

## 23. Constructability and staging

### 23.1 Constructability

Constructability of both the arterial and motorway upgrade has been taken into account in the development of the concept design. Areas of major concern in the concept design development process for the arterial upgrade were the following:

- Tie-in at southern end – the interface at the northern end of the Sapphire to Woolgoolga project which incorporates a grade separated interchange has been taken into account with consultation with RTA and adjoining project consultant to confirm and set common project limit locations for each of the carriageways. This project will see the staggered extension of both carriageways adjacent to the north facing on and off load ramps for the grade separated interchange to be constructed at the northern end of the Sapphire to Woolgoolga project. There appears to be no constructability issues in extending the Sapphire to Woolgoolga project at this location, however careful consideration of the sequencing will need to be accounted for in the construction phase.
- Corindi floodplain – geotechnical investigations throughout the Corindi Floodplain indicate that no significant soft soil issues should be encountered across the floodplain during construction of elevated shallow fill embankments. Several flood relief culverts and/or twin bridges are required across the floodplain and have been addressed in the concept design, therefore no constructability issues are foreseen across the floodplain other than a seasonal impact at time of construction.
- Dirty Creek Range – geotechnical investigations in the area of Dirty Creek Range indicate that no overall constructability issues will be encountered in the construction of the deep rock cutting and high fill embankments through the Dirty Creek Range section. It is noted that blasting will be required to construct the deep rock cutting south of Range Road. As this rock cutting is the main source of general fill and select material for the project there are some issues associated with transportation of material excavated from this area to the northern end of the project. This issue relates to both the road user impacts of large numbers of trucks moving material along the highway and the costs associated with this haulage of material.
- Dirty Creek Range – geotechnical investigations in the area of Dirty Creek Range indicate that no overall constructability issues will be encountered in the construction of the deep rock cutting and high fill embankments through the Dirty Creek Range section. It is noted that blasting will be required to construct the deep rock cutting south of Range Road. As this rock cutting is the main source of general fill and select material for the project there are some issues associated with transportation of material excavated from this area to the northern end of the project. This issue relates to both the road user impacts of large numbers of trucks moving material along the highway and the costs associated with this haulage of material.
- Twin bridges over the existing Pacific Highway south of Range Road – the provision of a complex underpass structure for the existing Pacific Highway has been investigated and designed for this area, due to topographical and land use constraints. Although the 110m long structure is a complex combination of bridge and reinforced soil wing walls (as described in section 9.4) there appears to be no constructability issues other than traffic management for existing highway traffic throughout the construction phase of this section of the project.

Geotechnical investigations and other investigations such as terrestrial and aquatic ecology, noise, indigenous and non-indigenous heritage and a flood study for the Corindi Floodplain indicate that the remainder of the project will have no significant constructability issues, subject to appropriate additional detailed investigations and careful consideration to traffic management during detailed design and construction.

With regard upgrade to motorway standard the concept design has addressed future overpass locations and provision of a continuous alternate route and other than the planning and management of construction of bridges over existing dual carriageway there appears to be no significant constructability issues to note.

### **23.1.1 Traffic management**

As the project is a combination of duplication of the existing highway and realignment of the existing highway there will be sections of the project and specific areas that will require particular attention with regard to traffic management. These sections and areas, particularly the sections of planned duplication will require constant traffic management provision and traffic switches, which in turn will impact on the cost delivery for the project as well as safety and road user delay.

Particular attention has been given throughout the concept design phase to minimise the switches in duplication from one side of the highway to the other so as to minimise traffic switches through the construction phase. However, it is acknowledged that a number of switches will be required as part of the construction phasing for this project.

Areas of likely concern are as follows:

- Southern project limits – extension under traffic of the Sapphire to Woolgoolga project and adjustment of the northern ramps of the grade separated interchange.
- Arrawarra Straight – duplication of a 2 km section along with provision for existing intersections both on the east and west sides.
- Kangaroo Trail Road – side track required for overbridge construction.
- Twin bridges over existing highway south of Range Road – reconstruction of the existing highway and construction of long bridge structure under traffic.
- Range Road to Halfway Creek Duplication – duplication of a 5 km section along with provision for existing intersections both on the east and west sides.
- Lemon Tree Road to Luthers Road - duplication of a 4 km section along with provision for existing intersections both on the east and west sides.
- Realignment sections – provision for cross traffic for public roads and private access.
- Proposed construction site accesses – access to and from the existing highway.
- Access to and from construction areas – as is normal practice the construction contractor will have to provide a number of safe entry and exits points along the different sections of the project.

### 23.1.2 Typical Construction Sequence

Construction sequence will depend largely on the staging of the project and delivery method that will be adopted at the time that funding is available for the project.

An indicative sequence for each section would be as follows:

- Acquisition.
- Utility relocations.
- Tendering and appointment of contractor.
- Pre-clearing investigations for flora and fauna.
- Detailed design taking into account the requirements of the EA.
- Site establishment – compounds etc.
- Installation of traffic control measures (ongoing throughout project).
- Clearing/grubbing.
- Installation of sediment and erosion control.
- Establishment of stockpile areas.
- Topsoil stripping and earthworks.
- Cross drainage, including fauna crossings.
- Establishment of concrete batch plant(s).
- Bridge construction.
- Subgrade and pavement construction.
- Construction of service roads, access roads and intersections.
- Topsoil, revegetation and landscaping.
- Noise mitigation measures.
- Linemarking and signage, including service and access roads and existing highway.
- Lighting at intersections.
- Finishing works.

As the delivery method for this project hasn't been determined there may be some difference in the above sequence once the preferred method is finalised and whether the project will be constructed in stages.

## 23.2 Staging of the project

The project is a combination of sections that are either a duplication of the existing highway or a realignment of the existing highway. The project is also between two other upgrade projects being the Sapphire to Woolgoolga upgrade to the south and the Wells Crossing to Iluka upgrade to the north.

Giving consideration to the Woolgoolga to Wells crossing project in isolation, the earthworks for the project is balanced across the full length, with most of the cut material being won from the Dirty Creek Range and then being hauled to the south or north. Given this consideration the project would be most economically constructed as a single contract with development of the southern and northern ends of the project occurring simultaneously.

Should staging of the project be required for non-economic considerations a likely construction sequence would be:

- Section 1 Southern Limit of works to Range Road.
- Section 2 Range Road to southern end of the existing Halfway Creek duplication (Dunmar Lane).
- Section 3 Northern end of the Halfway Creek Duplication (Lemon Tree Road) to the project limit at Bald Knob Tick gate Road.

This staging sequence anticipates that the Sapphire to Woolgoolga upgrade project would be completed prior to the commencement of the Woolgoolga to Wells Crossing Project.

The timing and sequence of delivery of the three different sections would be subject to funding and possibly delivery of the adjoining sections. A description of each of these three sections would be as follows:

- **Southern limit of works to Range Road** - this section is a combination of duplication (westside) at the southern end for approximately 2 km, then realignment of the existing highway on the westside through Corindi River floodplain and Dirty Creek Range to Range Road. This section also produces, from the Dirty Creek Range rock cutting, the bulk of the general fill and select material. If this section was to be constructed alone, then stockpiling of surplus material elsewhere on the project would be required.

Other than the short section of duplication at the southern end most of this section is construction through undulating topography, free of traffic and except for the challenges through Dirty Creek Range the easiest of the sections to construct, delivering an 11 km section of upgrade.

- **Range Road to Dunmar Lane** – this section is a combination of reconstruction of the existing highway and duplication of the existing highway, tying into the existing Halfway Creek Duplication at the northern end. The 12 m wide median facilitates the construction of the new north bound carriageway to the west of the existing highway, while the existing highway is under traffic. The traffic can be switched to the new northbound carriageway during reconstruction of the existing highway.
- **Lemon Tree Road to Bald Knob Tick gate Road** – this section is duplication of the existing highway (westside) from Lemon Tree Road to Kungala Road and realignment through to Bald Knob Tick gate Road. The section from Lemon Tree Road to Kungala Road would be constructed in a similar sequence to the Range Road to Dunmar Lane section of the upgrade, while the section north of Kungala road can be constructed offline from the existing highway.

The upgrade of the three different sections to motorway standard could only be completed and justified once all the sections are in place. It would only be at this time that the overpasses and a continuous alternate route could and would be constructed and be able to operate throughout.

### **23.2.1 Range Road staging sequence**

The most difficult staging consideration for the project is the construction of the underpass south of Range Road. Appendix B shows a potential staging sequence for the proposed underpass. This staging sequence assumes that the whole project is to be constructed under a single contract and that the proposed highway north of Range Road will be constructed as part of the sequence.

The figure 4 in Appendix B shows the proposed service road being constructed first followed by proposed highway to the south of the underpass, along with the southern abutment of the proposed highway. Following partial construction of the northern abutment of the underpass the traffic could be switched to the new service road while the remainder of the northern abutment and proposed highway could be constructed. Traffic could then be switched to the full highway upgrade.