept (refer to Appendix I).

6.7.2 Existing environment

Historical context

The study area was first settled in the early 1820s when land was cleared and a Government run timber sawing mill was established. Once the timber mill closed down in the 1830, the study area became associated with small scale orchards and farming. Although the land was
prosperous, the lack of transport and easy access to markets meant that the study area remained rural.

The establishment of the railway line in 1886 had a major impact on the study area. The railway brought money into the community, land prices rose and local farmers and growers were able to afford prominent homes. Wealthy citizens were also attracted to the area and subdivisions were rapidly created. It was during this period that Essex Street was established and subdivided.

In 1892, the railway line to the centre of Sydney was duplicated, offering a faster and more efficient route into and out of the city. Mount Tomah Nursery, operating in the area in the 1890s, was located on Laurel Avenue (now Epping Road) and played an important role in the development of the suburb. Laurel Avenue was extended in 1940 at which time it became Epping Road.

After World War Two, the post war boom reached its peak in the 1950s, and Epping grew and transformed dramatically. In the 1960s through to the 80s, medium density development took place in the area surrounding the proposed works, and later with the addition of the M2 Motorway, and upgrades to the Epping Railway Station, Epping saw even further large scale commercial and residential development.

**Database and survey results**

Two locally listed heritage items and one heritage conservation area are located within the study area. There are also unlisted items that contribute to the streetscape and historical context of the locality. A heritage item (park) is located adjacent to the study area. These are listed in Table 6-20 and are shown on Figure 6-7.

**Table 6-20  Listed and unlisted heritage items**

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Description</th>
<th>Heritage listings</th>
<th>Heritage significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Residential building</td>
<td>‘Asheldom’ is a large Federation period home built in the Queen Anne revival style house with a complex planned roof form with corner tower. In addition, the property has retained its original picket fence on the Epping Road frontage and distinctive brick chimneys with sandstone capping. The house is in good condition and has not been significantly altered.</td>
<td>Hornsby Local Environmental Plan 2013 LEP # 378</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>‘Asheldom’ 47 Essex Street</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Residential building</td>
<td>The building is a substantial, single storey timber weatherboard dwelling on brick footings with a hipped and gabled roof clad in corrugated steel and timber framed windows and doors. The building is setback from the street frontage which has a low stone flagged fence and edging and dense garden bed.</td>
<td>Hornsby Local Environmental Plan 2013 LEP # 800</td>
<td>Local</td>
</tr>
<tr>
<td></td>
<td>42 Essex Street</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Name</td>
<td>Description</td>
<td>Heritage listings</td>
<td>Heritage significance</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>-------------</td>
<td>-------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>3</td>
<td>Forest Park</td>
<td>The park has a period layout and mature trees and rose Garden as well as fine War Memorial existing from c1920 period.</td>
<td>Hornsby Local Environmental Plan 2013 LEP # 359</td>
<td>Local</td>
</tr>
<tr>
<td>4</td>
<td>Essex Street Conservation Area</td>
<td>This section of Essex Street is a wide dual carriageway with wide grassed verges and some street trees and plantings. The built context is characterised by a mix of Federation and Inter-war period houses with a number of late 20th and early 21st century period dwellings and residential complexes between.</td>
<td>Hornsby Local Environmental Plan 2013 LEP # C10</td>
<td>Local</td>
</tr>
<tr>
<td>5</td>
<td>Trees, garden beds, boundary hedges and brick walls along Epping Road</td>
<td>Trees, garden beds, boundary hedges and brick walls along Epping Road are representative of early street and landscape designs used in the late 19th and early to mid-20th century. These items are indicative of the various types of species, materials and aesthetics popular at the time and contribute to the overall aesthetic of the streetscape.</td>
<td>Unlisted</td>
<td>Representative of early landscape designs. Historic, associative, aesthetic and social significance.</td>
</tr>
<tr>
<td>6</td>
<td>36 and 38 Essex Street 2 and 4 Forest Grove</td>
<td>The four residences are likely to be original structures constructed after they first subdivision.</td>
<td>Unlisted</td>
<td>Contribute to the aesthetics of the streetscape and the historical context of the locality.</td>
</tr>
</tbody>
</table>
Figure 6-7
Non-Aboriginal heritage items and areas of archaeological potential
**Archaeological potential**

The corner of Blaxland Road and Epping Road was found to have a moderate potential to contain archaeological remains associated with an early to mid-20th century residential structure which was located close to the roadway. These remains are unlikely to be present within the portion of the property that has been impacted; however, the grassed verge which remains at street level-close to the roadway-has the potential to contain archaeological remains of this structure.

The remainder of the study area was assessed to have low archaeological potential. Areas of archaeological potential are shown on Figure 6-7.

### 6.7.3 Potential impacts

A summary of the potential impacts of the construction of the proposal on listed and unlisted heritage items is provided in Table 6-21.

The proposal would impact stone flagged fencing, edging and garden beds at the locally listed 42 Essex Street as well as trees, fences and gardens of three other residences within the Essex Street Conservation Area. The proposal would also impact on some unlisted items that contribute to the streetscape of Epping Road including brick fencing, hedges and mature trees.

There is a potential for indirect minor visual impacts to Forest Park through use of that site as compound D. The level of impact will relate to the activities undertaken at this location and how close they are to the park boundary.

The area of moderate archaeological potential at the corner of Blaxland Road and Epping Road would also be impacted by the proposal. The road widening would extend into the area of moderate archaeological potential and compound A is partially within the area of moderate archaeological potential.

### Table 6-21 Potential impacts on non-Aboriginal heritage items

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Potential impact</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>House ‘Asheldom’ 47 Essex Street</td>
<td>Minor visual impact during construction. Potential vibration impact during construction.</td>
<td>There would be no direct impact to Asheldom as the widening would occur on the western side of Essex Street. There would be minor temporary visual impacts during construction. Potential vibration impacts (as described in section 6.2) would be managed by implementing mitigation measures provided in section 6.2.4.</td>
</tr>
<tr>
<td>2</td>
<td>House 42 Essex Street</td>
<td>No direct impact. Minor temporary visual impacts during construction.</td>
<td>There would be no direct impact to 42 Essex Street as the widening would occur 10-15 meters to the north of the property. There would be minor temporary visual impacts during construction. Potential vibration impacts (as described in section 6.2) would be managed by implementing mitigation measures provided in section 6.2.4.</td>
</tr>
<tr>
<td>3</td>
<td>Forest Park</td>
<td>Indirect minor visual impacts</td>
<td>If compound D is used this would result in temporary visual impacts to Forest Park due to the use of 4 Forest Grove and use of that site as compound area. 4 Forest Grove would not be demolished or vegetation removed, therefore minimising any visual impacts. While compound D is operating there may be some minor impacts associated with noise.</td>
</tr>
</tbody>
</table>

GHD | Roads and Maritime Services - Epping Road westbound widening between Essex Street and Blaxland Road at Epping, 21/23388 | 115
<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Potential impact</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Essex Street Conservation Area</td>
<td>Direct physical impact on trees, fences and gardens of one residence. Potential vibration impact during construction. Minor visual impact.</td>
<td>Widening on the western site of Essex Street and the southern side of Epping Road would impact on trees, fence and garden of one property 38 Essex Street, plus the verge and footpath in front of this property. The removal of trees and established vegetation would impact on the aesthetics of the conservation area. However, impacts to the overall heritage significance of the conservation area would be minor.</td>
</tr>
<tr>
<td>5</td>
<td>Unlisted items – trees, garden beds, boundary hedges and brick walls along Epping Road</td>
<td>Direct physical impact Minor visual impacts.</td>
<td>Established trees and garden beds associated with number 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24 Epping Road would be impacted. Brick walls and boundary hedges associated with number 4, 6, 8 and 18 Epping Road and a picket fence at number 20 Epping Road would be impacted. Removal of trees, garden beds and fencing along Epping Road would impact on the aesthetics of the streetscape which is representative of early landscape design in the locality.</td>
</tr>
<tr>
<td>6</td>
<td>Unlisted items – 36 Essex Street</td>
<td>Potential direct physical impact.</td>
<td>This property is not considered to meet the threshold for local significance under the criteria within the Heritage Council guideline, <em>Assessing heritage significance</em> (2001). A section of widening of the north side of Epping Road would result in 36 Essex Street being demolished. The site may also be used as compound B during the works. There would be no visual impacts to items of heritage significance.</td>
</tr>
<tr>
<td>7</td>
<td>Unlisted items – 2 and 4 Forest Grove</td>
<td>Potential direct physical impact.</td>
<td>The two properties are not considered to meet the threshold for local significance under the criteria within the Heritage Council guideline, <em>Assessing heritage significance</em> (2001). All or part of this site may be used as compound D. This may require the demolition of the residential property at 2 Forest Grove, removal of garden vegetation and widening of the current access point off Forest Grove. The proposal will result in no visual impacts of heritage significance. The property and vegetation at 4 Forest Grove would be retained, therefore there would be minimal impacts on Forest Park (see item 3 above).</td>
</tr>
</tbody>
</table>

### 6.7.4 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on non-Aboriginal heritage.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct impacts on heritage items</td>
<td>If the final design of the proposal changes considerably from that currently proposed, additional assessment may be required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Visual impact to Forest Park</td>
<td>If compound D was preferred, maintain vegetation along the southern property boundary of 4 Forest Grove.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
### Environmental safeguards

<table>
<thead>
<tr>
<th>Impact</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of moderate archaeological potential</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Vibration impacts on heritage items</td>
<td>Construction Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Vibration management measures provided in section 6.3.3 would be implemented to minimise structural vibration impacts to heritage items.</td>
<td>Construction Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Essex Street Conservation Area</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Unlisted items – trees, garden beds, boundary hedges and brick walls along Epping Road</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Unexpected archaeological finds</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

### 6.8 Landscape character and visual impacts

#### 6.8.1 Overview

A visual, landscape and urban design report was prepared by GHD in September 2014. The results of the report are summarised in the following sections. A full copy of the report is provided in Appendix J.

The assessment was prepared in accordance with the *Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment (EIA-N04), Version 2* (Roads and Maritime, 2013). The assessment involved the following tasks:

- **Landscape character assessment:**
  - An analysis of the existing landscape that identifies landscape character zones (LCZs) according to their dominant characteristics
  - Classification of LCZs sensitivity as high, moderate, low or negligible

- **Sensitive visual receivers—**
  - Identification of potential visual receivers
  - Analysis of the main day-to-day viewers of the proposal site and their sensitivity to change in the visual environment as high, moderate, low or negligible

- **Identifying the potential sources of impacts** (type, scale, degree of visibility, compatibility with surrounding landscape and timescale)

- **The combination of sensitivity and impact magnitude** provides the level of importance of the impact on the landscape character, individual character zone or visual impact from viewpoints. The impact matrix shown in Table 6-22 was used to determine the level of importance for the proposal.
The assessment defines several landscape character zones and assesses the potential landscape character and visual impacts of the proposal. The assessment is based on the sensitivity of a view and the magnitude of the proposal in that view. Sensitivity and magnitude are combined to give a visual impact rating of high, moderate, low or negligible.

### 6.8.2 Existing environment

The landscape and visual environment of the proposal site is characterised by existing roads, residential dwellings and commercial buildings. This includes mainly single detached dwellings to the northern and southern sides of Epping Road. A multi-unit residential development with set-back frontages is located on the corner Epping Road and Smith Street. A five storey commercial building (Westpac corporate office) is located on the north-eastern corner of Epping Road and Langston Place. The building dominates views within the local area.

An auto centre commercial business is located on the corner of Epping Road and Blaxland Road. The North West Rail link corridor is situated to the west of the proposal site, at about 10 metres at the closest point to the proposal. Epping Station is located about 150 metres to the north west. Some vegetation screening is provided along the road corridor providing buffered views of the roadway. The vegetation consists of planted street trees, roadside verges and gardens, as discussed in section 6.5.

As noted in section 6.7, locally listed heritage properties (houses) are located at 42 and 47 Essex Street, adjacent to the proposal site. These properties also fall within the Essex Street Conservation Area (LEP no. C10). These are some established hedges, native and non-native trees and plantings at these properties.
## Landscape character zones

Four landscape character zones have been identified within the study area. These are described in Table 6-23 and are shown on Figure 6-1.

### Table 6-23 Landscape character zones

<table>
<thead>
<tr>
<th>Landscape character zone (LCZ)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LCZ 1:</strong> Residential</td>
<td>Residential, generally single-storey, single-dwelling residences (bungalows and cottages) built with a range of construction materials including weatherboard and masonry. Generally pitched roofs in metal and tile. Some two-storey buildings within a residential estate (Pembroke Gardens located at 7 Epping Road). Vegetation consists of mature trees, shrubs and lawns in private gardens and along property boundaries. Street trees make a contribution to the townscape scale and character primarily in side streets. Two street trees exist on Epping Road itself. Infrastructure includes driveways, fencing, overhead electrical and telecommunications. Access for pedestrians is provided for by a footpath along the northern and southern sides of Epping Road. There is infrequent pedestrian activity along footpaths.</td>
</tr>
<tr>
<td><strong>LCZ 2:</strong> Commercial</td>
<td>Commercial, typically single-level buildings built with a range of construction materials in varying styles and forms. There is a single-storey open workshop (Tuffey Auto Centre) located on the southern side of Epping Road and a five storey office building (Westpac Corporate) located on the northern side of Epping Road. The Westpac Corporate building dominates the streetscape and restricts views to within the road corridor. Vegetation consists of grassed verges and intermittent tree plantings in verges. Infrastructure includes overhead telecommunications and electrical infrastructure, street signage, footpaths and street lighting; public telephone and garbage bins, and cycle sheds. The public realm is mostly dominated by traffic requirements. The Epping Road corridor accommodates four lanes dual carriageway. Minimal footway space for pedestrians to the south side of Epping Road. There is moderate pedestrian activity in the vicinity of the Westpac Corporate office.</td>
</tr>
<tr>
<td><strong>LCZ 3:</strong> Public open space</td>
<td>Public open space including Forest Park to the south of Epping Road and a small park on the corner of Chambers Court and Pembroke Street. Vegetation includes a mix of native and exotic mature trees and shrubs and mown lawns. Infrastructure includes children’s playground, picnic tables and seating, post and rail fencing, concrete footpaths, lighting, memorial sculptures. Parking dominates the eastern edge of the park on Forest Grove. Residences on Epping Road back on to the park. Public open space of this scale and type is uncommon within the local area. Forest Park is an important amenity to the local community.</td>
</tr>
<tr>
<td><strong>LCZ 4:</strong> Transport infrastructure</td>
<td>Transport Corridor – Epping Road (cars, buses, trucks, etc.) and the North West Rail Link (passenger trains) on the western edge of the study area. Associated infrastructure includes signage, lighting, overhead power lines and the road pavement itself. Important infrastructure to the local community connecting to local and broader Sydney. Vegetation includes occasional street trees on Epping Road.</td>
</tr>
</tbody>
</table>
Figure 6-8
Landscape character zones
Figure 6-9
Selected viewpoint locations

Legend
- View points
- Potential compound locations
- The proposal site
- Railway
- Cadstral boundary

Data Source: NSW Department of Lands: Cadastre - Jan 2014; Geoscience Australia: 250k Data - Jan 2014; NSW Department of Primary Industry - Jan 2014; Imagery (Nearmap 07/11/2014). Created by: qjchung
Visual receivers

Visual receivers are individuals and/or groups of people whose views may be affected by the proposal. Five groups of sensitive visual receivers were identified for assessment:

- VR01 - Residents on Epping Road
- VR02 - Residents on side streets
- VR03 - Business owners/workers on Epping Road
- VR04 - Motorists
- VR05 - Pedestrians.

Representative viewpoints from these sensitive visual receiver groups were selected for assessment. The viewpoints are shown in Figure 6-9 and in photo 6-4 through to photo 6-12.

Photo 6-4 Viewpoint 1a - looking west along Epping Road
Photo 6-5 Viewpoint 1b - looking west along Epping Road from Essex Street

Photo 6-6 Viewpoint 2a – looking north along Forest Grove
Photo 6-7 Viewpoint 2b - looking north along Essex Street

Photo 6-8 Viewpoint 2c - looking south along Essex Street
Photo 6-9 Viewpoint 2d - looking south-west from Smith Street

Photo 6-10 Viewpoint 3a - looking east from corner Epping Road and Langston Place
Photo 6-11 Viewpoint 3b - looking east from corner Epping Road and Blaxland Road

Photo 6-12 Viewpoints 4 and 5 – looking east from corner Epping Road and Langston Place
6.8.3 Potential impacts

Construction

During construction, compound sites, positioning of plant and equipment within the view of neighbouring properties and existing road users would result in minor, temporary visual impacts. Earthworks would also expose subsoil. The use of lighting towers during any night work may result in light spill impacting adjoining properties and residents.

The proposal would require removal of some vegetation within the boundaries of the proposal site. This would include trimming and/or clearing of some street trees (as described in section 6.5) and landscaping within the road corridor and private property. Some of this vegetation contributes to the amenity and character of the local area, and/or screens views from properties adjoining the road. The removal of this vegetation would have the potential to reduce some screening between residential dwellings and the road. This would lead to temporary visual impacts during construction until the works are complete and disturbed areas rehabilitated.

Any construction works within the road’s visual envelope would result in temporary impacts to the visual amenity which may extend beyond the proposal site (i.e. haul routes, access routes etc). Visual impacts associated with construction activities are generally of greater magnitude than those associated with operation, but are temporary in nature.

Potential visual impacts during construction would be minimised through implementation of the safeguards and management measures outlined in section 6.8.4.

Operation

Landscape character impact

LCZ 1 Residential - is the largest zone in the study area and is predominately comprised of residential properties. Generally has an average to poor quality urban environment with little sense of place, a general dominance of traffic requirements on Epping Road and a lack of an effective public realm. There are a number of landscape elements in this area that influence the character of the townscape, including street trees on the side streets, Forest Park and grassed verge to the north of Epping Road between Langston Place and Smith Street which are generally in average to good condition. Therefore, the sensitivity of LCZ 1 to change is considered to be moderate. The magnitude of the impacts on this LCZ is considered moderate in areas close to the proposed works with the impacts reducing with distance. The Resultant rating of landscape impact is moderate in areas close to the proposed works with the impacts reducing with distance.

LCZ 2 Commercial - The magnitude of the impacts on this LCZ is considered low in areas close to the proposed with the impacts reducing with distance. The resultant rating of landscape impact is low.

LCZ 3 Public open space - parkland described within this LCZ is not directly located on Epping Road. The landscape elements, particularly vegetation within public realm, mature parkland trees contribute importantly to the local character and sense of place. Therefore the overall sensitivity of this landscape LCZ is considered to be high. The magnitude of the impacts on this LCZ is considered negligible. The resultant rating of landscape impact is negligible.

LCZ 4 Transport infrastructure - the sensitivity of this LCZ comprising transport and associated infrastructure, to change would be LOW. The magnitude of the impacts on this LCZ is considered moderate in areas close to the proposal with the impacts reducing with distance. The Resultant rating of landscape impact is moderate-low.

A summary of landscape character impact is provided in Table 6-24. The impacts on landscape character zones are expected to be between negligible to moderate.
Table 6-24  Summary of landscape character impact ratings

<table>
<thead>
<tr>
<th>Landscape character zone</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moderate</td>
<td>Moderate</td>
<td>The resultant rating of landscape impact is MODERATE in areas close to the proposed works with the impacts reducing with distance.</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
<td>Low</td>
<td>The resultant rating of landscape impact is LOW.</td>
</tr>
<tr>
<td>3</td>
<td>High</td>
<td>Negligible</td>
<td>The resultant rating of landscape impact is NEGLIGIBLE.</td>
</tr>
<tr>
<td>4</td>
<td>Low</td>
<td>Moderate</td>
<td>The resultant rating of landscape impact is MODERATE-LOW.</td>
</tr>
</tbody>
</table>

Land within the study area has recently been rezoned as part of the Epping Town Centre Urban Activation Precinct and the majority of land adjacent Epping Road within the study area is zoned R4, which is intended for high density residential development. Land on the corner of Epping Road and Langston Place is located within a Local Centre.

The ‘height of buildings’ map of the Hornsby Local Environmental Plan, identifies that land fronting Epping road within the study area has maximum building height between 17.5 and 26.5 metres. This excludes land located in the Local Centre Zone which has a maximum building height of 72 metres and land located on the south west corner of the Epping Road and Essex Street intersection which has a maximum building height of 8.5 metres.

Given the existing low-scale nature of residential development along Epping Road, it is expected that the built form and landscape character of the area will change markedly over time in line with the preferred character depicted by the zone and building height maps. The proposed works will support the additional growth and change to the built form and landscape character of the precinct envisaged over time.

Visual impacts

A summary of the results of the visual impact assessment in relation to the potential impacts on visual receivers is provided in Table 6-25. Two photo visualisations are provided below (photos 6-13 to 6-16) which provide an artist’s impression of the streetscape with the operational proposal.

Landscape character and visual impact ratings are defined in Appendix J.
Photo 6-13 Existing viewpoint 1a

Photo 6-14 Artistic visualisation from viewpoint 1a
Photo 6-15 Existing viewpoint 2d

Photo 6-16 Artistic visualisation from viewpoint 2d
### Table 6-25  Summary of visual impact assessment

<table>
<thead>
<tr>
<th>Criteria</th>
<th>VR01 - Residents on Epping Road</th>
<th>VR02 - Residents on side streets</th>
<th>VR03 - Business owners/workers on Epping Road</th>
<th>VR04 - Motorists</th>
<th>VR05 - Pedestrians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewpoint</td>
<td>Viewpoints 1a and 1b</td>
<td>Viewpoints 2a, 2b, 2c and 2d</td>
<td>Viewpoint 3a and 3b</td>
<td>Viewpoint 4</td>
<td>Viewpoint 5</td>
</tr>
<tr>
<td>Visual sensitivity</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Visible element of proposal</td>
<td>New road surfacing and layout, associated road infrastructure (signage, lighting); potential landscape and streetscape reinstatement, alteration of traffic movements, property boundary structures, noise remediation structures and potential construction compound location. Demolition of 36 Essex Street, retaining structures and potential construction compound location.</td>
<td>New road surfacing and layout, associated road infrastructure (signage, lighting), resurfacing, alteration of traffic movements, property boundary structures, noise remediation structures and potential construction compound location. Demolition of building at 36 Essex Street and potential construction compounds (including potential demolition of 2 Forest Grove).</td>
<td>New road surfacing and layout, associated road infrastructure (signage, lighting); potential landscape and streetscape reinstatement, alteration of traffic movements, property boundary structures, noise remediation structures and potential construction compound location. Demolition of 36 Essex Street, retaining structures and potential construction compound location.</td>
<td>New road surfacing and layout, associated road infrastructure (signage, lighting); potential landscape and streetscape reinstatement, alteration of traffic movements, property boundary structures. Demolition of 36 Essex Street, retaining structures and potential construction compound location.</td>
<td>New road surfacing and layout, associated road infrastructure (signage, lighting); potential landscape and streetscape reinstatement, alteration of traffic movements, property boundary structures. Demolition of 36 Essex Street, retaining structures and potential construction compound location.</td>
</tr>
<tr>
<td>Nature of impact</td>
<td>The proposal would introduce new elements into the existing view. Views may be screened by existing vegetation retained within private gardens, and/or noise or property boundary solutions between the residential receivers and the road. The topography of the site and curved route alignment at the eastern end of Epping Road would serve to</td>
<td>The proposal would introduce new elements into the existing view. Views may be partially screened by existing vegetation along side streets and the undulating topography surrounding Epping Road. Impacts would be greatest for residents in side streets</td>
<td>The proposal would introduce new elements into the existing view. Views would be temporarily dissected and obstructed across the street layout by traffic halting temporarily. Views may be screened by existing vegetation retained within private gardens, between the businesses (Westpac Corporate office)</td>
<td>The proposal would introduce new elements into the existing view. The topography of the site and curved route alignment to the eastern end of Epping Road would serve to break up the cumulative visual effect of the scheme.</td>
<td>The proposal would introduce new elements into the existing view. Views would be temporarily dissected and obstructed across the street layout by traffic halting temporarily. Views may be screened by existing vegetation retained on the northern side of Epping Road. The topography of the site and curved route alignment at the eastern end of Epping Road would serve to break up the cumulative visual effect of the proposal. Impacts would be</td>
</tr>
<tr>
<td>Criteria</td>
<td>VR01 - Residents on Epping Road</td>
<td>VR02 - Residents on side streets</td>
<td>VR03 - Business owners/workers on Epping Road</td>
<td>VR04 - Motorists</td>
<td>VR05 - Pedestrians</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td></td>
<td>break up the cumulative visual effect of the proposal. Impacts would be greatest for residents on the southern side of Epping Road, and on the corner of the Epping Road and Essex Street intersection due to their close proximity to the works. Views would be permanent and close in nature.</td>
<td>closest to Epping Road, and close to the Epping Road and Essex Street intersection due to their proximity to the works. Views would be permanent in nature.</td>
<td>and the proposal. Impacts would be greatest for businesses on the southern side of the Epping Road and Blaxland Road intersection due to their close proximity to the works.</td>
<td></td>
<td>greatest for pedestrians on the south side of the Epping Road and the corner of Epping Road and Essex Street due to their close proximity to the works.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Magnitude of visual effect</th>
<th>Moderate</th>
<th>Moderate</th>
<th>Moderate</th>
<th>Low</th>
<th>Moderate</th>
</tr>
</thead>
</table>

| Summary | The proposal would be seen in the context of an urban environment with existing congested vehicular movements within a road corridor. The proposal would result in a smaller set back from residential receivers on the southern side of Epping Road to the road. There would also be a permanent detraction of the quality of the visual amenity and outlook for these receivers. | Residents in side streets would view the proposal from a distance. The proposal would be seen in the context of an urban environment with existing congested vehicular movements within a road corridor. | The proposal would be seen in the context of an urban environment with existing congested vehicular movements and cluttered streetscape elements within a road corridor. | The proposal would be seen in the context of an urban environment with existing congested vehicular movements and cluttered streetscape elements within a road corridor. Views would be temporary with motorists passing through. Landscape and streetscape reinstatement works may constitute an improvement in the quality of the urban environment (i.e. consistent surfacing, new landscaping, sensitive locating of road infrastructure), depending on landscape and urban detailed design. | |

<table>
<thead>
<tr>
<th>Resultant rating of visual impact</th>
<th>Moderate - high</th>
<th>Moderate</th>
<th>Moderate</th>
<th>Low</th>
<th>Moderate</th>
</tr>
</thead>
</table>
Changes to alignment, massing or significant change to the arrangement and/or structure of the existing structural elements/materials of the road would contribute to the magnitude of impacts upon the landscape and visual amenity. In some cases, visual amenity may be improved through consistent urban and landscape design themes (i.e. garden walls, surfacing, layout of the public realm, soft landscaping, location of road infrastructure such as bus stops, signage and lighting). Due to the close proximity of the upgraded road to residential receivers on the southern side of Epping Road, careful detailed design will be critical to reducing the impact on their visual amenity.

The visual impact assessment concludes that receptors would experience impacts of moderate to low for most visual receivers except for VR01 – Residents on Epping Road, which are likely to experience a moderate/high impact. With the implementation of mitigation measures provided in section 6.8.4 would be implemented to minimise potential impacts on landscape character and visual receptors would be minimised.

### 6.8.4 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on landscape character and visual amenity.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape and visual integration - general</td>
<td>Ensure the design of the proposal is consistent with the Roads and Maritime Services <em>Urban Design Policy.</em></td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Visual impacts from road infrastructure</td>
<td>Permanent signage would be located in a manner that does not impede views of sensitive receivers.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Light spill</td>
<td>Lighting for construction works and any changes required for the operation of the proposal would be designed to minimise light spill into residential properties and sensitive receptors. Temporary lighting would be sited and designed to avoid light spill into residential properties and identified sensitive receptors.</td>
<td>Roads and Maritime</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Visual impacts from construction equipment</td>
<td>Construction equipment, stockpiles, and other visible elements would be located away from key views to and from the identified visual receptors where feasible. Where this is not feasible, screening measures and practices to keep sites tidy would be implemented.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Operational visual impacts</td>
<td>Where visually important vegetation is removed, revegetation would occur where it is safe and practicable to do so.</td>
<td>Construction contractor</td>
<td>Operation</td>
</tr>
</tbody>
</table>
### 6.9 Air quality

#### 6.9.1 Existing environment

**Air quality**

The air quality of the study area is considered to be typical of an urban area within the Sydney region. The main contributors to air quality are emissions from motor vehicles on the surrounding road network, as well as the operation of diesel train services along the Main North Line.

**Industrial pollution sources**

The National Pollutant Inventory was searched on 9 April 2015. The results of the search for the Hornsby local government area identified 31 air pollutant substances from six sources during the 2013 to 2014 reporting period. There were no identified sites within a five kilometre radius from the proposal.

**Traffic pollution sources**

In considering potential air quality impacts of a road widening project from traffic sources, the important factors are related to emissions and separation:

- Traffic volume
- Traffic mix - including passenger vehicles (PV – both petrol and diesel), light duty vehicles (LDV) and heavy vehicles (HV)
- Speed of traffic
- Traffic separation from sensitive receptors

The above factors will be influenced by levels of congestion which affect volume and speed of the traffic flow and the number of traffic lanes and distances to the kerb and beyond. Diurnal variations in the above will also influence localised air quality. Further details of these factors and case studies of near-road impact from air pollutants are provided in Appendix K.
6.9.2 Potential impacts

Construction

Construction of the proposal may have short-term localised impacts on air quality as a result of:

- Clearing of vegetation for the construction of the road widening, footpath and property boundary structures
- Stripping, stockpiling and managing of topsoil
- Earthworks, including:
  - Excavations for road widening, construction of the road and footpath
  - Excavations for the installation of property boundary structures, drainage pits and utility adjustments
- Road sub-grade preparation and road pavement work
- Transport and handling of soil and materials to and from the proposal site
- Use of construction vehicles
- Spray painting for line marking.

Potential air quality impacts during construction would be predominantly associated with the generation of dust from excavations required for the footpath, road widening and installation of stormwater pipes and utility adjustments. There would be minimal potential for air quality impacts as only limited earthworks are required, and the potential for impacts would be minimised by implementing the safeguards and management measures outlined in section 6.9.3.

The operation of machinery and other construction vehicles would result in the emission of exhaust fumes. The impact of these emissions would be temporary in nature (limited to the duration of construction and staging of construction) and are considered to be minor when compared to the exhaust fumes emitted by traffic on local roads. Implementation of the safeguards and management measures outlined in section 6.9.3 would minimise these impacts.

Odours may be generated during the application of asphalt and line marking. However, the construction period would be temporary and there would be no long-term odour impacts for nearby receivers.

Overall, potential air quality impacts during construction would be temporary in nature and minimised by the implementation of mitigation measures outlined in section 6.9.3.

Operation

The proposal would result in the traffic corridor being about 3.7 metres closer to residential receivers along the southern side of Epping Road, and 3.5 metres closer to residential receivers on Essex Street, at the intersection with Epping Road. Pollutant concentrations have a rapid decrease in level within 20 metres of the edge of the road and worst-case concentrations reduce even further with increasing distance.

The proposal area is not considered heavily trafficked. Even projected total traffic on Epping Road for the future year 2026 is no higher than 50,000 vehicles per day. The combination of limited lanes and speed limits will restrict traffic emissions compared to
freeways/motorways and major intersections. Additionally, there is a low heavy vehicle count also contributing to this road network area.

However, due to the suburban nature of the project site, sensitive residential receptors are nearby and can be considered as kerbside. Notwithstanding, near-road air quality impact quickly dissipates with increasing distance as demonstrated by the monitoring studies summarised in section 6.9.1. A widening and additional lane brings some receptor locations closer to a proportion of the source. Monitoring studies (see Appendix K) involving higher impact intersections suggests that the proposal would not result in impacts higher than established regulatory levels of concern.

The proposal would improve the operation of Epping Road in the study area, and the Epping Road and Essex Street intersection, by reducing local congestion and queuing times. This would therefore reduce the number of idling vehicles which may improve local air quality during peak traffic periods.

### 6.9.3 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on air quality.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
| General air quality impacts         | An air quality management plan would be prepared as part of the construction environmental management plan. The plan would include but not be limited to:  
  - A map identifying locations of sensitive receivers  
  - Identification of potential risks/impacts due to the work/activities as dust generation activities  
  - Management measures to minimise risk including a progressive stabilisation plan  
  - A process for monitoring dust on-site and weather conditions  
  - A process for altering management measures as required. | Construction contractor | Pre-construction |
<p>| Dust emissions                      | Dust suppression measures would be implemented as per the air quality management plan. | Construction contractor | Construction    |
| Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind. | Construction contractor | Construction    |
| All trucks would be covered when transporting material to and from the site. | Construction contractor | Construction    |
| Work activities would be reprogrammed if the mitigation measures are not adequately restricting dust generation. | Construction contractor | Construction    |
| Works (including the spraying of paint and other materials) will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely. | Construction contractor | Construction    |</p>
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust emissions</td>
<td>Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Plant and machinery would be turned off when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>Impacts on sensitive receivers</td>
<td>Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

### 6.10 Land use and property

#### 6.10.1 Existing environment

The proposal site is located within a predominantly residential area, just to the east of the Epping town centre. The study area within which the proposal site is located includes a mix of residential, commercial, education and infrastructure land uses.

The following land uses are located within the proposal site:

- The existing road reserve of Epping Road
- A small section of the road reserve on Essex Street, Forest Grove, Blaxland Road and Langston Place
- A strip of private residential land along the southern side of Epping Road, and along the eastern and north-western and south-western sides of the Epping Road and Essex Street intersection.
- A strip of private commercial property (Tuffy’s Auto Centre) on Epping Road at the intersection with Blaxland Road
- Two residential properties on Forest Grove (potential use as a compound site)
- The following land uses are located directly adjacent to the proposal site:
  - A commercial office building on the north-eastern corner of Epping Road and Langston Place (street address of 12-22 Langston Place) occupied by Westpac
  - Residential land uses to the north and south
  - Forest Park
  - Epping Eye Surgery is located on the western side of Essex Street, just to the south of the intersection of Essex Street and Epping Road.

Other land uses within 300 metres of the proposal site are described in section 6.11.

The main land uses surrounding the proposal site are indicated by the land use zoning under the Hornsby LEP, as shown in Figure 6-1.
Figure 6-10: Zoning and land use

Legend
- social infrastructure:
  - Child care
  - Community
  - Education
  - Health
  - Non-government
  - Parks and open space

Land zoning (Hornsby shire LEP):
- B2, Local Centre
- R2, Low Density Residential
- R3, Medium Density Residential
- R4, High Density Residential
- RE1, Public Recreation
- SP2, Infrastructure
- The proposal site
- Railway
- Cadastral boundary

Figure 6-10:
Zoning and land use
Future land uses

As noted in section 2.1.2, the proposal site is located in the Epping Town Centre Urban Activation Precinct. The Epping Town Centre Structure Plan was released by the Department of Planning and Infrastructure in 2013. The western end of the proposal site is located within the town centre core identified by the structure plan. The structure plan provides for development to a maximum of 22 stories in the town centre core.

For the remainder of the proposal site, the structure plan provides for medium density residential (maximum of eight storeys). The majority of the proposal site is located in a ‘residential intensification area’ which is defined as ‘…areas adjacent to the town core (maximum six storeys with a three storey maximum at interface with low density residential areas)’

The rezoning proposal for the Epping Town Centre Urban Activation Precinct was finalised in March 2014. The majority of the area surrounding the proposal site has been rezoned as R4 (High Density Residential). The area within the town centre core (currently occupied by the commercial building at the corner of Epping Road and Langston Place) has been rezoned as B2 (Local Centre). The area surrounding Essex Street to the south of Epping Road is zoned R2 (Low Density Residential).

6.10.2 Potential impacts

Construction

Direct impacts on land use as a result of the proposal would mainly relate to the short-term presence of construction work within the proposal site. Construction may temporarily impact on vehicular and pedestrian access in the immediate vicinity of the work sites. Potential traffic and access impacts are considered in section 6.1.

Construction activities have the potential to impact on existing utilities and services, in particular underground services such as electricity, gas, and telecommunications. The proposed strategies for adjustment and/or protection of each utility (based on initial consultation with utility providers) are provided in section 3.5.

Roads and Maritime would consult with relevant service providers during detailed design to identify possible interactions and develop procedures to be implemented to minimise the potential for service interruptions which have the potential to impact on existing land use.

Operation

As described in section 3.6, the proposal would require partial (strip) acquisition from 14 properties (mainly on the southern side of Epping Road) and the full acquisition of one property. The land use of the acquired land subject to strip acquisitions would change from residential and commercial to road reserve. The following additional changes will be made:

- Residential property and grounds at 36 Essex Street – This property has been historically owned by Roads and Maritime and not acquired as part of this proposal. The following treatments will be required for this proposal:
  - Demolition of building
  - Removal of fencing and other structures
  - Grassing over of the lot remaining outside of the new road infrastructure
• Part of the lot would change from residential to road reserve, the residue would remain as residential zone

• Residential property and grounds at 2 and 4 Forest Grove - If this site is leased for use as compound D the following treatment may be required:
  – The residential building at 2 Forest Grove may require demolition (as a condition of the land holder for the use of the land as a compound site)
  – Removal of all vegetation from 2 Forest Grove
  – Widening of the entrance at 2 Forest Grove to allow access by construction vehicles and removal of street trees in front of entrance
  – The land would not change from residential status as part of this proposal

• Residential property at 38 Essex Street has been acquired for the proposal. The following treatments will be required for this proposal:
  – The residential property will be retained
  – A strip of land on the northern boundary will be used for the widening works
  – A strip of land on the eastern boundary of the property will be used for the widening works
  – Part of the lot would change from residential to road reserve, the residue would remain as residential zone

Property adjustment plans would be developed in consultation with the affected property owners. All land acquisitions would be conducted in accordance with the Roads and Maritime Land Acquisition Policy and compensation would be based on the requirements of the *Land Acquisition (Just Terms) Compensation Act 1991.*

The proposal would not result in any other long-term land use impacts. The proposal would not impact on any future changes to land uses proposed as part of future development in the Epping town centre (refer to section 2.1.2).

### 6.10.3 Safeguards and management measures

No additional specific safeguards or management measures are required.

### 6.11 Socio-economic

#### 6.11.1 Overview

This section summarises the results of the socio-economic assessment of the proposal undertaken by GHD. The assessment was prepared in accordance with the Environmental Impact Assessment Practice Note: *Socio-economic assessment* (Roads and Maritime, 2013b). The full report is provided in Appendix K. It involved the following tasks:

The socio-economic impact assessment involved:

• Development and analysis of a community profile from information sourced through a review of 2011 Census data by the Australian Bureau of Statistics (ABS)

• Site observations and assessment of the land use context in proximity of the study area

• An audit of the local social infrastructure
Identification of potential socio-economic impacts and benefits that would result from the proposal

Developing appropriate mitigation measures.

6.11.2 Existing environment

Population and demographics

Key community indicators for the socio-economic assessment study area (which incorporated those statistical data units surrounding the proposal site) are summarised below. A comparison is made with the broader Pennant Hills-Epping statistical district.

Population

The population of the study area in 2011 was 1,981 people. Households are primarily couples with babies or young children; and young singles or couples aged 18 to 34 years who are likely to be studying or working. They are more likely to be renting or paying off a mortgage and living in apartments and separate houses. There are fewer people over 60 years (14.2 per cent compared to 21 per cent in Pennant Hills-Epping). Consistent with the age profile showing a small population of older people, there are less people living in the study area who require assistance with core activities (1.2 per cent) compared to Pennant Hills-Epping (three per cent).

Cultural diversity

Aboriginal and Torres Strait Islander people make up 0.5 per cent of the study area’s population, which is consistent with the Pennant Hills-Epping district at 0.3 per cent. The most common non-English languages spoken at home were Cantonese, Mandarin, Korean and Hindi.

Households and families

The proportion of family households (69.4 per cent) is lower than Pennant Hills-Epping (79.5 per cent), whilst lone person households (22.3 per cent) and group households (8.3 per cent) are both more prominent than in Pennant Hills-Epping (17.9 per cent and 2.6 per cent, respectively).

The most prevalent family type in Epping is couples with children (46.7 per cent), which is lower than Pennant Hills-Epping (56.2 per cent). This is reflected in the occupancy rate for the study area of 2.6 persons per dwelling. There is a larger proportion of one parent families in the study area (17.4 per cent) compared to Pennant Hills-Epping (10.7 per cent).

Dwellings and tenure

The most common dwelling types within the study area are flats, units or apartments (56.7 per cent). This is significantly higher than Pennant Hills-Epping (15.6 per cent). Within the study area and adjoining the town centre, separate houses make up one third of the dwellings (32.7 per cent), which is less than half of that for Pennant Hills-Epping (71.4 per cent).

The rate of home ownership is lower in the study area (30.3 per cent) compared to Pennant Hills-Epping (43.1 per cent). The proportion of people renting in the study area...
(43.6 per cent) is almost double that for Pennant Hills-Epping (22.0 per cent). There are no people living in the local study area renting public housing.

**Employment and education**

At $665 per week, average individual incomes in the study area are slightly lower than Pennant Hills-Epping ($697 per week) yet higher than NSW ($561 per week). Similarly, average household incomes ($1,650 per week) in the study area are lower than Pennant Hills-Epping ($1,897 per week) and higher than NSW ($1,237 per week).

The rate of participation in the labour force is 67 per cent in the study area. This is slightly higher than Pennant Hills-Epping at 63.7 per cent. The unemployment rate is 7.4 per cent in the study area, higher than Pennant Hills-Epping (5.3 per cent).

The employment profile of working residents in the study area shows employed residents primarily work in professional, clerical and administrative roles in the study area (58.6 per cent) which is slightly higher than Pennant Hills-Epping (54.7 per cent).

At one third (30 per cent) of the population, the proportion of people in the study area without post-school qualifications is consistent with Pennant Hills-Epping (32.7 per cent). However, more residents within the study area have completed year 12 (78.2 per cent), compared to Pennant Hills-Epping (71.2 per cent).

**Mobility**

There is a low to moderate level of private vehicle dependency due to lower rate of vehicle ownership and smaller proportion of residents travelling to work by car than Pennant Hills-Epping. The local study area is well-serviced by train and bus services, with a higher proportion of residents commuting to work using these modes of transport than other areas of Pennant Hills-Epping. Cycling and walking to work is slightly higher in the local study area than the district.

The majority of workers from within the local study area, who travel to work by one mode of transport only, travelled by car (49.8 per cent). This is lower than Pennant Hills-Epping (60.1 per cent). This was followed by workers who travelled only by train (36.8 per cent), bus (4.4 per cent) or tram (0.3 per cent). There were also slightly higher proportions of people who cycled (1.0 per cent) or walked (3.9 per cent), compared to Pennant Hills-Epping (0.6 per cent and 2.6 per cent, respectively).

Overall, the local study area is characterised by:

- **Generally low levels of disadvantage** – due to higher than state average incomes, low rates of unemployment, a primarily ‘white collar’ labour force consisting of professional, clerical and administrative workers, and high levels of education
- **Predominantly family households** – primarily made up of couples with babies and young children, who are more likely to be renting or paying off a mortgage and living in apartments and separate houses
- **Low to moderate levels of car dependency** – with lower rates of car ownership and almost half of workers travelling to work by one form of public transport only (train, bus or tram). Almost half of workers travel to work by car only however this proportion is comparatively smaller than Pennant Hills-Epping.
Parking

Clearways currently exist along both sides of Epping Road. Parking and stopping is restricted during the following periods:

- Monday to Friday 6am to 10am
- Monday to Friday 3pm to 7pm.

On-street parking is permitted along Epping Road during non-clearway periods. About 31 unmarked parallel parking spaces are available on the northern side of Epping Road, while 13 spaces are available on the southern side.

Bus services

The following bus services operate along the proposal site:

- Route M54 Parramatta Interchange to Lane Cove Road
- Route 630 Blacktown to Macquarie Park

Two bus stops are located along Epping Road within the proposal site:

- On the northern side of Epping Road (bus stop 2121214)
- On the southern side of Epping Road (bus stop 2121215).

Social infrastructure

Social infrastructure refers to community facilities, services and networks which help individuals, families, groups and communities meet their social needs, maximise their potential for development and enhance community well-being.

Social infrastructure located in or adjacent to the study area include health facilities, childcare facilities, places of worship, educational institutions, parks and open space and other community facilities (such as community centres, youth outreach, libraries, etc). Figure 6-10 provides a map of the locations of these various facilities. Local social infrastructure is mostly concentrated within Epping Town Centre to the north of Epping Road.

Businesses

Businesses within the works area comprise Tuffy’s Auto Centre, located on Epping Road at the intersection with Blaxland Road. Other businesses immediately adjoining the study area include Epping Eye Surgery (western side of Essex Street), and Westpac (12-22 Langston Place). Other businesses are located in the wider area, including along Blaxland Road and Langston Place.

6.11.3 Potential impacts

Construction

Access – community and businesses

Construction may result in temporary delays and increased travel time for road users that travel on Essex Street, Blaxland Road, Langston Place and Epping Road, including motorists, cyclists and bus passengers. These impacts are considered minor and short-term.
A temporary diversion of a small portion of the footpath on the south-west and north east of Essex Street and the southern side of Epping Road would be required during construction. The footpath on the northern side of Epping Road would maintain pedestrian access in the study area. This may cause a minor, temporary impact to pedestrians.

The westbound bus stop located on the southern side of Epping Road (bus stop 212126) would need to be temporarily relocated as construction progresses, which may result in additional walking distances for commuters. This potential impact is unlikely to be significant as the proposal would be constructed progressively to minimise impacts (refer to section 6.1).

Residents located on the southern side of Epping Road in the proposal site may experience altered access to their properties during construction. This altered access would be short-term and temporary. Pedestrian access would be maintained to properties; however, temporary diversions would be required around work areas.

Access to social infrastructure is unlikely to be impacted by the proposal as these are not located within proximity to the proposal site.

Users of the Essex Street Kindy and Christian Chinese Community Service Centre located on Essex Street to the north-eastern side of the proposal site may experience minor short-term impacts to access during construction.

Impacts on local roads and access are discussed in further detail in section 6.1.3 and Appendix C.

**Acquisition**

The proposal would require partial acquisition and related property adjustments of 14 properties and the total acquisition of one property (refer Figure 3-7). This would be a direct and permanent impact that would affect a small proportion of residents at the local level. The partial acquisitions will result in the loss of mature vegetation and fencing that provides a separation between the home and the road. The affected properties are primarily larger residential blocks with significant rear yards so with partial acquisition most would retain substantial private open space.

Property adjustment plans would be developed during detailed design in consultation with the property owners. Development of these plans would aim to recognise and respond to the vulnerabilities of any affected property owners or users. All land acquisitions would be conducted in accordance with the Roads and Maritime land acquisition policy and compensation would be based on the requirements of the *Land Acquisition (Just Terms) Compensation Act 1991*.

The residential property at 38 Essex Street is owned by Roads and Maritime and currently tenanted. This property may be used as compound C with a site office/staff facilities for this proposal. This would require the existing lease to be terminated.

Partial acquisition of land at the Christian Chinese Community Service Centre located at 41 Essex Street would permanently reduce the length of the driveway (loss of 42m²) and may temporarily reduce access for staff and patrons during the adjustment of the driveway.

The properties at 2-4 Forest Grove are privately owned and currently vacant. Roads and Maritime would not be acquiring these lots but may lease them from the landowner.
for this project. The residence at 2 Forest Grove may need to be demolished to provide space for Compound D. The compound would be vacated at the completion of this project. The residence at 4 Forest Grove may be used as a site office and returned to residential use following completion of the project. Any future development of these lots would be subject to future assessment.

**Business impacts**

Two businesses may be impacted during construction of the proposal. These include an automotive garage (Tuffy’s Auto Centre) on the corner of Epping Road and Blaxland Road and a home business on the corner of Epping Road and Forest Grove.

Tuffy’s Auto Centre would be affected by partial acquisition. The site has vehicle access from Epping Road and Blaxland Road as well as on-site parking allocated to the business. Acquisition would involve a strip acquisition about 30 metres in length and about 3.0 metres wide on the northern boundary of the site. This may result in the loss of up to four parking spaces. The potential use of the parking area as a construction compound (Compound A) may also disrupt its operation.

Potential impacts on these businesses would include the following:

- Loss of business if people avoid the area due to delays and inconvenience caused by construction
- Reduced parking
- Amenity impacts such as noise, dust and vibration.

The potential impacts on these businesses would be temporary and managed by implementing the mitigation measures provided in section 6.11.4.

**Amenity**

Construction of the proposal may result in minor amenity impacts on the local community due to the following:

- Potential increase in construction traffic due to the delivery of plant, materials and construction personnel and disruptions to access
- Increases in noise due to the operation of plant and equipment and increased traffic
- Visual impacts due to construction work
- Visual and noise impacts at construction compounds
- Potential dust disturbance due to exposed soils or removal of existing infrastructure.

These issues have been addressed in other sections of this report, as follows:

- Traffic and access (refer to section 6.1)
- Noise and vibration (refer to section 6.2)
- Visual impacts (refer to section 6.7)
- Air quality (refer to section 6.8)
- Land use and property (refer to section 6.10).
Amenity impacts would be temporary and appropriately managed with the safeguards provided in the above mentioned sections. Amenity in the broader area is unlikely to be impacted by construction as impacts would be localised and limited to areas immediately adjacent to the proposal site. A small number of properties located on side streets (Smith Street and Forest Grove) and Blaxland Road may also experience these temporary amenity impacts to a lesser extent.

Other impacts

Construction activities have the potential to result in temporary disruptions to services (power, water, gas and telecommunications) for neighbouring properties during the relocation of utility services (refer section 3.5). These impacts are considered to be minimal as the disruptions would be short-term in nature and affected residents would be notified of the disruptions by letter in accordance with Roads and Maritime utility relocation requirements.

Operation

Community connectivity

The proposal has the potential for positive operational impacts on the community, by improving accessibility and safety for motorists and pedestrians within the Epping town centre. The proposal would improve:

- Travel time for both cars and bus passengers travelling in a westbound direction by decreasing the number of interruptions occurring along Epping Road and increasing road capacity, leading to reduced travel time and traffic congestion. This is likely to improve the east-west connectivity along Epping Road.
- Access into Epping Road from Essex Street with the additional right turn lane
- Pedestrian access and connectivity across the intersection.

The proposal would deliver one of the infrastructure improvements identified as a prerequisite for future urban growth in the Epping town centre by the Epping Town Centre Study (JBA Planning, 2011) and the Epping Town Centre Urban Activation Precinct Finalisation Report (Department of Planning, 2013). This is considered to be a positive socio-economic impact.

Access

The median strip proposed to be installed along Epping Road between Essex Street and Langston Place would remove the right turn movements into and out of Forest Grove and Smith Street. This would result in altered vehicle travel paths for:

- Local residents of Smith Street and Forest Grove who would need to take longer routes
- Residents of Epping Road (both sides) between Blaxland Road and Essex Street
- Road users going to and from Forest Park currently using Epping Road.

The central median strip proposed on Essex Street may permanently remove the right turn access into and out of six properties, including the Christian Chinese Community Service Centre. This may result in a permanent negative impact. Access would require detours via the local road network of up to 450 metres.
Other local drivers travelling through the area may also experience a minor increase in travel distance in their overall journey from this change to and from places such as Epping Town Centre.

Depending on the distance travelled, some residents of Epping Road, Forest Grove and Smith Street may experience an increase in the distance travelled due to the loss of right turn movements from Epping Road into Forest Grove and Smith Street (refer section 6.1).

The removal of the right turn movement from Langston Place to Epping Road would likely improve travel time for road users and bus passengers by decreasing the number of interruptions occurring along Epping Road, improving local connectivity. For local road users previously heading west from the town centre, this would result in a one kilometre detour via Pembroke Street and Essex Street. With the peak use of this turn being mid-day Saturday, this has the potential to affect local shoppers and visitors to the town centre.

None of the proposed route alterations are expected to have a noticeable impact on existing social infrastructure.

Pedestrian access and safety for local residents in the south-east of the study area may benefit from the introduction of new traffic controlled pedestrian crossings for Essex Street at the intersection of Epping Road and Essex Street. The upgrade of the intersection may also lead to a significant improvement in pedestrian and driver safety, as drivers would be able to safely right turn into Epping Road from Essex Street using new dedicated lanes.

Partial acquisition of land at Tuffy’s Auto Centre on the corner of Epping Road and Blaxland Road has the potential to create a negative impact on its operation due to loss of customer parking spaces. The potential use of the site as a construction compound may also disrupt its operation.

Potential impacts on access are assessed further in section 6.1 and Appendix C.

**Amenity**

Properties located along Epping Road and a small number of properties located on side streets which intersect with Epping Road between Essex Street and Blaxland Road would likely experience varying degrees of amenity impacts during operation including:

- Visual impacts from the loss of the roadside strip of properties along Epping Road including removal of vegetation, fencing and yard areas
- Minor increases in traffic noise and vibration due to potential increase in traffic as a result of improved road capacity.

Partial property acquisition may lead to a reduction in amenity for residents and businesses, as the widening of Epping Road may lead to vehicle traffic being closer to the properties.

The loss of fencing, vegetation and yard areas due to partial property acquisition may be a short-term negative visual impact, which would be addressed by landscaping and restoration work within a neighbourhood already visually dominated by the road corridor.
**Community values**

The proposal may permanently alter the accessibility of the road network for local residents and motorists due to the removal of right turn movements from Langston Place on to Epping Road, Epping Road on to Smith Street and Forest Grove and for residences along Epping Road. This is considered a minor impact as alternative routes such as Essex Street and Blaxland Road are available.

There is community concern about increased traffic and congestion on surrounding local streets from the proposal. The proposal may result in significantly higher traffic volumes during peak periods on Pembroke Street and Essex Street. Potential traffic implications and intersection performance is considered in section 6.1.

The proposal also contributes to the community desire for improved road safety for both pedestrians and motorists. The upgrade of the Epping Road and Essex Street intersection may improve the safety of local residents, bus users, motorists and pedestrians using the intersection.

### 6.11.4 Safeguards and management measures

Mitigation measures provided in Table 6-26 would be implemented to minimise potential socio-economic impacts.

#### Table 6-26 Summary of potential impacts and environmental safeguards – socio-economic

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition impacts</td>
<td>Roads and Maritime would liaise and consult on an ongoing basis with landowners and tenants whose property would be acquired or leased regarding the status and timing of acquisition.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>All property valuations, lease fees and acquisition payments would be carried out in accordance with the Roads and Maritime Services’ <em>Land Acquisition Information Guide</em> (2011) and the <em>Land Acquisition (Just Terms Compensation) Act 1991</em>. Property acquisition plans would be prepared for each of the properties to be acquired as part of the detailed design.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td></td>
<td>Particular attention should be given to ensuring appropriate consultation is undertaken with any vulnerable (elderly or low income) households.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Pedestrian safety</td>
<td>A pedestrian safety assessment is recommended for the Pembroke Street corridor due to the increase in traffic that would occur as a result of the proposal.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>Impact</td>
<td>Environmental safeguards</td>
<td>Responsibility</td>
<td>Timing</td>
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</tr>
<tr>
<td>Construction impacts on the community.</td>
<td>A complaint handling procedure and register would be included in the construction environment management plan.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Construction related amenity impacts</td>
<td>Develop a project communications strategy to include:</td>
<td>Construction Contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td></td>
<td>• Communication with the community with timely and relevant information to enable them to understand the likely nature, extent and duration of vibration, dust and noise impacts and access changes</td>
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<tr>
<td></td>
<td>• Targeted communication with Essex Street Kindy and Christian Chinese Community Service Centre located on Essex Street in regard to timing of the most noise intensive works and in management of adjacent parking and access issues</td>
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</tr>
<tr>
<td></td>
<td>• Particular attention should be given to ensuring any vulnerable (elderly or low income) households are appropriately targeted</td>
<td></td>
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<td></td>
<td>• Communications should include roadside signage, letterbox dropped newsletters, newspaper advertisements, Roads and Maritime web based information, a complaints line, and advice to specific service providers such as community transport and seniors organisations.</td>
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</tr>
<tr>
<td>Construction related traffic changes and impacts to parking</td>
<td>Consultation with local residents, businesses and organisations would be undertaken with regard to timing and duration of works, likely impacts on car parking and alternate routes of travel. For residents and businesses directly impacted by changes to access (in and out of their properties), Roads and Maritime would consult with owners and tenants regarding alternate access arrangements.</td>
<td>Construction Contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Altered pedestrian access on the southern side of Epping Road in the proposal site</td>
<td>Provide timely information to road users with information about changes to access including the bus stop along Epping Road. Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements to maintain safe pedestrian passage within the proposal site.</td>
<td>Construction Contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Changed road network and travel delays for road users</td>
<td>Provide timely information to road users with information about changes to access or travel delays. Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
6.12 Resource use and waste management

Roads and Maritime is committed to ensuring the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2000*. These resource management hierarchy principles, in order of priority are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

By adopting the above principles, Roads and Maritime aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development as outlined in section 8.2.3 of this REF.

6.12.1 Potential impacts

*Resource use*

Construction of the proposal would require the use of a number of resources, including:

- Resources associated with the operation of construction machinery and motor vehicles (this includes the use of diesel and petrol)
- Material required for road surface and pavements (road base, asphalt, spray seal, sand, concrete, aggregate etc)
- Fill required to meet design levels - about 2000 cubic metres of certified fill material would be imported
- Materials required for road signage, street lighting and traffic signals
- Construction water (for concrete mixing and dust suppression).

The initial estimated quantities of these materials that would be required for the proposal are provided in section 3.3.5.

The materials required for construction of the proposal are not currently limited in availability. However, materials such as metal and fuel are non-renewable and would be used conservatively. Excess spoil, not suitable for reuse, would be disposed of in accordance with safeguards and mitigation measures outlined in section 6.12.2.

As discussed in section 3.3.5, the amount of water required for construction is currently unknown but would be sourced from Council water supply.

The management measures outlined in section 6.12.2 to reuse waste on-site would assist in minimising the amount of resources required for construction.

*Waste generation*

The proposal has the potential to generate waste from the following activities:

- Vegetation (potentially including noxious weeds) to be removed as part of the proposal
- Earthworks for road widening outside the existing carriageway
- Building demolition
- Utility adjustments.

Waste streams likely to be generated during construction of the proposal include:

- Excess spoil – about 1000 cubic metres of spoil would be removed from the site
- Building demolition waste
- Green waste as a result of vegetation clearing. Noxious weed material would be separated from native green waste
- Roadside materials (fencing, guide posts, guard rails etc)
- Packaging and general waste from staff (lunch packaging, portable toilets etc)
- Chemicals and oils
- Waste water from wash-down and bunded areas
- Redundant erosion and sediment controls
- Asbestos waste from the removal of asbestos ducts (during property demolition).

The potential to reuse materials would be investigated during detailed design. Unsuitable fill material, demolition waste and excess cut material that cannot be used on-site would be classified in accordance with the Waste Classification Guidelines (DECCW, 2009) and disposed of at an approved materials recycling or waste disposal facility. The same classification and disposal process would be followed in the event that contaminated material is encountered during works relating to the service station site.

6.12.2 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise waste generation.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand on resources</td>
<td>Procurement would endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
| Waste management     | A resource and waste management plan would be prepared and included in the construction environmental management plan. The plan would include the following (as a minimum):  
  - The type, classification and volume of all materials to be generated and used on-site including identification of recyclable and non-recyclable waste in accordance with Waste Classification Guidelines  
  - Quantity and classification of excavated material generated as a result of the proposal (refer Roads and Maritime Service’s Waste Management Fact sheets 1-6, 2012) | Construction contractor | Pre-construction            |
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand on resources</td>
<td>Excavated material would be reused on-site for fill where feasible to reduce demand on resources.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Any additional fill material required would be sourced from appropriately licensed facilities and/or other Roads and Maritime projects, wherever possible.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| Waste minimisation | The following resource management hierarchy principles would be followed:  
• Avoid unnecessary resource consumption as a priority  
• Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)  
• Disposal would be undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). | Construction contractor | Construction |
<p>| Management of green waste | Cleared weed-free vegetation would be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible. | Construction contractor | Construction |
| Spoil management | Excess excavated material would be disposed of at an appropriate facility or reused appropriately for fill on the proposal site. | Construction contractor | Construction |</p>
<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess soil requiring waste disposal</td>
<td>Excess soil requiring waste disposal would first be assessed against the <em>Waste Classification Guidelines- Part 1: Classifying Waste</em> (EPA 2014). Soil samples would be taken from stockpiled material and analysed. Transportation would be undertaken by a licensed contractor capable of transporting the waste and waste would be disposed of to an appropriately licensed waste facility with supporting waste classification documentation.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| Contaminated spoil | A Contamination Management Plan (CMP) will be prepared in accordance with the *Contaminated Land Act 1997* and relevant EPA Guidelines. This plan will be form part of the CEMP and will include at a minimum:  
- Contaminated Land Legislation and guidelines including any relevant licences and approvals to be obtained.  
- Identification of locations of known or potential contamination and preparation of a map showing these locations  
- Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint  
- Contamination management measures including waste classification and reuse procedures and unexpected finds procedures  
- Monitoring and sampling procedure for landfill seepage (leachate)  
- A procedure for dewatering and disposal of potentially contaminated liquid waste  
- In the event that indications of contamination are encountered (known and unexpected, including odorous or visual indicators), work in the area will immediately cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate.  
- A process for reviewing and updating the plan  
The CMP would be reviewed by RMS Senior Environment Officer and RMS Land Management Specialist prior to the commencement of works. | Construction contractor and Roads and Maritime | Pre-construction and construction |
| Waste management | Garbage receptacles would be provided and recycling of materials encouraged. Rubbish would be transported to an appropriate waste disposal facility. | Construction contractor | Construction |
Impact | Environmental safeguards | Responsibility | Timing
--- | --- | --- | ---
All wastes would be managed in accordance with the POEO Act. | Construction contractor | Construction
Portable toilets would be provided for construction workers and would be managed by the service provider to ensure the appropriate disposal of sewage. | Construction contractor | Construction
Noxious weeds removed during work would be managed in accordance with the Department of Primary Industries’ requirements that relate to its classification status. | Construction contractor | Construction
Site inductions would occur and be recorded by a Site Supervisor to ensure staff are aware of waste disposal protocols. | Construction contractor | Construction
Wastewater contamination of soils and water | A dedicated concrete washout facility would be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility. | Construction contractor | Construction

6.13 Hazards and risks

Existing hazards and risks in the vicinity of the proposal site are generally associated with operation of the existing road network.

6.13.1 Potential impacts

Construction

Key hazards and risks for this proposal are activities within the vicinity of the service station. Construction activities which may potentially expose contaminated material are discussed within section 6.3. These include excavation within an area of a former service station which could encounter contaminated fill or groundwater or cause release of odours. This risk would be managed with the implementation of safeguards as outlined within section 6.3.3.

Other hazards and risks associated with construction include:

- Spills or leakage of contaminants such as fuels, chemicals and hazardous substances entering surface and groundwater or contaminating soils
- Discharge of turbid run-off, resulting in pollution of waterways
- Encountering utilities or contaminated material during building demolition or earthwork including asbestos
- Spread of noxious weed material
-Flooding of the area during extreme rain events
- Changed traffic conditions leading to incidents.

An emergency response plan for hazards and risk during construction would be incorporated into the construction environmental management plan.
Management and disposal of the following contaminated materials or hazardous substances may be required for the construction works and if demolition is required for compound D (requiring the demolition of 2 Forest Grove) and 36 Essex Street:

- Hydrocarbons (TRH, BTEX),
- Solvents and pesticides
- Asbestos within building materials
- Synthetic mineral fibres
- Lead based paints and lead dust
- PCBs

This risk would be managed with the implementation of safeguards as outlined within section 6.3.3 and section 6.13.2.

**Operation**

Operational hazards and risks relating to the proposal could include:

- Fuel and oil spills during maintenance activities polluting the natural environment.
- Vehicle incidents.

Vehicle crashes are an inherent aspect of the operation of any road. During design of the proposal, Roads and Maritime has applied the requirements of the *Guide to Road Design* (Austroads, 2009) to meet appropriate safety standards.

### 6.13.2 Safeguards and management measures

Mitigation measures provided below would be implemented to ensure potential hazards and risks are minimised.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Management</td>
<td>Emergency response plans would be incorporated into the construction environmental management plan</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Management of demolition activities</td>
<td>Prior to commencement of any demolition activities a pre-demolition hazardous materials survey will be carried out of the building to be demolished to establish the presence of any contaminated materials or hazardous substances which may be impacted by the works and require safe removal and disposal in accordance with relevant Safe Work Australia Codes of Practice and National Standards.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>Management of contaminated materials or hazardous substances</td>
<td>Any contaminated materials or hazardous substances encountered would be classified first and then stored, transported and disposed of in accordance with OEH requirements at an OEH licensed waste facility.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
</tbody>
</table>
### Impact

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
</table>
|        | The handling of asbestos and asbestos work would be carried out in accordance with the following documents published by the Safe Work Australia:  
- ‘Guide to the Control of Asbestos Hazards in Buildings and Structures’.  
- ‘Code of Practice for the Safe Removal of Asbestos’. | Construction contractor | Pre-construction and construction |
|        | The handling and removal of any synthetic mineral fibres would be carried out in accordance with the National Standard for Synthetic Mineral Fibres (Safe Work Australia 1990). | Construction contractor | Pre-construction and construction |

### 6.14 Climate change and greenhouse gases

Climate change refers to the warming temperatures and altered climate conditions associated with the concentration of greenhouse gases in the atmosphere. These changes to future climatic conditions have the potential to impact existing and new road infrastructure.

In 2010 the NSW Government published climate change projections for NSW. The study focused on projections to the year 2050 for rainfall, evaporation and maximum and minimum temperatures as these are the four climate variables considered to most directly affect biophysical systems across the State.

The projected climatic changes by 2050 for the Sydney region of NSW show that rainfall is likely to increase in all seasons except for winter; sea levels are predicted to rise, changing flood frequency; and average daily maximum and minimum temperatures are likely to increase in all seasons by 1.5 to 3.0 °C (DECCW, 2010). Table 6-27 shows the projected climate change in the Sydney region.

#### Table 6-27 Current and projected climate change in the Sydney region

<table>
<thead>
<tr>
<th>Season</th>
<th>Minimum temperatures</th>
<th>Maximum temperatures</th>
<th>Precipitation</th>
<th>Evaporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>2-3°C warmer</td>
<td>2-3°C warmer</td>
<td>10-20% increase</td>
<td>10-20% increase</td>
</tr>
<tr>
<td>Summer</td>
<td>1.5-3°C warmer</td>
<td>1.5-2°C warmer</td>
<td>20-50% increase</td>
<td>10-20% increase</td>
</tr>
<tr>
<td>Autumn</td>
<td>1.5-3°C warmer</td>
<td>1.5-3°C warmer</td>
<td>No significant change</td>
<td>No clear pattern</td>
</tr>
<tr>
<td>Winter</td>
<td>1.5-3°C warmer</td>
<td>2-3°C warmer</td>
<td>10-20% decrease</td>
<td>No clear pattern</td>
</tr>
</tbody>
</table>

**Roads and Maritime Climate Change Plan**

To address the challenge of climate change, Roads and Maritime has developed a Climate Change Plan which includes actions to:

- Reduce Roads and Maritime’s carbon footprint
- Help reduce the carbon footprint of NSW road transport
Adapt the Road and Maritime road transport system to the impacts of climate change

Manage Road and Maritime’s transition to a low carbon economy.

Roads and Maritime also reports its greenhouse gas emissions and direct energy consumption annually to the Office of Environment and Heritage in accordance with the NSW Government Sustainability Policy. The annual report includes information on greenhouse gas emissions from energy usage associated with the operation of Roads and Maritime Services’ properties, street lighting, traffic signals, and vehicles.

6.14.1 Potential impacts

Potential climate change impacts on the proposal

Changes in rainfall patterns and severe weather events may influence the risk of erosion impacts on the proposal site and associated sediment loss. Severe weather events may also influence the construction schedule.

In the long-term, increases in temperature may affect the integrity of pavement and other construction elements, either directly or through evaporative changes and then changes to soil moisture content and soil instability which may eventually impact on foundations of structures, softening of pavements, and road rutting.

The proposal is not in a coastal location and would not be directly affected by sea level changes.

Potential impacts of the proposal on climate change

The effect of greenhouse emissions on the climate has been provided to be the main instrument driving increased temperatures and other associated indicators of climate change. Each gas that has been identified by the Intergovernmental Panel on Climate Change has been classified with a global warming potential, the units of which are ‘carbon dioxide equivalents’. Greenhouse gas emissions are also categorised according to the source of emission. Scope one emissions are created directly by a person, for example fuel consumption. Scope two emissions are indirect emissions and include the generation of electricity. Scope three emissions are indirect emissions generated by the wider economy for example coal mining and export.

Construction

Construction of the proposal would result in greenhouse gas emissions being produced, including:

- Release of stored carbon dioxide from vegetation removal (decomposition of cleared vegetation)
- Carbon dioxide and nitrous oxide from liquid fuel use in plant and vehicles (diesel, petrol) during construction, disposal and transport of materials
- Use of materials such as concrete that have high embodied energy content
- Methane from landfilling any carbon based waste, and possible fugitive emissions from the use of natural gas
- On-site electricity usage.
It is anticipated that operation of construction equipment would be the main emissions source during construction.

Vegetation removal can result in an increase in carbon dioxide in the atmosphere as the carbon would no longer be stored in this vegetation through carbon sequestration. However, the potential loss of a small amount of vegetation as a result of the proposal is considered to result in a negligible increase in carbon dioxide.

**Operation**

During operation, the proposal may alleviate vehicle emissions through increased efficiency of the road network, reducing congestion and travel times. A minimal amount of emissions would be generated during maintenance activities (which would be frequency and intensity dependant) and through the use of electricity for street lighting and new traffic signals.

### 6.14.2 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential impacts on climate changes and greenhouse gas generation.

<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>The use of alternative fuels and power sources for construction plant and equipment would be investigated and implemented, where appropriate.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>The energy efficiency and related carbon emissions would be considered in the selection of vehicle and plant equipment.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td></td>
<td>Materials would be delivered as full loads and local suppliers would be used where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Construction equipment, plant and vehicles would be appropriately sized for the task.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Equipment would be serviced frequently to ensure they are operating efficiently.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Vehicles and machinery would not be left idling when not in use.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Clearing of vegetation would be minimised where possible.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

### 6.15 Cumulative impacts

Cumulative environmental impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of other external projects. Roads and Maritime is required under Clause 228(2) of the EP&A Act to take into account potential cumulative impacts as a result of the proposal.

This section describes the cumulative impacts and benefits likely to arise from the combination of construction and operation of the proposal with other projects being carried out in the area.
Based on a search of the major projects register maintained by the Department of Planning and Environment, the following projects are likely to be constructed at the same time as the proposal:

- North West Rail Link (Epping Services Facility)
- Epping to Thornleigh Third Track
- Epping to Chatswood railway upgrade
- Beecroft Road and Carlingford Road intersection upgrade in Epping.

The rail projects listed above involve major construction compounds and sites, which are located off Beecroft Road to the north of the proposal site.

**North West Rail Link**

The North West Rail Link project involves the construction of eight new train stations, provision of 4000 commuter car parking spaces, and the construction of two 15 kilometre tunnels from Bella Vista to Epping.

The North West Rail Link site (Epping Services Facility) is situated to the immediate west of the proposal site and about 50 metres to the north of the Beecroft Road and Carlingford Road intersection (Lots 21 and 22 DP 700406 and Lot 786 DP 752028). The site will be one of the major spoil handing sites for the excavation of tunnels and will be in use until early 2018.

Tunnel boring and construction is expected to start in late 2014 and would be undertaken 24 hours per day during this period. Heavy vehicles will remove spoil via a heavy vehicle access entry on Beecroft Road from 7am to 10pm. There would therefore be a large number of heavy vehicles accessing this site to remove spoil. Noise barriers have been erected around the site to mitigate noise impacts.

**Epping to Thornleigh Third Track**

The Epping to Thornleigh Third Track project involves the construction of six kilometres of new and upgraded track within the rail corridor between Epping and Thornleigh stations on the western side of the existing tracks. The new (third) track will separate northbound freight from all-stops passenger train movements along the steep incline between Epping and Thornleigh.

One of the construction sites for the project is located about 400 metres to the north of the proposal site. The site will be used for the construction of an overbridge across the M2 Motorway and is likely to be in use until about 2016.

**Epping to Chatswood railway upgrade**

Transport for NSW plans to upgrade the Epping to Chatswood railway line to modern metro standards as part of the Sydney Metro Northwest project. This will involve converting a major upgrade, including overhauling the stations (including Epping), 26 km of new cabling, power and signalling systems and customer improvements such as platform screen doors.

In 2018, buses will replace trains for around seven months between Epping and Chatswood, while early works are carried out. A temporary transport plan will be developed to manage this process. Special works will be implemented across the temporary bus routes to:
• Provide extra bus stops, shelters and seats
• Provides special signage at key intersections
• Introduce bus only signal phasing at selected locations
• Temporarily remove some on-street car parking to make way for extra bus parking.

**Beecroft Road and Carlingford Road intersection upgrade**

Roads and Maritime are also proposing to upgrade the intersection of Beecroft Road and Carlingford Road, which is located about 0.5 kilometres to the north-west of the western end of the proposal site. The key features of the proposal include:

• Widening Beecroft Road on the eastern side by about two metres over a length of about 100 metres
• Providing an additional right turn lane from Beecroft Road to Carlingford Road
• Providing a third southbound lane on Beecroft Road, over a length of 40 metres, with a 60 metre diverge taper length
• Modifying the left turn movement from Carlingford Road to Beecroft Road by widening the left turn slip lane by up to five metres over a length of 30 metres
• Providing a new signalised pedestrian crossing on the western side of the intersection
• Property boundary structures, utility and property adjustments.

**Local developments**

A search of development applications for Hornsby LGA since June 2014 has identified a number of application proposals close to the proposal area. Small developments such as single property renovations are not considered on a scale to result in cumulative impacts. Table 6-28 lists larger construction projects which have been lodged with Council.

**Table 6-28 Local development applications**

<table>
<thead>
<tr>
<th>Address</th>
<th>Proposal</th>
<th>DA reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Forest Grove, Epping</td>
<td>Residential - new multi unit - residential flat building comprising 37 units</td>
<td>346/2015</td>
</tr>
<tr>
<td>7 Forest Grove, Epping</td>
<td>Residential - new multi unit - residential flat building comprising 73 units</td>
<td>358/2015</td>
</tr>
<tr>
<td>31 Forest Grove, Epping</td>
<td>Demolition of existing structures and construction of a new multi unit residential flat building comprising 55 units</td>
<td>153/2015</td>
</tr>
<tr>
<td>1 Forest Grove, Epping</td>
<td>Demolition of existing structures and construction of a new multi unit - residential flat building comprising 36 units - strata subdivision</td>
<td>1606/2014</td>
</tr>
<tr>
<td>15, 17 and 19 Essex Street, Epping</td>
<td>Demolition of existing structures and construction of a five storey residential flat building comprising 80 units with basement car parking</td>
<td>1440/2014</td>
</tr>
<tr>
<td>9 Essex Street, Epping</td>
<td>Demolition of existing structures and construction of a new multi unit - residential flat building comprising 32 units</td>
<td>1110/2014</td>
</tr>
</tbody>
</table>
### Address | Proposal | DA reference
--- | --- | ---
17-25 Epping Road Epping | Demolition of existing structures and construction of two, five storey residential flat buildings comprising 91 units with basement car parking | 1059/2014
11 Forest Grove Epping | Demolition of existing structures and construction of a new multi unit - residential flat building comprising 37 units | 963/2014
23 Epping Road Epping | Demolition of existing structures and construction of a new multi unit - residential flat building comprising 91 units | 1059/2014
6 Epping Road Epping | Demolition of existing structures and construction of a new multi unit - residential flat building comprising 75 units | 635/2014

#### 6.15.1 Potential impacts

Potential cumulative impacts may occur as a result of construction activities occurring simultaneously with the projects listed above. Potential impacts would include:

- Increased traffic travelling through the proposal site and the surrounding road network and associated delays for road users
- Changes to Langston Place / Epping Road intersection to allow a right turn movement for buses
- Construction noise and vibration
- Reduced visual amenity.

Cumulative impacts would be minimised and managed through the application of environmental safeguards and management measures as summarised in sections 6.15.2 and 7.2.

A temporary transport plan for the upgrade the Epping to Chatswood railway line works may require signalling changes to the Langston Place / Epping Road intersection to allow a right turn movement by buses. This would have a temporary effect on the performance of this intersection resulting in increased congestion and queuing.

Developments close to the proposal site would also increase construction vehicles on local roads and result in construction noise. The construction period for local developments is unknown.

Consultation with relevant stakeholders would be undertaken during construction planning to ensure that potential cumulative impacts are minimised. Any additional mitigation measures from consultation would be included in the traffic management plan and noise and vibration management plan.

In the long-term, the proposal would have a positive cumulative impact on travel times, road safety and efficiency, facilitating the anticipated increase in traffic volumes as a result of future traffic predictions and population growth.
6.15.2 Safeguards and management measures

Mitigation measures provided below would be implemented to minimise potential cumulative impacts.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative impacts</td>
<td>The construction environmental management plan would be revised to consider potential cumulative impacts from surrounding development activities as they become known.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Cumulative traffic and access impacts</td>
<td>The traffic management plan would be prepared in consultation with TNSW, the Transport Management Centre and Hornsby Shire Council.</td>
<td>Roads and Maritime and construction contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>Night work</td>
<td>An ‘out of hours work procedure’ would be prepared as part of the construction noise and vibration management plan for the proposal in accordance with the requirements of the <em>Interim Construction Noise Guideline</em> (DECC, 2009) and the Roads and Maritime Services’ <em>Environmental Noise Management Manual Practice</em> (RTA, 2001a) and would consider the cumulative impact from other construction activities occurring in the vicinity of the proposal.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>

6.16 Summary of beneficial effects

The beneficial effects of the proposal would include:

- Contribution to addressing the continued growth and development of the Epping town centre
- Reduced travel times and congestion
- Improved pedestrian access across Essex Street
- Improved intersection performance
- Improved road safety for all road users.

6.17 Summary of adverse effects

The key potential adverse effects of the proposal would include:

- Temporary construction phase traffic impacts, due to increased heavy vehicle movements on the existing road network
- Temporary construction noise experienced by properties adjacent to the proposal site
- Temporary disruptions to traffic flow and access during construction
- Potential to encounter contaminated material during building demolition works and in the vicinity of the auto centre
- Minor impacts to locally significant heritage
- Vegetation removal
- Partial and full property acquisition and the demolition of existing residential properties
- Alterations to structures and vegetation within Essex Street heritage conservation area.
7. **Environmental management**

This section describes how the proposal would 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 QA specifications. A summary of site-specific environmental safeguards is provided as detailed in section 6 and the licence and approval requirements required before construction starts are also listed.

7.1 **Environmental management plans**

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 and a construction environmental management plan would be prepared to describe safeguards and management measures identified. These plans would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

The plans would be prepared before construction of the proposal and must be reviewed and certified by Roads and Maritime’s Environment Officer, Sydney Region, before the start of any on-site work. The construction environmental management plan would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The construction environmental management plan and project environmental management plan would be developed in accordance with the specifications set out in the *RTA QA Specification G36 – Environmental Protection (Management System)*, *RTA QA Specification G38 – Soil and Water Management (Soil and Water Plan)* and *RTA QA Specification G40 – Clearing and Grubbing*.

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 7-2.
7.3 Licensing and approvals

A summary of the licencing and approvals required for the proposal is provided in Table 7-1.

Table 7-1 Summary of licencing and approvals requires

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exception permit under section 139 of the Heritage Acts for works within the area mapped as having moderate archaeological potential</td>
<td>Prior to construction commencing</td>
</tr>
<tr>
<td>No.</td>
<td>Impact</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Traffic and access</td>
</tr>
</tbody>
</table>
| 2.  | Traffic and access      | A detailed traffic management plan would be prepared in accordance with *Traffic Control at Work Sites* (RTA, 2010) and Specification G10 - *Control of Traffic*. The plan would be approved by Roads and Maritime before implementation to provide a comprehensive and objective approach to minimise any potential impacts on road network operations during construction. The traffic management plan would include measures such as:  
- Safe access points to work areas from the adjacent road network  
- Safety barriers where necessary  
- Temporary speed restrictions when necessary  
- Maintaining adequate sight distance  
- Displaying prominent warning signage  
- Minimise the use of local roads by construction vehicles  
The plan would be reviewed when complaints are received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Construction contractor | Pre-construction |
<p>| 3.  | Traffic and access      | Consultation would be undertaken with local bus operators before and during construction. The community would be kept informed about construction through advertisements in the local media and by prominently placed advisory notices or variable message signs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Roads and Maritime      | Pre-construction and construction |
| 4.  | Traffic and access      | Traffic control would be provided to manage and regulate traffic movements during construction. For example, construction and delivery vehicles entering or leaving the site compound and/or stockpile sites would use arterial roads. These movements would be restricted to non-peak traffic periods.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Construction contractor | Construction     |
| 5.  | Traffic and access      | Property access would be maintained at all times, where practicable. Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements. Construction workers would be advised to use public transport since there are limited parking spaces at the potential compound sites. Workers are to be advised on suitable alternative parking locations including the eastern side of Forest Park, along Forest Grove, or on the southern side of Forest Grove.                                                                                                                                                                                                                                                                                                                                            | Construction contractor and Roads and Maritime | 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>6.</td>
<td>Traffic and access</td>
<td>Right turn ban signs would be clearly displayed at Langston Place, Smith Street and Forest Grove.</td>
<td>Roads and Maritime</td>
<td>Operation</td>
</tr>
<tr>
<td>7.</td>
<td>Noise and vibration</td>
<td>Detailed design would consider at-property treatments for sensitive receivers predicted to exceed the <em>Noise Mitigation Guideline</em> (RMS 2014).</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
| 8.  | Noise and vibration        | A construction noise and vibration management plan would be prepared as part of the construction environmental management plan. This plan would include, but not be limited to:  
• A map indicating the locations of sensitive receivers including residential properties  
• Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of *Interim Construction Noise Guidelines* (DECC 2009)  
• A risk assessment to determine potential risk for activities likely to affect receivers (for activities undertaken during and outside of standard working hours)  
• Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements  
• A process for assessing the performance of the implemented mitigation measures  
• A process for documenting and resolving issues and complaints  
• A process for updating the plan when activities affecting construction noise and vibration change  
• Identify in toolbox talks where noise and vibration management is required | Construction contractor | Pre-construction and construction |
| 9.  | Noise and vibration        | An out of hours procedure would be prepared and include as a minimum:  
• Background levels for noise criteria in accordance with the *Interim Construction Noise Guideline* (DECC 2009)  
• Locations of the works  
• Locations of sensitive receivers  
• Predicted noise levels  
• Communications plan  
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact</th>
<th>Environmental safeguards</th>
<th>Responsibility</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Noise and vibration</td>
<td>Where the noise levels are predicted to exceed construction noise management levels after implementation of the general work practices, additional mitigation measures should be considered where feasible and reasonable. Measures may include: • Consultation / specific Notifications • Monitoring • Alternative accommodation</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>11.</td>
<td>Noise and vibration</td>
<td>Construction compounds would be laid out to maximise the distance of noise sources and loading areas from residences with solid structures (sheds etc) placed between residences and noise sources, where possible.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
</tr>
<tr>
<td>12.</td>
<td>Noise and vibration</td>
<td>All equipment would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and would be appropriately maintained to ensure optimum running conditions with periodic monitoring. Noise-emitting plant would be directed away from sensitive receivers where possible. Traffic flow, parking and loading and unloading areas would be planned to minimise reversing movements within the proposal site. Non-tonal reversing beepers (or an equivalent mechanism) would be fitted and used on all construction vehicles and mobile plant regularly used on site.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>13.</td>
<td>Noise and vibration</td>
<td>Site inductions would be provided to train staff on ways to minimise construction noise impacts on-site. Responsible working practices include: • Avoid the use of outdoor radios during the night-time period • Avoid shouting and slamming of doors • Where practical, operate machines at low speed or power and switched off when not being used rather than left idling for prolonged periods • Minimise reversing • Avoid dropping materials from height and avoid metal to metal contact on material.</td>
<td>Construction contractor</td>
<td>Construction</td>
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| 14. | Noise and vibration         | Where non-vibration inducing construction methods are impractical, the following principles from the *Assessing Vibration: A Technical Guideline* (DEC 2006) would be utilised to assist with minimisation of adverse reactions from the community:  
  • Confining vibration generating operations to the least vibration sensitive part of the shift which could be when the background disturbance is highest  
  • Determining an upper level for vibration impact also considering what is achievable using feasible and reasonable mitigation | Construction contractor | Construction   |
| 15. | Noise and vibration         | Compliance vibration monitoring would be undertaken when vibration generating activities occur within the structural damage buffer distances as described in DIN 4150-3 classifications.  
Building condition surveys should be undertaken when vibration generating activities occur within the structural damage buffer distances as described in DIN 4150-3 classifications. | Construction contractor | Construction   |
| 16. | Noise and vibration         | The local community would be contacted and informed of the proposed work, location, duration of work, and hours involved. The contact would be made a minimum five days before work starts. The *Environmental noise management manual* (RTA 2001) Practice note 7 would be followed for road works outside normal working hours. | Construction contractor and Roads and Maritime | Pre-construction and construction |
| 17. | Noise and vibration         | A complaints management procedure would be put in place, with a mechanism for responding to complaints.  
Attended compliance noise or vibration monitoring would be undertaken to confirm the predicted noise or vibration levels upon receipt of a complaint in accordance with the *Interim Construction Noise Guideline* (DECC 2009).  
  • Avoid the use of equipment which generates impulsive noise  
  • Avoid dropping materials from a height  
  • Avoid metal-to-metal contact on equipment  
  • Schedule truck movements to avoid residential streets  
  • Avoid mobile plant clustering near residences and other sensitive land uses. | Construction contractor | Construction   |
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</table>
| 18. | Soils, topography and geology | A soil and water management plan (SWMP) will be prepared as part of the construction environmental management plan in accordance with the requirements of Roads and Maritime Services contract specification G38 prior to the commencement of construction. The SWMP will also address the following:  
- Roads and Maritime Services Code of Practice for Water Management, the Roads and Maritime Services’ Erosion and Sedimentation Procedure  
| 19. | Soils, topography and geology | The SWMP would detail the following as a minimum:  
- Identification of catchment and sub-catchment areas, high risk areas and sensitive areas  
- Sizing of each of the above areas and catchment  
- The likely volume of run-off from each road sub-catchment  
- Direction of flow of on-site and off-site water  
- Separation of on-site and off-site water  
- The direction of run-off and drainage points during each stage of construction  
- Dewatering plan which includes process for monitoring, flocculating and dewatering water from site (ie sediment basin and sumps)  
- A mapped plan identifying the above  
- Include progressive site specific Erosion and Sedimentation Control Plans (ESCPs). The ESCP is to be updated at least fortnightly  
- A process to routinely monitor the BOM weather forecast  
- Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. These controls are to be shown on the ESCPs  
- Provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls | Construction contractor | Pre-construction |
<p>| 20. | Soils, topography and geology | A Contamination Management Plan (CMP) would be prepared in accordance with the Contaminated Land Act 1997 and relevant EPA Guidelines. This would be reviewed by RMS Senior Environment Officer and RMS Land Management Specialist prior to the commencement of works. | Construction contractor | Pre-construction |</p>
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<tr>
<td>21.</td>
<td>Soils, topography and geology</td>
<td>Completion of a hazardous materials surveys and a soil contamination assessment for lead paint, asbestos following building demolition and from underground fuel storage infrastructure relating to the Auto Centre. Procedure would be prepared and implemented to manage any lead paint or asbestos identified following building demolition.</td>
<td>Construction contractor</td>
<td>Pre-construction and construction</td>
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<tr>
<td>22.</td>
<td>Soils, topography and geology</td>
<td>Upon closure of the works compound, site assessment would be undertaken to assess the risk posed by contamination (if any) introduced during use of the works compounds and remediation undertaken as required.</td>
<td>Construction contractor</td>
<td>Construction</td>
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</table>
| 23. | Soils, topography and geology           | Erosion and sediment control measures would be implemented and maintained (in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book)) to:  
  • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets.  
  • Reduce water velocity and capture sediment on site.  
  • Minimise the amount of material transported from site to surrounding pavement surfaces.  
  • Divert clean water around the site. | Construction contractor | Construction                 |
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| 24. | Soils, topography and geology              | Erosion and sediment controls would be implemented before any construction starts and inspected regularly, particularly prior to and after a rainfall event of 10 mm or greater. (including clearing of sediment from behind barriers) and records kept and provided on request. Maintenance work would be undertaken as needed.  
Site stabilisation of disturbed areas would be undertaken progressively as stages are completed.  
All stockpiles would be designed, established, operated and decommissioned in accordance with Roads and Maritime Services’ Stockpile Management Procedures (RTA 2011).  
Controls would be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces.  
Any material transported onto pavement surfaces would be swept and removed at the end of each working shift.  
Excess spoil not required or able to be used for backfilling would be stockpiled in a suitable location before being reused or removed from the site, and disposed of at an appropriately licensed facility.  
A fully equipped emergency spill kit would be kept on-site at all times.  
If an incident (eg spill) occurs, the RMS’s Environmental Incident Classification and Management Procedure is to be followed and the Roads and Maritime Services Contract Manager notified as soon as practicable.  
All staff would be inducted about incident and emergency procedures and made aware of the location of emergency spill kits.  
Machinery would be checked daily to ensure there is no oil, fuel or other liquid leaking from the machinery.  
Any fuel, oils or other liquids stored on site would be stored in an appropriately sized impervious bunded at least 120% larger than the greatest container and in an area least 50 metres away from water bodies.  
Final waste classification is required once the volumes of waste requiring offsite disposal during construction are confirmed. Waste soils should be classified in accordance with the NSW EPA Waste Classification Guidelines (2014)                                                                                                                                                                                                 | Construction contractor         | Construction    |
<p>| 25. | Hydrology, water quality, flooding and drainage | Erosion, sedimentation and contamination measures identified in section 6.3.3 would be implemented.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Roads and Maritime and construction contractor | Pre-construction and construction |</p>
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<tr>
<td>26.</td>
<td>Hydrology, water quality, flooding and drainage</td>
<td>All fuels, chemicals, and liquids would be stored at least 50 metres away from the existing stormwater drainage system and would be stored in an impervious bunded area within the compound site. The refuelling of plant and maintenance of machinery would be undertaken in impervious bunded areas in the designated compound area. Vehicle wash downs and/or concrete truck washouts would be undertaken within a designated bunded area of an impervious surface or undertaken off-site. Low lying areas of construction formations and excavations that collect stormwater would be dewatered in accordance with the Roads and Maritime Services’ <em>Technical Guideline for Dewatering</em>.</td>
<td>Construction contractor</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 27. | Biodiversity | Biodiversity management measures would be included within the construction environmental management plan. Measures would include (but not necessarily be limited to) the following:  
- Fauna handling and vegetation removal would be in accordance with the Roads and Maritime Services’ *Biodiversity Guidelines 2011 (RTA 2011a)*  
- Trees to be retained would be protected during construction, where appropriate  
- Content of toolbox talks and records of attendance  
- Compliance with Roads and Maritime Services’ *Biodiversity Guidelines 2011 (RTA 2011a)*. | Construction contractor     | Pre-construction     |
| 28. | Biodiversity | Declared noxious weeds are to be managed according to requirements under the *Noxious Weeds Act 1993* and *Guide 6 (Weed Management)* of the RTA Biodiversity Guidelines 2011.                                                                                                                   | Construction contractor     | Pre-construction and construction |
| 29. | Biodiversity | If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the *RTA Unexpected Threatened Species Find Procedure in the RTA Biodiversity Guidelines 2011 – Guide 1 (Pre-clearing process)*.  
Erosion and sedimentation mitigation measures would be implemented to minimise any erosion and sedimentation impacts. | Construction contractor     | Construction         |
<p>| 30. | Aboriginal cultural heritage | In the event of an unexpected find of an Aboriginal heritage item (or suspected item), work would cease in the affected area and Roads and Maritime’s Environment Officer, Sydney Region and the Roads and Maritime Aboriginal Cultural Heritage Officer, would be contacted for advice on how to proceed. The Roads and Maritime Services Standard Procedure’ <em>Unexpected Heritage Finds 2015</em> would be followed in the event a potential artefact is uncovered. | Construction contractor     | Construction         |</p>
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<tr>
<td>31.</td>
<td>Non-Aboriginal heritage</td>
<td>If the final design of the proposal changes considerably from that currently proposed, additional assessment may be required.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>32.</td>
<td>Non-Aboriginal heritage</td>
<td>If compound D was preferred, maintain vegetation along the southern property boundary of 4 Forest Grove. An exception (section 139) excavation permit would be required for impacts to the area of moderate archaeological potential at the corner of Blaxland Road and Epping Road.</td>
<td>Roads and Maritime</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>33.</td>
<td>Non-Aboriginal heritage</td>
<td>A construction noise and vibration management plan would be prepared as part of the construction environmental management plan to determine what construction methods would be used in the vicinity of heritage listed items. This would include measures to minimise the likelihood of vibration impacts. Vibration management measures provided in section 6.3.3 would be implemented to minimise structural vibration impacts to heritage items.</td>
<td>Construction Contractor</td>
<td>Pre-construction</td>
</tr>
<tr>
<td>34.</td>
<td>Non-Aboriginal heritage</td>
<td>Any trees or shrubs removed at 38 Essex Street would be reinstated. Any trees, fences, edging and gardens impacted at 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24 Epping Road would be reinstated if practicable at the completion of construction. If any unanticipated archaeological deposits are identified within the study area during construction the Roads and Maritime Services Standard Procedure ‘Unexpected Heritage Finds 2015’ would be followed in the event a potential artefact is uncovered.</td>
<td>Construction Contractor</td>
<td>Construction</td>
</tr>
<tr>
<td>35.</td>
<td>Landscape character and visual impacts</td>
<td>Ensure the design of the proposal is consistent with the Roads and Maritime Services Urban Design Policy. Permanent signage would be located in a manner that does not impede views. Lighting would be designed to minimise light spill into residential properties and sensitive receptors.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
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<tr>
<td>36.</td>
<td>Landscape character and visual impacts</td>
<td>Construction equipment, stockpiles, and other visible elements would be located away from key views to and from the identified visual receptors where feasible. Where this is not feasible, screening measures and practices to keep sites tidy would be implemented. Temporary lighting would be sited and designed to avoid light spill into residential properties and identified sensitive receptors.</td>
<td>Construction contractor</td>
<td>Construction</td>
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<tr>
<td>37</td>
<td>Landscape character and visual impacts</td>
<td>Where visually important vegetation is removed, revegetation would occur where it is safe and practicable to do so. New plantings would incorporate locally occurring species which reflect the landscape character zone (generally transitioning from a greater variety and informal compositions through the residential areas, to more formal and less diverse plantings through the approach to the commercial centre and around commercial uses). New plantings along the shared path or footpath would be selected and positioned such that they do not present safety hazards and reduce casual surveillance from the road and adjoining properties.</td>
<td>Construction contractor</td>
<td>Operation</td>
</tr>
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</table>
| 38  | Air quality                         | An air quality management plan would be prepared as part of the construction environmental management plan. The plan would include but not be limited to:  
• A map identifying locations of sensitive receivers  
• Identification of potential risks/impacts due to the work/activities as dust generation activities  
• Management measures to minimise risk including a progressive stabilisation plan  
• A process for monitoring dust on-site and weather conditions  
• A process for altering management measures as required. | Construction contractor | Pre-construction |
<p>| 39  | Air quality                         | Dust suppression measures would be implemented as per the air quality management plan. Stockpiled materials would be covered, stabilised or stored in areas not subject to high wind. All trucks would be covered when transporting material to and from the site. Work activities would be reprogrammed if the mitigation measures are not adequately restricting dust generation. Works (including the spraying of paint and other materials) will not be carried out during strong winds or in weather conditions where high levels of dust or airborne particulates are likely. Construction plant and equipment would be maintained in a good working condition in order to limit impacts on air quality. Plant and machinery would be turned off when not in use. Local residents would be advised of hours of operation and duration of work and supplied with a contact name and number for queries regarding air quality. | Construction contractor | Construction |
| 40  | Land use and property               | No additional specific safeguards or management measures are required                                                                                                                                                                                                                                                                                                      |                  |          |</p>
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<td>41.</td>
<td>Socio-economic</td>
<td>Roads and Maritime would liaise and consult on an ongoing basis with landowners and tenants whose property would be acquired or leased regarding the status and timing of acquisition. All property valuations, lease fees and acquisition payments would be carried out in accordance with the Roads and Maritime Services’ <em>Land Acquisition Information Guide</em> (2011) and the <em>Land Acquisition (Just Terms Compensation)</em> Act 1991. Property acquisition plans would be prepared for each of the properties to be acquired as part of the detailed design. Particular attention should be given to ensuring appropriate consultation is undertaken with any vulnerable (elderly or low income) households. A pedestrian safety assessment is recommended for the Pembroke Street corridor due to the increase in traffic that would occur as a result of the proposal.</td>
<td>Roads and Maritime</td>
<td>Detailed design</td>
</tr>
<tr>
<td>42.</td>
<td>Socio-economic</td>
<td>A complaint handling procedure and register would be included in the construction environment management plan.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
</tr>
</tbody>
</table>
| 43. | Socio-economic | Develop a project communications strategy to include:  
- Communication with the community with timely and relevant information to enable them to understand the likely nature, extent and duration of vibration, dust and noise impacts and access changes  
- Targeted communication with Essex Street Kindy and Christian Chinese Community Service Centre located on Essex Street in regard to timing of the most noise intensive works and in management of adjacent parking and access issues  
- Particular attention should be given to ensuring any vulnerable (elderly or low income) households are appropriately targeted  
- Communications should include roadside signage, letterbox dropped newsletters, newspaper advertisements, Roads and Maritime web based information, a complaints line, and advice to specific service providers such as community transport and seniors organisations.  
Consultation with local residents, businesses and organisations would be undertaken with regard to timing and duration of works, likely impacts on car parking and alternate routes of travel. For residents and businesses directly impacted by changes to access (in and out of their properties), Roads and Maritime would consult with owners and tenants regarding alternate access arrangements. Provide timely information to road users with information about changes to access including the bus stop along Epping Road. Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements to maintain safe pedestrian passage within the proposal site. | Construction Contractor | Pre-construction and construction |
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<td>44.</td>
<td>Socio-economic</td>
<td>Provide timely information to road users with information about changes to access or travel delays. Where changes to access arrangements are necessary, Roads and Maritime would advise owners and tenants and consult with them in advance regarding alternate access arrangements.</td>
<td>Construction Contractor</td>
<td>Construction</td>
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<td>45.</td>
<td>Resource use and waste management</td>
<td>Procurement would endeavour to use materials and products with a recycled content where that material or product is cost and performance effective.</td>
<td>Construction contractor</td>
<td>Pre-construction</td>
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| 46. | Resource use and waste management | A resource and waste management plan would be prepared and included in the construction environmental management plan. The plan would include the following (as a minimum):

1. The type, classification and volume of all materials to be generated and used on-site including identification of recyclable and non-recyclable waste in accordance with *Waste Classification Guidelines*
2. Quantity and classification of excavated material generated as a result of the proposal (refer Roads and Maritime Service’s *Waste Management Fact sheets 1-6, 2012*)
3. Interface strategies for cut and fill on-site to ensure re-use where possible
4. Strategies to ‘avoid’, ‘reduce’, ‘reuse’ and ‘recycle’ materials
5. Classification and disposal strategies for each type of material
6. Destinations for each resource/waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility
7. Details of how material would be stored and treated on-site
8. Identification of available recycling facilities on and off-site
9. Identification of suitable methods and routes to transport waste
10. Procedures and disposal arrangements for unsuitable excavated material or contaminated material including asbestos waste
11. The types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register.
12. Site clean-up for each construction stage. | Construction contractor | Pre-construction |
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<tr>
<td>47.</td>
<td>Resource use and waste management</td>
<td>Any additional fill material required would be sourced from appropriately licensed facilities and/or other Roads and Maritime projects, wherever possible.</td>
<td>Construction contractor and Roads and Maritime</td>
<td>Construction</td>
</tr>
</tbody>
</table>
| 48. | Resource use and waste management | Excavated material would be reused on-site for fill where feasible to reduce demand on resources. The following resource management hierarchy principles would be followed:  
  • Avoid unnecessary resource consumption as a priority  
  • Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)  
  • Disposal would be undertaken as a last resort (in accordance with the *Waste Avoidance and Resource Recovery Act 2001*).  
  Cleared weed-free vegetation would be chipped and reused on-site as part of the proposed landscaping and to stabilise disturbed soils where possible.  
  Excess excavated material would be disposed of at an appropriate facility or reused appropriately for fill on the proposal site.  
  Excess soil requiring waste disposal would first be assessed against the *Waste Classification Guidelines-Part 1: Classifying Waste* (EPA 2014). Soil samples would be taken from stockpiled material and analysed. Transportation would be undertaken by a licensed contractor capable of transporting the waste and waste would be disposed of to an appropriately licensed waste facility with supporting waste classification documentation.  
  Garbage receptacles would be provided and recycling of materials encouraged. Rubbish would be transported to an appropriate waste disposal facility.  
  All wastes would be managed in accordance with the POEO Act.  
  Portable toilets would be provided for construction workers and would be managed by the service provider to ensure the appropriate disposal of sewage.  
  Noxious weeds removed during work would be managed in accordance with the Department of Primary Industries’ requirements that relate to its classification status.  
  Site inductions would occur and be recorded by a Site Supervisor to ensure staff are aware of waste disposal protocols.  
  A dedicated concrete washout facility would be provided during construction so that run-off from the washing of concrete machinery and equipment can be collected and disposed of at an appropriate waste facility. | Construction contractor | Construction        |
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</table>
| 49. | Resource use and waste management | A Contamination Management Plan (CMP) will be prepared in accordance with the *Contaminated Land Act 1997* and relevant EPA Guidelines. This plan will be form part of the CEMP and will include at a minimum:  
  • Contaminated Land Legislation and guidelines including any relevant licences and approvals to be obtained.  
  • Identification of locations of known or potential contamination and preparation of a map showing these locations  
  • Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint  
  • Contamination management measures including waste classification and reuse procedures and unexpected finds procedures  
  • Monitoring and sampling procedure for landfill seepage (leachate)  
  • A procedure for dewatering and disposal of potentially contaminated liquid waste  
  • In the event that indications of contamination are encountered (known and unexpected, including odorous or visual indicators), work in the area will immediately cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate.  
  • A process for reviewing and updating the plan  
  The CMP would be reviewed by RMS Senior Environment Officer and RMS Land Management Specialist prior to the commencement of works. | Construction contractor and Roads and Maritime | Pre-construction and construction |
<p>| 50. | Hazards and risks               | Emergency response plans would be incorporated into the construction environmental management plan | Construction contractor           | Pre-construction    |</p>
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| 51. | Hazards and risks                          | Prior to commencement of any demolition activities a pre-demolition hazardous materials survey will be carried out of the building to be demolished to establish the presence of any contaminated materials or hazardous substances which may be impacted by the works and require safe removal and disposal in accordance with relevant Safe Work Australia Codes of Practice and National Standards. Any contaminated materials or hazardous substances encountered would be classified first and then stored, transported and disposed of in accordance with OEH requirements at an OEH licensed waste facility. The handling of asbestos and asbestos work would be carried out in accordance with the following documents published by the Safe Work Australia:  
  • ‘Guide to the Control of Asbestos Hazards in Buildings and Structures’.  
  • ‘Code of Practice for the Safe Removal of Asbestos’.  
  The handling and removal of any synthetic mineral fibres would be carried out in accordance with the National Standard for Synthetic Mineral Fibres (Safe Work Australia 1990). | Construction contractor | Pre-construction and construction |
<p>| 52. | Climate change and greenhouse gases        | The use of alternative fuels and power sources for construction plant and equipment would be investigated and implemented, where appropriate.                                                                                     | Construction contractor | Pre-construction            |
| 53. | Climate change and greenhouse gases        | The energy efficiency and related carbon emissions would be considered in the selection of vehicle and plant equipment.                                                                                                     | Construction contractor | Pre-construction            |
| 54. | Climate change and greenhouse gases        | Materials would be delivered as full loads and local suppliers would be used where possible. Construction equipment, plant and vehicles would be appropriately sized for the task. Equipment would be serviced frequently to ensure they are operating efficiently. Vehicles and machinery would not be left idling when not in use. Clearing of vegetation would be minimised where possible. | Construction contractor | Construction                |
| 55. | Cumulative impacts                         | The construction environmental management plan would be revised to consider potential cumulative impacts from surrounding development activities as they become known.                                                      | Construction contractor | Pre-construction            |
| 56. | Cumulative impacts                         | The traffic management plan would be prepared in consultation with TfNSW, the Transport Management Centre and Hornsby Shire Council.                                                                                       | Roads and Maritime and construction contractor | Pre-construction            |</p>
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<tr>
<td>57.</td>
<td>Cumulative impacts</td>
<td>An ‘out of hours work procedure’ would be prepared as part of the construction noise and vibration management plan for the proposal in accordance with the requirements of the <em>Interim Construction Noise Guideline</em> (DECC 2009) and the Roads and Maritime Services’ <em>Environmental Noise Management Manual Practice</em> (RTA 2001a) and would consider the cumulative impact from other construction activities occurring in the vicinity of the proposal.</td>
<td>Construction contractor</td>
<td>Construction</td>
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8. **Conclusion**

This section 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 principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

8.1 **Justification**

The proposal is considered to be consistent with a number of national, State and local strategies and plans, including:

- Epping Town Centre Study.
- Epping Town Centre Urban Activation Precinct planning.
- Metropolitan Plan for Sydney 2036.
- Draft North Subregional Strategy.
- NSW 2021: A plan to make NSW number one.
- NSW Government State Infrastructure Strategy.
- NSW Long Term Transport Master Plan.

The proposal is considered to be justified as it would:

- Upgrade Epping Road and the Essex Street intersection in accordance with the recommendations of the *Epping Town Centre Study* (JBA Planning, 2011) and planning for the Epping Town Centre Urban Activation Precinct.
- Provide some of the road improvements required as a prerequisite for future urban growth in the Epping town centre, as proposed by the *Epping Town Centre Urban Activation Precinct Finalisation Report* (Department of Planning, 2013).
- Address congestion issues on Epping Road leading to improved efficiency and travel times.
- Improve intersection performance.
- Improve road safety for all road users.

While there would be some environmental impacts as a consequence of the proposal, they have been avoided or minimised wherever possible through design and site-specific safeguards summarised in section 7. The beneficial effects listed in section 6.17 are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal (refer section 6.18).
## 8.2 Objects of the Environmental Planning and Assessment Act 1979

Table 8-1 provides a summary of the proposal against the objects of the EP&A Act.

### Table 8-1 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 is needed to improve traffic flows and access to the Epping town centre. It is needed to fulfil the commitments of the NSW Government, as confirmed by the 2012/13 budget, to improving the road network within and in the vicinity of the town centre. A number of mitigation measures would be implemented to minimise any environmental impacts associated with the proposal.</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 improve travel times and cater for likely future traffic growth in the area.</td>
</tr>
<tr>
<td>5(a) (iii) To encourage the protection, provision and co-ordination of communication and utility services.</td>
<td>Some utilities would need to be relocated or protected during construction. The management of utilities is described in section 3.5.</td>
</tr>
<tr>
<td>5(a) (iv) To encourage the provision of land for public purposes.</td>
<td>The proposal involves work for the purpose of a road, which is for a public purpose.</td>
</tr>
<tr>
<td>5(a) (v) To encourage the provision and co-ordination of community services and facilities.</td>
<td>The proposal involves work for the purpose of a road and would not impact on any community services or facilities. During construction, potential noise impacts may be experienced at sensitive receivers, however these would be minimised through the implementation of safeguards and management measures outlined in section 6.2.4. The proposal would benefit the community by providing an upgraded road, reducing current congestion and improving travel times and safety.</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>Construction of the proposal would require the clearing or permanent modification of existing vegetation (mainly grass and landscaping). The potential impacts on vegetation, threatened species, population and ecological communities are discussed in section 6.5. The proposal would be designed to minimise the potential for impacts to significant street trees.</td>
</tr>
<tr>
<td>5(a) (vii) To encourage ecologically sustainable development.</td>
<td>Ecologically sustainable development is considered in section 8.2.</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>Consultation with the community and relevant government agencies was undertaken during the development of the proposal. Details of this consultation can be found in section 5.</td>
</tr>
</tbody>
</table>
An objective of the EP&A Act is to encourage ecologically sustainable development. The principles of ecologically sustainable development have been considered throughout development of the proposal and are considered further below.

### 8.2.1 The precautionary principle

This principle states “if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation”.

Evaluation and assessment of alternative options have aimed to reduce the risk of serious and irreversible impacts on the environment. Stakeholder consultation considered issues raised by stakeholders and a range of specialist studies were undertaken for key issues to provide accurate and impartial information to assist in the evaluation of options.

The concept design has sought to minimise impacts on the amenity of the study area while maintaining engineering feasibility and safety for all road users. A number of safeguards have been proposed to minimise potential impacts. These safeguards would be implemented during construction and operation of the proposal. No safeguards have been postponed as a result of lack of scientific certainty.

A construction environment management plan would be prepared before construction starts. This requirement would ensure the proposal achieves a high-level of environmental performance. No mitigation measures or management mechanisms would be postponed as a result of a lack of information.

### 8.2.2 Intergenerational equity

The principle states, ‘the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations’.

The proposal would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations by ensuring road safety is improved, with this being a positive benefit for all road users.

Should the proposal not proceed, the principle of intergenerational equity may be compromised, as future generations would inherit a lower level of service associated with Epping Road near the Epping town centre. Travel times and public safety may be affected by future traffic incidents within the corridor.

### 8.2.3 Conservation of biological diversity and ecological integrity

This principle states the ‘diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival’.

The environment in which the proposal would be undertaken is a highly modified urban environment. However, a thorough assessment of the existing local environment was undertaken to identify and manage any potential impacts of the proposal on local biodiversity. Specific design efforts have been taken to minimise impacts upon locally listed heritage items.

The proposal would not have a significant impact on biological diversity and ecological integrity. A biodiversity assessment and appropriate site-specific safeguards are provided in section 6.5.
8.2.4 Improved valuation, pricing and incentive mechanisms

This principle requires ‘costs to the environment should be factored into the economic costs of a project’.

The REF has examined the environmental consequences of the proposal and identified mitigation measures to manage the potential for adverse impacts. The requirement to implement these mitigation measures would result in an economic cost to Roads and Maritime. The implementation of mitigation measures would increase both the capital and operating costs of the proposal. This signifies that environmental resources have been given appropriate valuation.

The concept design has been developed with an objective of minimising potential impacts on the surrounding environment. This indicates that the proposal is being developed with an environmental objective in mind.

8.3 Conclusion

The proposal involves upgrading about 500 metres of Epping Road, between Blaxland Road and Essex Street in Epping, from a two-lane partially divided carriageway to a four-lane divided carriageway. The proposal also includes upgrading the intersection of Epping Road and Essex Street, relocation of services and new pathways for pedestrians and cyclists to integrate with the surrounding network.

The proposal 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. A number of potential environmental impacts from the proposal have been avoided or reduced during the options assessment and concept design process. The proposal as described in the REF best meets the proposal objectives. However, it would still result in some potential impacts. These would be mainly short-term and temporary, and associated with construction, including potential traffic and access disruptions, noise and vibration impacts, potential impacts on non-Aboriginal heritage items and loss of on-street parking.

The mitigation measures detailed in this REF would ameliorate or minimise these potential impacts. The proposal would also reduce travel times and congestion, improve safety for road users, improve driving conditions and intersection performance and provide pedestrian and cyclist facilities. On balance the proposal is considered justified.

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 sought for the proposal from the Minister for Planning and Infrastructure 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 TSC Act or FM Act 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. Therefore, a referral to the Australian Government Department of the Environment is not required.
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.

Amanda Raleigh
Principal Environmental Planner
GHD Pty Ltd
Date: 6 November 2015

I have examined this review of environmental factors and the certification by Amanda Raleigh from GHD Pty Ltd and accept the review of environmental factors on behalf of Roads and Maritime Services.

Khang Kiat Liaw
Project/Contract Manager
Contract Management Office
Roads and Maritime Services
Date: 9 November 2015
10. References


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<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ARI</td>
<td>The average recurrence interval (ARI) is a measure of the rarity of a rainfall event and is the average, or expected, value of the periods between exceedances of a given rainfall total accumulated over a given duration</td>
</tr>
<tr>
<td>DEC</td>
<td>Department of Environment and Climate</td>
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<td>DECC</td>
<td>Department of Environment and Climate Change</td>
</tr>
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<td>DECCW</td>
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<td>Department of Planning</td>
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<tr>
<td>DPI</td>
<td>Department of Primary Industries</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</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> Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process</td>
</tr>
<tr>
<td>FM Act</td>
<td><em>Fisheries Management Act 1994 (NSW)</em></td>
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<tr>
<td>GHD</td>
<td>GHD Pty Ltd</td>
</tr>
<tr>
<td>ISEPP</td>
<td><em>State Environmental Planning Policy (Infrastructure) 2007</em></td>
</tr>
<tr>
<td>LEP</td>
<td>Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&amp;A Act</td>
</tr>
<tr>
<td>LoS</td>
<td>The level of service is the standard measure used to assess the operational performance of the network and intersections. There are six levels of service from LoS A to LoS F, with LoS A representing the best performance and LoS F the worst</td>
</tr>
<tr>
<td>MNES</td>
<td>Matters of national environmental significance</td>
</tr>
<tr>
<td>NCA</td>
<td>Noise catchment area</td>
</tr>
<tr>
<td>Proposal site</td>
<td>The area that would be directly impacted by the proposal</td>
</tr>
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<td>REF</td>
<td>Review of environmental factors</td>
</tr>
<tr>
<td>RMS</td>
<td>Roads and Maritime Services</td>
</tr>
<tr>
<td>RTA</td>
<td>NSW Roads and Traffic Authority which now forms part of Roads and Maritime</td>
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<td>RTA QA Specifications</td>
<td>Specifications developed by Roads and Maritime for use with roadwork and bridgework contracts let by Roads and Maritime</td>
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<tr>
<td>TSC Act</td>
<td><em>Threatened Species Conservation Act 1995 (NSW)</em></td>
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