Part C – Outcomes of the Plan
7 Broad options, needs and opportunities

The preceding chapters provide information on what is known about the Bells Line of Road corridor from investigations into aspects such as transport, engineering and environmental and social issues, as well as the issues identified during the public consultation process. They set out the needs and constraints that are key inputs into planning for the corridor.

This chapter presents a range of improvement options and opportunities that could address these deficiencies. These provide a platform for nominating development and improvement priorities, which are presented in Chapter 8.

7.1 Broad options

There are two broad improvement options available to meet the corridor objectives described in Chapter 2. These can be summarised as follows:

> A major upgrade in the longer term, with associated connections to the broader road network and corridor reservation in the interim.
> Short and medium term improvements focused on the existing corridor.

The above options are not mutually exclusive and a combination could be implemented at different stages and at different locations in the corridor. The opportunities around these broad options are discussed in the sections below.

7.2 Strategic opportunities for a major upgrade of the Bells Line of Road corridor

A major future upgraded Bells Line of Road would generally be expected to be two-lanes in each direction with appropriate overtaking lanes, and constructed to a high speed standard. It may include an entirely new route, or a realignment or widening of a significant section of Bells Line of Road.

The transport analysis undertaken as part of this project indicates that there is anticipated to be a traffic efficiency justification for a major upgrade of Bells Line of Road east of Kurrajong Heights in the long term. However, projected traffic volumes even under a high growth scenario suggest that a major upgrade west of Kurrajong Heights is not justified in the foreseeable future.

In terms of a future upgrade east of Kurrajong Heights, traffic analysis shows that a substantial proportion of traffic originating from within and beyond the corridor is bound for the Sydney metropolitan area. Therefore, the Bells Line of Road requires an effective ongoing connection to the Sydney motorway network. Existing congestion at North Richmond currently affects this connection at peak times, while traffic forecasts suggest that congestion may occur as far west as Kurrajong Heights in the long term if no network improvements are undertaken. Likewise, significant development pressures in north-western Sydney mean that reservation of a corridor is required in the short to medium term, with the process to reserve a corridor commencing in the short term.
7.2.1 Opportunities for an eastern corridor upgrade

The following strategic opportunities have been identified for an upgraded Bells Line of Road east of Kurrajong Heights:

> Upgrade primarily within the existing alignment, including upgrading of Richmond Bridge and its approaches, and connecting with the Blacktown Road/Richmond Road corridor, which would also be upgraded as appropriate.

> Establish a new connection between Kurrajong Heights and the Sydney motorway network, which may utilise sections of the existing road network such as The Driftway, Richmond Road and/or Londonderry Road, or rely on an entirely new corridor.

> Establish a new connection that crosses the Hawkesbury (or Nepean) River further south and utilises all or part of the Castlereagh Freeway corridor to connect with the M7 Motorway at Dean Park.

Under current RMS planning, Richmond Road is proposed to be progressively upgraded to a six-lane urban arterial road as the North West Growth Centre develops. However, it is unlikely that an upgrade primarily within the existing alignment will provide an efficient long term connection between the Bells Line of Road and the Sydney motorway network, as it traverses existing and future urban areas and will continue to provide access for local traffic. Nonetheless, a future upgrade of Richmond Road may provide opportunities for short to medium term improvements to traffic congestion in the eastern corridor.

A new corridor, or a corridor that utilises parts of the existing network, is more likely to provide an efficient long term connection between Kurrajong Heights and the Sydney motorway network.

It is unlikely that traffic associated with the Bells Line of Road would in itself justify development of the Castlereagh Freeway corridor. If the Castlereagh Freeway corridor is developed for other reasons, such as large urban releases between the North West Growth Centre and Penrith or as an alternative access route to Penrith, then a connection between the Bells Line of Road at Kurrajong and the Castlereagh Freeway corridor would potentially be viable in the long term.

Any option to connect Kurrajong Heights to the Sydney motorway network would require extensive and rigorous investigations to identify a cost-effective route that efficiently negotiates the change in elevation while minimising socio-economic and environmental impacts.

7.2.2 Opportunities for improved connections to the Great Western Highway (in the Lithgow area)

The following strategic opportunities have been identified for improved connections between the Bells Line of Road corridor and the Great Western Highway in the Lithgow area:

> Use the existing road corridor through Lithgow, with traffic rationalisation where appropriate.

> Use the Darling Causeway to connect with the Great Western Highway at Mount Victoria, with upgrades to Darling Causeway and the Great Western Highway as appropriate.

Other opportunities have been considered in previous studies, including a route across the Newnes Plateau to the north of Lithgow and routes through the Hartley Valley. These previous studies have found these routes to have limited feasibility. The analyses conducted as part of the preparation of this Plan reaffirms these outcomes, particularly in terms of environmental constraints, and they are not regarded as strategic opportunities for the purposes of corridor planning.
7.3 Short and medium term improvements to the existing corridor

7.3.1 Minor curve realignments and straightening

The need
The engineering analysis identified a number of sections of Bells Line of Road that have tight curves which could be improved by minor realignment and straightening to improve road safety and capacity. The results of the engineering analysis are reinforced by the crash analysis (refer to Chapter 6), which identified higher crash rates within these areas compared to other sections of the Bells Line of Road.

Opportunities
There is an opportunity to undertake a program of horizontal and vertical curve straightening at key locations, and particularly where tight curves are combined with steep grades. This includes:

> For various curves in the 6 kilometre section between Kurrajong and Kurrajong Heights (including Bellbird Hill), which has a design speed of 60 kilometres per hour or less.
> In the vicinity of Mount Tomah, which has a design speed of 70 kilometres or less.
> For various curves in the eight kilometre section between Newnes Junction and Lithgow, which has a design speed of 60 kilometres per hour or less.

This type of improvement would generally provide a good standard rural road with a target design speed of 70 to 80 kilometres per hour. Generally, one lane in each direction would be adequate, with climbing lanes provided on long, steep uphill grades.

Opportunities for minor realignments and straightening are likely to be affected in some locations by the environmental, social and technical constraints discussed in Chapter 5. Sensitive design and detailed environmental impact assessment is likely to be required in areas where this treatment is potentially appropriate.

7.3.2 Overtaking

The need
Road sections that have long distances without an overtaking lane can result in increased risk-taking by motorists.

Most of Bells Line of Road has only one lane in each direction and overtaking opportunities are restricted by the numerous curves in the road. Crash statistics suggest that the existing overtaking lanes may be too short in some locations and that the lack of overtaking opportunities may have contributed to motorists taking greater risks on occasions.

Opportunities
The engineering analysis identified that the following locations have sections of 10 kilometres or more with no overtaking opportunities, or would otherwise benefit from additional overtaking opportunities:

> In both directions in the section between Kurrajong Heights and Mount Tomah.
> For westbound traffic west of Bell.
> For eastbound traffic between Dargan and Mount Wilson.
> At Mount Tomah, where the long, steep grades cause truck speeds to drop to around 40 kilometres per hour. The only additional lane in this location is a climbing lane for eastbound traffic.
The feasibility of providing overtaking opportunities in these locations would partly depend on a detailed examination of environmental and engineering constraints.

7.3.3 Lanes, shoulders, clear zones, safety barriers and improved drainage

The need

The engineering analysis identified the following needs:

> Wider lanes – the assessment suggests that lanes are narrower than RMS’ recommended width of 3.5 metres for roads carrying more than 2000 vehicles per day. Lanes are typically 3–3.2 metres wide. Narrow lanes reduce the lateral clearance between vehicles, reducing safety, travel speeds and road capacity.

> Shoulders – RMS recommends a sealed shoulder width of at least 1 metre for roads carrying more than 2000 vehicles per day. The engineering analysis identified that sealed shoulders are narrower than this for most of Bells Line of Road. Narrow shoulders reduce the opportunity for an errant vehicle to recover and return safely to the roadway, reduce the available safety margin for avoiding vehicles travelling in the opposite direction, and limit the opportunity for a vehicle to safely stop clear of the running lane.

> Clear zones – for the traffic volumes on Bells Line of Road and with a flat verge RMS recommends clear zones between three metres at 60 kilometres per hour to nine metres at 100 kilometres per hour. However, the engineering analysis identified that the available clear zone widths in each direction are generally significantly less than these targets for the design speed. Trees are the most common hazards in the clear zones. The analysis showed that clear zones are more limited east of Bilpin, where traffic volumes are higher.

> Drainage – the crash analysis identified a relatively high proportion of accidents on Bells Line of Road occurring in wet weather. While this does not necessarily indicate that there are drainage issues, this statistic and community feedback on road drainage issues suggests that road drainage characteristics should be examined in detail to determine if drainage improvements could improve road safety.

Opportunities

A program of lane and shoulder widening from the Bilpin Fruit Bowl to 10 kilometres west of this point is currently in the planning phase and is proposed to be implemented by RMS in 2012. There is an opportunity to ultimately extend this to other locations in the Bells Line of Road corridor.

At any locations where an adequate clear zone cannot be achieved, consideration may be given to installing a section of safety barrier.

There is also an opportunity to implement minor drainage improvements as part of these works to address any areas where inadequate drainage allows runoff to cross the road during periods of heavy rainfall.

Higher priority should be given to lengths within these sections where tight curves are combined with steep grades.

7.3.4 Pedestrian and cycle access

The need

The narrow shoulders that occur in much of the corridor mean that cyclists are obliged to be on or very close to the traffic lanes, increasing their risk of accidents.

There are some locations (primarily the villages along the route) where higher pedestrian and cyclist activity occurs, and safety and efficiency could potentially be improved.
Opportunities
Providing better cycle access mostly involves improved shoulder treatments, as addressed in Section 7.3.3.
There may also be opportunities to improve or create dedicated off-road pedestrian and cycle links within villages.

7.3.5 Intersections
The need
Intersections are a potential road safety issue, particularly when there are no turning lanes or there is limited sight distance. The Bells Line of Road/Kurmond Road and Bells Line of Road/Comleroy Road intersections have a relatively high number of crashes, suggesting a need for improvement.

Opportunities
There is an opportunity to make improvements to intersections that have safety issues, geometric constraints or higher turning volumes. The improvements could focus on providing turning lanes, widening shoulders, and improving sight lines.

7.3.6 Driveways
The need
Observations and community comments indicate that many driveways directly connecting to Bells Line of Road have restricted sight distance in one or both directions.

Opportunities
There are opportunities to identify driveways where sight distance or other aspects are hazardous. It may be possible to rationalise these driveways by constructing short lengths of access roads. This would require extensive consultation and negotiation with the land owners concerned and it would directly affect property access.

7.3.7 Slopes
The need
The steep embankments in parts of the corridor are prone to land slip, which could result in debris on the road or shoulder. This in turn can create a hazard for motorists.

Opportunities
RMS has an ongoing program of slope evaluation and stabilisation. Works are carried out in the corridor under this program.

Any lane and shoulder widening would create the opportunity to treat and protect slopes in such a way that ongoing maintenance and future risks of land slips are substantially reduced in those areas.

7.3.8 Bridge safety
The need
Apart from the Hawkesbury River Bridge at Richmond, there are only two bridges crossing creeks and two railway overpasses between North Richmond and Lithgow. These are:

> Redbank Creek Bridge – this is located on the outer edges of North Richmond. It is narrow (about 6.5 metres between barriers). The bridge is speed limited to 60 kilometres per hour.

> Little Wheeny Creek Bridge – this is located in the Kurrajong section. It is relatively narrow at 5.5 metres between white lines, and has a speed limit of 80 kilometres per hour.

> Bell railway overpass – this has acceptable width.
> Newnes Plateau overpass – this is narrow (approximately 5.75 metres between white lines), barely allowing two trucks to pass.

**Opportunities**

There is the opportunity to improve the bridges listed above as follows:

> Redbank Creek Bridge could be widened to approximately 9.0 metres between barriers.
> Little Wheeny Creek Bridge could be widened to approximately 9.0 metres between barriers and the barriers could be upgraded to current standards.
> The railway overpass just west of Newnes Junction Plateau overpass could be widened to 9.0 metres between barriers and the barriers could be upgraded to current standards. This may involve considerable cost.

### 7.3.9 Rest areas

**The need**

Rest opportunities are important in the context of the distances being driven by some users of the corridor. While there are no formal rest areas in the corridor, there are a number of rest opportunities (such as fruit stalls, council facilities at Mount Tomah near Charleys Road, Mount Tomah Botanic Gardens, and the Prisoner of War Memorial near Clarence).

There are fewer rest opportunities in the national park areas west of Bilpin. While there are several entry roads into the national parks, they do not lead to any rest opportunities (such as lookouts) that are both accessible and of high quality.

**Opportunities**

There are opportunities to provide additional rest opportunities within the national park areas by upgrading existing or establishing new picnic or lookout areas. This would require collaboration between RMS and the National Parks and Wildlife Service.

In addition, safer, more efficient access could be made available to some roadside rest opportunities.

### 7.3.10 Urban and landscape design

**The need**

While the Bells Line of Road corridor passes through some highly scenic and distinctive landscapes, there is no framework for managing this from an overall character perspective, other than RMS’ statewide urban design framework, *Beyond the Pavement*, available on the RMS website.

**Opportunities**

There is an opportunity to improve the cultural and natural landscapes of the corridor through the development of a corridor urban design framework, which could provide a clearer vision of the character of the road.

An urban design framework would be associated with a program of road improvements. It would enable appropriate landscape and urban design treatments to be incorporated into these improvements.

### 7.3.11 Environmental improvements

**The need**

The Bells Line of Road corridor passes through highly sensitive natural environments, including parts of the Greater Blue Mountains World Heritage Area. There are also ecologically
sensitive areas of vegetation within the road reserve that are likely to include Endangered Ecological Communities. The construction and operation of the road needs to address the sensitivity of these adjacent environments in terms of weed management, water quality management and wildlife movement.

**Opportunities**
There is the opportunity to implement a coordinated environmental management framework throughout the corridor that addresses weed, water quality and wildlife issues.

In addition, there may be an opportunity for existing ecologically degraded areas to be improved either as part of road improvement works or general road maintenance activities.

A focus on maintaining native regeneration processes within the road reserve is likely to lead to lower long term maintenance costs (for example through reduced need for weed removal) and improved ecological outcomes.