

6 Project construction

This chapter describes the construction activities, construction programming, workforce, working hours and ancillary facilities required to construct the project.

Director General's requirements	Where addressed
Description of the project including construction facilities, including construction compounds, batching plants, material laydown areas, offices and amenities, and spoil stockpiling areas	Chapter 6

6.1 Construction activities and equipment

The proposed construction activities and equipment that would likely be required are outlined in Table 6.1. The types of equipment and plant requirements would be refined during the detailed design. Traffic control and environmental controls would be established as required.

Table 6.1 Proposed construction activities, plant and equipment

Phase	Construction activities	Plant and equipment	
Enabling works	Establishment of construction site compounds including offices and storage areas. Delivery of plant and equipment.	• Heavy vehicles • Light vehicles	• Crane
	Installation of temporary concrete safety barriers.	• Trucks	• Crane
Site preparation	Clearing and grubbing of vegetation would involve removing tree stumps and stripping topsoil.	• Excavators • Chainsaws • Mulcher	• Dump trucks • Water carts
Bulk earthworks	Excavation of soil and rock, loading material and haulage.	• Excavator • Dump trucks • Compactors • Water carts	• Graders • Profilers • Bulldozers • Vibratory rollers
Roadworks (road formation)	Ripping and re-compacting of subgrade, placing select material, and compacting.	• Graders • Excavators • Rock breaker • Vibratory rollers • Dump trucks	• Water carts • Wacker packers • Spray sealing equipment
Operations management control system	Installation of utilities and conduits along the route.	• Excavators • Dump trucks	• Boring machines
	Installation of variable message signs. This would involve trenching, constructing footings, delivering equipment and installing the signs.	• Excavators • Piling machines • Cranes • Trucks	• Concrete saw cutters • Concrete pumps • Concrete trucks • Vibratory rollers
	Replacement of existing signs and installation of new static signs.	• Piling machines • Concrete trucks • Concrete pumps • Vibratory rollers	• Cranes • Trucks • Generators

Phase	Construction activities	Plant and equipment	
Drainage works	Excavation of trenches and pits, delivery and placement of precast pipes and pits, filling and compacting.	• Concrete trucks • Concrete pumps • Vibratory rollers	• Jackhammers • Welding machines • Boring machines
	Installation of sedimentation basins would involve excavating new basins, associated concrete works, modifying existing basins and associated drainage works.	• Excavators • Concrete pumps • Concrete trucks	• Vibratory rollers • Trucks
Bridge and underpass works	Excavation of soil, forming of steel reinforcements, concrete pouring and/or installing precast units.	• Rock breaker • Piling machines • Concrete trucks • Concrete pumps • Vibratory rollers	• Generators • Trucks • Cherry pickers • Welding equipment • Cranes
Pavement works	Construction of concrete pavement, kerbing and barriers.	• Concrete trucks • Concrete pumps • Vibratory rollers • Compactors	• Concrete saws • Compressors • Generators
Finishing works	Asphalt paving. Delivery of raw materials, placement of surface material, saw cutting, lane marking.	• Milling machines • Trucks • Paving machines	• Asphalt trucks • Rollers
	Construction of new noise walls or modification of existing noise walls.	• Piling machines • Concrete trucks • Vibratory rollers • Cranes	• Trucks • Generators • Welding equipment • Oxy gear
	Landscaping and vegetation works would involve planting new areas and rehabilitating disturbed areas.	• Light vehicles	• Trucks

6.2 Construction programming

Construction of the project is anticipated to take about two years, with works anticipated to commence in the first quarter of 2011. An indicative program and the expected duration of the works and activities at each location are provided in Figure 6.1.

The program of works identified in Figure 6.1 is an example of how the project might be delivered. This program would be subject to change based on further development of the project during the detailed design phase. The specified durations cover the active construction period and works may be undertaken intermittently during the entire construction period. Other factors that may influence the timing and duration of construction activities include wet weather periods, changes to construction methods and/or materials, uncovering an unexpected item (for example threatened biodiversity species or heritage items/areas), management of unsuitable material, community interests or complaints, and management of traffic impacts.

Should changes be required to the duration and/or timing of the construction program, works would be re-scheduled taking into consideration the various constraints to the construction process. Most notably, these include construction traffic management and the need to balance the timely conclusion of noise and vibration-generating works with periods of receiver respite.

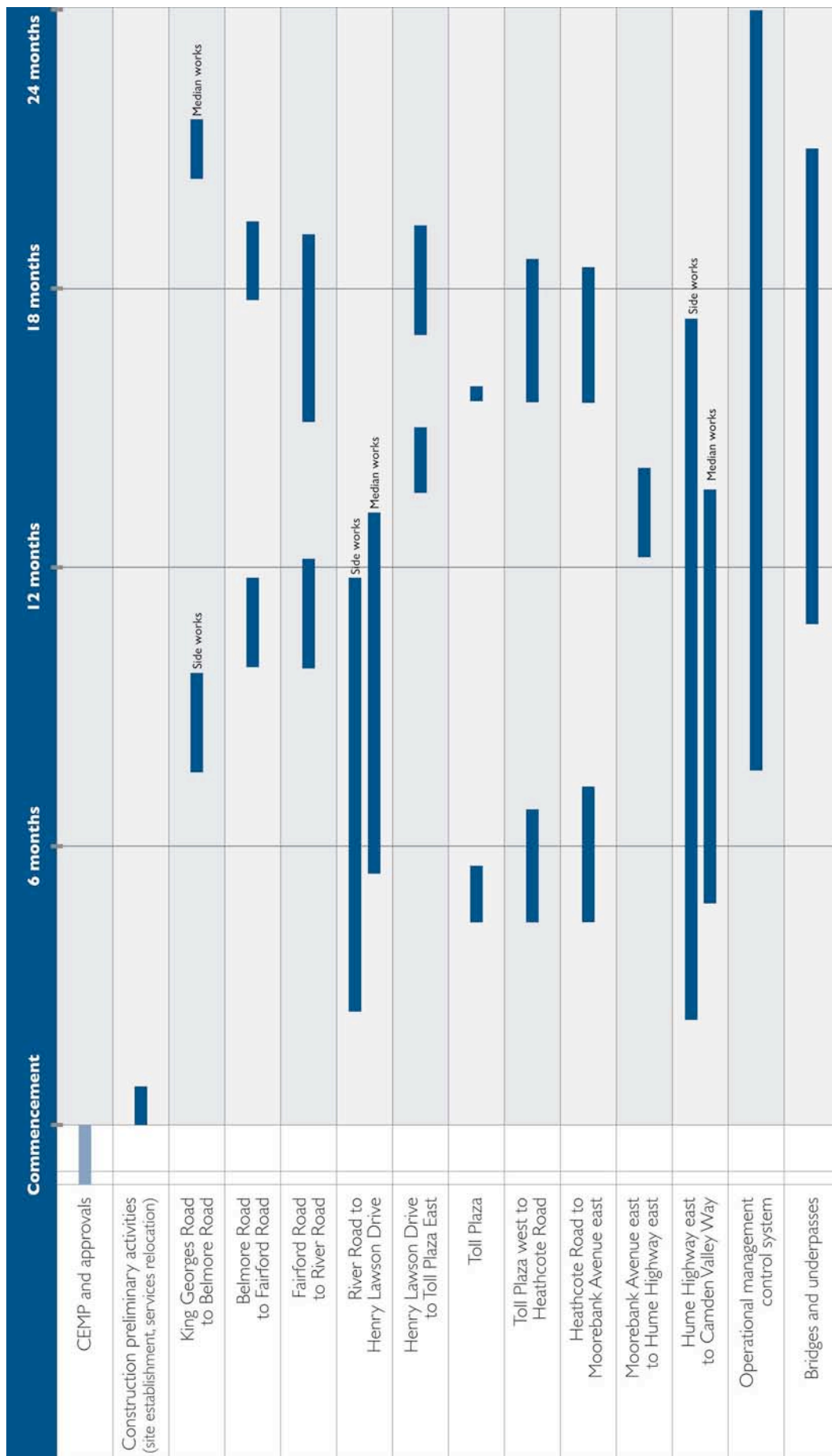


Figure 6.1 Indicative construction program

As shown in Figure 6.2, the construction works would be divided into two distinct types:

- Central median works. The central median works would involve any construction adjacent to the inside lane of the motorway and would include excavation, pavement construction, drainage works, bridge works and service utilities works.
- Side works. The side works would involve any construction adjacent to the slow lane and outside shoulder of the motorway and would include construction and/or installation of drainage, excavation, drainage basins, service utilities, the operational management control system, signage (both fixed and variable message signs), noise walls, and landscaping.

Along the majority of the 20 kilometre construction corridor, both central median works and side works would be carried out during the course of construction. Work would typically be undertaken such that when central median works are being performed in one section, no side works would be performed in that section, and vice versa.

At any one time along the entire corridor, it is anticipated that there would be four to six construction work sections; two to three in the median and two to three at the motorway edge. Each work section would be about four to five kilometres long and it is expected that up to 10 kilometres of central median works and 10 kilometres of side works would be under construction.

The establishment of the median and side works sites would involve the placement of temporary concrete safety barriers to create a safe work zone. This work would be undertaken at night. Other night works are detailed in section 6.5.2. Due to the impacts on traffic, daytime lane closures of the motorway would be avoided.

Where traffic modelling indicates that there would be benefits in sequencing the opening of the three lanes, this would be considered in the final staging plans. Any staged opening would seek to ensure that additional weaving or merging by motorway traffic would be avoided.

6.3 Construction methodology

6.3.1 Site preparation

It is proposed to undertake the following works as soon as practicable after project approval in order to facilitate detailed design and prepare for key construction activities:

- Geotechnical investigations, such as boreholes, test pits and soil sampling.
- Investigation and inspection of existing structures such as bridges, culverts and headwalls; and closed circuit television examination of existing drainage.
- Survey works within the corridor that would include installation of traffic management controls.
- Installation of environmental controls.
- Site establishment, including hardstand, fencing, office installation and service connections.
- Construction of temporary breakdown bays required for incident management.
- Drainage basin works that do not require access from the motorway.
- Construction of underbore pits on the side of the motorway, underboring and relocation of services.
- Installation of concrete barriers and line-marking associated with the traffic control of the first stage of the works.
- Installation of construction signage and advisory signs.

6.3.2 Utility adjustments

As described in Chapter 5, a number of utilities and services may be impacted by the project. The extent of impacts would not be identified until the detailed design is finalised. Strategies to address impacts may include protection or relocation of the utility, or adjustments to the project design to avoid any impacts. Either the construction contractor or the relevant utility provider would undertake utility adjustments. A management plan would be prepared for the utility adjustments.

6.3.3 Temporary traffic management works

Light and heavy vehicles and cyclists would continue to use the motorway during construction. For the duration of construction, motorway traffic speed would be lowered to 80 kilometres per hour at all times. Traffic controllers would direct all traffic, including cyclists, during the works. A traffic management and access plan would be prepared during detailed design and construction planning.

As outlined in section 6.2, the works are broken up into two distinct types, the side works and the central median works. Along the majority of the alignment both central median and side works would be carried out during the course of construction. At any one time along the alignment length, it is anticipated that there would be four to six construction work sections; two to three in the median and two to three at the motorway edge. Each work section would be approximately four to five kilometres in length and it is expected that approximately up to 10 kilometres of central median works and 10 kilometres of side works would be under construction.

Central median works

For the central median works, the vehicle lane widths would be reduced to 3.2 metres, the motorway traffic speed lowered to 80 kilometres per hour at all times, and concrete barriers placed along the work areas in the existing 'fast lane' shoulder (refer to Figure 6.2). This would provide a shoulder about two metres wide where cyclists could travel. There are a number of areas where the shoulder would narrow from two metres to about 1.75 metres. A two metre wide shoulder would be provided by either temporary pavement construction or by laterally shifting the traffic lanes by 300 millimetres towards the centre. These adjustments would be required at the following locations:

- Hume Highway bridge (for a distance of less than 100 metres).
- Just west of the Hume Highway (for a distance of about one kilometre).
- At the Kurrajong Road overbridge (for a distance of less than 100 metres).
- Just west of Kurrajong Road (for a distance of about 200 metres).

Side works

For the side works, the vehicle lane widths would also be reduced to 3.2 metres, the traffic speed lowered to 80 kilometres per hour along the full length of the motorway (excluding the main toll plaza precinct) at all times, and temporary concrete barriers placed along the work areas in the existing road shoulder (refer to Figure 6.2). This would provide a protected shoulder, generally 2.5 metres wide, where cyclists would be directed. Cyclists may be temporarily diverted for short durations. The shoulder would narrow to 2.2 metres for a distance of about five kilometres between Moorebank Avenue and the M7 interchange.

Cyclists would be separated from traffic lanes by a safety barrier where side works are undertaken and may be required to stop at certain times, at the direction of traffic controllers, in order to ensure safe passage. Outside of work hours, a clear shoulder would be maintained at all times, with adequate advance warning signs advising cyclists of any narrowing of the shoulder ahead.

Access across existing ramps would not be changed.

Asphalt removal and re-sheeting would be carried out at night, and the motorway may be subject to total carriageway closures for both safety and quality reasons. Tie-in works would be required at the entry and exit ramps of the motorway. During these works, cyclists may be temporarily diverted off the motorway for short durations (less than one week) and traffic diversions may also be required.

Any of the changes to traffic conditions would be notified well in advance and any temporary diversions would be adequately signposted.

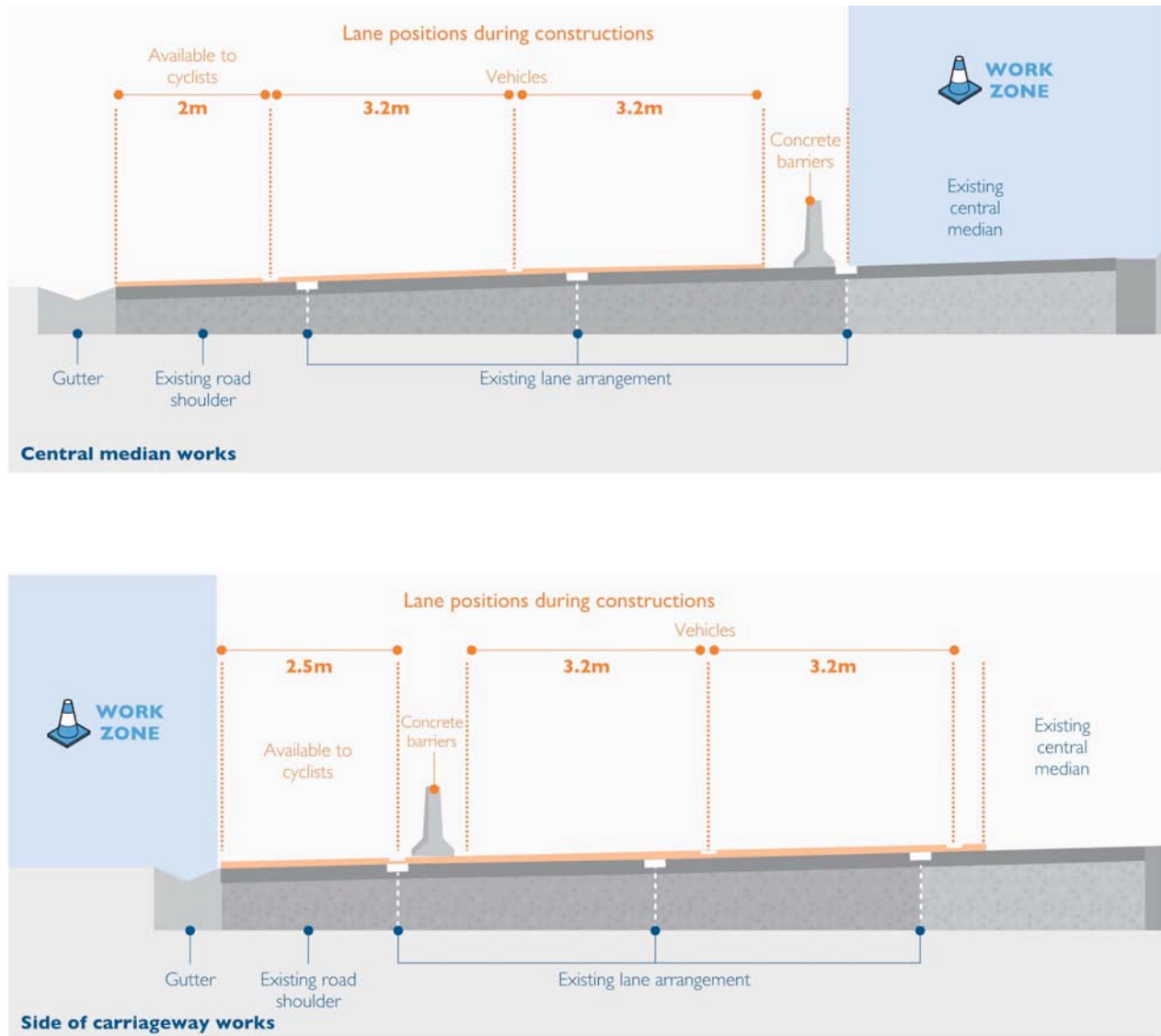


Figure 6.2 Typical construction site layout during central median works and side works

6.3.4 Road widening works

Central median works

Between King Georges Road and Fairford Road, the existing motorway carriageway is wide enough to provide additional lanes. Works would involve:

- Milling and re-sheeting the existing carriageways. (Re-sheeting would take place at night under traffic control.)
- Constructing a concrete slip-form type central safety barrier.
- Providing pier protection for existing overbridges.

- Lane marking to suit the new lanes' configuration. (Lane marking would take place at night under traffic control.)
- Constructing the operations management control system.

Between Fairford Road and Camden Valley Way, additional lanes would be provided in the central median. Works would involve:

- Removing vegetation from the central median.
- Modifying the drainage system.
- Excavating the existing material in the median areas, and stabilising the formation layer to allow the new pavement to be constructed.
- Constructing new pavement for the additional traffic lanes. The new pavement would be about 700 millimetres deep and comprise a select material zone overlayed by asphalt layers and a wearing course.
- Constructing a concrete slip-form central safety barrier.
- Providing pier protection for existing overbridges.

During the central median works, motorway traffic would be diverted onto the existing shoulder to provide two through lanes of traffic in each direction. Temporary traffic barriers would be used to separate motorway traffic from the construction zone. Defined access and egress points would be provided for construction traffic to enter and exit the construction zone via the motorway.

Side works

Widening along the outside of the motorway would be required at a number of locations between Fairford Road and Camden Valley Way. These works would generally involve:

- Constructing full-depth pavement. Pavement construction would be similar to that for the central median.
- Modifying the drainage.
- Constructing the operations management control system.

The pavement construction in these areas would be similar to that for the central median pavement construction (see above).

6.3.5 Operational road traffic noise mitigation

Noise walls would be demolished and rebuilt in accordance with the noise modelling requirements. Where practicable, noise walls would be constructed as early as possible in the construction sequence to provide attenuation during construction. The introduction of new noise walls, would typically require vegetation removal, piling, construction of reinforced concrete footings and steel posts, and installation of concrete panels.

The removal and reinstatement of existing noise walls would require some demolition works prior to commencement of the construction activities outlined above.

Where low-noise pavement and noise barriers would be insufficient to limit noise to within relevant noise criteria, residential dwellings would be assessed and, where eligible, residents would be offered architectural treatments. Depending on the results of the noise assessment, treatments could include:

- Providing or upgrading boundary fencing.
- Upgrading seals on windows and doors.
- Providing mechanical ventilation.
- Upgrading window glazing.

6.3.6 Drainage works

Constructing drainage would involve localised excavation and installation of drainage pipes and pits, and construction of drainage basins. Retaining walls, gross pollutant traps and water dissipation devices would also be required. Drainage basins would most likely be constructed with a concrete lining (reinforced base and shotcrete sides).

For the existing drainage structures that are planned to be rebuilt, the existing concrete linings would be demolished.

Where practicable, new drainage basins would be constructed and existing basins modified during the early phase of construction in order to capture any stormwater runoff during construction.

6.3.7 Bridge and underpass works

Queen Street and Nuwarra Road

Work on the bridges at Queen Street and Nuwarra Road would include piling, construction of concrete structures, and installation of precast concrete planks. These locations are illustrated in Figure 6.3.

Specific construction sites would be required to construct foundations, piers and headstocks for the bridges. As the elements are small, localised fencing would be required to secure the sites, typically adjacent to the kerb. It is envisaged that local road lane closures would be sufficient to allow the safe construction of these bridges, with closures undertaken at night to minimise impacts on traffic.

De Meyrick Avenue

The extent of works at the De Meyrick Avenue underpass would be confirmed during detailed design. Should the scope of works outlined in section 5.3.3 be undertaken, activities would likely include the demolition of various elements of the existing underpass structure, and construction of new underpass structures. This scope of work would take around 12 months to complete. De Meyrick Avenue would need to be closed for about six months, and a speed limit of 60 kilometres per hour would be implemented on the motorway in the vicinity of the bridge for the duration of the works. In addition, a full closure of the motorway may be required for about 20 nights to complete the works.

Construction planning will ensure safe pedestrian access is maintained through DeMeyrick underpass during any construction works undertaken at this location.

6.3.8 Operational management control system

Cables

The cabling for power and telecommunications would generally be installed by trenching along the side of the motorway. The trenches would be about 900 millimetres wide and two metres deep and would extend for about 18 kilometres of the motorway. Any crossings to the other side of the motorway would generally be provided by directional drilling under the carriageways.

At underpasses along the length of the works, the crossing of local roads by the cables would be achieved by installing four galvanised steel conduits fixed to the outside face of the existing southern parapet of the westbound motorway underpass bridge. The bridges where cable crossing is required include Penshurst Road, Bonds Road, Salt Pan Creek Bridge, Queen Street, Nuwarra Road and Georges River West as well as the De Meyrick Avenue underpass.

Variable message signs

The installation of variable message signs and the possible provision for variable speed limit signs would generally involve trench and footing excavation, installation of piles and concrete foundations, installation of services and delivery and installation of the sign and its support structure. Vehicle maintenance bays would be constructed at each of the six on-motorway variable message sign locations to provide a safe parking area for maintenance vehicles without the need to close shoulders or lanes. These bays would be used by maintenance personnel to inspect and repair the variable message signs.

As much work as possible would be completed during standard daytime hours. However, depending on the location and the need for lane closures, some work, including lifting the sign into place, may need to be completed at night.

The off-motorway variable message signs would usually take up to five weeks to install, but variable message sign installation that involves substantial trenching works may take longer.

Operational management control system building

The operations management control system building would be constructed using concrete foundations and a frame and cladding. Services such as power, water and communications would also be installed. The location for the building is shown in Figure 6.3.

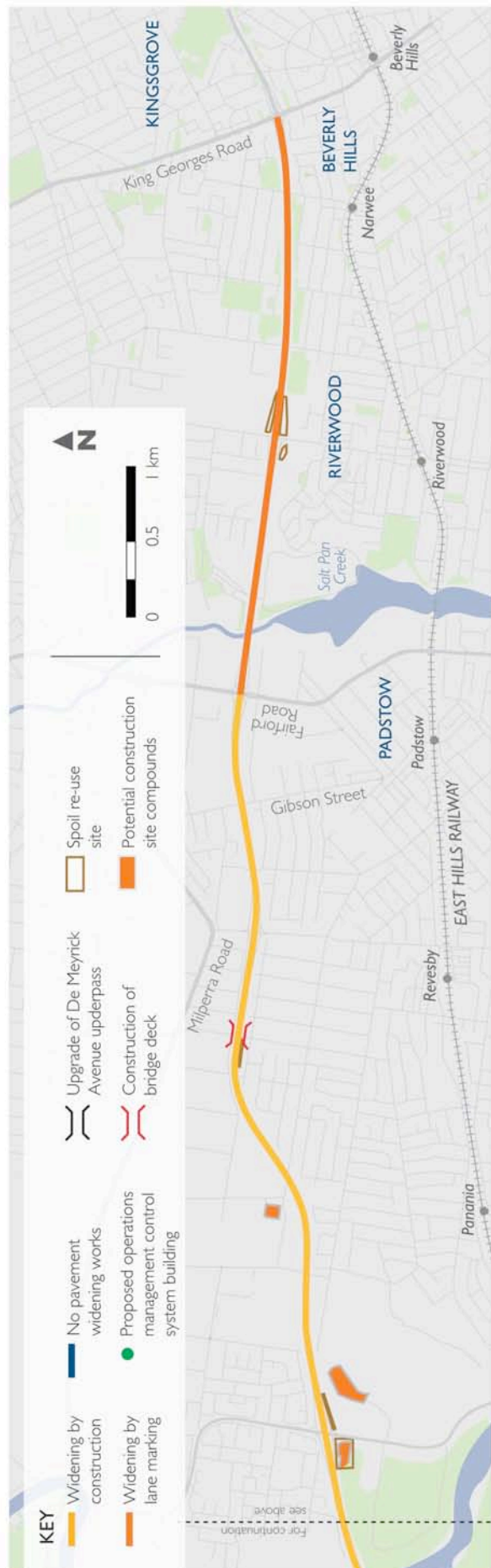
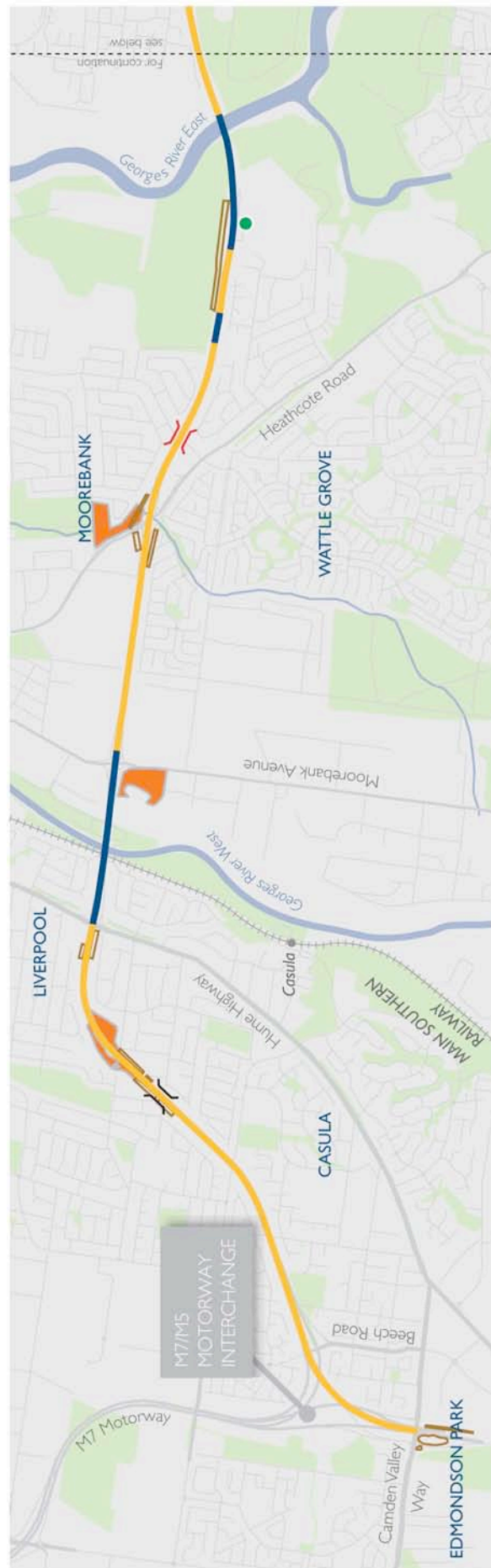


Figure 6.3 Proposed construction elements

Note: Project detail shown is indicative only subject to detailed design

6.4 Resource consumption

6.4.1 Construction energy requirements

All construction activities associated with the project would consume energy. Activities with high energy demands include:

- Excavation of earth and rock cuttings.
- Removal, relocation and compaction of excavated material in fill embankments.
- Clearing of vegetation.
- Transport of raw materials.
- Construction of pavement, major bridges and structures.
- Demolition of existing structures.
- Operation of electronic signage and lighting.

Equipment and vehicles on the construction site would consume a large quantity of fuel. It is estimated that three million litres of fuel would be used to construct the project.

Electricity needs on the site would be minor; and connecting the offices to the local power grid would be sufficient. Some generators may be necessary for emergency power supply.

6.4.2 Earthworks

The need for earthworks in the median would be minimised where possible, which in turn would reduce the need for select fill. The project would require:

- About 130,000 cubic metres of material to be excavated from the corridor, mainly for construction in relation to the central median, drainage, drainage basins and operational management control system.
- About 40,000 to 50,000 cubic metres of select fill for pavement construction.

Fill may also be used as earth mounding for noise attenuation. The project therefore offers the opportunity to re-use excavated material on site, thus avoiding the environmental and economic costs associated with the transport and disposal of all of the excavated material off site.

Where possible, material excavated from the corridor would be re-used in the widening works or placed on site either for noise mounds or to stabilise batters. Potential spoil re-use sites are identified in Figure 6.3. The precise location, height and quantities of spoil re-use sites would be confirmed during the detailed design phase.

6.4.3 Water requirements

Construction of the project would require about 15 to 20 megalitres of water (non-potable and potable). Water would be available along the motorway from the eight existing filling points (potable water requiring metered standpipes) or the wet detention basins.

6.4.4 Construction materials

In addition to the fill and water requirements described above, construction of the motorway would require the use of many other materials, including:

- About 35,000 to 45,000 cubic metres of concrete.
- About 500 to 1000 tonnes of steel reinforcement.

A concrete batching plant would not be required. Asphalt and concrete materials would be sourced from within the local area where possible, with the quantities and exact source of these materials determined throughout the detailed design phase prior to commencement of construction.

6.5 Workforce and working hours

6.5.1 Workforce

It is anticipated that the workforce size would average 300 workers, peaking at 500 for short periods of time. It would generally comprise labourers, plant operators, tradesmen, technicians and supervisors.

6.5.2 Working hours

Standard working hours

As identified in the Interim Construction Noise Guidelines (DECC, 2009) the standard working hours on site would be between 7 am and 6 pm, Monday to Friday and 8 am to 1 pm on Saturdays. While the majority of the project could be constructed during these standard hours, a number of construction activities would need to be undertaken at night for reasons including safety, design and quality considerations, and to avoid substantial traffic delays on the motorway and surrounding road network. These reasons are explained in more detail below.

Night time works would generally commence after the evening peak once the operations management control system centre confirms that traffic volumes have reduced.

Rationale for work outside standard hours

There are two key reasons to undertake work outside standard hours: to minimise impacts on traffic, and to protect public safety. These reasons are discussed below.

To minimise impacts on traffic

The M5 South West Motorway is one of the busiest roads in Sydney, carrying about 85,000 vehicles each weekday with substantial traffic volumes also experienced on weekends. Constructing the project under traffic is a complex task that would inevitably involve lane closures and even full carriageway closures for asphaltting works. Closing lanes during peak periods would result in significant traffic disruption at the worksite and along the entire motorway. In addition, congestion on the motorway increases the risk of traffic incidents and often has a flow-on effect of causing congestion on the orbital network, increasing the risk of secondary incidents. It is therefore considered inappropriate to undertake these works in circumstances where a large number of people would be affected by daytime traffic disruption.

To protect public safety

In addition, working on busy roads such as the M5 South West Motorway can pose safety risks to both construction personnel and the road users if appropriate measures are not put in place. Construction works associated with roads often require temporary modification to existing lane alignments and other traffic control measures which are different to the usual conditions experienced by road users at these locations. This increases the potential for traffic incidents that could affect the safety of construction personnel and other road users.

Noise impacts

An assessment of the potential noise impacts associated with construction of the project (including potential impacts from out of hours construction) is included in section 8.2. This assessment has been undertaken in accordance with the *Interim Construction Noise Guidelines* (DECC, 2009) and feasible and reasonable noise management measures have been identified as part of this assessment. Noise management measures would

be further refined during the detailed design phase in consultation with the Department of Environment, Climate Change and Water. Further, the need for an environment protection licence under the POEO Act would also provide for the appropriate management of construction noise impacts.

Typical activities outside standard working hours

As noted above, certain activities are proposed to take place at night to address traffic congestion and safety concerns. Some of these works involve short-term activities. Typical activities that would likely be undertaken outside standard working hours could include:

- Some bridge and underpass works, including piling, installing structures such as girders, concrete decking and drainage.
- Re-surfacing of the existing asphalt pavement.
- Removal of existing static signage and installation of new signs.
- Ramp tie-in works.
- Drainage installation at Georges River East bridge and Salt Pan Creek.
- Removal of existing traffic barriers and installation of temporary and permanent traffic barriers.
- Installation of safety barriers to create an area for both construction personnel and road users so that works can be undertaken during the daytime that would otherwise need to be undertaken at night.
- Removal of existing lane marking and application of new lane marking.
- Some concreting works.
- Some works to implement the operations management control system including trenching, which requires lane closures, and lifting the variable message signs into place.
- Use of some construction site compounds to support night works.
- The delivery of plant and materials that is required outside these hours as requested by police or other authorities for safety reasons.
- Any works that do not cause noise emissions to be audible at any sensitive receptor.
- Emergency work to avoid the loss of lives, property and/or to prevent environmental harm.

Some of these works are discussed below.

Bridge and underpass works

Bridge works are required at Queen Street and Nuwarra Road. There would also be works at the De Meyrick Avenue underpass. Associated works would include the delivery and installation of bridge deck girders. Local road traffic control and lane closures would be required to safely install the bridge girders, so these works would need to be undertaken during night-time periods. The De Meyrick Avenue underpass works (as described in section 6.3.7) may require full closure of the motorway over about 20 nights.

In addition, concrete works associated with the bridge decks would need to occur at night for structural reasons. This is because excessive vibrations associated with peak vehicular movements would affect the bond between the new deck and existing deck during the time it takes for the concrete to set. To minimise this and ensure the structural integrity of the bridge deck, these works would need to occur at night when lower traffic volumes would allow lane closures and lower speed limits to be implemented.

Bridge piling

The works associated with the bridge widening (described above) would require piled foundations at the new abutments and piers.

Due to the equipment required to construct these piles and their locations, either directly adjacent to motorway traffic in the central median area or partially on the local roads, traffic lane closures would be required. Some local road closures or traffic contra-flow arrangements would be required to allow sufficient space for the piling rig to operate safely. These closures can only be carried out at night when traffic volumes are at their lowest. Due to the proximity of the piling rig to travelling motorists, on-motorway lane closures would be required to again allow sufficient space to safely construct the works.

Asphalting

The asphalting works would involve the milling and re-sheeting of asphalt overlay for the entire existing motorway, and full depth asphalt paving of the additional lanes. While these works are to be completed in stages, they require motorway lane closures and, in some cases, total closure of the motorway in order to safely carry out the works. This means that asphalting cannot be undertaken during periods of high traffic volumes and would need to occur during evening and night-time periods.

Signage

The project includes the installation of new variable message signs and the removal and/or replacement of signage along the motorway. Because of their size, these structures require significant transport and cranes to erect them safely. Cranes would need to be set up adjacent to the final positions of the signs, which would require the occupation of motorway traffic lanes to safely perform the installation. Therefore, these works would need to occur at night to ensure the safety of all road users and construction personnel.

Drainage at Georges River East bridge and Salt Pan Creek

The project includes upgrading the drainage at Georges River East bridge and Salt Pan Creek. As access to the underside of the bridges would be limited, an installation unit located on top of the existing bridges would be required to perform the works. This would require lane closures and would therefore need to be undertaken at night.

Ramp tie-in works

Some of the existing ramps would require reconfiguring as part of the upgrade works. These works would need to be undertaken at night as entry and exit ramps would need to be closed to allow the works to be conducted safely.

6.6 Indicative construction footprint

Figure 6.3 shows the indicative construction footprint, including the location of construction site compounds and spoil reuse areas. The location of other works, including for new variable message signs and new or augmented drainage basins are illustrated in Figure 5.1 (a)–(d).

6.6.1 Works within the M5 corridor

The majority of pavement construction would be confined to the central median. Construction would also be undertaken outside the existing median but would largely be confined to within the road corridor, including upgrades to existing drainage basins to accommodate increased stormwater runoff, construction of additional emergency phone and maintenance bays, alterations and additions to noise walls, installation of the operational management control system, and landscaping.

6.6.2 Works outside the M5 corridor

Construction site compounds would be established outside the M5 corridor. The location and size of these are described in section 6.7.1.

There would also be some works to install the operations management control system. These would be carried out on local roads outside the M5 corridor, and would include the installation of 16 'Type B' variable message signs (refer to Figure 5.1 (a)–(d)).

6.7 Ancillary facilities

6.7.1 Construction site compounds

Construction site compounds would provide support to the construction sites.

As the project would need to be constructed under traffic, there are very limited opportunities to locate them within the motorway corridor. Construction site compounds would therefore be established at locations as close as possible to the corridor. They would comprise:

- Hardstand. The whole area would be covered in hardstand.
- Temporary buildings (generally prefabricated) with:
 - Offices and meeting rooms.
 - Reception and general administration area.
 - Amenity and first aid facilities.
- Parking areas.
- Materials laydown and storage areas (refer to section 6.7.2). These would include purpose-built temporary structures as required.
- Perimeter fencing.

Where practicable, access to the construction site compounds would be via the motorway or the arterial road network to minimise impacts on local roads.

The locations of these compounds, together with details of their size, proposed uses and access points are yet to be finalised, but potential locations are outlined in Table 6.2 and in Figure 6.3.

Table 6.2 Construction site compound details

Compound	Location	Size (approx) m ²	Proposed use	Proposed access
Moorebank Avenue (24 hour use)	Near 175–209 Moorebank Avenue, Moorebank	46,750	Main office	From Moorebank Avenue
M5/Graham Avenue (1) (24 hour use)	Near 59–79 Graham Avenue, Casula	17,930	Satellite office	From M5 South West Motorway
M5/Graham Avenue (2)	Near 81 Graham Avenue, Casula	6,170	Satellite office Materials laydown	Access from either Graham Avenue, Liverpool Street or M5 South West Motorway.
M5/Graham Avenue (3)	Near 85A Graham Avenue, Lurnea	10,900	Satellite office Materials laydown	From Graham Avenue.
Bransgrove Road (24 hour use)	Bransgrove Road, Panania	29,940	Satellite office Materials laydown	Access from Henry Lawson Drive into Bransgrove Road.

Compound	Location	Size (approx) m ²	Proposed use	Proposed access
Henry Lawson Drive	Near 450 Henry Lawson Drive, Milperra	12,000	Satellite office Materials laydown	Access from Henry Lawson Drive and possibly from M5 South West Motorway on ramp.
Beaconsfield Road (24 hour use)	Near 68 Marigold Street, Milperra	3,000	Main office Materials laydown	Access via either Milperra Road or Beaconsfield Road into Marigold Street.
Heathcote Road (north) (northern side of the M5 South West Motorway)	Corner M5 on ramp and Heathcote Road, Moorebank	3,000	Materials laydown	Access/egress from southbound Heathcote Road. Possible egress onto M5 South West Motorway on ramp.

Assessment of the potential impacts of construction traffic on local access roads during the construction period, especially in the areas surrounding proposed construction site compounds, is included in section 8.1 of this environmental assessment.

No building demolition would be required to establish the construction site compounds. All construction compounds would be utilised for the duration of the construction period.

6.7.2 Materials laydown and stockpile sites

Materials laydown is proposed at seven of the nine construction site compounds as identified in 0. Materials laydown would include:

- Storage of plant, equipment and tools.
- Materials storage areas, including stockpiling.

In addition to materials laydown, stockpile sites would be used to store, prepare and distribute aggregate and other bulk materials such as topsoil, sands, drainage pipes and drainage pits. Materials such as topsoil, mulched vegetation and any unsuitable cut material would need to be stockpiled during construction prior to being re-used in the final landscaping.

As identified in section 0, no batching plant is proposed as part of this project.

6.7.3 Assessment of ancillary construction facilities

The potential environmental impacts of the ancillary construction facilities proposed as part of the project (refer to 0) are assessed in Table 6.3. This table also identifies proposed management measures for the ancillary construction facilities as currently proposed. Ancillary facilities would be solely for use on this project and would be removed at the completion of construction.

Table 6.3 Potential impacts of proposed ancillary construction facilities

Potential impact	Proposed management measure
Soil and water	
• Soil erosion • Discharge of sediment	• Where practicable, comply with criteria. Compounds to be located 100 metres away from any watercourses. • Minimise area of disturbance to vegetation and topsoil. • Implement appropriate erosion, sedimentation and pollution controls such as silt fencing. • Design and size drainage basins for optimised performance during construction and operation. • Treat runoff from fuel storage areas and vehicle washdown area prior to discharge. • Promptly clean up and remove material spills. • Comply with the draft statement of commitments.
Noise and vibration	
Additional vehicle and equipment noise	• This issue is addressed in section 8.2 of this environmental assessment. • Comply with the draft statement of commitments.
Traffic and access	
Impacts on surrounding roadways	• This issue is addressed in section 8.1 of this environmental assessment. • Provide dedicated access points into construction compounds. • Comply with the draft statement of commitments.
Air quality	
Dust generation	• Implement dust management measures including protection of erodible material stockpiles. • Minimise energy use. • Maintain and operate all plant and equipment to a proper and efficient condition. • Implement a dust monitoring program. • Comply with the draft statement of commitments.
Ecology	
• Removal of potential habitat • Impacts on endangered ecological communities and/or threatened species	• Minimise construction footprint and clearing for the operational management control centre building and retain native vegetation wherever possible (SoCs FF1 and FF2). • Revegetation and landscaping with indigenous species progressively following construction of operational management control centre and drainage basins (SoC FF3). • Develop suitable management strategies with the Department of Climate Change and water and the Commonwealth Department of Environment, Water, Heritage and the Arts for endangered species and endangered ecological communities for impacts from variable message sign installation (SoC FF4). • Develop a management plan for the Green and Golden Bell Frog to provide specific mitigation measures for water quality devices in proximity to potential habitat and near watercourses (SoC FF5). • Comply with the draft statement of commitments.
Waste	
	• Minimise generated waste. • Implement a recycle/re-use strategy as part of the construction environmental management plan. • Comply with the draft statement of commitments.

It is important to locate ancillary works in areas that facilitate efficient and cost effective construction of the project while ensuring minimal biophysical and social impact. Should any new ancillary facilities locations be required, they would be sited in accordance with the construction and environmental criteria set out in Table 6.4. In addition to considering these criteria, security of the site would also be considered in determining appropriate locations.

Should a site be identified that complies with most, but not all of the identified criteria, and management measures can be applied to effectively ameliorate potential impacts, it would be further considered for use.

Table 6.4 Criteria for the location of ancillary facilities

Location criteria	Construction compound	Stockpile site/ materials laydown
Environmental		
More than 100 metres from waterway.	Yes	Yes
Areas of low ecological and heritage conservation significance.	Yes	Yes
Distance from dwellings or other activities that may be affected by noise or other construction impacts.	200 metres	100 metres
Construction		
Easy and safe access to the main road network.	Yes	Yes
Relatively level ground elevated to assist drainage and allow treatment of runoff.	Yes	Yes
Minimum area preferred.	1 hectare	1 hectare

The criteria outlined for the location of ancillary facilities have been introduced in order to minimise any impact that the facilities may have on the surrounding environment.