

3 Alternatives

3.1 ALTERNATIVES TO THE PROPOSED ACTION

The following alternatives to the proposed project are available:

- do nothing
- upgrade the entire section of the Highway to meet higher road standards (e.g. 1 in 100 year storm events) as established elsewhere on other major highway systems
- complete realignment of this section of the Highway.

Table 3.1 provides a comparison of the AATOC for the proposed and alternative options (KBR 2004).

Table 3.1 Annual average time of closure for the proposed and alternative options

Location	Annual average time of closure (hours/y)		
	Do nothing	*ARI 20 (proposed option)	ARI 100
Victoria River	96	6	0
Joe Creek	16	6	0
Lost Creek	45	6	0
Sandy Creek	10	8	0

* — Average flood recurrence interval.

3.1.1 Do nothing

The ‘do nothing’ option involves retaining the existing Highway infrastructure and with it the current road failures and closures. Regular road maintenance will continue as necessary.

This option will not improve road safety, nor will it provide relief from the flooding events that occur each wet season, and which result in the Highway being closed for parts of each year. As shown in Table 3.1, there would still be significant lengths of time when the Highway would be closed. This would continue the existing situation where commercial traffic and tourists are delayed by an average of four days/year, and sometimes by up to three weeks, at the Victoria River.

Damage to the road pavement as a result of water saturation will continue to occur. Therefore, DPI will continue to impose axle and configuration limits on heavy transport operators (trucks and buses) using the Highway. These restrictions last a lot longer than the actual periods of flooding and cause much more inconvenience, and therefore additional cost, to the commercial transport industry.

The 'do nothing' option will continue to provide a substandard transport route for the Victoria Highway and for the transportation industry, tourists, business people and Defence. It will mean that the residents of the surrounding district remain stranded during periods of flooding and road closure.

3.1.2 Upgrade to a higher standard

This option will not entirely eliminate the potential for flooding to occur along this section of the Victoria Highway. However, the upgrade will ensure that the Highway will remain open for the majority of wet seasons and will be closed for short periods only during those slightly above average rainfall seasons.

The flood immunity standard for the rest of the Victoria Highway route is Q_{20} and 12 hours AATOC. This standard, which is below the normal National Highway standard of Q_{50} , was developed by the Northern Territory and presented to the Commonwealth in 1990. It identified that for the reduction in standard proposed, a saving of \$58m (1988 costs) could be achieved across the programme for the Victoria Highway. This provided an optimised outcome for the economic investment required. This approach was accepted as a basis for the subsequent programme of continuing improvements, of which this current project is a key and integral component.

Upgrading this section of road to Q_0 flood immunity (or better) would not benefit traffic during storms events greater than Q_{20} , as the other bridge structures between Katherine and Kununurra only provide immunity to a Q_{20} level.

Upgrading to greater flood immunity would largely involve the same realignment works and construction activities as the current proposal. However, the road will need to be raised considerably higher than is currently proposed, and hence this will result in a wider environmental impact area owing to the larger batters required to support the pavement. Additionally, significantly greater quantities of fill material would need to be sourced from borrow areas. The greater the flood mitigation standard proposed, the higher the road will need to be raised, and hence the greater the environmental impact and economic cost of the project.

In summary, upgrading the road to provide greater flood immunity would increase the environmental impact, be economically prohibitive, and provide limited benefit to freight and tourist traffic.

3.1.3 Horizontal realignment of the road

A third alternative to the proposed development is the complete realignment of this section of the Victoria Highway to higher ground. The realignment options have been previously reviewed with no environmental and economically acceptable alternatives being available (KBR 2004). The only alternatives previously assessed were across steep ground or involved a large lateral shift in location, which would have a large impact on the environment. Most of the realignments would be within the Gregory

National Park. Approval for these realignments into undisturbed areas of the Park would be unlikely to be obtained owing to the presence of Aboriginal Sacred Sites and adverse environmental impacts. These alternative realignments would involve considerable environmental impact and, therefore, require formal assessment, owing to the size and extent of the impact area. In summary, they would be environmentally and economically prohibitive owing to the impacts and construction requirements.

3.2 ALTERNATIVE BORROW SOURCES (GRAVEL AND FILL)

A detailed review of the potential sources of borrow materials (gravel and fill) for the project has been undertaken by DPI. Potential sources are discussed in Section 2.4.5, especially Table 2.2, of this PER.

An ongoing process has been established to assess the potential borrow source sites for environmental and heritage issues, particularly the occurrence of Sacred Sites. The AAPA, NLC and representatives of Traditional Owner groups have been and are being consulted on these matters. The assessment, review, documentation and approval processes will exceed the time span of the PER.

Once heritage approvals are in place, it would be unrealistic to establish alternative sources of these materials. Instead of using borrow pits close by the project work area, materials could be carted from commercial quarries in either Katherine, NT, or Kununurra, WA. However, the cost of transporting the material would likely be so high that the project would become uneconomical to undertake. In addition, the amount of heavy transport required to transport the materials would place a high load on the rest of the Highway pavement. This could lead to premature failure of the Highway, resulting in additional major maintenance costs and reduced safety.

3.3 ALTERNATIVE WORKS AND TRAFFIC FLOW MANAGEMENT

An alternative access arrangement for the proposed works along the Highway would be to establish a detour for the length of the roadworks. This is not practicable without establishing a greater construction footprint for the works along the Victoria Highway through the Gregory National Park, with consequent greater environmental impact.

A further alternative would be to establish a detour through Stokes Ranges along the Victoria River Downs Road to Top Springs and via the Buchanan Highway to the Victoria Highway. This would add approximately 300km to a trip. These roads are unsealed and also impassable for much of the wet season.

Given the above, it is considered that there is no practicable alternative to management of traffic during construction except by major detours.

It is currently difficult to assess specific alternatives to the management of traffic flow during the proposed construction works. DPI expects that construction will be undertaken 'under traffic', and a draft TMP will be developed by the contractor appointed for the construction works.

The draft TMP for the Victoria Highway roadworks programme will be submitted by the contractor to DPI for review prior to construction commencing; that is, initially as a draft as part of the Tender documents and then in detail after the contract has been awarded.

It is mandatory that all aspects of the TMP in the DPI Specification (Appendix B) are addressed by the contractor before construction commences. The TMP must comply with DPI's standards (as noted in the Specification for the works) and the appropriate Australian Standards. DPI reserves the right to require that the TMP is amended. Therefore, until the proposed TMP is submitted and DPI understands what is being proposed by the contractor, it is impossible to comment further on traffic management alternatives during construction.

3.4 ALTERNATIVE CONSTRUCTION TECHNIQUES

The likely construction activities are discussed in Section 2.4.3. The likely construction techniques will involve current best practice in the fields of earthworks, drainage installation, pavement construction, bridge construction, bituminous sealing, line-marking, and erection of safety devices and road 'furniture', such as signs and guide posts. Borrow materials are likely to be extracted, processed, transported, placed and compacted using conventional plant and current best practice.

Construction techniques will be provided by the contractor(s) that tenders for the works. These techniques must be compliant with the RFT requirements and Specifications established by DPI for the project. The construction techniques and the approach to construction must be established independently by the contractor so as to ensure that the requirements and outcomes set by DPI for the project are achieved.

The physical attributes of the construction sites, such as water flows, rock and soil type and road levels determine what structure types will be feasible. In this case it has been determined that the structures over the major watercourses (Victoria River and Joe, Lost and Sandy creeks) will be bridges and the remaining minor drainage structures will be pipe or box culverts.

An alternative to the bridges over the major watercourses could be culverts; however, these are less hydraulically efficient and therefore would need to be built to a higher level, which would incur more costs and environmental impacts.

It is proposed that the current road pavement is built from natural gravel materials. Alternatives to this could include concrete, segmental pavers and deep lift asphalt. However, there is no need for these higher strength structural pavements, the costs of which would be prohibitive both financially and environmentally.

There is no practical alternative to the use of natural fill material to raise the level of the road at the approaches to the new structures or the sections that require lifting.

A summary of the likely construction techniques will involve the activities described below.

3.4.1 Roads

The basic steps involved in construction of roads will involve:

- surveying and setting out of the works
- clearing the site of vegetation, including borrow sites
- construction of detours or side tracks (if required), and implementing the TMP

- importing fill material to raise the level of the Highway, and to construct approaches to the new bridges
- importing gravel base material
- sealing the road
- installing road furniture—guide posts, painting lane and edge lines, installing signs etc.

There are potential alternatives available for each of these steps. However, the exact method by which a contractor proposes to undertake these tasks will only become known during the evaluation of Tender submissions.

3.4.2 Bridges and culverts

Construction at bridge and culvert sites will involve:

- surveying and setting out of the works
- clearing the site of vegetation
- construction of detours or side tracks (if required), and implementing the TMP
- excavation for foundations, either individual sites (for bridge piers) or total areas (e.g. slabs for culvert installation)
- installation of bridges and culverts.

3.4.3 Borrow materials

For riparian and terrestrial areas the process of construction and operation is detailed in Section 2.4.5. It is unlikely that there are alternatives available for these activities.

3.5 ALTERNATIVE ENVIRONMENTAL MANAGEMENT TECHNIQUES

Proposed environmental management techniques will incorporate all requirements from the PER process into Tender documentation for the road and bridge construction. Once the Tender is let, the contractor will be required to develop a final EMP that will incorporate all these requirements. The Contract Superintendent will review the EMP to ensure compliance. The Superintendent will inspect and audit the Contractor's compliance with the EMP throughout construction.

In terms of construction techniques there may be a few alternatives to specific environmental management matters. For example, the contractor could use a number of commercial materials and applications for specific environmental protection in areas of batter protection and scour protection at drainage outlets. These protection measures could include items and activities such as rock batters, gabions, geotextiles, geogrid, hydromulch and progressive revegetation of slopes and disturbed areas during construction.

Weed control techniques used could include spraying or removal of weeds by hand.

Expansion of cane grass communities could be accomplished by transplanting of cane grass from construction sites to depleted areas, or by installing fences to protect existing cane grass communities from impacts from feral animals.

3.6 FUTURE DEVELOPMENTS

It is possible that the construction contract may be expanded to include pavement strengthening and widening between Ch 186 km to Ch 220 km. As noted in Chapter 2, a larger quantity of gravel (an additional 50,000 m³) will probably be required over the next two to 10 years for this activity. This would only occur if funding is available to reconstruct sections of deformed pavement over this longer period of time.

At this stage, no other major future developments are proposed for this section of the Victoria Highway. Regular road maintenance works will continue as required along the Highway following completion of construction.