ALBION PARK RAIL BYPASS

Road corridor review

December 2013
Executive summary

Background

The Princes Motorway / Princes Highway (M1/A1) route is a major commuter, tourist, and freight road connecting Sydney and Wollongong to the Illawarra, the South Coast and Victoria.

Roads and Maritime Services (Roads and Maritime) has undertaken substantial upgrades in the last 10 years to improve the route between Wollongong and Nowra.

In the mid 1990s, the then Roads and Traffic Authority (RTA, now incorporated in Roads and Maritime) undertook a study to identify a preferred route for an upgrade of the route between Yallah and Oak Flats, about 20 kilometres south of Wollongong. The study identified a preferred road corridor that would involve an extension of the M1, which would bypass the Princes Highway and the township of Albion Park Rail (see Figure A).

To reserve the land for the future bypass, the proposed road corridor was included in the Wollongong City and Shellharbour City Council local environmental plans (LEPs), as it is located within both local government areas. (In this report, the corridor is called the ‘LEP corridor’.) At the time, RTA (now Roads and Maritime) advised the local community that construction of the preferred route would be unlikely to take place within 15 years as traffic volumes were not sufficient to justify investment in the project.

Purpose of the road corridor review

The purpose of this review is to:

• Identify the existing and future problems along the Princes Motorway / Princes Highway between Yallah and Oak Flats.

• Undertake an assessment of the LEP corridor to determine if it remains a suitable location for the future bypass of Albion Park Rail.

• Identify the next steps for the project to progress planning for the Albion Park Rail bypass.

Approach to the road corridor review

This road corridor review of the LEP corridor involved:

• Reviewing the route selection study undertaken in 1996.

• Examining the key physical and engineering features of the LEP corridor to ensure the bypass can meet current road design standards.

• Analysing the traffic and transport performance of the LEP corridor. This included the consideration of current and future traffic volumes, travel times, and the proportion of trips that would use the bypass. This included forecasting the future performance of the current road network should the bypass not be constructed.

• Assessing the economic value and benefits that the bypass would bring to the community and the economy.

• Assessing the LEP corridor in terms of environmental, community and social issues and considerations.
Problem definition

The Princes Motorway (M1) joins the Princes Highway (A1) at Yallah. Between Yallah and Oak Flats, the highway passes through the township of Albion Park Rail. The following issues affect driving conditions on this section of the highway:

- Heavy congestion:
  The M1/A1 route between Yallah and Oak Flats is heavily congested during the morning and afternoon peak traffic periods and in peak holiday periods, causing long delays. The traffic volumes are steadily increasing with a high proportion of through vehicles undertaking trips within the Illawarra and for longer journeys especially for freight and tourist trips. The numerous traffic
lights and intersections along the existing route exacerbate the stop-start traffic conditions. A substantial portion of the peak hour traffic travelling on the existing route is through traffic, conflicting with local trips.

- Significant current and planned development:
  Since 1996, the Illawarra and south coast population has grown substantially. Within the next 30 to 50 years, development is planned at Calderwood, West Dapto, Tullimbar and Tallawarra. This would add up to 30,000 new home sites, and increase traffic volumes along the existing route.

- Flooding:
  Flooding causes the full closure of the Princes Highway south of Station Road and the Illawarra Highway north of Taylor Road for an average of 0.5 and 4.5 days a year, respectively.

- Inconsistent driving conditions:
  Motorists experience a high-speed environment north of Yallah and south of Oak Flats. Lower speeds are experienced in between the two suburbs. The change of traffic conditions creates frustration and reduces travel efficiency.

- Town Bypass:
  Roads and Maritime has undertaken a series of upgrades on the M1/A1 route between Sydney and just south of Nowra. Much of this work has been completed, is under construction, or is in planning. The bypass of Berry will be completed by 2018, leaving Albion Park Rail as the only town between Heathcote in Sydney and Bomaderry just north of Nowra that has not been bypassed. Similarly Albion Park Rail is the only place on the M1/A1 route with traffic lights between Heathcote and Bomaderry.

- Road safety:
  The Princes Highway between Yallah and Oak Flats is experiencing a high and increasing number of crashes. The frequency of crashes is expected to worsen as traffic on the highway increases in future years.

**Key findings of the road corridor review**

The road corridor review found that if no action is taken to improve traffic flow on the highway, the following is likely to occur:

- Major congestion during peak periods at a number of key intersections in the next five years, extending to a large part of the day over the next 20 years.

- The traffic conditions on the Princes Highway are expected to reach Level of Service E or F by 2046, partly due to substantial additional development planned in the surrounding area.

- Travel times on the route would substantially increase to 44 minutes in the northbound peak and 24 minutes in the southbound peak direction by 2046.

- Crashes are expected to increase in the future.

The road corridor review also confirmed that the LEP corridor is suitable for the bypass of Albion Park Rail. The review confirms that the corridor would perform well when assessed against a range of technical and environmental criteria (refer section 5 of the main report).
Benefits of the LEP corridor

Constructing the Albion Park Rail bypass would:

- Divert a substantial proportion of through traffic onto the bypass, allowing the existing Princes Highway to mainly cater for local traffic. This would:
  - Improve travel times for through and local traffic, and reduce driver frustration.
  - Improve the reliability of journey times. This would be particularly important for trips during peak travel periods.
  - Provide consistent travel conditions for through traffic.
- Increase the road capacity of the M1/A1 route: This would support population growth in West Dapto, Calderwood, Tullimbar and Tallawarra.
- Maximise the benefits of upgrading the M1/A1 corridor between Sydney and Nowra by bypassing the only traffic lights along the route between Heathcote and Bomaderry.
- Reduce traffic volumes on the Princes Highway through Albion Park Rail. This would improve local amenity and access, and reduce other traffic related impacts, such as noise for nearby residents.
- Improve flood immunity: The bypass would include the removal of a section of the Illawarra Highway near the Illawarra Regional Airport that is highly susceptible to flooding and improve the flood immunity of the Princes Highway.

Issues to consider

The LEP corridor is largely located on rural land, which would minimise social and environmental impacts. Overall, the likely impacts would be comparable to those on other upgrade projects on the M1/A1 route, and these potential impacts would be minimised and managed accordingly.

The following environmental, social and economic issues will be further investigated as part of planning for the bypass:

- Biodiversity considerations:
  - Three endangered ecological communities have been identified in the LEP corridor.
  - The LEP corridor crosses Frazers Creek, Macquarie Rivulet and Duck Creek. Bridges would need to be built across these creeks.
- Social and heritage considerations:
  - Recreation facilities, including walking tracks, public reserves and sporting fields.
  - Views of the escarpment and towards Lake Illawarra.
  - Two Aboriginal heritage sites and one Potential Archaeological Deposit are within the LEP corridor.
  - Six locally listed non-Aboriginal heritage items are within the LEP corridor.
  - Connectivity for motorists and pedestrians between Albion Park and Albion Park Rail.
- Economic considerations:
• An Albion Park Rail bypass may impact businesses dependent on passing traffic along the existing Princes Highway.

Roads and Maritime will seek to minimise and mitigate environmental, social and economic impacts during the future planning the bypass. Roads and Maritime considers that the bypass could be built with acceptable social, economic and environmental impacts.

Next steps

In the next phase of work, Roads and Maritime will:

• Recomence the community engagement process. The community will have opportunities to talk to the project team about the report and the project next steps in early 2014. Details will be available in early 2014.

• The community will have an opportunity to provide input and comments on the design during future stages of planning for the bypass.

• Further investigate potential interchange locations and their design.

• Further investigate the route near Croom Regional Sporting Complex to ensure that the concept road design can incorporate current road design standards and potentially shorten the route to improve its performance by reducing travel distances and times.

• Further investigate key issues, such as flooding, environmental, and geotechnical aspects. The preliminary environmental assessment was based on a desktop analysis. Further research and detailed ecological surveys, including field investigations, are required to confirm the findings. This would include further studies to identify potential impacts on the threatened Eastern Flame Pea. RMS will seek to minimise any potential impacts of the proposed bypass and manage any remaining impacts.

• Further investigate the potential impact of the bypass on the Aboriginal heritage sites and Potential Archaeological Deposits and Non-Aboriginal heritage.

Roads and Maritime will keep the community informed of ongoing investigations through newsletters, the project web site (www.rms.nsw.gov.au/roadprojects/apr), and through coverage in the local and regional media.
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## Appendices

Appendix A Strategic Design for LEP corridor

Appendix B Albion Park Rail Bypass: Traffic Study (Bitzios Consulting)

Appendix C Yallah to Oak Flats Road Upgrade –Stage 2 PACHCI Aboriginal Archaeological Survey Report (Artefact Heritage)
1 Introduction

1.1 Background

Over the last 30 years, Roads and Maritime Services (Roads and Maritime) has undertaken substantial work to improve the route comprising the Princes Motorway (M1) / Princes Highway (A1) between Wollongong and Nowra.

Roads and Maritime is also planning and constructing a number of projects to further improve the route into the future. See Figure 1.1.

In the mid 1990s, the then Roads and Traffic Authority (RTA, now incorporated in Roads and Maritime Services, and now referred to as Roads and Maritime in this document) undertook a route selection study to identify a preferred route between Yallah and Oak Flats to provide a four lane divided road suitable for 100km/h (Connell Wagner, 1996). The route selection study concluded in 1996 with the announcement of a preferred road corridor between Yallah and Oak Flats that would bypass the existing Princes Highway and the township of Albion Park Rail to the west (see Figure 1.2). Following the study, the project became known in the region as the Albion Park Rail bypass.

This road corridor was then included in the Wollongong City and Shellharbour City Council local environmental plans (LEPs) (as it is located within both local government areas), reserving the land for the future bypass. In this report, the corridor is now called the ‘LEP corridor’.

In 1995, during the initial consultation process, Roads and Maritime advised the local community that: “Construction of the preferred route is unlikely to take place within the next 15 years”.

In general terms, the LEP corridor would comprise a four-lane divided road with median separation approximately 10.6 kilometres in length, with grade separated interchanges and a posted speed limit of 100 or 110 km/h. The LEP corridor would bypass the Albion Park Rail town centre.

1.2 Purpose of this road corridor review

The purpose of this review is to:

- Identify the traffic and transport problems along the Princes Motorway / Princes Highway between Yallah and Oak Flats.
- Undertake an assessment of the LEP corridor to determine if it is still a suitable location for the Albion Park Rail bypass.
- Identify the next steps for the project.

The report describes the existing situation including the current traffic problem and the predicted traffic conditions on the current road network.

1.3 Study area

The study area for this project is located in Yallah, Albion Park, Albion Park Rail and Oak Flats. The study area is bounded by Duck Creek to the north, the Oak Flats interchange in the south, the Princes Highway in the east and the western extent of the LEP corridor in the west, see figure 1.2.
Figure 1.1 Princes Motorway / Princes Highway upgrade projects

- Bulli Pass upgrade
  - In planning
- Yallah to Oak Flats upgrade
  - In planning
- Oak Flats to Dunmore upgrade
  - Completed October 2009 - $108 million
- North Kiama bypass
  - Completed October 2005 - $179 million
- Kiama on and off ramps
  - Completed 2008/09 - $8 million
- Gerringong upgrade
  - Under construction
- Foxground and Berry bypass
  - In planning
- Berry to Bomaderry upgrade
  - In planning
- Nowra Bridge study
  - (southbound)
  - In planning
- South Nowra upgrade
  - Kinghorne Street to Forest Road
  - Under construction
- Forest Road to Jervis Bay Road
  - Completed December 2008 - $23.5 million
- Conjola Mountain realignment
  - Completed April 2010 - $58 million
- Burrill Lake Bridge
  - In planning
- Termeil Creek realignment
  - In planning
- Nangudga Lake Bridge replacement
  - Completed December 2011 - $3.7 million
- Victoria Creek upgrade
  - Completed January 2013 - $32 million
- Dignams Creek upgrade
  - In planning
- Bega bypass
  - Completed October 2013 - $55 million
- Pambula River Bridge replacement
  - Completed March 2008 - $17 million

LEGEND
- Princes Highway, four lanes
- Princes Motorway, four lanes
- Princes Highway upgrade
- completed, four lanes
- Princes Highway, two lanes
- Princes Highway upgrade
- completed, two lanes
- Princes Highway under
- construction
- In planning
- Town/Suburb

Locations shown on map are a guide only.
Drawing not to scale.
1.4 Approach to the road corridor review

This road corridor review of the LEP corridor involved:

- Examining the key physical and engineering features of the LEP corridor to ensure it could meet relevant design guidelines/standards and RTA requirements for safety and traffic performance while providing value for money. This work considered:
  - Horizontal and vertical radius of road curves.
  - Road gradients.
  - Road cross-section and width requirements.
- Analysing the traffic and transport performance of the LEP corridor including consideration of traffic volumes, travel times, attractiveness and ability to cater for all future planned development. This includes an assessment of future traffic conditions if the bypass is not constructed.
- Assessing the LEP corridor in terms of community, environmental, economic and social issues (likely benefits and adverse impacts). The potential issues considered included Aboriginal and non-Aboriginal (historic) heritage, amenity, land use, property, urban design, road traffic noise, and accessibility.
- Assessing the economic value and benefits that the bypass would bring to the community and the economy.
- Preparing a strategic cost estimate and broad economic analysis to determine road user costs and benefits in developing the LEP corridor.

While community consultation has not recently been undertaken with the community potentially affected by the LEP corridor, likely issues can be identified.
Roads and Maritime carried out the road corridor review with the assistance of independent experts in the areas of Aboriginal cultural heritage, biodiversity, traffic modelling and economic analysis. The review involved both desktop reviews and site visits.

The road corridor review included a multi-disciplinary planning workshop that evaluated the LEP corridor. The workshop was a critical step in the process as it brought together experts from all relevant disciplines. At the workshop, each expert presented their assessment of the corridor and all workshop participants then considered whether or not the corridor would meet the project objectives, and if it is still appropriate for the upgrade of the M1/A1 route.

1.5 Strategic context

The NSW Government has committed to a series of upgrades on the M1/A1 route between Sydney and Jervis Bay Road at Falls Creek, just south of Nowra. Much of this work has been completed, is under construction or is in planning making the section between Yallah and Oak Flats an inconsistent road standard for the M1/A1 route.

The Foxground and Berry bypass has now been approved by the NSW Minister for Planning and Infrastructure and the NSW Government has committed to funding construction. When that bypass is constructed, Albion Park Rail will be the only town between southern Sydney and Bomaderry that has not been bypassed.

Between Sydney and Nowra there are free flowing traffic conditions and limited traffic lights. The only remaining traffic lights between Heathcote and Bomaderry exist at Albion Park Rail. The removal of these on this main north south route would mean that it would be entirely free flowing without stopping for traffic lights.

The need to upgrade the M1/A1 route between Yallah and Oak Flats is mentioned in the following NSW Government reports.

1.5.1 NSW Long Term Transport Master Plan

The NSW Long Term Transport Master Plan (NSW Government, 2012) recognises the need for infrastructure improvements to support the future population growth in the Illawarra region and, in particular, improvements in transport connections between Sydney and the region.

The Master Plan states that in the medium to longer term the NSW Government “will deliver previously identified regional road upgrades to support the planned growth around the new release areas of West Dapto, Calderwood and Tallawarra, including the widening of the F6 (M1) and sections of the Princes (A1) and Illawarra (A48) Highways and a number of new ramps and interchanges on the F6 (M1).”

The Albion Park Rail bypass would be important for providing additional capacity to cater for the proposed land releases, reduce travel times and provide a more consistent journey between Sydney and Nowra by bypassing the only traffic lights between Heathcote and Bomaderry.

The Long Term Transport Master Plan also includes an action to improve regional road safety as part of the Road Safety Strategy for NSW by providing "rural highway upgrades, major arterial road upgrades in growing areas and bypasses of town centres". The proposed bypass would divert traffic from the town centre of Albion Park Rail and reduce the potential for crashes by avoiding a number of intersections and property accesses along the highway.

1.5.2 Illawarra/South Coast Regional Action Plan

The Illawarra/South Coast Regional Action Plan (NSW Government, 2012) focuses
on revitalising the region's economy, improving transport connectivity, delivering local infrastructure and protecting the natural environment.

The report states that the NSW Government will plan for and deliver significant road upgrades across the region including "A planning study for Yallah to Oak Flats (Albion Park Rail upgrade) to be completed by 2015". This study satisfies the Illawarra Regional Action Plan by identifying the suitability of the LEP corridor for the long term use of traffic between Yallah and Oak Flats and outlines a plan for the future stages of the project.

1.5.3 The Illawarra over the next 20 years: A Discussion Paper

The Illawarra over the next 20 years discussion paper is a strategic paper that details the growth in the Illawarra in terms of population, housing supply, economic opportunities, transport and infrastructure needs, and protecting the regions environment and heritage.

The paper has been on display for comment and closed on 11 November 2013 and feedback will be used to develop a draft plan. The discussion paper predicts that 31,300 new homes will be built, 24,250 new jobs will be needed and an additional 52,300 people will be living in the region over the next 20 years. With a heavy dependence on private vehicles in the Illawarra, this growth will result in substantial increases in traffic movements requiring upgrades to transport infrastructure to support this growth including widening of the M1 and sections of the Princes Highway (A1).
2 Problem definition

This chapter provides a description of the Princes Highway between Yallah and Oak Flats. This is followed by a discussion on the consequences to the road network if a bypass is not constructed. The latter half of the chapter provides an overview of the issues along the Princes Motorway (M1) / Princes Highway (A1) route that Roads and Maritime is seeking to address, such as future traffic growth, road safety and flooding.

2.1 The existing road network

The M1/A1 route connects Sydney and Wollongong to the Illawarra, the South Coast and Victoria along the east coast of NSW. The route serves as:

- A commuter route between Sydney, Wollongong and Nowra.
- A local route for residents.
- A major tourist route between Sydney and the South Coast.
- An important freight route for the South Coast.

2.1.1 The Princes Highway

The Princes Highway was originally constructed in the early 1900s. Roads and Maritime has been consistently upgrading the highway so that it can meet contemporary road design standards. It has undertaken substantial upgrades in the last 10 years. This has included the upgrade of the Princes Highway from Oak Flats to Kiama. This section of the highway is a high standard, 100km/h road with restricted access.

Figure 1.1 shows the upgrades recently completed along this section of the highway, and planning underway for future upgrade sections.

South of Kiama, the Princes Highway passes through the township of Berry, where the signposted speed is 50 km/h. Planning to upgrade this section of the route has now been completed and the Berry bypass is scheduled to be completed by 2018.

2.1.2 The Princes Motorway

The Princes Motorway is a high-speed, high capacity road with restricted access and a minimum of four lanes. The majority of the motorway has a signposted speed of 100km/h or above (with some minor exceptions around Wollongong and largely associated with steep grades).

The Motorway starts at Waterfall in the north and takes a more or less parallel route with the Princes Highway until Yallah, where it rejoins the Princes Highway.

Between Wollongong and Yallah, the motorway bypasses a number of town centres such as Figtree, Unanderra and Dapto.

2.1.3 The road network in the study area

The four main roads in the study area are the Princes Motorway, Princes Highway, Illawarra Highway and Tongarra Road (see Figure 2.1).

The section of Princes Motorway / Princes Highway within the study area is about 7.6 kilometres long. There are three distinct sections:

- Princes Motorway southern section to the Illawarra Highway intersection: This 2.5-kilometre section is a four-lane divided road.
• Princes Highway / Illawarra Highway intersection to Tongarra Road intersection (at Albion Park Rail): This 2.7-kilometre section is a four-lane largely undivided road.

• Princes Highway / Tongarra Road intersection to East West Link intersection (at Oak Flats): This 2.4-kilometre section is a four-lane divided road.

The Princes Motorway is a high speed high capacity road with four lanes and extends from the northern boundary of the study area and joins the Princes Highway at Yallah. From Yallah to Oak Flats, the Princes Highway passes through the township of Albion Park Rail through a lower speed urbanised area. The speed limit within the study area varies between 60 and 100 km/h (see Figure 2.1).

Therefore, motorists travelling south through Yallah to Oak Flats experience a range of driving conditions and speed limits.

Interchanges and intersections
There are two interchanges along the route:
• Haywards Bay Interchange (Haywards Bay Drive).
• Oak Flats Interchange (New Lake Entrance Road).

There are six sets of traffic lights at intersections along the route:
• Illawarra Highway (roundabout with traffic lights).
• Airport Road.
• Creamery Road.
• Station Road.
• Tongarra Road.
• Colden Drive.

There are a number of other intersections without traffic lights within the urban area of Albion Park Rail, some of which have restricted turn movements.

2.2 Current traffic conditions in the study area

Traffic on the Princes Motorway / Princes Highway in the study area is characterised by:
• Varying traffic volumes throughout the study area. The annual average daily traffic volumes are shown in Figure 2.2.
• Steadily increasing traffic volumes, with linear growth rates of between about one and two per cent per annum.
• Significant variations in daily traffic flows. Weekdays tend to follow a similar pattern, the northbound movement is the peak direction in the morning and the southbound movement is the peak direction in the evening. The Friday afternoon southbound peak movement tends to be higher than the other days, due to tourist traffic combining with the commuter peak.
• Weekend days show a different traffic pattern to the weekdays with the dominant northbound peak occurring on Sunday afternoons and the southbound peak on Saturday mornings. These weekend peaks are similar to or greater than the weekday peaks.
• A high proportion of regional freight trips. The highway is classified as a B-double route between Wollongong and Nowra. Heavy vehicles comprise about nine per cent of vehicles on the route.

• A high proportion of tourist trips in particular during weekends and holiday periods. This is likely to be contributing to the Friday southbound and Sunday northbound peaks being so high.

• Traffic congestion during the morning and afternoon peak. Travel time surveys conducted in 2013 show that the level of service in the northbound direction reaches E (the second worst level of service see Table 2.1 below) in the morning peak northbound approaching the intersection with the Illawarra Highway. The extent of delays during the morning and afternoon peaks has been gradually increasing, with average travel speeds reducing and travel times generally increasing. Currently it takes 9.5 minutes in the northbound morning peak and 7.5 minutes in the southbound afternoon peak to travel the 7.6 kilometre section of the existing route.

• Seasonal variation in traffic volumes. The weekly volumes can vary by about 25 per cent throughout the year largely due to holiday traffic associated with the peak holiday periods.

• Varying travel speeds during the morning and afternoon peak. The slowest section is between Creamery Road and the Illawarra Highway, where speeds are at least 30 kilometres per hour slower than the speed limit for the dominant traffic flow in both directions.
Table 5.1  Level of service definition

<table>
<thead>
<tr>
<th>LOS</th>
<th>AustRoads Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS F</td>
<td>Forced flow. The amount of traffic approaching a point exceeds that which can pass it. Flow breakdowns occur, and queuing and delays occur.</td>
</tr>
<tr>
<td>LOS E</td>
<td>Traffic volumes are at or close to capacity and there is virtually no freedom to select desired speed and to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdowns in operation.</td>
</tr>
<tr>
<td>LOS D</td>
<td>Approaching unstable flow where all drivers are severely restricted in their freedom to select desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor and small increases in traffic flow will cause operational problems.</td>
</tr>
<tr>
<td>LOS C</td>
<td>Stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience has declined noticeably.</td>
</tr>
<tr>
<td>LOS B</td>
<td>Stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is less than LOS A.</td>
</tr>
<tr>
<td>LOS A</td>
<td>Free flow in which drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of comfort and convenience is excellent.</td>
</tr>
</tbody>
</table>

Figure 2.2  Annual average daily traffic volumes
Substantially reduced traffic speeds during peak holiday periods, when large queues of traffic are being experienced due to increased traffic volumes and local traffic constraints.

A high proportion of through traffic (71 per cent in the morning peak, and 47 per cent in the afternoon peak).

2.3 Future traffic conditions without a bypass

The traffic capacity of the Princes Motorway / Princes Highway between Yallah and Oak Flats is heavily constrained. A high level traffic capacity analysis was undertaken based on current traffic growth rates at key locations that currently cause peak hour traffic congestion. This was done to see what the future traffic conditions would be if the bypass was not constructed. The analysis also looked beyond the peak hour to identify likely traffic congestion throughout the day. The worst performing sections of the study area are outlined below.

Southbound merge on the Princes Motorway

Southbound traffic merging from the Princes Highway (from Dapto) onto the Princes Motorway currently experiences congestion during afternoon peaks. Due to the volume of traffic merging onto the Princes Motorway the through traffic are slowed down by vehicles trying to merge at lower speeds. Congestion occurs during peak holiday periods and, more recently, during commuter peaks when extended delays and queuing have been observed.

If the road conditions stay the same and no bypass is constructed, it is expected that:

- In the next five years, the traffic merge would be at capacity or have major congestion for four hours of the afternoon.
- In 20 years, delays are expected to spread substantially to the majority of the day.

This would mean that the travel time would be increased for those travelling south in the afternoon with queues likely to present for long periods.

Illawarra Highway intersection with the Princes Highway

The Illawarra Highway intersection with the Princes Highway is a roundabout that has been upgraded with traffic lights to reduce the delays and levels of congestion. The most congested movement is the northbound traffic on the Princes Highway that is in direct conflict with the traffic heading south on the Princes Highway turning right onto the Illawarra Highway.

This roundabout now performs significantly better with the traffic lights installed, but it still experiences congestion in the morning peak and afternoon peak. Based on the traffic capacity assessment, if the road conditions stay the same and no bypass is constructed, it is expected that:

- In the next five years, major congestion would occur for five hours of the day.
- In 20 years, major congestion would extend throughout the entire day.

The Illawarra Highway intersection is a key intersection for the northbound traffic as delays to this movement cause flow on effects for the proceeding intersections to the south. Delays for the northbound traffic in this intersection results in a rapid formation of queues and this is expected to increase in the future.
Creamery Road

Creamery Road is the major capacity concern for southbound traffic. This traffic has to wait for both traffic travelling north on the Princes Highway turning right into Creamery Road and those exiting Creamery Road. The southbound traffic experiences major congestion in the afternoon peak.

Parking is located adjacent to the southbound travel lanes south of Creamery Road. These parking spaces are narrow and have a high level of turnover, so the friction arising from vehicles parking and merging with highway traffic results in reduced capacity of the adjacent travel lane on the highway.

If the road conditions stay the same and no bypass is constructed, it is expected that:

- In the next five years, the intersection would be at capacity or experience major congestion that would extend to four hours of the afternoon.
- In 20 years, major congestion would occur for seven hours of the day.

Airport Road intersection

The Airport Road intersection has capacity concerns for northbound traffic travelling on the Princes Highway, which is stopped by traffic turning right into Airport Road travelling south on the Princes Highway as well as traffic exiting Airport Road.

The intersection is close to capacity for one hour during the morning peak. If the road conditions stay the same, it is expected that:

- In the next five years, congestion would occur for three hours in the morning peak, and would also impact the afternoon peak. Congestion could also be increased by growth in operations or development at Illawarra Regional Airport.
- In 20 years, there would be major congestion for six hours of the day.

The future traffic conditions within the study area are expected to worsen in the short term and substantially worsen in the long term if a bypass is not constructed. This would result in extended delays and long queues on the existing route. Travel times are expected to increase as the traffic conditions worsen. This would result in impacts extending beyond the current morning and afternoon peak hours and occur for extended periods throughout the day.

2.4 Urban development and forecast traffic growth

Over the past 10 years, the intensity of land use has gradually increased around the study area. The residential population has increased noticeably in Flinders, Albion Park and West Dapto. There is also substantial growth occurring within Shellharbour town centre. Looking ahead:

- Over the next 10 years, planned growth at Tallawarra, Calderwood, Tullimbar and West Dapto, is likely to see the performance of the highway deteriorate rapidly if no action is taken to increase road capacity. Over the next 30 to 50 years these developments would contribute up to about 30,000 new lots, which would substantially increase traffic volumes on the Princes Motorway / Princes Highway and the surrounding road network.
- Expected growth in airport-related traffic or in traffic along Tongarra Road is likely to substantially affect the performance of the Princes Highway in the northbound direction.

In summary, current and planned urban development in the surrounding area will substantially increase traffic volumes and peak period traffic congestion on the Princes Highway and the nearby road network. The locations and size of development is shown in Figure 2.3.
2.5 Road safety

As well as worsening traffic congestion, the section of the Princes Highway between Yallah and Oak Flats is experiencing an increasing number of crashes. This issue is expected to worsen as traffic on the highway increases.

The Albion Park Bypass Traffic Study (Bitzios, 2013), states that “the crash record within the study section compared to adjacent sections of the Princes Highway and other major highways in NSW is extremely poor”.

Historical data suggest a consistent increase in the number of crashes along the highway. In the five year period between April 2008 and March 2013 there were 327 crashes resulting in one fatal crash and 143 injury crashes on the existing Princes Motorway Princes Highway route within the study area.

The historical data shows that:

- About half of the crashes were ‘rear-end’ crashes.
- Over 87 per cent of the crashes involved multiple vehicles, while almost half of the crashes occurred at an intersection.
- There were only a small number of pedestrian and cyclist related crashes.
- Speeding, fatigue and alcohol were a contributing factor for about 10 per cent of all crashes on the highway.
2.6 Flooding

Roads and Maritime analysed recent asset information and NSW Live Traffic data and found there has been an average of three flooding incidents that impact on traffic a year on the Princes Highway and seven on the Illawarra Highway. Flooding causes the Princes Highway south of Station Road and the Illawarra Highway north of Taylor Road to close for an average of 0.5 and 4.5 days a year, respectively.

Given the flood frequency, the road network in the study area is highly susceptible to flooding.

2.7 Chapter summary

Roads and Maritime has undertaken substantial road upgrades on the Princes Highway over the last 10 years. This includes a section between Oak Flats and Kiama that is now a four-lane divided road, with bypasses of the adjacent townships.

One section of the highway that has not been upgraded is the section between Yallah and Oak Flats. This section is experiencing increasing traffic, congestion and delays during the peak periods, an increasing number of crashes and a high number of flooding events that disrupt traffic. These issues will worsen with increasing future development and population in the surrounding area.

The next chapter provides a description of the investigations into options for the LEP corridor.
3 Previous investigations

This chapter provides a description of the route selection process undertaken in the mid 1990s, and the reasons why Roads and Maritime selected the preferred route.

3.1 Route selection study

In 1994, the then Roads and Traffic Authority (RTA) began a route selection study for a suitable long-term corridor for a high standard divided carriageway between Yallah and Oak Flats. This was undertaken so that the planning of adjacent sections of land could occur. RTA commissioned Connell Wagner to manage the investigations and prepare the study report (Connell Wagner, 1996).

The aim was to establish a road corridor that would be able to operate at a satisfactory level of service with a service life of 30 years or more while catering for future development. This study also aimed to reduce the crash rate so it would be comparable with other parts of the State by reducing the conflict between through traffic and local traffic.

3.1.1 Description of route options

The route selection investigated a number of options for possible locations where the road corridor could be placed. Six options were shortlisted for detailed evaluation. The six options are shown in Figure 3.1 and are:

- Option 1: On the existing Princes Highway alignment.
- Option 2: On a combination of the Princes Highway and the railway alignment between Albion Park and Oak Flats railway stations.
- Option 3: Between the airport and the Princes Highway, then along the railway corridor between Albion Park to Oak Flats railway stations.
- Option 4: To the east, predominantly along the railway corridor to Oak Flats.
- Option 5: On the existing alignment, then along the Illawarra Highway and through the Croom Regional Sporting Complex and Croom Reserve onto the East West Link corridor.
- Option 6: As per Option 5, but passing west of Croom Regional Sporting Complex.

3.1.2 Evaluation of route options

Roads and Maritime evaluated each route option against a number of technical, environmental, social and economic constraints. These included:

- Impacts on private property and businesses.
- Impacts on open space and public reserves (particularly Croom Regional Sporting Complex).
- Implications for the operation of Illawarra Regional Airport.
- Impacts on local vehicle and pedestrian access to private properties.
- Impacts on schools, shops and other community facilities.
- Impacts on landscape and visual amenity, noise and air quality.
- Impacts on flora and fauna.
- Impacts on flooding.
• Cost and economic benefits.
• Impacts on traffic.

The findings of the route selection study are presented in Table 3.1.

Figure 3.1  Route options evaluated in 1996
### Table 3.1 Summary of findings of evaluation of options (1996 strategic review)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
<th>Option 5</th>
<th>Option 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic, transport and road-user benefits</td>
<td>Substantially improves travel times and travel speeds</td>
<td>Substantially improves travel times and travel speeds</td>
<td>Substantially improves travel times and travel speeds</td>
<td>Substantially improves travel times and travel speeds</td>
<td>Substantially improves travel times and travel speeds</td>
<td>Substantially improves travel times and travel speeds</td>
</tr>
<tr>
<td></td>
<td>High traffic use on the bypass</td>
<td>High traffic use on the bypass</td>
<td>Moderate traffic use on the bypass</td>
<td>Moderate traffic use on the bypass</td>
<td>Moderate traffic use on the bypass</td>
<td>Moderate traffic use on the bypass</td>
</tr>
<tr>
<td></td>
<td>Through traffic and local traffic not fully separated</td>
<td>Through traffic and local traffic not fully separated</td>
<td>Through traffic and local traffic not fully separated</td>
<td>Through traffic and local traffic not fully separated</td>
<td>Through traffic and local traffic not fully separated</td>
<td>Through traffic and local traffic not fully separated</td>
</tr>
<tr>
<td></td>
<td>Does not cope as well with the full development traffic</td>
<td>Does not cope as well with the full development traffic</td>
<td>Does not cope as well with the full development traffic</td>
<td>Does not cope as well with the full development traffic</td>
<td>Does not cope as well with the full development traffic</td>
<td>Does not cope as well with the full development traffic</td>
</tr>
<tr>
<td>Economic and financial (1996 dollars)</td>
<td>Overall traffic within network travels further than before the construction</td>
<td>Overall traffic within network travels further than before the construction</td>
<td>Overall traffic within network travels further than before the construction</td>
<td>Overall traffic within network travels further than before the construction</td>
<td>Overall traffic within network travels further than before the construction</td>
<td>Overall traffic within network travels further than before the construction</td>
</tr>
<tr>
<td></td>
<td>Costs are higher than benefits</td>
<td>Costs are higher than benefits</td>
<td>Costs are higher than benefits</td>
<td>Costs are higher than benefits</td>
<td>Costs are higher than benefits</td>
<td>Costs are higher than benefits</td>
</tr>
<tr>
<td></td>
<td>No impact on rural land</td>
<td>No impact on rural land</td>
<td>No impact on rural land</td>
<td>No impact on rural land</td>
<td>No impact on rural land</td>
<td>No impact on rural land</td>
</tr>
<tr>
<td></td>
<td>Acquisition of many businesses and impacts on access to businesses</td>
<td>Acquisition of some businesses and impacts on access to businesses</td>
<td>Acquisition of some businesses and impacts on access to businesses</td>
<td>Acquisition of some businesses and impacts on access to businesses</td>
<td>Acquisition of some businesses and impacts on access to businesses</td>
<td>Acquisition of some businesses and impacts on access to businesses</td>
</tr>
</tbody>
</table>

Albion Park Rail bypass
Strategic Corridor Review
<table>
<thead>
<tr>
<th>Issue</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
<th>Option 5</th>
<th>Option 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment and community impacts</td>
<td>Acquisition of 100 properties</td>
<td>Acquisition of 80 properties</td>
<td>Acquisition of 50 properties</td>
<td>Acquisition of up to 70 properties</td>
<td>Acquisition of 5–10 homes</td>
<td>Acquisition of about 5 homes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reconstruction of railway line and alterations to properties along the railway</td>
<td>Reconstruction of railway line and alterations to properties along the railway</td>
<td>Reconstruction of railway line and alterations to properties along the railway</td>
<td>Acquisition of corridor through rural land and Croom Regional Sporting Complex, Relocation of BMX and equestrian facilities</td>
<td>Acquisition of corridor through rural land and Croom Regional Sporting Complex, and impact on proposed facilities (but not existing facilities)</td>
</tr>
<tr>
<td>Exacerbates existing severance of the community by the highway</td>
<td>Partially exacerbates existing severance of the community by the highway and railway line</td>
<td>Partially exacerbates existing severance of the community by the highway and railway line</td>
<td>Maintains severance of the community by the railway line, but improves community ties across highway</td>
<td>Minor severance between Albion Park and Albion Park Rail, but improves community ties between Oak Flats and Albion Park Rail</td>
<td>Minor severance between Albion Park and Albion Park Rail, and impact on existing facilities</td>
<td></td>
</tr>
<tr>
<td>Minor impact on vegetation</td>
<td>Minor impact on vegetation</td>
<td>Impacts locally important vegetation in airport</td>
<td>Minor impact on vegetation</td>
<td>Impacts important vegetation in Croom Regional Sporting Complex and minor impact on Frazers Creek</td>
<td>Impacts Frazers Creek and vegetation along the creek</td>
<td></td>
</tr>
<tr>
<td>No impact on heritage</td>
<td>No impact on heritage</td>
<td>alterations to Albion Park Rail station</td>
<td>Demolition of Albion Park Co-op building and Albion Park Rail station</td>
<td>Impacts on setting of Ravensthorpe</td>
<td>Minor impact on setting of Ravensthorpe</td>
<td></td>
</tr>
</tbody>
</table>

From Connell Wagner, 1996
Community and stakeholder consultation was an integral part of the options evaluation process. The consultation process included:

- The establishment of a community focus group comprising key stakeholders and residents.
- Coverage in the local and regional media.
- Five newsletters distributed to local residents during 1994 and 1995 to publicise the route selection study. Newsletter 3 (December 1994) presented information on the six route options. It also included information on the exhibition of the concept plans for these options and a return questionnaire that asked readers to state their concerns about the highway, and to nominate a preferred option.
- Exhibition of the six route options from December 1994 to February 1995.

3.2 Design refinements

There was a strong community response to the display of the six options. Roads and Maritime received 400 completed questionnaires, 30 letters and a petition with 1200 signatures.

The community indicated that it was concerned about the following key issues:

- Traffic congestion on the Princes Highway at Albion Park Rail. The community regarded weekend traffic as a significant problem, particularly congestion south of Oak Flats caused by the highway returning to a single lane. This has since been addressed by the construction of the Oak Flats to Dunmore Princes Highway upgrade.
- Concerns for any adverse impacts from the highway upgrade on the Croom Regional Sporting Complex, which was regarded as an important public asset.
- The existing Princes Highway through Albion Park Rail, which was regarded as environmentally unsatisfactory due to the impacts of traffic congestion including air and noise pollution.

Given the response received and specific concerns raised by Shellharbour City Council, Roads and Maritime undertook additional concept design work to develop a route that would minimise the effect on the Croom Regional Sporting Complex.

The route was also extended in the northern portion to traverse undeveloped land to the west of the industrial area at Yallah and tie in around Duck Creek (The original western options used the existing alignment through Haywards Bay and Yallah). However, this was changed due to the planned development, difficulties with providing access arrangements at this location, the need to meet airspace requirements and the current land use constraints in the area.

3.3 The preferred route

In 1996, Roads and Maritime selected the preferred option as the long-term route for the Princes Highway / Princes Motorway upgrade. Roads and Maritime selected this option because it would:

- Be a suitable corridor for the major transport route in the long term.
- Provided adequate capacity for traffic volumes including future growth areas for both weekday and holiday peaks.
- Improve road safety.
• Reduce the conflict of through and local in the area.
• Minimise the environmental and social impacts.
• Provide economic benefits that are almost three times the expected costs.

The road corridor for this route was formally included in the Wollongong City Council and Shellharbour City Council local environmental plans (refer Figure 3.2).

Figure 3.2 The LEP corridor (red outline)
3.4 Chapter summary

In 1994, Roads and Maritime began a route selection study for a suitable long-term corridor for a high standard divided carriageway between Yallah and Oak Flats. This was undertaken so that the planning of adjacent sections could occur. In 1996, Roads and Maritime selected the preferred option as the long-term route for the Princes Highway / Princes Motorway upgrade. The road corridor for this route was formally included in the Wollongong City and Shellharbour City LEPs.

The next chapter provides a description of the LEP corridor.
4 Description of the LEP corridor

This chapter provides a description of the LEP corridor, and the constraints in the study area.

4.1 The LEP corridor

The LEP corridor is located to the west of the current Princes Highway / Princes Motorway and is 10.6 kilometres long. As shown in Figure 3.2, the LEP corridor is located as described below (from north to south):

- The LEP corridor deviates to the west of the existing Princes Motorway at Yallah and passes to the west of an industrial precinct.
- The LEP corridor crosses the Macquarie Rivulet to the west of the twin Princes Motorway bridges, travels along the Illawarra Highway, turning to the south and continuing around the west of Illawarra Regional Airport.
- The LEP corridor crosses Tongarra Road to the east of the Albion Park Showground. It then continues to the south, turning east around the Croom Regional Sporting Complex and connects to the East West Link.
- The LEP corridor travels along the East West Link and connects to the current Princes Highway interchange at Oak Flats, where it ends.

When announcing the LEP corridor in 1996, interchanges were located at Yallah, Tongarra Road and Croome Road.

The potential interchange locations and layouts will be investigated in future stages of the project.

About 40 per cent of the land within the LEP corridor has been purchased for the purposes of road infrastructure.

4.2 Key physical features

There are a number of key physical features within and adjacent to the LEP corridor. Some of these features have emerged since the LEP corridor was announced in 1996. These key physical features in the study area include:

- Creeks: The LEP corridor crosses Duck Creek, Macquarie Rivulet and Frazers Creek, which drain to Lake Illawarra. Frazers Creek also contains wetlands on the eastern and western sides of the LEP corridor.
- Illawarra Regional Airport: The airport is bounded by the Princes Highway to the east, Illawarra Highway to the west, and Tongarra Road to the south. It is understood an Airport Master Plan is being developed providing for the next 15 years of operation. Any road design would need to meet the air space requirements of the Civil Aviation Safety Authority (CASA).
- Residential areas and community views: The main residential areas are Albion Park, Albion Park Rail and Oak Flats. Since the LEP corridor was reserved, there has been a substantial change in the character of the local community due to the influx of new residents. A number of rural residential lots have also been developed within Yallah to the west of the LEP corridor.
- Commercial land uses: There has been a substantial increase in commercial properties in the surrounding area, the majority of which are located beside the existing Princes Highway / Princes Motorway route.
- Recreational facilities: There are substantial recreational facilities in and around...
the LEP corridor. The LEP corridor would directly impact land used by the Stony Range Pony Club and by the Albion Park Junior Soccer Club. The LEP corridor also borders the Croom Regional Sporting Complex, where a number of sporting facilities have been built since the LEP corridor was reserved. It should be noted Roads and Maritime Services purchased the land which Albion Park Junior Soccer Club uses. A lease agreement has been in place between the Shellharbour City Council and Roads and Maritime Services for seventeen years.

- **Vegetation:** The majority of the LEP corridor has been cleared and consists of grasslands. However, there is remnant vegetation in the northern portion of the corridor around Yallah Road and small patches of vegetation adjacent to Macquarie Rivulet and Frazers Creek.

- **Topography:** The LEP corridor traverses relatively level terrain and a substantial section of floodplain. In the northern section, it is about 20 metres above sea level. In the central section, it traverses a floodplain less than 10 metres above sea level. Along the East West Link, it is about 40 metres above sea level.

### 4.3 Chapter summary

The LEP corridor was selected in 1996 and is largely undeveloped land. The LEP corridor is 10.6 kilometres long compared to the existing route which is 7.6 kilometres long. There are varying land uses in and surrounding the LEP corridor ranging from residential, agricultural, recreational, commercial and industrial.

The next chapter provides an analysis of the LEP corridor, with a focus on road design, traffic, financial costs, and environmental and community impacts.
5 Analysis of the LEP corridor

This chapter provides an analysis of the LEP corridor, with a focus on road design, traffic, financial costs, and environmental and community issues.

5.1 Road design

Roads and Maritime has reviewed the road designs from the mid 1990’s and developed a strategic road design to ascertain whether the LEP corridor is still suitable for the Albion Park Rail bypass.

This section looks at how the road design criteria have changed since 1996, and the major features of the proposed bypass.

5.1.1 Comparison of 1996 and current design criteria

The proposed bypass was designed at a strategic level in 1996 using the RTA Road Design Guide as the primary standards reference.

In 2011, Roads and Maritime adopted the Austroads guidelines in Guide to Road Design (Austroads, 2010) as the primary technical reference for road design along with the Australian Standards referenced in those guides and associated Roads and Maritime supplements.

As part of the current corridor review, Roads and Maritime reviewed the 1996 strategic design for compliance with the new design reference material. The strategic design within the LEP corridor is provided in Appendix A.

The review found that the main element that has changed in the intervening period relates to the design speed for the road. The LEP corridor is based on a design speed standard of 100 km/h. However, the current design standards state that a design speed of 110 km/h should be adopted.

This design speed cannot be achieved in one section of the LEP corridor. The key issue is that one of the curves within the LEP corridor adjacent to the Croom Regional Sporting Complex is a 500 metre radius curve. To match the current standards, the radius would need to be increased to at least 600 metres. A 600 metre radius would not fit within the LEP corridor and, as such further design refinement is required around the Croom Regional Sporting Complex. This section of the LEP corridor is shown in Figure 5.1 and Appendix A.
The 1996 and 2013 design criteria are compared in Table 5.1.

Table 5.1 Design criteria (1996 and 2013)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1996</th>
<th>2013</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design speed (km/h)</td>
<td>100</td>
<td>110</td>
<td>Adopt 110 km/h for horizontal and vertical design.</td>
</tr>
<tr>
<td>Minimum curve radius (metres)</td>
<td>500</td>
<td>600</td>
<td>For this type of road the minimum horizontal curve radius is 600 m with a desirable minimum curve radius of 750 m.</td>
</tr>
<tr>
<td>Vertical alignment</td>
<td>–</td>
<td>TBC</td>
<td>Levels were set on interpreted and anecdotal flood data. A complete flood study is required to test assumptions used to set design vertical geometry for the LEP corridor. The vertical alignment would need to comply with any air space restrictions imposed by the Civil Aviation Safety Authority (CASA) adjacent to Illawarra Regional Airport.</td>
</tr>
<tr>
<td>Criteria</td>
<td>1996</td>
<td>2013</td>
<td>Comment</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>------</td>
<td>------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Reaction time (seconds)</td>
<td>2</td>
<td>2.5</td>
<td>The vertical alignment may need minor adjustment but is generally suitable.</td>
</tr>
<tr>
<td>Stopping sight distance (metres)</td>
<td>160</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Verge width (metres)</td>
<td>1</td>
<td>2</td>
<td>Verge widths need to be designed in response to any adopted safety barrier system. Where safety barriers are not required it should be designed to be traversable by errant vehicles.</td>
</tr>
</tbody>
</table>

5.1.2 Major design features

The major features of the proposed bypass are the cross-section, the interchanges, and bridges, as outlined below.

Cross-section

The LEP corridor has a nominal width of 80 metres, which compares with other Princes Highway projects for example the Gerringong Upgrade (65 metres, which is currently being built) and the Berry to Bomaderry Upgrade (85 metres). The LEP corridor allows for a road divided in the centre with two lanes in each direction and a design speed of 100 km/h. The entire road width in the strategic design is 29.6 metres (excluding the kerbs, channels and verges). This is the same as the Princes Highway section between Oak Flats and Dunmore, and allows for future widening within the middle of the road. If future widening would take place, a median of 2.6 metres wide would remain.

A review of the road design found that there seems to be sufficient space outside the design footprint for additional design features such as noise walls and sediment basins.

A diagram of the proposed road cross-section is in Figure 5.2.

Figure 5.2 Previous cross section
Interchanges

The LEP corridor allows for an interchange at Tongarra Road (within Albion Park). The strategic design developed in the mid 1990's is based on a simple closed diamond shaped layout using traffic lights at the intersection of the ramps and Tongarra Road.

The Tongarra Road interchange requires further investigation and review in conjunction with traffic modelling to determine the location, design and the footprint required. The previous strategic design for the interchange layout that was used to determine the layout and the footprint within the LEP corridor was based on an estimate of the ramp lengths and grades based on the required clearance over the bypass and estimates of bridge lengths and the depth of the bridge deck and supports.

It is possible that the LEP corridor is not sufficiently wide at this location.

The design would also need to consider nearby constraints, such as the State Environmental Planning Policy 14 (SEPP 14) wetland.

The connections with the existing Princes Highway / Princes Motorway and other roads (including property accesses) also need to be further developed and guided by traffic modelling to determine the need and performance of any interchange locations and layouts. These connections would need to cater for current traffic volumes and future planned development.

Bridges

A preliminary assessment of the need for bridges within the LEP corridor found that bridges could be required at the following locations:

- The northbound Princes Motorway at Yallah.
- The South Coast Rail Line at Yallah.
- Yallah Road.
- Macquarie Rivulet.
- Frazers Creek.
- Tongarra Road.
- Croome Road.
- Over the main carriageway at Durgadin Drive to provide local access.

5.2 Review of the strategic design

Roads and Maritime has reviewed the key aspects of the strategic design. It found that the majority of the LEP corridor is sufficiently wide to build a four-lane divided road that can meet current design standards / guidelines and project objectives, and provide high-speed conditions consistent with the road design to the north and south of the corridor. The review also found that technical issues with the strategic road design could be managed through the concept road design phase. The design review also made the following recommendations:

- The horizontal alignment needs to be re-examined in the vicinity of the Croom Regional Sporting Complex (refer Figure 5.1).
- The vertical alignment needs to be tested against contemporary flood studies, and flood study results need to be undertaken and incorporated into future design work.
• Interchange locations and layouts need to be further investigated.
• The design needs to ensure that it complies with any air space restrictions imposed by the Civil Aviation Safety Authority (CASA) adjacent to Illawarra Regional Airport.
• Urban design needs to be carefully considered, particularly visual impacts, connectivity and amenity.
• The bypass appears to be constructable and could be built without major impacts on the existing Princes Highway. It's expected there would be minor impacts to traffic on the existing Princes Highway during construction of the bypass. However a constructability assessment is required during the future design stages of the project.

5.3 Traffic analysis

Extensive traffic modelling of the LEP corridor has been undertaken and peer reviewed by a third party (refer Bitzios Consulting, 2013).

5.3.1 Overview of traffic modelling

The traffic study provided in Appendix B adopted the Wollongong and Shellharbour Strategic Transport (WOLSH) Model that considers the full amount of development within the surrounding region including Calderwood, Tallawarra, West Dapto and Tullimbar as well as development within existing suburbs. This model is widely used for the Illawarra Region.

The model considered a current year model being representative of 2013 traffic conditions and a future year model comparative to the year 2046. There are two models a morning peak model and an afternoon peak model. These models are both utilised to determine the peak hour traffic impacts.

The traffic modelling for this project was complex due to the nature of the LEP corridor. The LEP corridor is about three kilometres longer than the existing Princes Highway / Princes Motorway route. As a result the travel distances for traffic travelling all the way through the proposed bypass actually increase. This means that the transfer of traffic from the existing M1/A1 route to the proposed bypass is not necessarily automatic. Extensive work has been undertaken on the traffic model to ensure that the most reasonable prediction of future traffic volumes can occur.

The traffic study separately modelled ‘time only’ and ‘time and distance’ route choice to ascertain the likely benefits of the bypass. These models provided different outcomes, as follows:

• The ‘time and distance’ model output shows higher traffic volumes and increased delays along the existing Princes Highway. There is less traffic switching to the proposed bypass corridor mainly due to the impact of having to drive an additional three kilometres, even though there is a travel time benefit of 2.5 to 3 minutes along the bypass.
• Under the ‘time only’ model, only travel time is considered, with a higher proportion of traffic subsequently attracted to the bypass.

Another complexity for the traffic analysis is that traffic modelling does not take into account driver behaviour that would preference the use of the bypass. Some factors of driver behaviour include the drivers preference (possibly with cruise control engaged) to stay on a road because it is a consistent speed environment. The traffic model does not account for the effects on a driver from being guided by street signage or satellite navigation to a major route rather than a minor route alternative.
For this traffic analysis, a conservative approach has been made for the presentation of the traffic results using the ‘time and distance’ route choice model. The ‘time only’ route choice is provided in Appendix B, this reflecting the most optimistic results for bypass usage.

It is acknowledged that while being conservative the ‘time and distance’ results still indicate that the bypass would substantially improve traffic in the future years, improving travel time, reducing traffic volumes on the existing road network and improving the travel conditions.

5.3.2 Traffic volumes and levels of service

The traffic volumes generated by the future model without the bypass and the future year with the bypass are provided in Figure 5.3 and Figure 5.4. These figures give the number of vehicles travelling on the major roads. It also identifies the direction of travel.

Future year without the bypass

The future year model without the bypass shows about 3,000 vehicles per hour travelling in the northbound and southbound peak direction on the most congested section of the Princes Highway between the Illawarra Highway and Tongarra Road. Given the traffic constraints described in section 2.2 of this report it is considered that there would be significant congestion experienced in this portion of the road network.

Similarly, the rest of the roads in the nearby area experience very high traffic volumes including Tongarra Road and the East West Link.

Future year with the bypass

The traffic volumes for the future year model with the bypass show that a large portion of traffic has transferred onto the bypass route and the volumes have substantially reduced on the existing Princes Highway.

It is noted that the volumes of traffic on the bypass at the junction with Tongarra Road are quite low in the off peak direction (northbound PM, Southbound AM) as noted above these are conservative results and it is likely that a higher volume of traffic could utilise the bypass based on the ‘time only’ modelling results.

By diverting through traffic to the bypass, there would be reduced traffic volumes along the Princes Highway. This would:

- Result in an improvement in safety on the existing Princes Highway without affecting the needs of through traffic. Apart from reducing traffic on the Princes Highway, the bypass would provide an opportunity to separate faster paced through trips (on the bypass) from slower paced, local vehicles, pedestrians and cyclists.

- Provide opportunities to improve reliability of bus services between future development areas and key transport nodes. There would also be more flexibility in locating bus stops in the centre of towns with the view of improving the Albion Park Rail town centre amenity without concerns of compromising the ‘traffic throughput’ capacity of the corridor. The Princes Highway, Tongarra Road, Lake Entrance Road and Terry Street are part of a strategic bus corridor. The bypass would improve the reliability of service conditions on the bus corridor.

- Improve the amenity of the Albion Park Rail town centre, and provide opportunities for further amenity improvements in these town centres. This could include upgrading pedestrian and cycle paths and built form, and enhancing the relationship between the adjacent land use, the road and the local residential communities.
- Improve accessibility for local businesses by reducing the conflict of through vehicles with local traffic.

**Figure 5.3  Future year model traffic volumes without the bypass**
Figure 5.4  Future year traffic volumes with the bypass

<table>
<thead>
<tr>
<th>AM Peak</th>
<th>PM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>1678</td>
</tr>
<tr>
<td>638</td>
<td>542</td>
</tr>
<tr>
<td>130</td>
<td>1051</td>
</tr>
<tr>
<td>1765</td>
<td>2011</td>
</tr>
<tr>
<td>1438</td>
<td>1253</td>
</tr>
<tr>
<td>1575</td>
<td>817</td>
</tr>
<tr>
<td>898</td>
<td>130</td>
</tr>
<tr>
<td>433</td>
<td>1289</td>
</tr>
<tr>
<td>2375</td>
<td>1244</td>
</tr>
</tbody>
</table>
The traffic modelling shows with the forecast increase in traffic volumes on the Illawarra Highway and Princes Highway, it will result in the Princes Motorway reaching capacity limitations with a level of service (LOS, Table 2.1) E/F noticed (Figure 5.5) if a highway upgrade between Yallah and Oak Flats is not carried out. The Illawarra Highway / Princes Highway roundabout in the northbound direction is a cause for delays along with the southbound approach to the Tongararra Road / Illawarra Highway intersection due to traffic returning during the PM peak period.
The future year traffic results show that the level of service on the Princes Highway improves from LOS E/F to LOS C/D, reflecting a substantial reduction in congestion on the Princes Highway. Figure 5.6 shows the AM and PM peak levels of service traffic for the future year model. As shown, the bypass is expected to operate during the peak periods at good levels of service except for the section north of the Tongarra Road Interchange. Higher traffic volumes in the peak traffic movement direction are likely to result in slightly lower travel speeds, this indicates that a six lane, two way carriageway may be necessary. This should be further investigated in the future planning of the project.
5.3.3 Travel times and reliability

Future year without the bypass

The travel times results with and without the bypass are provided in Figure 5.7 and Figure 5.8. The travel time for the through route in the future year is expected to significantly increase to 44 minutes in the northbound morning peak and 24 minutes in the southbound afternoon peak.

Future year with the bypass

With the bypass in place for the future year the travel times on the existing route show that the travel times are between 9 and 9.5 minutes with a considerable saving in time for bypass traffic, this journey taking about 6.5 minutes.

The bypass travel time also provides a substantial saving in time over the current travel times observed during travel time surveys with three minutes being saved in the morning peak and one minute being saved in the afternoon peak.

With the increased road capacity there would be a significant improvement in travel time reliability. The bypass would be much less susceptible to congestion with grade separated access points (such as enter and exit ramps) and free flow travel conditions. This would substantially improve journey times during holiday peak periods and reduce the delays currently being experienced during peak traffic flow conditions which would further increase the attractiveness of the South Coast for tourists.

Similarly, there would be considerably lower risk of major impacts to traffic if unplanned incidents such as flooding or crashes occur on either the existing Princes Highway or bypass. The bypass would be built with much improved flood immunity. As a result the travel time reliability is expected to substantially improve as a result of a bypass.

<table>
<thead>
<tr>
<th>Table 5.2 Peak direction travel times (current and forecast)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Travel time</td>
</tr>
<tr>
<td>AM peak northbound</td>
</tr>
<tr>
<td>PM peak southbound</td>
</tr>
</tbody>
</table>
Figure 5.7  Future year model travel time without bypass

<table>
<thead>
<tr>
<th>Travel Time</th>
<th>AM Peak</th>
<th>PM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM Peak</td>
<td>43min 52s</td>
<td>14min 24s</td>
</tr>
<tr>
<td>PM Peak</td>
<td>8min 17s</td>
<td>23min 31s</td>
</tr>
</tbody>
</table>
Figure 5.8 Future year model travel time with the bypass

Travel Time
AM Peak
PM Peak

North

<table>
<thead>
<tr>
<th>AM Peak</th>
<th>PM Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>8min 13s</td>
<td>9min 5s</td>
</tr>
<tr>
<td>9min 28s</td>
<td>9min 6s</td>
</tr>
<tr>
<td>6min 38s</td>
<td>6min 31s</td>
</tr>
<tr>
<td>6min 29s</td>
<td>6min 36s</td>
</tr>
</tbody>
</table>
5.3.4 Road safety

The bypass would result in a substantial improvement in safety on the M1/A1 route. The current crash rate on the Princes Highway within the study area is 77 crashes per 100 million vehicle kilometres travelled. Based on the adjacent Princes Highway / Princes Motorway sections, the proposed bypass is expected to result in a crash rate in the order of 12.5 crashes per 100 million vehicle kilometres travelled, a substantial reduction. The bypass would therefore be about six times safer than the current section of the Princes Highway.

It is acknowledged that the Princes Motorway is substantially better performing in regards to road safety than the Princes Highway with a crash rate of 22 crashes per 100 million vehicle kilometres travelled. This substantially lower rate is likely to be attributed to the road conditions, the limited access points to the motorway, and no intersections and therefore much less traffic conflicts.

Although the Princes Motorway (within the study area) has a reduced crash rate compared with the Princes Highway, the crash rate is still substantially higher than the sections of the Princes Highway that have recently been upgraded such as the section between Oak Flats and Dunmore. It is expected the bypass would perform better than the current Princes Motorway in the study area and be more comparable with those crash rates in the more recently upgraded sections of highway.

There would be substantial road safety benefits from the construction of the bypass. This would also have a positive impact on journey reliability as it is expected that there would much less traffic impacts due to crashes.

5.4 Economic analysis

Roads and Maritime developed a strategic cost estimate of building the bypass in the LEP corridor using the global strategic rates provided in its Project Estimating Manual (RTA 2008).

Roads and Maritime estimates that the bypass has a base cost of $383 million and a contingency of $217 million (57%). This gives a total strategic cost estimate of $600 million (in 2013 dollars).

Using this strategic cost estimate, and the forecast traffic flows that would be attracted to the bypass, Roads and Maritime calculates that the project would have a benefit versus cost ratio of at least 2.2. This means that the economic benefits produced by constructing the bypass are more than twice the cost of the infrastructure over the 30 year life of the analysis period. For a large road infrastructure project, this is considered to be a very positive result and reflects the economic merits of the project.

On this basis, the benefits of the project are sufficient to justify its cost, and the bypass would represent a good economic investment.

The benefit versus cost ratio is presented in Table 5.3.

The benefit versus cost ratio is based on traffic modelling that shows the bypass would divert enough through traffic from the Princes Highway, reducing traffic congestion on the existing Princes Highway.

During the traffic modelling and economic analysis it was identified that the length of the bypass corridor was reducing the economic performance of the project by impacting on travel time and distances. This was due to the bypass being three kilometres longer than the existing Princes Highway / Princes Motorway route.
Table 5.3  Benefit cost ratio (BCR) – 30-year analysis, 2020–50

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic capital cost estimate</td>
<td>$600 million #</td>
</tr>
<tr>
<td>BCR (4%*)</td>
<td>4.1</td>
</tr>
<tr>
<td>BCR (7%*)</td>
<td>2.2</td>
</tr>
<tr>
<td>BCR (10%*)</td>
<td>1.3</td>
</tr>
<tr>
<td>Net present value ($M, 7%*)</td>
<td>$755 million #</td>
</tr>
<tr>
<td>First year rate of return (%, 7%*)</td>
<td>12%</td>
</tr>
</tbody>
</table>

* Discount rate  
# Figures are in 2013 dollars

To counteract this, a shorter alignment was used in the traffic investigated to the east of the LEP corridor in the vicinity of the Croom Regional Sporting Complex (Figure 5.9). This was undertaken to test the economic improvements that might be achieved by shortening the bypass length. It was found that this shorter option would provide measurable benefits, and that the benefit cost ratio would improve to 2.6 (at a seven per cent discount rate).

In view of this result, the shorter option should be investigated and assessed based on all potential impacts.
5.5 Environmental considerations

The likely environmental impacts of developing a bypass in the LEP corridor are presented below. Environmental considerations include social, biodiversity, soil and water, hydrology, Aboriginal heritage, and urban design. Other issues may become apparent as more detailed investigations are undertaken. Environmental constraints are shown in Figure 5.10.

5.5.1 Social considerations

Social issues include considerations of impacts on residents, businesses, visitors and/or the travelling public. The bypass would have several major social benefits:

- The bypass would reduce highway traffic through Albion Park Rail and reduce the physical barrier of the highway traffic from the centre of town. The improved amenity along the existing Princes Highway would improve the quality of the Albion Park Rail urban environment for businesses and the local community, create a more pedestrian-friendly environment and reinforce a sense of community identity and community wellbeing.

- The bypass would remove the substantial delays experienced by the motorists during peak periods, which are exacerbated during peak travel times such as holiday periods. These delays impact commuters daily as they travel to and from work. Anecdotal evidence suggests that congestion levels are such that people's travel patterns are modified, for example commuters may change their start and end times or avoid congested areas altogether.

- The bypass would be of benefit to tourists, and the tourism industry. During
holiday peak periods, the Princes Highway / Princes Motorway takes a substantial amount of holiday traffic. This traffic often experiences extended delays. The bypass would increase the reliability of tourism related trips.

Figure 5.10 Environmental constraints
5.5.2 Biodiversity considerations

The biodiversity in the LEP corridor was investigated through a desktop review and targeted field investigation undertaken in 2013. This involved searching the NSW Wildlife Atlas maintained by the NSW Office of Environment and Heritage and the Commonwealth Protected Matters Database maintained by the Australian Government’s Department of the Environment. The desktop study also included a review of the Southeast NSW Native Vegetation Classification and Mapping (2006), which includes the vegetation types within the study area and relevant topographic mapping and aerial photography.

The review found that the study area had been largely disturbed by past and current land use such as farming and industrial activities. The LEP corridor is largely cleared of remnant vegetation, and very few shrubs and trees are present, which reduces its value for flora and fauna. In the northern part of the LEP corridor around Yallah Road, a portion of remnant vegetation exists, as do small amounts of riparian vegetation around Macquarie Rivulet and Frazers Creek.

The results of the review are outlined below.

Vegetation communities and endangered ecological communities

There are six vegetation communities mapped in the LEP corridor. These consist of open pasture grasslands and sporting fields, warm temperate rainforest around the creek lines, and three endangered ecological communities (EEC). The mapped EECs are:

- Four patches of Illawarra lowlands grassy woodlands around Frazers Creek, Tongarra Road, north of Macquarie Rivulet and north of the industrial area.
- Two patches of freshwater wetlands on coastal floodplains.
- Coastal Saltmarsh north of Macquarie Rivulet.

Wetlands and waterways

The LEP corridor mostly falls within the Macquarie Rivulet Catchment, which covers an area of about 110 square kilometres from the Illawarra escarpment in the west to Lake Illawarra in the east. This catchment flows to Lake Illawarra.

The LEP corridor crosses a number of watercourses, which generally flow east from the Illawarra escarpment, and north towards Lake Illawarra. From north to south, these watercourses are Duck Creek and its tributaries; Macquarie Rivulet (the major stream draining the catchment); and Frazers Creek, a tributary to Macquarie Rivulet that drains the southern portion of the Macquarie Rivulet Catchment. At the southern end, the LEP corridor turns east and again crosses Frazers Creek, as well as Horsley Inlet and its tributaries. These watercourses provide semi-permanent and permanent water sources.

The most important wetland within or surrounding the LEP corridor is located on Frazers Creek (north of Tongarra Road, Albion Park), as it is listed under State Environmental Planning Policy 14 Wetland No. 382. It is about 100 metres east of the LEP corridor near the western runway of the Illawarra Regional Airport. This wetland flows into Lake Illawarra, about 2.6 kilometres to the east. There is a second wetland within the corridor north of Macquarie Rivulet.

The LEP corridor is mostly within one to two kilometres of Lake Illawarra, which is on the Australian Government Department of the Environment list of Nationally Important Wetlands. It provides habitat and contains species that are considered threatened at a national level.
Threatened animal species
Waterways, wetlands and EECs are potential habitat for threatened birds, frogs, reptiles, microbats and migratory species.

Searches of the NSW Wildlife Atlas and the Commonwealth Protected Matters Database revealed that 95 threatened animals have been identified in the locality. The majority of the species are transient in nature and could potentially traverse over or fly through the LEP corridor but are much less likely to use the LEP corridor for roosting or nesting purposes. Five species are known to occur within 200 metres of the LEP corridor (Barking Owl, Pink Robin and Freckled duck are known from the northern portion of the study area near Yallah Road, Black Bitterns are known from the wetland south of the industrial area, and the Black-necked Stork and Freckled Duck are known from the wetland adjacent to the LEP corridor near Tongarra Road).

Threatened plant species
Searches of the NSW Wildlife Atlas and the Commonwealth Protected Matters Database found 34 threatened plants in the locality. These included:

- Two threatened plants within 200 metres of the LEP corridor: Eastern Flame Pea *Chorizema parviflorum* and Illawarra Greenhood Orchid *Pterostylis gibbosa*.
- 32 plant species within 10 kilometres of the LEP corridor (the corridor provides potential habitat for 17 of these plant species).

Targeted searches for the Eastern Flame Pea have confirmed the presence of up to 32 individuals within the LEP corridor. This species was observed within lands adjacent to the north and south of Yallah Road. There were also numerous individuals of the Eastern Flame Pea outside the corridor, but the size and extent of the population is not known. Improving the understanding of the size and extent of this population in the area will be an important part of future investigations.

Further investigations
Further ecological investigations are required to confirm the biodiversity features of the LEP corridor and surrounding land. The investigations should involve detailed surveys, including:

- Targeted surveys of potentially occurring threatened species and EECs.
- Eastern Flame Pea surveys to identify the extent and size of the population.
- Fauna habitat surveys.
- Aquatic habitat surveys and flora surveys of each vegetation community.

5.5.3 Property and land use considerations
The LEP corridor is within a locality that is undergoing rapid and substantial development with further residential, commercial and industrial development proposed. A summary of findings in relation to property and land use is presented below.

Land use
Land uses in the LEP corridor are varied and include sporting fields and reserves, agriculture, railways, roads, a wholesale plant nursery, power utility infrastructure, dairy and cattle grazing. Land uses adjacent to the LEP corridor include residential areas, an industrial area, Illawarra Regional Airport, and tourism.
Crown land is located south of where the LEP corridor crosses Illawarra Highway, between East West Link and the LEP corridor. It includes Frazers Creek, Macquarie Rivulet and Duck Creek.

There has been a road corridor on the Shellharbour City Local Environmental Plan for the bypass route for the Princes Highway since 1983. The previous corridor from the was largely in the same location as the north–south portion of the LEP corridor but did not join up with the East West Link; it terminated at the base of the ridge.

In the wider locality there has been a considerable change in land use since the mid 1990s (when the previous route selection study was undertaken) with a noticeable increase in housing in Albion Park, Haywards Bay and Flinders. Commercial development has also increased, largely adjacent to the Princes Highway. There has also been rapid expansion of the Shellharbour Town Centre, with Stockland Shellharbour recently doubling its size to become one of the largest shopping centres in the Illawarra.

Large scale residential development is also planned for the surrounding region within Calderwood, Tullimbar, West Dapto and Tallawarra. These land releases have been approved by the NSW Government and adopted in the relevant council LEPs, with the exception of Calderwood, which has been rezoned under State Environmental Planning Policy (Major Development) 2005. These are major developments and are expected to substantially change the land use of the locality. The location and size of these developments are outlined in Section 2.4.

The development of the LEP corridor may have direct and indirect impacts on local properties, which may include:

- Acquisition.
- Severance of land parcels.
- Changed access.

Due to the early identification of the potential road corridor and its incorporation on the Shellharbour and Wollongong City Council LEPs in the mid 1990s, there would be less potential severance of lots than with many similar road projects. About 40 per cent of the land has already been purchased for road infrastructure see Figure 5.11.

Where property would be directly affected by the project, Roads and Maritime would negotiate land acquisition under the Land Acquisition (Just Terms Compensation) Act 1991. Both partial and total property acquisitions may be undertaken, as appropriate.

**Scenic values**

The LEP corridor is set in an area with high scenic values. A key component of these scenic values is the backdrop provided by the escarpment and hills. Also contributing to the area’s scenic values are the extensive areas of green space in which the LEP corridor is situated. This green space includes:

- Natural areas comprising remnant vegetation, wetlands and rivers.
- Open space recreation facilities: The LEP corridor crosses two reserves (Darcy Dunster Reserve in the north, and Terry Reserve in the south) and is adjacent to Croom Regional Sporting Complex, Des King Oval, and the Albion Park Showground.
- Farming properties used for dairying, agriculture, and cattle grazing.

The LEP corridor is set in a floodplain and the bypass would be raised in some areas as it traverses the landscape to improve flood protection. Together with associated structures such as noise walls, the bypass would constitute a major new built element.
The bypass would therefore have potential to impact on the area’s scenic values. In particular, the bypass may impact views of the escarpment and hills from many ground-level locations to the east and north of the LEP corridor. Views to Lake Illawarra may also be impacted from some locations west of the LEP corridor.

It is acknowledged that with large scale infrastructure projects adjacent to suburban areas impacts are difficult to completely avoid. But with careful consideration the design impacts can be substantially reduced. Roads and Maritime will do this by adopting the principles from the publication Beyond the Pavement RTA Urban
Recreation areas and the public domain

As outlined above, the LEP corridor passes through or near a number of open space recreation facilities. The bypass would have impacts on these facilities and there may also be access changes, depending on how the bypass is designed and the access needs identified by the community and stakeholders.

Land in a part of the LEP corridor near Croom Regional Sporting Complex is currently used as sporting fields for the Albion Park Junior Soccer Club (refer Figure 5.12). This land is owned by Roads and Maritime and leased to Shellharbour City Council with (for the use of the soccer club) the understanding that it is reserved for future road infrastructure. Lands north of the sporting fields are currently being used by the Stony Range Pony Club. This land is owned by Shellharbour City Council.

Figure 5.12 Land in the corridor leased to local soccer club

Connectivity for pedestrians and cyclists

The landscape in which the LEP corridor is situated presents as a large open space area within a multitude of land uses. Roads and paths cross the LEP corridor, and pedestrians and cyclists typically enjoy unimpeded access across the corridor. This makes it relatively simple for residents of Albion Park to access recreation areas to the east, and for residents on either side of the LEP corridor to walk or cycle to each other’s residences, or to shops and other businesses. Roads and Maritime will investigate the community’s access requirements and consider how they can be managed. A particular focus will be connectivity across the LEP corridor between
Albion Park and Croom Regional Sporting Complex.

The wide, open areas within the LEP corridor also provide clear visibility across the landscape, providing a safe area for recreation, walking and cycling, and for people using the corridor as a means of access. This aspect of safety is important for the local community, and the bypass needs to be designed so that surveillance and safety issues are addressed as part of future design work.

**Opportunities for Albion Park Rail town centre**

The bypass would provide opportunities to improve aspects of the public domain and the Albion Park Rail town centre. For example, there would be substantial improvements in the amenity of the area when the majority of through traffic is removed from the Princes Highway. This would be expected to improve access and, in particular, parking for local businesses and there would be opportunities to make the town centre more pedestrian friendly. With the reduction of traffic and associated traffic noise along the Princes Highway new development opportunities would arise.

The bypass would reduce highway traffic through Albion Park Rail and may impact businesses dependent on passing traffic along the existing Princes Highway. These impacts will be further investigated during future stages of the project.

### 5.5.4 Aboriginal heritage

Roads and Maritime engaged Artefact Heritage to conduct an Aboriginal archaeological survey and assessment for the LEP corridor in accordance with Stage 2 of Roads and Maritime’s Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI). Artefact Heritage (2013) undertook the detailed investigation including field work and the report is provided in Appendix C. A summary of key findings is provided in this section.

The LEP corridor is within the boundary of Illawarra Local Aboriginal Land Council (ILALC). Artefact Heritage consulted with ILALC throughout the Aboriginal archaeological survey.

**Registered Aboriginal sites in the local area**

Material traces of Aboriginal occupation exist throughout the landscape and are known as Aboriginal sites. An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was undertaken on 23 April 2013. Two previously recorded sites are located within the LEP corridor:

- **Substantial artefact scatter** – this comprises 89 artefacts and has high archaeological potential (that is, it has potential to contain additional surface/subsurface deposit).
- **Midden/artefact scatter** – a number of artefacts are scattered and it is possible the site also contains undisturbed sub-surface material.

Stone artefacts are the most common trace of Aboriginal occupation in the Sydney / Illawarra region, and it is possible that further unrecorded stone artefacts, on the surface or buried, exist within the LEP corridor.

**Survey results**

Artefact Heritage conducted a field survey during which they observed the two previously recorded Aboriginal sites.

The researchers did not detect any previously unrecorded Aboriginal sites but identified one area of potential archaeological deposit (PAD). Areas are classified as
PAD’s if there is a likelihood of archaeological material existing underground, or on the ground surface but obscured from view.

**Analysis and discussion**

There are high levels of ground disturbance along most of the LEP corridor. The ground has been disturbed by the construction of roads; industrial and residential development; and installation of utilities.

In addition, all drainage channels and creeks have been heavily modified. Some modifications are associated with the construction of roads. Other modifications are associated with dredging and the installation of dams.

In terms of archaeological potential, the land within and near the LEP corridor would have provided a wide range of food and manufacturing resources for the local Aboriginal population. It is also located close to perennial fresh water.

One PAD was identified during this study. Because of the sensitivity of the locality (very gentle slope less than 200 metres from Frazers Creek) and low level of ground disturbance, there is potential for subsurface artefacts to be present within the PAD, and it is assessed as having high archaeological potential.

**Significance assessment**

Artefact Heritage has determined the archaeological significance of the two recorded sites and the PAD as follows:

- **Midden/artefact scatter** – this site is located in a disturbed context on a floodplain and was therefore assessed as having a low archaeological significance.

- **Substantial artefact scatter** – this site’s archaeological research potential was assessed as moderate. However, the site could not be accurately assessed based on observations in the field. The levels of subsurface disturbance are unknown and therefore further archaeological investigations are required prior to assessments of representative, rarity, educational and archaeological values. The archaeological significance of the site is therefore unknown.

- **The PAD** was identified based on the research potential of the designated area. The PAD was assessed as having a high archaeological potential and high research potential. The PAD area has the potential to provide information on the nature of occupation in the area and enable a comparative analysis with other sites in the vicinity. However, the archaeological significance of the PAD, archaeological values, and representative and rarity values cannot be accurately determined until the further archaeological investigations are undertaken.

The remainder of the study area was generally disturbed or included areas of low archaeological potential and was therefore assessed as demonstrating low archaeological significance. Impacts to Aboriginal heritage within the study area would therefore be relatively low.

Only two of the sites / PAD identified are considered moderate or high archaeological potential. Given the large size of the LEP corridor the impacts on Aboriginal heritage items within the LEP corridor is considered to be relatively low.

**Further work**

The following actions would need to be taken if Roads and Maritime proceed with the development of the project in the LEP corridor:

- If the midden/artefact scatter were to be impacted, an Aboriginal Heritage
Impact Permit (AHIP) would be required prior to impacts occurring.

- If the substantial artefact scatter or PAD were to be impacted, Stage 3 of the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) would need to be undertaken for future management of the site. This includes comprehensive Aboriginal consultation and developing a cultural heritage assessment report.
- If Roads and Maritime were to alter the project design and areas not surveyed were to be impacted, or other Aboriginal sites not identified were to be impacted, further archaeological assessment would be required.

5.5.5 Non Aboriginal heritage

Heritage database searches identified six heritage items in the LEP corridor and two very close to the LEP corridor. All items are recorded as being of ‘local significance’ including Stapletons Bridge, which is on Roads and Maritime Section 170 Register. These heritage items are listed in Table 5.5. There may also be other archaeological remains in the study area, such as agricultural equipment, old buildings, and old pavements.

The project is likely to impact Swansea Farmhouse and Stapletons Bridge over Frazers Creek, and would traverse land that contains Boles Meadows, Swansea Dairy, and Albion Park Showground. These heritage items have local significance.

No heritage items within the LEP corridor are currently identified as of state or national heritage significance.

More detailed heritage studies will be undertaken to better understand and assess any potential impact on heritage items and values in the area.

Heritage sites in or near the LEP corridor are shown in Figure 5.13.

Table 5.5 Heritage items in or near the LEP corridor

<table>
<thead>
<tr>
<th>Heritage item</th>
<th>Address</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boles Meadows</td>
<td>2105 Illawarra Highway, Albion Park</td>
<td>Local</td>
</tr>
<tr>
<td>Albion Park Showground</td>
<td>Tongarra Road, Albion Park</td>
<td>Local</td>
</tr>
<tr>
<td>Stapletons Bridge over Frazers Creek</td>
<td>Tongarra Road, Albion Park</td>
<td>Local RMS 170 Register</td>
</tr>
<tr>
<td>Swansea Dairy site, fig tree and silo</td>
<td>149 Croome Road, Croom</td>
<td>Local</td>
</tr>
<tr>
<td>Swansea Farmhouse</td>
<td>152 Croome Road, Croom</td>
<td>Local</td>
</tr>
<tr>
<td>House, Yallah</td>
<td>Princes Highway, Yallah</td>
<td>Local</td>
</tr>
<tr>
<td>Illawarra Regional Airport</td>
<td>Airport Road off Princes Highway, Albion Park Rail</td>
<td>Local</td>
</tr>
<tr>
<td>Ravensthorpe grounds and Workers Cottages (close to the LEP corridor)</td>
<td>52–56 Tongarra Road, Albion Park</td>
<td>Local</td>
</tr>
</tbody>
</table>
Figure 5.13 Heritage sites in or near the LEP corridor
5.5.6 Noise and vibration

Noise and vibration from both construction and operation of road projects is an important component of project development for communities, stakeholders and Roads and Maritime.

The LEP corridor is located in some places adjacent to suburban environments, of which the proposed bypass would be a new or changed noise source. There are residential areas and individual houses within about 200 metres of the LEP corridor including:

- Houses on Gumnut Street, Albion Park Rail (95 metres from the LEP corridor).
- Houses on Grey Street, Albion Park (110 metres from the LEP corridor).
- Houses on Stapleton Avenue, Albion Park (near Tongarra Road) (100 metres from the LEP corridor).
- A house on Tongarra Road and Ravensthorpe (a heritage property), Albion Park Rail on Tongarra Road (the house is 170 metres from the LEP corridor, and Ravensthorpe is 230 metres from the LEP corridor).
- Houses on Illawarra Highway (less than 10 metres from the LEP corridor).
- Houses on Larkins Lane, Yallah (less than 20 metres from the LEP corridor).

Although there is expected to be a new noise source associated with the proposed bypass there would also be substantial changes to the existing Princes Highway noise conditions due to a reduction in traffic volumes on this route.

Roads and Maritime considers a number of noise reduction and management measures on road projects to mitigate potential impacts. In addition, the Environmental Protection Authority (EPA) has daytime and night-time noise level targets for projects involving new roads and existing roads. A noise and vibration impact assessment would need to be undertaken and if predicted noise levels for homes exceed the EPA target levels, Roads and Maritime considers further noise mitigation, such as noise treatment, low-noise pavement and noise walls.

5.5.7 Landform, soil and water

Preliminary information on landform, soil and water is derived from the Aboriginal Archaeological Survey Report commissioned by RMS (Artefact Heritage, 2013).

Topography

Overall, the landform within the study area ranges from alluvial flats and creek terraces, to gentle and moderate hill slopes and gullies.

Most of the LEP corridor is flat, with elevations ranging between 10 and 20 metres above sea level. The highest point is near the East West Link, at the southern end of the project, where the land is 40 metres above sea level.

The land at the very northern end of the study area rises up moderately into the hill slopes of Mount Brown. South of this, the terrain flattens out towards the Lake Illawarra floodplain. The area immediately to the north and west of Macquarie Rivulet is gently undulating.

Geology and soils

The underlying geology of the study area primarily consists of sedimentary rock of the Berry Siltstone formation, part of the Permian-aged sediments of the Shoalhaven Group. The Berry siltstone formation is found exposed in low-lying parts of the study area.
area, along drainage channels. It is overlain by Quaternary Alluvium, which is material that has been transported and deposited by water, and includes gravel, swamp deposits, peat, silt, and sand. The east–west stretch of the study area is underlain in places by Late Permian Gerringong volcanics.

The LEP corridor passes through three main soil landscapes:

- Fairy Meadow soil landscape: This is the predominant soil landscape, and is widely present in the alluvial plains, floodplains, valley flats and terraces below the Illawarra escarpment. The topography of this soil landscape is relatively flat, generally consisting of slopes less than 10 metres high and inclined less than five per cent. The Fairy Meadow soil landscape is characterised by flood hazard, low wet-bearing strength, topsoils that are highly permeable, and high water tables.

- Albion Park soil landscape: A small part of the northern sector of the study area, and the entire east–west stretch of the study area, pass through the Albion Park soil landscape. This soil landscape is subject to seasonal water logging and characterised by eroding soils.

- Shellharbour soil landscape: The very northern and eastern ends of the study area cross the Shellharbour soil landscape. This soil landscape is subject to localised water erosion hazard and characterised by eroding soils.

The floodplain portions contain soils subject to water logging and soils of the LEP corridor may have the potential to require geotechnical ground treatments prior to construction. Further geotechnical analysis needs to be undertaken within the LEP corridor to determine any future design techniques that may need to be utilised in the design and development of the project. This is not anticipated to be a major constraint on the development of the bypass and is likely to be able to be managed with commonly utilised engineering techniques. A number of techniques for dealing with similar soil environments have been utilised in recent Roads and Maritime projects on the Princes Highway.

Hydrology

Watercourses in the study area are described in section 5.5.2. All of these watercourses can be considered sensitive receiving environments and drain into Lake Illawarra, listed by the Australian Government Department of the Environment as a nationally important wetland for its suitable habitat for nationally listed threatened species.

As described in section 2.5, flooding is a current problem impacting both the Illawarra Highway and Princes Highway. The LEP corridor is located within the Macquarie Rivulet / Frazers Creek floodplain and as such flooding needs to be carefully managed during the design of the proposed bypass.

Flooding impacts would be managed by selecting appropriate flood structures such as culverts and bridges while managing the impacts within both the upstream and downstream catchments. In addition, flood risk would be an issue considered when developing any construction methodology for the project to minimise the risk to the environment and the construction process.

The design of flood mitigation structures would take into account current climate change policy.

Contamination

The NSW Office of Environment and Heritage maintains a contaminated land register. A search of the register did not indicate any known contaminated sites near the LEP corridor. However, there is potential for contaminated land to occur due to
the use of chemicals associated with land uses in or near the LEP corridor such as:

- Sporting fields: fertilisers and herbicides.
- Agriculture: fertilisers, insecticides, fungicides and herbicides.
- Railways: hydrocarbons, arsenic creosote, heavy metals, nitrates and ammonia.
- Roads: coal tar.
- Wholesale plant nursery: fertiliser, insecticides, fungicides and herbicides.
- Transgrid land: Polychlorinated Biphenyls (PCBs), solvents, tin, lead, copper and mercury.
- Industrial area (auto recycling): hydrocarbons, metal, solvents, acids and alkalis, refrigerants and antifreeze.
- Illawarra Regional Airport: hydrocarbons, aviation fuel, metals particularly aluminium, magnesium and chromium.

A ‘phase one’ investigation is required to verify the location and types of contaminants in the LEP corridor. Land contamination is not expected to be a major constraint to the use of the LEP corridor, Contaminated land would be managed in accordance with Roads and Maritime guidelines for Contaminated Land Management and further investigated during the environmental assessment process.

**Acid sulphate soils**

Acid sulphate soils are a naturally occurring soil and sediment that contains iron sulphides. Acid sulphate soils (ASS) can be classified into two types; actual acid sulphate soils and potential acid sulphate soils. Potential acid sulphate soils are waterlogged soils rich in iron sulphides that have not been oxidised. Potential acid sulphate soils (PASS) are harmless to the environment if kept in this state or under water. Any exposure of potential acid sulphate soils to air or the lowering of the watertable would lead to the development of actual acid sulphate soils and sulphuric acid would be formed.

Acid sulphate soils are likely to be encountered within the LEP corridor.

The highest risk of encountering acid sulphate soils (one metre below surface) is adjacent to the Princes Highway, north of the intersection with the Princes Highway and Illawarra Highway.

Areas with a high probability of encountering acid sulphate soils (two metres below surface) are near Frazers Creek where the creek crosses the Illawarra Highway, adjacent to Macquarie Rivulet.

Roads and Maritime Services has successfully managed acid sulphate soils and PASS on other road construction projects and, while specialist management techniques may be required, these are typically well developed. The extent of ASS and PASS identified to date is not anticipated to present a substantial constraint to the project’s development or construction.

**5.5.8 Air quality**

The Environmental Protection Authority has maintained a monitoring station at Albion Park since the early 1980s. The following information on air quality in the Illawarra region was sourced from the EPA station in Albion Park, the results are:

- Concentrations of carbon monoxide in the region are low.
• Ozone in the region can occur as a result of photochemical smog produced from local emissions or from smog or precursors transported down the coast from the Sydney region. It appears that most ozone events in the Illawarra occur as a result of the combined effect of these two factors. Within the region, based on data from 1993 to 1998, Albion Park records the greatest number of exceedences of the National Environment Protection Measures (NEPM) standard for both four-hour and one-hour ozone concentration.

• Concentrations of nitrogen dioxide in the region can reach 50–60 per cent of the NEPM standard.

• There were no exceedences of the goal for concentrations of particulate matter in the region.

The results from the station in Albion Park show that there are some air quality issues within the region, however the source of these air pollutants is not known. The bypass would shift traffic from the existing Princes Highway to a new area. However, the bypass is not expected to have a substantial impact on air quality, traffic on the bypass would generally be free flowing so that congestion related emissions are expected to reduce. In addition, the reduction of traffic on the Princes Highway would lead to a reduction in traffic-related air pollutants in Albion Park Rail town centre.

5.5.9 Community

Community and stakeholder views and input are an important part of Roads and Maritime’s project development process. Future project development will build on previous consultation, which substantially informed the development of the LEP corridor.

Roads and Maritime consulted with the local community during the route options study in 1994–95. No further consultation has been undertaken, however Roads and Maritime has received ongoing input from the community on the need for substantial roadwork in the area.

It is expected that many people who were originally consulted have left the area and new residents have arrived. Therefore, while the LEP corridor has been marked on council planning LEPs (and street directories), many community members may not be aware of it and may not currently support construction in the LEP corridor.

Community engagement will form a key component for this important road project. Roads and Maritime Services will recommence the community engagement process. The community will have opportunities to talk to the project team about this report and the project next steps in early 2014. Further community engagement will be carried out as the development of the project progresses.

Particularly over the last few years there has been media coverage on the increasing traffic congestion on the Princes Highway in Albion Park Rail. As a result of commercial and residential developments in the area, traffic congestion is now considered an important community issue. There is community pressure to have the bypass built which is reflected in a petition in 2013 encouraging the community to campaign to have the bypass built. This section of road has been referred to in the media as the ‘missing link’ along the highway.

In addition, an NRMA report (2012) ranked the Princes Highway at Albion Park Rail as the second worst road in NSW and the worst road in the Illawarra region. While the survey results show that this section of highway is a major local community issue, the validity of the results has not been assessed, and it is considered that the issues at Albion Park Rail need to be managed in the context of transport development throughout the Illawarra and NSW.
5.5.10 Overview of environmental considerations

The review of environmental constraints on the LEP corridor found that there would be substantial positive benefits from the proposed bypass being constructed within the LEP corridor. These include:

- The bypass would reduce highway traffic through Albion Park Rail thereby reducing the barrier posed by heavy traffic.
- Improve amenity within Albion Park Rail.
- Reduce the delays and improve travel time reliability during peak travel times for commuters and tourism traffic.
- The bypass would provide opportunities to improve the public domain within the Albion Park Rail town centre.
- The bypass would substantially improve the flood access in the study area.

A number of environmental issues will require further consideration in planning for a bypass in the LEP corridor. Roads and Maritime will seek to minimise impacts arising from the proposed bypass and mitigate these impacts where possible. These issues include:

- Three endangered ecological communities (EEC) identified within the LEP corridor.
- The presence of the threatened Eastern Flame Pea, and further studies need to be undertaken to identify the potential impacts.
- The presence of Frazers Creek, Macquarie Rivulet and Duck Creek, and the potential need to install bridges to carry the roadway across them.
- The direct and indirect impacts on local properties, including soccer grounds and the Stony Range Pony Club facilities.
- The visual impacts within the study area.
- Aboriginal heritage there are two Aboriginal heritage sites and one Potential Archaeological Deposit within the LEP corridor. Further work is required to understand the impact of the bypass on these sites.
- Non-Aboriginal heritage, there are six locally listed items within the LEP corridor and two very close to the LEP corridor. However, further heritage assessment and a statement of heritage impact would be required to verify if and how the bypass would impact on these items.
- The noise impacts, there are expected to be changed noise conditions and new noise sources in some locations of the study area. This would have varying noise impacts. Negative impacts beyond target levels would be managed with consideration to noise mitigation, such as noise treatments, low-noise pavement and noise barriers.
- Flood mitigation would need to be further investigated structures would need to take into account current climate change policy.
- Contaminated land in the LEP corridor, but this could be managed during the construction phase.
- The potential for encountering acid sulphate soils, Roads and Maritime has proven techniques for managing these soils.

Overall, the likely environmental impacts would be comparable to other large road
projects on the coastal plain. Roads and Maritime has successfully mitigated where possible and managed these impacts on other road construction projects and, while specialist management techniques may be required, these are typically well developed.

The environmental assessment was based on a desktop analysis and limited field surveys and further research and detailed surveys, are required to confirm these findings.

5.6 Chapter summary

Recent investigations have found that the LEP corridor meets the requirements for a proposed bypass. It has a generous width, could provide motorway conditions, could largely meet road standards and guidelines (except for around the Croom Regional Sporting Complex) for consistent driving conditions, would provide substantial traffic benefits, and would not pose constructability issues. However, further studies are required, including traffic modelling, flood studies, constructability and environmental assessment. Roads and Maritime would also need to engage with the community during future stages of the project.


6 Findings and next steps

This road corridor review presents an assessment of the LEP corridor in terms of the justification for the development of a bypass of Albion Park Rail. This chapter presents conclusions, recommendations and next steps in the planning process.

6.1 Conclusions

The purpose of this report is to identify the need for the Albion Park Rail Bypass and assess whether the LEP corridor announced in the mid 1990’s is still appropriate for the bypass project.

The project is justified when looking at the current and future problems on the existing Princes Highway / Princes Motorway in the study area.

Current problems

The current issues within the study area include:

- The standard of road is inconsistent compared with the route to the north and south between Heathcote and Bomaderry.
- The route passes through the township of Albion Park Rail where through and local traffic are in conflict. All other townships between Heathcote and Bomaderry are bypassed or have a NSW Government commitment to be bypassed.
- The route contains five sets of traffic lights and a roundabout with traffic lights. These are the only remaining traffic lights and roundabout on the route between Heathcote and Bomaderry.
- Motorists experience substantial congestion in the morning and afternoon peaks (LOS D/E).
- Motorists experience extended delays and queuing during holiday peak periods (LOS F).
- Crash rates on the Princes Highway in the study area are higher than the NSW average for the same road type, and significantly higher than the sections of Princes Highway / Princes Motorway to the north of Yallah and south of Oak Flats.
- Flooding is experienced on the Princes Highway and substantial flood impacts are experienced on the Illawarra Highway.

Future year problems without the bypass

The future problems expected to occur should the bypass not be constructed include:

- The future traffic conditions within the study area are expected to worsen in the short term and substantially worsen in the long term.
- In the next five years there would be major congestion at the following conflict points within the study area and these would extend substantially over the next 20 years to cover the majority of the day.
  - Southbound merge on the Princes Motorway with traffic from the Princes Highway (from Dapto).
  - Illawarra Highway intersection.
  - Creamery Road intersection.
  - Airport Road intersection.
• Substantial additional development is planned in the surrounding area that would exacerbate current traffic conditions. The traffic conditions on the Princes Highway are expected to become LOS E/F by 2046.

• Travel times on the route would substantially increase to 44 minutes in the northbound peak and 24 minutes in the southbound peak direction by 2046.

• Crashes are expected to increase in the future.

The assessment of the existing LEP bypass corridor found the corridor is generally suitable for the future bypass of Albion Park Rail. When designed to current road design standards / guidelines, a bypass would largely fit within the LEP corridor except for a small section around the Croom Regional Sporting Complex.

**Project benefits**

Benefits of an Albion Park Rail bypass would include:

• Improve travel times in both directions on this important route.

• Improve the reliability of travel times. This would be particularly important for trips during peak travel periods.

• Bypass Albion Park Rail, and reduce noise and other traffic related impacts for residents living close to the existing highway.

• Divert substantial through traffic away from the Princes Highway in Albion Park Rail. The bypass would cater mainly for through trips, while the existing Princes Highway would cater mainly for local trips.

• Increase road capacity in the study area, which would cater for the anticipated future population growth in West Dapto, Calderwood and Tallawarra.

• Maximise the benefits of upgrading the M1/A1 route between Sydney and Nowra by bypassing the only traffic lights on the route between Heathcote and Bomaderry.

• Maximise the benefits of upgrading the M1/A1 route between Sydney and Bomaderry by bypassing the only town not bypassed (following completion of the Berry Bypass by 2018).

• Remove the section of the Illawarra Highway near the Illawarra Regional Airport that is highly susceptible to flooding.

• Substantially improve road safety by separating through and local traffic and removing traffic conflicts.

• Provide economic benefits more than twice the costs.

The environmental issues are comparable to other large road projects on the coastal plain that Roads and Maritime has successfully managed in the past. Further environmental investigation needs to be undertaken to better understand these issues and develop mitigation measures to reduce the potential impacts.

Given the above it is recommended that the LEP corridor be adopted as the preferred corridor for further design and development work for the Albion Park Rail Bypass.

During the road corridor review, some issues were identified that should be further incorporated into the proposed bypass. The further design and development of the proposal will be subject to the following steps being undertaken:

• Further investigate the route near Croom Regional Sporting Complex to ensure that the design can incorporate current road design standards and investigate possibilities for shortening the route.
Further investigation and traffic modelling needs to be undertaken to identify the potential interchange locations and layouts for connections of the proposed Albion Park Rail Bypass with the surrounding road network.

6.2 What happens next

Figure 6.1 shows the process that has been undertaken to date and the future steps that are required for the proposed Albion Park Rail Bypass.

In the next phase of work, Roads and Maritime will:

- Further investigate and undertake traffic modelling and design work for potential interchange locations.
- Further investigate the route near Croom Regional Sporting Complex to ensure that the concept road design can incorporate current road design standards / guidelines and investigate possibilities for shortening the route.
- Further investigate key issues such as flooding, environmental impacts, and geotechnical aspects to help the design process.
- Undertake further studies including environmental, traffic, geotechnical, hydrological.
- Hold community information sessions to give the community an opportunity to ask questions about the LEP corridor and the review process (these sessions will be arranged in early 2014).
- Prepare the concept design and environmental impact assessment.

Roads and Maritime will keep the community informed of ongoing investigations through newsletters and the project web page, and by gaining coverage in the local and regional media.
Figure 6.1  Current and future steps for the project
References

Artefact Heritage 2013, Yallah to Oak Flats Road Upgrade – Draft Stage 2 PACHCI Aboriginal Archaeological Survey.

Austroads 2010, Guide to Road Design.

Bitzios Consulting 2013, Albion Park Rail Bypass Traffic Study.

Connell Wagner 1996, State Highway No. 1, Princes Highway – Yallah to Oak Flats Route Selection Study.

NSW Government 2012, NSW Long Term Transport Master Plan.


RTA 2009, Beyond the Pavement.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>A1</td>
<td>The acronym given to the Princes Highway.</td>
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<tr>
<td>ASS</td>
<td>Acid Sulphate Soils</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental impact assessment.</td>
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<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>
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<tr>
<td>EEC</td>
<td>Endangered ecological community.</td>
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<tr>
<td>ESD</td>
<td>Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.</td>
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<tr>
<td>Heritage Act</td>
<td><em>Heritage Act 1977 (NSW)</em>.</td>
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<tr>
<td>LALC</td>
<td>Local Aboriginal Land Council.</td>
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<td>LEP corridor</td>
<td>The road corridor reserved on the Shellharbour and Wollongong City councils’ LEPs.</td>
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<tr>
<td>LOS</td>
<td>Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.</td>
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<tr>
<td>M1</td>
<td>The acronym given to the Princes Motorway.</td>
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<tr>
<td>M1/A1 corridor</td>
<td>The main southern route between Sydney and the Victorian border.</td>
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<tr>
<td>NES</td>
<td>Matters of national environmental significance under the Commonwealth <em>Environment Protection and Biodiversity Conservation Act 1999</em>.</td>
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<tr>
<td>NPW Act</td>
<td><em>National Parks and Wildlife Act 1974 (NSW)</em>.</td>
</tr>
<tr>
<td>PASS</td>
<td>Potential Acid Sulphate Soils (PASS)</td>
</tr>
<tr>
<td>QA Specifications</td>
<td>Specifications developed by Roads and Maritime Services for use with roadwork and bridgework contracts let by Roads and Maritime Services.</td>
</tr>
<tr>
<td>SEPP</td>
<td>State Environmental Planning Policy (a type of planning instrument made under Part 3 of the EP&amp;A Act).</td>
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<tr>
<td>SEPP 14</td>
<td><em>State Environmental Planning Policy No.14 – Coastal Wetlands</em>.</td>
</tr>
<tr>
<td>The project</td>
<td>The Albion Park Rail bypass project.</td>
</tr>
<tr>
<td>TSC Act</td>
<td><em>Threatened Species Conservation Act 1995 (NSW)</em>.</td>
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