

4 Project development and alternatives

This chapter describes the various alternatives to the project that were considered as part of the project development process, explains how and why the project was confirmed as the preferred option, and describes design options for particular elements of the project.

4.1 Alternatives to the project

4.1.1 Alternatives considered

The merits of the project were considered in the context of a range of other alternatives. A number of these alternatives were considered as part of the M5 Transport Corridor Feasibility Study (RTA, 2009a). Alternatives to the project were considered based on the extent to which they could meet the project objectives and how well they performed with reference to other transport, environmental, engineering, social and economic factors.

The following alternatives to the project were considered:

- **Alternative 1** – The base case option.
- **Alternative 2** – Improve the existing arterial road network.
- **Alternative 3** – Investment to improve public transport provision.
- **Alternative 4** – Investment to increase the rail share of the freight task.
- **Alternative 5** – Demand management.

These alternatives are described below.

Alternative 1 – The base case option

The base case option involves retaining the M5 South West Motorway, in essentially its current configuration, as the main east–west arterial route between King Georges Road and Camden Valley Way.

Future transport demand in the M5 corridor represents a significant challenge for Sydney and NSW (refer to section 3.5.2 and 3.5.3). Without upgrading, the motorway would continue to operate at capacity in peak hours. It is already experiencing significant congestion during peak hours, with times of high demand spreading further throughout the day and across the weekend. Planned commercial and industrial growth at Port Botany and Sydney Airport, as well as planned population growth and employment growth along the M5 and M7 corridors is expected to add further pressure to this already congested route.

The base case option would:

- Increase travel times on the motorway and arterial roads, which would result in longer AM and PM peak periods.
- Reduce travel time reliability.
- Result in poorer access to community facilities and key residential areas.
- Provide limited support for future employment and population growth.
- Reduce Sydney's economic competitiveness and economic development due to deteriorating levels of access for tourists and freight.
- Increase vehicle emissions from cars stopping and starting more frequently.
- Increase vehicle incidents associated with increased congestion.

The consequences of the base case option are likely to be unacceptable to the people and businesses that rely on this important route.

Alternative 2 – Improve the existing arterial road network

This alternative would involve measures targeting both the capacity and operation of the arterial road network. Measures to improve the operational efficiency of the arterial road network (which notably includes King Georges Road) are being implemented as part of the NSW Government's \$100 million 'pinch point' program (a program to relieve traffic congestion at bottlenecks on 23 major road corridors across Sydney). These initiatives complement the project but are not an adequate standalone response to the identified strategic need.

Measures to improve road capacity could include:

- Widening roads on key arterial routes.
- Implementing parking restrictions on key routes.
- Reallocating road space on key routes (bus, transit and freight lanes).
- Constructing viaducts over existing surface roads.

Measures to improve the operational efficiency of the arterial road network could include:

- Providing grade separation of major intersections along corridors adjacent to the M5.
- Implementing access controls.
- Changing signal operation to increase priority for key routes.
- Providing grade separation of major pedestrian crossings.
- Installing right-turn bays at key intersections.
- Implementing tidal flow along key routes

To provide a reasonable alternative route to the M5 South West Motorway, operational and capacity improvements to those arterial roads that represented the primary route prior to the construction of the motorway would be required, including King Georges Road, Canterbury Road, Newbridge Road and the Hume Highway.

However, improving road capacity and operational efficiency on these roads would not adequately respond to the identified strategic need, or would have unacceptable impacts because:

- Widening would generally need to go beyond the existing public road boundaries because of the limited median space. Land use adjacent to the existing arterial road network predominantly comprises established commercial, industrial and residential development, and this represents a major constraint to widening in terms of construction related disruption, impacts on businesses, severance, and noise. Road widening would require the acquisition of a large number of properties and, as a consequence, would cost substantially more than the project as proposed.
- Achieving increased capacity by imposing parking restrictions would deliver some benefits for through traffic but would have major impacts on commercial and retail development lining the targeted routes.
- Implementing exclusive bus, freight or transit lanes in the absence of capacity increases would have unacceptable congestion consequences for general traffic (including commercial vehicles).
- Building a road viaduct would require property acquisition and present considerable challenges in terms of connectivity with the surrounding road network. It would also result in considerable noise and visual impacts.

- Providing grade separation of major intersections would help relieve congestion associated with the current signalisation of these intersections. However, it would involve considerable cost and property acquisition and would not deliver the same level of benefit as the project.
- Access controls and further priority for arterial routes would create congestion on connecting roads.
- Providing grade separation of pedestrian crossings would allow for the removal of pedestrian phases at some traffic signals and this would potentially allow more 'green time' to be allocated to through traffic. Improvements are likely to be marginal and not sufficient to address the growing demand discussed in Chapter 3.
- Installing right turn bays at key intersections would help prevent the queuing of traffic back into through lanes and can therefore minimise delays to through traffic. This is already occurring as part of the previously mentioned 'pinch point' program and alone would not sufficiently address the growing demand discussed in Chapter 3.
- Implementing tidal flow initiatives can be a useful targeted response to specific congestion areas but are not considered a viable alternative on longer routes such as those under consideration.

It is important to recognise that part of the justification for building the M5 South West Motorway is to gain benefits from removing traffic, particularly heavy vehicles, from heavily congested arterial and sub-arterial routes. Pursuing arterial upgrade options would not deliver those benefits.

Alternative 3 – Investment to improve public transport provision

As described in Chapter 3, there is continuing substantial public transport investment in and around the project corridor. Further public transport projects are also proposed.

Further investment options could include:

- Improving the operation of existing passenger rail services, including:
 - Changes to the service operation and frequency on the East Hills Line and Bankstown Line.
 - Signalling upgrades.
- Providing single-deck carriages to improve loading and unloading times.
- Improving strategic bus corridors.
- Extending the Metrobus network (in particular, route 90).
- Improving bus, private vehicle and bicycle accesses to rail stations.
- Improving park-and-ride facilities on the East Hills Line.
- Providing a new heavy rail corridor or further expanding the East Hills Line.
- Providing a light rail network.
- Providing bus lanes on the motorway.
- Converting the M5 South West Motorway to an integrated transport corridor (rail and road).

However, these measures are not favoured over the M5 West widening project because:

- Further improvements to the existing rail corridor through changes to signalling, rolling stock (eg single deck carriages), services and access are not anticipated to result in major increases in the capacity of the line, or result in a mode shift from private vehicle use at levels sufficient to meet future transport demand in the corridor. They should be seen as complementary to the project rather than alternatives to it.
- Current road-based public transport services tend to be limited to supporting interchanges with rail transport. Improvements to these services are likely to address a more localised transport need.

- Improvements to strategic bus corridors are currently occurring. Strategic bus corridors and the Metrobus network complement other road-based travel, in many cases serving a different transport task to the M5 South West Motorway.
- Motorway demand is different in many respects from public transport demand, with road transport better placed to accommodate off-centre employment, multi-purpose trips and commercial travel. For this reason, initiatives such as additional park-and-ride facilities do not represent a viable alternative to the project.
- The provision of a new rail corridor (or the further expansion of the East Hills Line) would be capital intensive and result in major environmental and social impacts, particularly over the lengthy construction period that would be required.
- The provision of light rail in the corridor would generally not offer the capacity or travel speeds required to represent a reasonable alternative. Light rail is generally unable to achieve reasonable travel speeds unless it is provided with exclusive running space. This would come at substantial cost and would require property acquisition in order to provide the necessary two-way tracks. It would also require many commuters to switch public transport modes, which would reduce its attractiveness.
- The M5 South West Motorway is not a recognised route for buses and does not form part of the strategic bus corridor network. Longer distance public transport travel demand is better served by rail in this part of Sydney; and the arterial road network, rather than the motorway, gives bus services better access to local travel demand.
- The conversion of the M5 South West Motorway to an integrated transport corridor would be capital intensive and would not address off-centre employment demand, multi-purpose trips or commercial travel.

Alternative 4 – Investment to increase the rail share of the freight task

Initiatives to increase the freight task are complementary to the project, rather than representing a viable alternative to it. As noted in Chapter 3, while in some instances it is possible to use rail alone to carry goods from origin to destination, in most instances – and particularly in the case of non-bulk freight – it is necessary to transport cargo to and/or from rail by truck.

Alternative 5 – Demand management

Travel demand management is about modifying travel decisions and reducing dependence on travel by cars, especially during peak periods. Transport policies to encourage greater use of public transport were considered as possible alternative to the project. This could include limiting parking in the key centres, implementing additional charges on vehicle registration, making changes to tolling, and changing land use policy to improve transport access and reduce travel demand.

Improved land use planning integration and measures to minimise the need to travel are important medium-term to long-term initiatives, but alone do not represent an adequate response to the more immediate strategic need.

Changes to the tolling regime for the M5 South West Motorway that were considered included distance based tolling and time-of-day variable tolling. Neither represents a viable alternative to the project.

While variable time-of-day tolling could help to spread the demand for peak travel to less congested time periods, its effectiveness would be limited by other constraints, such as availability of other travel modes at the user's origin and destination and flexibility of working arrangements. Time-of-day tolling would not reduce demand during the peak periods to the extent that widening would not be required, but it may lead to a redistribution of traffic to the surrounding road network with consequent social and environmental impacts.

An unintended consequence of distance based tolling could be additional congestion in the highest demand section of the M5 South West Motorway. This would be due to the attractiveness of a lower toll.

Demand management measures are seen as complementary initiatives rather than a viable stand-alone alternative to the project. To have a major impact on road traffic, demand management measures would also require major changes in social attitudes, travel behaviour and government policy.

4.1.2 The preferred option

Upgrading the existing M5 South West Motorway to provide additional capacity was confirmed to be the preferred option because it would perform well against the project objectives, it would have lower costs than most other options and could be delivered with comparatively fewer environmental and social impacts. Many of the comparative advantages arise as a result of the M5 South West Motorway being originally designed to accommodate capacity increases in the future.

4.2 Motorway widening options

Following confirmation of motorway widening as the preferred transport option, a number of design options were considered. These design options were concerned with how the widening could be achieved. Some related to the length of the corridor between Beverly Hills and Prestons, while others addressed issues at specific locations.

4.2.1 Length-of-corridor options

Four widening options were considered for the length of the corridor. They were:

- **Option 1** – Outward widening beyond the kerbside lanes; with tie-in to the existing pavement where existing pavements are not sufficient. This would achieve three lanes eastbound between Camden Valley Way and Fairford Road and three lanes westbound between King Georges Road and Camden Valley Way.
- **Option 2** – Widening within the median; with tie-in to the existing pavement where existing pavements are not sufficient. This would achieve three lanes eastbound between Camden Valley Way and Fairford Road and three lanes westbound between King Georges Road and Camden Valley Way.
- **Option 3** – Widening to achieve a motorway with four lanes eastbound and four lanes westbound between Camden Valley Way and King Georges Road.
- **Option 4** – Widening to achieve three lanes eastbound and three lanes westbound between Camden Valley Way and Bexley Road.

Options 1, 2 and 3 recognise that between King Georges Road and Fairford Road, re-marking existing pavements can provide the required capacity increase. All options recognise that the sections of motorway between the Georges River (east) and west of the toll plaza, and between Moorebank Avenue and the Hume Highway are already three to four lanes wide in each direction and the addition of further capacity here would not deliver additional road-user benefits.

These options are appraised below.

Option 1 – Outward widening

Outward widening of the motorway is not considered feasible because substantial modification to batters, bridges, ramps and interchanges would be required, and because the option does not recognise the provision made during the original design for expansion into the median. Outward widening would also require expansion of the road corridor beyond existing boundaries in a number of locations with consequent increases in cost, and property and amenity impacts.

Option 2 – Widening into the median

This is the preferred option and recognises that provision was made during the original design for expansion into the median. As a consequence, the cost and potential impacts would be lower than for other options. In particular, there would be no property acquisition required, less impact on motorway structures, and reduced environmental impacts compared to outward widening (ie option 1).

Option 3 – Motorway widening to eight lanes

This option would involve an eight-lane configuration, instead of the preferred option of predominately six lanes. This option would have a greater environmental impact as construction activities would be outside the existing motorway corridor. Extensive land acquisition would be required, resulting in property impacts, community disruption and increased cost.

Option 4 – Widening between Camden Valley Way and Bexley Road

This option extends the six-lane configuration (options 1 and 2) eastward to Bexley Road.

It was decided that the Bexley Road to King Georges Road section of the motorway would be best investigated as part of the M5 East expansion. This is because benefits associated with improved capacity in this section are largely dependant on other improvements in the M5 East corridor.

It is also noted that an extension of the M5 West widening to Bexley Road would add considerable extra cost to the project and would require additional traffic management works on the surrounding network.

4.2.2 The preferred widening option

Option 2 has been selected as the preferred option for widening the motorway. It has been selected ahead of the other options because:

- It is unlikely to require property acquisitions.
- It would have less impact on motorway structures.
- It would have less environmental impact than outward widening.

Widening approach between Fairford Road and King Georges Road

In order to achieve a balance in the system capacity, eastbound widening is proposed to terminate at Fairford Road, rather than extend to King Georges Road (as is the case in the westbound direction). Analysis has shown that a significant number of trips travelling eastbound on the M5 South West Motorway exit at the Fairford Road intersection. The Fairford Road interchange is located on a strategic north-south corridor that provides access to Bankstown to the north and Sutherland Shire to the south. The eastbound widening to Fairford Road would provide improved access to these areas via the M5 South West Motorway instead of Newbridge/Milperra Roads.

Widening to three lanes eastbound between Fairford Road and King Georges Road would result in increased congestion levels, as the three lanes would need to merge down to two as the M5 South West Motorway joins the M5 East at King Georges Road. At this time point in time there is significant congestion for eastbound traffic during the morning peak period and to add another lane would exacerbate this situation. The same issue does not apply in the westbound direction as the capacity increase is being provided in the downstream section.

An additional eastbound lane east of Fairford Road would form part of the M5 East expansion project.

4.3 Other design options

A number of localised design options were also considered to address specific issues. These are considered below.

4.3.1 Hume Highway underpass

This option would involve constructing an additional eastbound lane commencing in the vicinity of Kurrajong Road, Casula and connecting with a reconfigured Moorebank Avenue eastbound off-ramp. The new lane and ramp configuration would require an underpass at Hume Highway on the northern side of the motorway.

This option would reduce traffic weaving between the Hume Highway and Moorebank Avenue. In particular, it would reduce the weave movement for traffic entering the motorway from the southbound Hume Highway carriageway to travel eastbound, and traffic travelling in the same direction on the motorway to exit on the Moorebank Avenue northbound off-ramp.

Traffic modelling undertaken indicates that this option may not provide substantial benefits until 2016. While manageable, construction activities associated with the underpass would lead to greater construction traffic impacts on the Hume Highway, likely necessitating lane closures, and would substantially increase the cost of the project. The M5 West widening project would not preclude the potential future provision of an underpass. The RTA will continue to monitor traffic performance along this section of the motorway and reconsider the need for this option.

4.3.2 Additional ramps at Hume Highway

West-facing off-ramp

This option would involve the provision of an eastbound off-ramp at the Hume Highway with the aim of achieving greater connectivity to Liverpool and surrounding areas. Preliminary modelling indicates that the provision of a ramp in this location would increase traffic along the Hume Highway. As the highway already experiences periods of high congestion, it is likely that this option would necessitate a capacity increase to accommodate the anticipated additional traffic. There would be significant costs associated with the widening of the Hume Highway to increase capacity.

In this context, and having regard to the project objectives, an eastbound Hume Highway off-ramp was not considered a priority at this time and therefore does not form part of the project.

West-facing on-ramp

This option would involve provision of a new west-facing on-ramp from the Hume Highway to the motorway for vehicles travelling north along the highway. Preliminary investigations indicate that this option may reduce northbound congestion along the Hume Highway, in the section north of the motorway towards Liverpool, by allowing traffic to utilise the motorway instead of the highway. Southbound traffic along the Hume Highway would also benefit from this option.

Notwithstanding these potential benefits, this option was not considered a priority at this time in the context of the project objectives and has not been included as part of the project.

It should be noted that the current design of the M5 South West Motorway and the design of the M5 West widening project does not preclude the potential construction of these west-facing ramps at some time in the future.

4.4 Confirmation of the project as the preferred option

The M5 Transport Corridor Feasibility Study (RTA, 2009a) concluded that the preferred option for the M5 South West Motorway is to modify the surface road network by increasing the capacity of the existing motorway. It identified an indicative preferred option as the widening of the existing motorway to provide three lanes in the westbound direction between King Georges Road to Camden Valley Way, Prestons and in the eastbound direction between Camden Valley Way, Prestons and Fairford Road, Padstow.

This conclusion is supported by further consideration of potential alternatives and design options (as documented in the preceding sections of this environmental assessment).

The original design provides for the future addition of a traffic lane in each direction, either in the central median or via the re-marking of existing pavements. In this context, the project as proposed is the most logical approach to addressing the identified need, both in terms of cost effectiveness and in achieving the most favourable environmental outcomes.

4.5 Refinement of the preferred option

Development of the concept design of the project has continued since lodgement of the major project application with the Department of Planning. This has included refinement of the design to address issues identified during environmental investigation and design development. Further refinements to the concept design would continue to occur as new information is obtained during the detailed design and construction phases, as discussed further in Chapter 5.