4. Construction

The construction of the Southern Expressway Duplication is anticipated to commence late in 2011 with a completion date of mid-2014.

Listed below are the broad steps that the project has been working towards for construction to start later this year.

- Planning design and Environmental Impact Assessment July 2010 – November 2011
- Community Engagement from October 2010
- Detailed design December 2011 – March 2012
- Tender award and Construction start December 2011
- Construction Completed mid 2014.

4.1 Environmental management

The impact on the environment of the construction of the expressway will be measured, managed and where possible mitigated.

Before construction begins the contractor is required to develop a Contractor’s Environmental Management Plan (CEMP) to identify the potential environmental impacts of the project and appropriate measures to minimise these effects.

The CEMP will include detailed management measures prepared by and implemented by relevant technical experts for the following aspects:

- Non-Aboriginal Heritage – including delineated ‘no-go areas’ during construction, completing property condition assessment surveys prior to works commencing and conducting vibration monitoring during construction.
- Aboriginal Heritage – awareness training for construction staff, and compliance with any conditions of approval under the Aboriginal Heritage Act 1988.
- Flora – including minimising the construction footprint, delineating ‘no-go’ areas, and implementing a Vegetation Management Plan, which will describe how vegetation offsets will be delivered for all vegetation removals.
- Fauna – identification of opportunities to maintain or enhance fish passage delineated ‘no-go areas’ during construction and relocating tree hollows where possible.
- Sustainability and Greenhouse – development of a Sustainability Implementation Plan to implement sustainability initiatives for the project.
- Noise – development of a Noise and Vibration Management Plan identifying management of night works and noise monitoring and management requirements (including the installation of permanent noise barriers early in the construction program to assist in effectively mitigating noise for surrounding communities during works).
- Vibration – a Noise and Vibration Management Plan identifying management of vibration monitoring and management requirements and a Blast Management Plan to manage noise, vibration dust and any other impacts associated with blasting activities.
- Air quality – Measures to manage air quality, including air quality monitoring, modelling and mitigation.

- Water and soil – including a Soil Erosion Drainage Management Plan (SEDMP), which will detail how waterways will be protected during construction works, a final Water Quality Risk Assessment (WQRA) of all watercourses as well as a Water Quality Monitoring Plan.

- Training and awareness – An induction and training plan to ensure all site personnel (including subcontractors) understand the CEMP and environmentally sensitive areas when working on site.

- Compliance and procedures – processes such as inspection and test plans and checklists to manage all risks and impacts and all approvals, licences and permits necessary to meet statutory requirements.

- Emergency response – procedures and processes for managing any environmental emergencies on site.

The department’s environmental objectives will be addressed in the plan and included in all aspects of the works. Throughout construction, the department will monitor the contractor’s adherence to the plan with regular audits and on-site inspections.

4.1.1 Working with the community

Throughout delivery of this project the department will liaise with the community to manage and contain construction impacts and effects along the corridor, in particular noise, vibration, air quality, access and traffic impacts.

Refer to Supplement 3.1 Community Engagement.

DPTI is committed to community Engagement throughout the design and construction of the Southern Expressway Project. Community engagement opportunities will be identified and continually updated in the project Community Engagement Plan/Strategy that identifies key strategies for sharing information with the project community such as:

- web-based communication on the Southern Expressway Project Page on DPTI’s website www.infrastructure.sa.gov.au/content/southern_expressway
- project updates posted and discussed using DPTI’s Facebook page
- holding public meetings and attending local Council meetings from time to time
- holding community Open Days where interested members of the community can learn more and ask questions about the project
- door-knocking individual residents
- letter-box drops for specific messages
- optional email and/or text-messaging for specific messages
- development of working groups with key stakeholders and community interest groups on specific issues/aspects of the project
- display of key traffic impacts and access issues using signage and Variable message Boards.
4.1.2 Fauna and flora

- Measures for managing and mitigating impacts to fauna and flora, including minimising machinery movement in vegetated areas and through potential habitat.
- Identification and management of environmentally sensitive areas and establishment of ‘no go’ zones during construction.
- A Sustainability Implementation Plan has been prepared (see Section 3.14).
- A Vegetation Management Plan, which will describe how vegetation offsets will be delivered and managed and the how the significant environmental benefit will be achieved (required under the Native Vegetation Act 1991).
- Plans for revegetation and landscaping to re-establish removed vegetation and habitat.

4.1.3 Training, compliance and procedures

- An induction and training plan to ensure all site personnel (including subcontractors) understand the CEMP and are aware how it is to be implemented.
- Procedures to manage all identified impacts and environmental protection requirements, including inspection and test plans and checklists.
- Details of approvals, licences and permits necessary to meet statutory requirements.

4.1.4 Emergency response

- An emergency response procedure which includes processes for managing any environmental emergencies on site.

4.1.5 Water and soil

- A water quality risk assessment (WQRA), which includes an assessment of the existing conditions at catchments.
- Opportunities to maintain or enhance fish passage will be investigated throughout the detailed design phase.
- Construction of new and upgrades to existing stormwater detention and treatment basins to ensure water quality targets are achieved downstream of the project.
- Management of soil and groundwater contamination or potential contamination, including the provision of a Contamination Management Plan (CMP) as required.
- A Soil Erosion Drainage Management Plan (SEDMP), which will detail how waterways will be protected during construction works (based on Environmental Protection Agency (EPA) and department guidelines, codes of practice and other relevant documents such as the department’s Protecting Waterways Manual, TSA 2002.

4.1.6 Air quality

- Measures to manage air quality, including air quality monitoring, modelling and mitigation.
4.1.7 Noise and vibration

- Investigation of sources of noise and vibration that will impact on the surrounding community and measures to mitigate impacts.
- Investigations and measures will be detailed in the contractors Construction Noise and Vibration Management Plan (CNVMP).
- The CNVMP will include:
  - measures to ensure the department's procedure for the ‘Management of Construction Noise and Vibration’ and other reasonable and practicable standards are adhered to
  - minimalisation of night construction works, and, where unavoidable, justification for and details of the works, noise exceedances, and associated noise management and mitigation measures, including consultation with the community
  - vibration monitoring and management of all structures adjacent to the expressway
- Development of a blast management plan by appropriate experts to manage noise, vibration dust and any other impacts associated with minor blasting activities.
- Installation of temporary or permanent noise barriers where possible early in the construction program to assist in effectively mitigating noise for surrounding communities during works.

4.1.8 Monitoring and checking

- A procedure for review and continual improvement of the CEMP.
- A documented process for auditing the CEMP, including the on-site environmental protection measures.

4.2 Traffic management

During construction, traffic management for the expressway requires careful consideration to minimise interruption for motorists while ensuring the project progresses on schedule.

Managing traffic during construction of this project is challenging because of the area’s high density and corridor constraints, the unique bi-directional nature of the existing expressway and the traffic devices which control traffic movement.

This will require a high degree of coordination between the contractor, the department and other stakeholders including councils and emergency services. Of particular importance is the forward planning to provide advanced notification to road users on impending road closures, detours and restrictions that are required to carry out the works.

Minimum traffic requirements during construction are:

- Generally the number of lanes on the expressway during peak traffic periods will not be reduced; however speed restrictions may apply.
- During off-peak and inter-peak periods the contractor may restrict or close parts of the expressway.
- Exceptions to off-peak closures include long weekends and special events such as the Tour Down Under and Sea and Vines Festival. During these events the expressway will remain open to cater for the peak flow.

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Specific requirements for the key junctions and interchanges are:

- Bedford Park Junction must remain open to traffic during works with no lane restrictions during the peak periods, together with the existing level of access to and from the expressway.
- Marion Road Interchange must remain open to traffic during works with no lane restrictions during peak periods.
- Beach Road and Sherriffs Road must remain open to traffic during works, however access may be restricted in off-peak periods.

Requirements for all other interchanges and crossovers are:

- Closures will be permitted; however the adjacent roads immediately upstream or downstream cannot be closed at the same time to ensure detours are available and the impact on motorists is minimised. For example:
  - Honeypot Road cannot be fully closed while Beach Road movements are restricted
  - Elizabeth Road – when closed Flaxmill Road shall be open to traffic
  - Flaxmill Road – when closed O’Sullivan Beach Road shall be open to traffic
  - O’Sullivan Beach Road – when closed Flaxmill shall be open to traffic
  - Lander Road – when closed Majors Road shall be open to traffic
  - Majors Road – when closed Seacombe Road and Lander Road shall remain open for traffic
  - Seacombe Road – when closed Marion Road and Majors Road will remain open to traffic
  - Pedestrian / cycle overpass and underpass structures cannot be closed simultaneously with adjacent road and pedestrian/cycle overpass and underpass structures.

These traffic management principles will be implemented to ensure the work can be undertaken safely and quickly with minimal inconvenience.

4.3 Service utilities

There are approximately 170 individual utility services that cross or run alongside the expressway that may need to be relocated, protected or adjusted. These services include electrical overhead and underground power, communications, water, sewer and gas. The design of the expressway will look to avoid or minimise disruption to key services where possible.

Before the main construction works begin some preliminary works will be undertaken to protect or relocate key services that will conflict with the works. This will assist the overall construction program and risks associated with working around live services.

4.4 Setting up

At the start of construction, a site office, compounds and storage yards will be set up at various locations along the expressway corridor. This will be followed by pre-construction activities such as survey and the implementation of traffic management and environmental controls, including silt fencing, temporary drainage controls and protection measures around existing stormwater drainage, waterways and basins.
4.5 Earthworks and rock removal

A substantial amount of earthworks will be undertaken as part of the construction of the expressway duplication project.

The topography of the corridor varies with deep valleys and high mounds requiring a balance of cut and fill of soil to construct the new road.

During construction it is expected that more than two million tonnes of earth and rock will be cut and relocated to fill, with any excess removed from the site or stored within the site.

Following earthworks, the road banks will be stabilised using seed plantings to prevent erosion until landscaping can commence in the latter stages of the project.

The alignment of the new carriageway will be west of the existing expressway through the escarpment between Seacombe Road and to the north of Majors Road (refer to Section 2.3.2 Alignment). The rock in this escarpment is extremely hard and a series of minor blasts in conjunction with mechanical means of rock excavation and breakage, such as jack hammering, will be the most effective and least disruptive method of removing it.

Rock blasting will be conducted at regular intervals and the community will be notified beforehand. All blasting will be monitored for vibration to ensure compliance to limitations of nearby structures, houses and public areas. The blasting required will be undertaken in a controlled manner, in a series of stages. Holes will be drilled and packed with small explosives to cause ‘pre-splitting’ (the combination of many small explosions to split or fracture the rock).

Pre-splitting is used initially to manage the vibration and safety issues associated with larger explosions and ‘fly rock’. Noise, dust, fly rock and ground/air vibrations will all be limited to Australian Standard requirements. Each minor blast is a very short event, lasting only a second or two, depending on the size.

The rock can be easily and safely removed by machinery in manageable sizes, and then processed via an on-site crushing facility and used as fill material, road base and asphalt aggregates.

4.6 Bridgeworks and underpasses

Bridges and underpasses will need to be extended to cross the new expressway carriageway.

The two current options being considered are:

1. the total removal of the western abutment support and installation of a temporary support of the existing bridge whilst excavating the soil adjacent to the existing expressway and construction of the new bridge (refer to Figure 4.1 Staged bridge construction process option 1); or

2. the construction of a new central column and new western abutment support followed by the installation of new bridge beams and the new road over (refer to Figure 4.2 Staged bridge construction process option 2).
Stage 1 - Construction of New Roadway

Stage 2 - Construction of bridge deck

Note: Drawings are issued for comment only and are subject to detail design.

Staged bridge construction process - Option 1

Figure 4.1
Staged bridge construction process - Option 2

Stage 1 - Construction of New Roadway

Stage 2 - Construction of bridge deck

Note: Drawings are issued for comment only and are subject to detail design
4.7 Interchanges

The existing Beach Road and Sherriffs Road interchanges will need extensive modification to provide both exit and entry points for traffic.

During construction both of these interchanges will need to remain open when the existing expressway is operating during the peak periods. This can be achieved by first constructing the new ramps on the opposing sides, shifting the traffic to use the new ramps (still as a reversible ramp), reconstruct the existing ramps and ultimately open all ramps once the expressway carriageway is completed.

At Beach Road the new bridge will be constructed in two halves. Traffic will utilise the existing bridge while the new northern section is constructed. Once this is completed the traffic will be shifted onto this new part while the original bridge is lengthened.

At the interchange where the expressway crosses above Sherriffs Road, the new expressway bridge will be constructed during a weekend closure. This is to allow sufficient room to install the new bridge beams (using cranes) under a safe working environment. Traffic will be managed through detours to minimise disruption.

4.8 Roadway and road furniture

Once earthworks and drainage are sufficiently completed, the road base and asphalt for pavements will be placed. This will occur at different times, depending on the progress of the earthworks, interchanges and bridge works.

The expressway is then completed with the installation and modification of traffic signals, street lighting, traffic barriers, signage and line marking. Landscaping and other urban design features will be carried out concurrently.

4.9 Other works

Noise walls, stormwater drainage, including upgrades and new detention basins, will be installed during the project. In most cases the design will make use of the existing wetlands with some upgrades.

4.10 Existing carriageways

Given the age of the pavement and high volume of traffic that uses the expressway daily, the existing road surface will be rehabilitated during the delivery of this project. Taking advantage of expressway closures during construction allows this work to be undertaken efficiently and safely.

In addition to upgrading the road surface and line marking on the existing expressway (to meet the need of southbound traffic flow) signage and the Intelligent Transport Systems infrastructure will also be modified.