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PARLIAMENT OF TASMANIA

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PARLIAMENTARY STANDING COMMITTEE ON  
PUBLIC WORKS

# **BASS HIGHWAY – BLACK RIVER BRIDGE – BRIDGE REPLACEMENT AND REALIGNMENT OF ITS APPROACHES**

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*Presented to His Excellency the Governor pursuant to the provisions of the  
Public Works Committee Act 1914.*

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## **MEMBERS OF THE COMMITTEE**

### **LEGISLATIVE COUNCIL**

*Mr Wing (Chairman)*  
*Mr Harriss*

### **HOUSE OF ASSEMBLY**

*Mr Green*  
*Mr Kons*  
*Mrs Napier*

## **INTRODUCTION**

To His Excellency the Honourable Sir Guy Stephen Montague Green, Companion of the Order of Australia, Knight Commander of the Most Excellent Order of the British Empire, Governor in and over the State of Tasmania and its Dependencies in the Commonwealth of Australia.

### **MAY IT PLEASE YOUR EXCELLENCY**

The Committee has investigated the following proposal: -

### **BASS HIGHWAY – BLACK RIVER BRIDGE – BRIDGE REPLACEMENT AND REALIGNMENT OF ITS APPROACHES**

and now has the honour to present the Report to Your Excellency in accordance with the *Public Works Committee Act 1914*.

## **BACKGROUND**

This reference sought the approval of the Parliamentary Standing Committee on Public Works for the replacement of the Black River Bridge and the realignment of its approaches.

The Bass Highway crosses Black River near the mouth of the river, about 1.5 km from the coast. The site is located about 23 km east of Smithton on the North West Coast of Tasmania.

The Bridge is a critical element in the Bass Highway linking Wynyard/Burnie to the far north west of the State. At this site the highway carries approximately 2000 vehicles per day and of these approximately 17% are heavy vehicles.

The bridge has a number of deficiencies including corrosion of steel and concrete and inadequate strength to carry increased vehicle masses. As a result of these deficiencies the bridge was identified for replacement in order to maintain the current level of service to the north west of the state.

## **ECONOMIC AND SOCIAL JUSTIFICATION**

### ***Need for Project***

Deterioration of the bridge has increased in recent times with the following identified deficiencies:

- Corrosion of steel and reinforcement in the concrete
- The presence of lead based paint
- Expansion joint deterioration
- Limited width for current vehicles
- Road approach alignment deficiencies

- Inadequate strength to carry increased vehicle masses and high productivity vehicles

The corrosion and deterioration of the existing bridge if not addressed will lead to load limits being placed on the bridge and ultimately full closure for safety purposes. To ensure that this is not required and to allow for the increase in vehicle masses, the bridge requires replacement.

## **DESIGN PROPOSAL**

### ***Bridge and Road Alignment***

The new alignment for the bridge and road approaches provides a 200m radius curve from the northern end of the bridge with the curve being a tangent to the straight section of highway to the west.

The design speed on the curve to the north of the bridge will be 85kmph.

The bridge will have a slight skew, which will allow a straight alignment from the bridge to tie into the existing curve to the south.

The vertical alignment of the new road will follow that of the existing road as both the existing road alignment and adjacent land are relatively flat.

### ***Cross Section***

The typical cross section for the bridge provides 3.5m lanes and 1.0m shoulders. The typical cross section for the road approaches provides 3.5m lanes, 1.5m sealed shoulders and 0.5m verges. The verges are widened to 1.0m where safety barriers are required.

Superelevation of 7% is used on the horizontal curve to the north of the bridge. There is insufficient distance between the end of the curve to the northern end of the bridge to allow for the full transition of the superelevation.

To overcome this, the superelevation has been transitioned in the curve to 3% at the northern end of the bridge. The 3% superelevation has been carried across the bridge, providing one way crossfall on the bridge, and the remainder of the superelevation transition is located south of the bridge.

### ***Preliminary Design – Bridge***

The design and construct contract process will offer a range of alternative designs for the bridge which are developed to suit the successful Contractor's preferred construction methodology.

The Preliminary Design that has been developed for the bridge addresses the technical requirements and the site constraints.

The key factors influencing the selection of superstructure type and span length are:

- The bridge has simple uniform geometry;
- The superstructure needs to be erected over water, therefore precast beams of reasonable weight need to be used;
- The topographical and hydrological conditions of the river and river bed and their effect in locating the piers; and
- Due to the corrosive marine environment, durability is a major concern.

The use of stainless steel in concrete with good construction practice during concreting and curing is considered to be appropriate to achieve a 100 year service life.

A Super-T superstructure provides an economic and viable solution and is discussed in the following sections.

### ***Superstructure***

The proposed deck cross section has 5 pretensioned open topped Super-T beams with a cast in-situ deck slab over. Overall structural depth including asphalt 1.6m. Overall width is 10m. The new bridge has 3 spans closely matching the existing configuration.

### ***Piers and Abutments***

The proposed pier type has a single simple blade pier with a spread footing. The required height of both piers does not suit the use of multiple columns. However, the blade pier with rounded ends is a more aesthetic solution.

The ground conditions suggest that pad footings would be suitable provided that excavation, shoring and dewatering are carried out efficiently.

The proposed abutments are shallow wall type founded on pad footings. The abutments may need to be held down to provided sufficient stability under horizontal loads.

### ***Durability Measures***

The design life of the bridge shall be 100 years. In this context, at the end of the design life the structure will operate in a safe and serviceable manner, however will be due for replacement by a new bridge. Consideration of ongoing maintenance expenditure necessitates that the replacement bridge will need to be durable for much of its design life.

The replacement structure shall be built from reinforced and pre-stressed concrete, except for fences, which may be constructed from black or stainless steel or aluminium.

The use of stainless steel reinforcement along with appropriate concrete mix design, reinforcement fixing, concrete placement, compaction practices and curing are considered necessary to meet the durability objectives in marine environments.

An asphalt-running surface of 50mm minimum thickness is to be provided on the carriageway, at least for the 7m width of running lanes.

### ***Demolition of Existing Bridge***

The demolition of the existing Black River Bridge once traffic has been transferred onto the new bridge will be a significant cost and time component of the overall project. The demolition of similar structures has not been common in Tasmania.

The following areas of risk have been identified and will be further investigated prior to inviting tenders:

- i) The capacity of the existing bridge to support the required craneage to remove the central span.
- ii) The demolition to be undertaken to meet the environmental requirements laid down in the DP&EMP.
- iii) A suitable disposal site is yet to be identified.

## **SOCIAL IMPACTS**

### ***Properties***

The realignment of the highway will require the acquisition of land from the two adjacent landowners.

To the north of the bridge the owner requires a 12m wide strip to be cleared from the new fence line. This is to reinstate the existing situation which provides for movement of farm vehicles and stock and for fire prevention.

To the south of the bridge an existing cattle yard, cattle crush and loading ramp will be relocated. An access road with a hammerhead turning facility for a stock truck will be provided to allow loading of stock from inside the property instead of adjacent to the road as currently exists.

### *Parking for Fishing Activities*

Fishermen currently use the existing verge and hard stand areas on the southern side of the bridge to park when fishing. A hard stand area will be provided on the eastern side of the highway south of the bridge. This hard stand area is approximately 50m long and will accommodate approximately 8 cars. The existing road that will become redundant is considered not to be suitable for parking as it will encourage pedestrian traffic across the highway.

## **ENVIRONMENTAL IMPACTS**

### ***Regional Setting***

The Black River Bridge is located near the mouth of Black River within the tidal zone between back-dune lagoonal areas and inland estuarine river flats. The catchment of the river extends some 25 kilometres inland to the south and about 25 kilometres from Willis Hill in the west to the Dip Range in the east. Most of the upper catchment area is forested, with the lower areas under private ownership and agricultural activities.

The environmental values of potential relevance to the proposed bridge replacement works are both within the associated aquatic environment and the terrestrial environment in the immediate vicinity.

### ***Aquatic Environment***

#### ***Environmental Setting of the Aquatic Environment***

The Black River bridge crosses the river near its mouth and within the estuarine zone between a back-dune lagoonal area and broader estuarine flats inland. The separation of these parts is the result of the geology where resistant siltstone and quartzitic rocks have been broken through by the Black River via a narrow gorge-like section. The upstream flats in the meandering section of the Black River are the result of flooding behind the gorge section and related deposition of sediment brought down by the river during historic flood events.

It is of particular note that the Black River Estuary is classified as a Class A Estuary by the Tasmanian Aquaculture and Fisheries Institute, meaning that it has a high conservation significance, showing minimal effects of human activity and is a key component of representative reserve areas in Tasmania.

### ***Aquatic Species of Significance***

The aquatic environmental setting provides inland habitat for a range of fresh water and estuarine species, as well as passage to the open sea for spawning fish species. In the higher areas above the tidal limit, freshwater species of particular conservation significance that are known to occur include the Giant

Freshwater Crayfish (*Astacopsis gouldii*) and species that may frequent the area include the Green and Gold Frog (*Litoria reniformis*). Neither of these species will be affected by the proposed works.

One species of particular conservation significance that utilises the river passage is the Australian Grayling (*Prototroctes maraena*). While much of its biology is not well known, this species appears to have a marine stage in its life cycle. This species generally lives in the middle and lower reaches of most of the river systems of Tasmania, especially the northern and eastern coastal rivers. Spawning takes place in fresh flowing rivers in late spring to early summer, with larvae apparently being swept into the estuaries and to sea. Fingerlings return as whitebait after about four to six months (late Summer to Autumn). This migration may be sensitive to water quality conditions, where excessive turbidity, especially, may limit their movement back into the upper estuary and inflowing streams.

This species is listed as “Vulnerable” under Schedule 4 of the Tasmanian Threatened Species Conservation Act, 1995, and is thus afforded protection under the Tasmanian legal system.

### ***Water Quality***

The health of aquatic plant and animal species in the vicinity of the bridge and in adjacent waters will rely on water quality that is not affected by external changes to the present condition. Such external impacts could include increased turbidity from runoff of eroded soils, concrete washings or cutting wastes, accidental oil and fuel spills, chemical losses and spills including excess grouting and bonding agents and loss of heavy metal particulates, especially lead from structural protective coating (lead based paint primer and paints).

Also, the removal of underwater parts of the existing bridge piers and abutments will result in disturbance to the substrate and the stirring up of silt with resultant increased turbidity in the receiving waters. This is unavoidable but is expected to be temporary and of short duration. The resulting turbidity may thus be regarded as being similar to a flood event that subsides within a relatively short period.

### ***Mitigation Measures for Aquatic Environment***

Indirect effects on the habitat of the above aquatic species is unlikely to occur as the present flooding regime of the lower Black River will not be altered by the proposed works. The gorge-like confinement of the river at the site of the bridge will remain unchanged as the water passage will not be affected by any additional bridge piers to those that presently exist. The existing bridge is to be demolished with all substructure, including piers and abutments, to be removed following construction of the new bridge.

With respect to the potential effects on migrating fish species, particular measures will be implemented to ensure that runoff from disturbed areas is minimised and that turbidity in the receiving waters is controlled. The potential for scouring of river banks in the vicinity of the bridge is to be minimised through provision of adequate scour protection of the embankments at the bridge abutments. Also, construction measures that minimise any constriction of the river channel and the potential for channel scouring in the vicinity of the bridge will be required.

Runoff and turbidity controls and scour protection during construction will be especially important during the summer and autumn months when fish migrations are at their peak.

Measures for control of potential impacts on water quality will be aimed at ensuring preventative measures and processes throughout construction. The control of fuel storages and avoiding refuelling operations on the river bank area will reduce the potential for accidental fuel spills during the construction period. In the event of accidental spills, or burst hoses, oil absorbent materials will be retained on site and used for cleaning up spills in the estuary. Contaminated soils will be cleared and removed from site for proper disposal at a licensed facility.

During bridge demolition, concrete cutting wastes will be collected and all materials removed from the river environs. Lead-based protective coating will be kept intact and removed in whole pieces from the construction site, to avoid contamination of river sediment or soils on the banks of the river.

### ***Terrestrial Environment***

#### ***Environmental Setting of the Terrestrial Environment***

The terrestrial environment is based on Proterozoic geology of the Rocky Cape Group consisting of a suite of conglomerate, siltstone, dolomite and quartzites. The location of the bridge allows the straddling of the rocks on either side of the river, with foundations directly onto rocks via spread footings.

Soils in the immediate vicinity of the proposed bridge works are sandy and thinly developed over rocky substrate. To the west, soil development includes a peaty upper organic layer in areas of poor drainage.

#### ***Vegetation Communities and Species***

The vegetation of the area is generally described as dry sclerophyll woodland occurring on sandy acidic low nutrient soils, and is comprised of three main vegetation communities. Heathy Black Peppermint (*Eucalyptus amygdalina*) Woodland occurs on the drier high-lying parts of the site, and on the southern side of the river has a high diversity of understorey heathland species. On the northern side of the river, the community has been invaded by



Gorse (*Ulex europaeus*) with consequent displacement of understorey species.

Tea-tree Shrubland occurs in the western parts of the project area consisting of *Melaleuca squarrosa* and *Leptospermum scoparium* in poorly drained areas. The boundary of the property adjacent to the road reservation has been cleared as a fire break and Gorse has invaded this area.

The Riparian Zone is a narrow strip of vegetation on either side of the river that extends inland around the edges of the inland estuarine area. The species within this zone vary on the basis of soil profile, rock outcrop and river bank steepness. The continuity of the zone between lower estuary to upper estuary to inland forested hills provides an important corridor for movement of fauna species.

A fourth community of localised significance is a Lithophytic sub-Community occurring on a rocky outcrop area on the northern side of the bridge to the east of the project area. This includes a range of fern and orchid species of conservation significance. This community is outside the boundary of the proposed works and related surface disturbance and it is unlikely to be affected by the proposed works.

A total of 50 plant species has been recorded in the area of the project through the random meander sampling technique used during the botanical survey of the area. None of the species identified is listed under the Tasmanian Threatened Species Protection Act.

### ***Terrestrial Fauna of Significance***

The terrestrial fauna includes mammals, birds and reptiles of which 75 species are known to occur in the lower Black-Detention River Catchment. Of these, the species of particular conservation significance includes Eastern Quoll (*Dasyurus viverrinus*), Spotted Tail Quoll (*Dasyurus maculatus*) Eastern Barred Bandicoot (*Perameles gunnii*), Wedge-tailed Eagle (*Aquila audax fleayi*), Grey Goshawk (*Accipiter novaehollandiae*), White-bellied Sea Eagle (*Haliaeetus leucogaster*) and Swift Parrot (*Lathamus discolor*).

None of the above species is likely to be affected directly by the proposed works, although indirect effects on the species through habitat clearance may occur. There are no known nesting sites of the above bird species within or adjacent to the project area. The movements of quoll and bandicoot that may inhabit the adjacent areas may be affected slightly by removal of vegetation adjacent to the existing road reservation, although the extent of vegetation clearing is minimal with respect to surrounding areas and will not affect the species as a whole in the area.

## *Mitigation Measures*

The outcrop of rock at or near the surface on either side of the gorge, enables construction of the new bridge and approaches with minimal cutting and filling to achieve the desired vertical alignment for the bridge. Earthworks will thus not be significant. The thin layer of sandy soils at the bridge site would appear to be easily erodible following disturbance and runoff control measures will be required to prevent scouring and turbidity in the receiving waters. This will require flow diversion drains to prevent runoff through disturbed areas and drainage control from exposed soils during the construction of bridge abutments and related back-fill.

The clearing of native vegetation will require control to the necessary limits of construction, and adjacent areas of native vegetation will require protection. Clearly defined limits of clearing will need to be marked on site throughout the construction period to avoid the parking of vehicles or stockpiling of materials or equipment over the roots of remaining trees or in areas of native shrubs and grasses.

The lithophytic sub-community to the north and east of the project area will require protection from possible disturbance by construction-related activities, especially laying down of equipment.

Where possible, continuity in the fauna corridor from the downstream side of the bridge to the upstream areas will be provided beneath the bridge between outer piers and river embankment. This may include surface shaping to provide a terrace above the high water mark .

The replanting of native vegetation species will be included in the rehabilitation and revegetation of areas disturbed during construction. This is especially important on streambanks and adjacent areas to stabilise exposed earthworks and to assist with filtration of runoff and provision of habitat for protection of smaller mammals and reptiles.

Weed controls will be required to be implemented both prior to and during construction activities to prevent the spread of weed seeds from the site to adjacent or nearby areas. Weed-infested topsoils (especially the upper organic layer) will be removed separately and disposed of properly, especially in Gorse-infested areas and in the roadside drain area along the eastern bridge approach where Iris (*Iris germanica*) infestations are prevalent.

Also, preventative measures to avoid the introduction of weed seeds and plant disease to the area, especially root rot fungi (*Phytophthora cinnamomi*) and *Armillaria* sp. are required. These fungi are both soil-borne and both attack the root systems of plants and cause die-back. Armillaria is mainly sourced from metropolitan areas and may be introduced to rural areas in rotting vegetation and soil. Preventative measures include ensuring that all vehicles and plant are washed prior to entering the site and regular inspections and cleaning of plant and vehicles moving into and out of the construction area.

## ***Historic Setting***

No specific historic sites are listed on the Register of the National Estate, the Tasmanian Heritage Register, Circular Head S.42 Planning Scheme nor Cultural Heritage Information System or Tasmanian Historic Places Index. There are thus no existing statutory compliance requirements relating to historic heritage sites, however, the presence of potentially relevant historic heritage features of the present bridge structure require further determinations to be made in consultation with the Tasmanian Heritage Council.

Black River itself represented the eastern-most boundary of the Van Dieman's Land Co.'s Circular Head Block. In 1841, the land on the eastern side became the first privately owned land in the district.

Investigations revealed that the Black River environs represent an historic landing area and early settlement of the North West Coast of Tasmania. A landing site was identified about 80 metres to the east of the proposed bridge site by remnant timbers and bank cuttings. Records indicate that an early settlement had been surveyed in the area in 1856, but actual settlement never occurred, with the area around the nearby Black River Inn, opened in 1854, being a more favourable settlement area. Black River developed into a village with scattered population, churches, post office, school, sawmill, until depopulation during the Great Depression and remnants being finally destroyed by fire in 1948. This area is located some 500 metres upstream of the current bridge site, and neither this area nor any nearby relics will be disturbed by the proposed bridge replacement.

The existing Black River road bridge was constructed in conjunction with the upgrading of the Bass Highway between Wynyard and Smithton between 1954 – 1957, with the bridge being opened to traffic in January 1957. The bridge consists of two piers and three plate girders with reinforced concrete deck. The outside girders cantilever over the piers with the third girder being a drop-in span between the piers. The piers are hinged at the base of the shaft for expansion movement.

## ***Historic Heritage Features***

Two design features of the Black River Bridge are of potential interest with respect to historic heritage values relating to bridge design and engineering in Tasmania. The drop-in span (with suspended central girder) is an uncommon feature, although there are other known examples of this characteristic.

The other feature is less common and is thought to be the only hinged joint with this arrangement in Tasmania. This involves a hinged joint near the base of the bladed bridge piers, with their uniqueness being that other bridges are hinged at the beams and not in the piers themselves. In this case, the beams are fixed at the abutments and the hinges within the piers to allow for thermal movement.

This hinge configuration, while unique, is not considered to be the most effective and durable and thus has not been more widely adopted, where more accessible and more easily replaceable hinges at the beams are generally used.

### ***Mitigation Measures***

In recognition of the potential interest in the unique hinge joint, the historic value of the joint is to be preserved through a description of the feature with relevant plans and photographs, compilation of a complete record of its occurrence and registration in the Department's data-base.

Further liaisons with the Tasmanian Heritage Council are underway in relation to any other particular requirements relating to the preservation of records or representation of the design features described. While not presently listed as a heritage feature, the potential remains for the feature to be listed during further development of the project, which would require further approvals being sought prior to demolition of the bridge and result in later delays in completing the project works. The department thus intends to make a representation to the Heritage Council in relation to a case that there is no "prudent and feasible alternative" and to seek confirmation on this course of action from the Heritage Council prior to tendering for the project works.

### ***Summary of Aboriginal Issues Survey of the Area***

The area of the proposed works was surveyed on two occasions for the presence of any relics of Aboriginal significance and the Tasmanian Aboriginal Land Council was consulted on any other values of significance in the area. A desktop study was carried out and the TASI data-base was searched. No sites are listed in the study area, although one site is located about 1.5 kilometres to the north of the bridge site.

The study area has been subjected to surface disturbances and no evidence was found of any relics or other features of importance.

It is known that the general area of Rocky Cape and surrounds has been occupied in the past by Aboriginal people and it is likely that people have moved through the area, although no evidence of this was found during the site surveys.

### ***Mitigation Measures***

In view of there having been a possible presence in the area in the past, all construction works and related surface disturbance are to be carried out with due regard to the potential for uncovering relics. In the event that any evidence or relics are found, work is to cease and the Tasmanian Aboriginal

Land Council and Director of Parks and Wildlife are to be contacted for further advice and direction.

## **COST ESTIMATES**

Cost estimate has been based on the following:

- A new bridge to be constructed approximately 20 m downstream of the existing structure.
- A 10 metre wide new bridge 60 metre long
- Road approaches which accommodate:
  - 2 No. 3.5 metre wide lanes;
  - 2 No. 1.5 metre shoulders;
  - 2 No. 0.5 metre verges
  - Parking provisions for fishers and other recreational users of Black River.
  - New fencing along the eastern side of the new road alignment and construction of new stock yards
- The existing bridge is fully removed.

### ***Cost Estimates***

	<b>\$M</b>
Bridge	1.2
Contingency 15%	0.2
Road	0.6
Contingency 15%	0.1
Bridge Removal	0.2
Contingency 25%	0.05
Detailed Design & Services	0.1
<b>D&amp;C Contract Sum</b>	<b>2.45</b>
Planning, Concept Design & Documentation	0.1
Contract Supervision	0.1
DIER Project Management	0.05
<b>Total Project Cost</b>	<b><u>\$2.70</u></b>

## **EVIDENCE**

The Committee commenced its inquiry on Friday 21 September 2001. The Committee inspected the site of the proposed works. Following such inspection, the Committee commenced hearing evidence at the Circular Head Council Chambers, Smithton. The submission of the Department of Infrastructure, Energy and Resources, together with a submission from Mr Rodney Medwin of Black River were received and taken into evidence. The following witnesses appeared, made the Statutory Declaration and were examined by the Committee in public:-

- Peter Todd, Manager Asset Management, Roads and Public Transport Division, Department of Infrastructure, Energy and Resources
- Graeme Nichols, Project Manager, Department of Infrastructure, Energy and Resources; and
- Philip Millin, Environmental Consultant, Millin Environmental Management Services Pty Ltd.

## **Overview**

The Manager - Asset Management, Roads and Public Transport Division, Department of Infrastructure, Energy and Resources, Mr Peter Todd provided the Committee with an overview of the proposal:

*As you would be aware, the Bass Highway is a vital transport link to this part of the State and the Black River Bridge on the Bass Highway to the east of Smithton is an important bridge. There are approximately 2000 vehicles per day travelling that road and a large proportion of those, or 17 per cent of those, are commercial vehicles. Freight transport into this part of the State is important for industry and the local community and to maintain that access is vital.*

*The bridge has a number of deficiencies which include the corrosion of the steel and the concrete, the inadequate capacity of the bridge to carry increased mass vehicles and, as a result, we need to replace that bridge to maintain the current level of service to this part of the State...*

*The deterioration of the bridge will, if we allow it to continue, eventually lead to the imposition of load limits which would have dire consequences for this part of the State and for access into Smithton and the areas beyond and on that basis we need to replace the structure.*

*A planning report was produced and there were three options considered to replace the bridge. Firstly, to upgrade the existing bridge with no realignment. Secondly, to relocate both the rail and the road bridges upstream approximately 500 metres. The third option was to relocate the bridge downstream, which is the preferred option.*

*There are certainly some problems with upgrading the existing bridge. Perhaps one of the greatest ones would be the need to have the bridge operating as a single-lane bridge for eight to twelve months. That would have very significant impacts on access into this part of the State and we believe to be an unacceptable imposition on the travelling public and in particular on freight transport. Also, that would mean that the existing*

*deteriorated piers would also remain and would be an ongoing maintenance problem. The road alignment would be unchanged and we would not get any of the safety benefits that we are looking at deriving from the preferred option of relocating the bridge downstream of the existing bridge.*

*The second option was to relocate both rail and road upstream by about 500 metres. This is a much more significant cost of nearly \$6 million. It involves realigning about one and half kilometres of the new road and rail bridge and it provides that we would create some problem accesses into the rail yard just to the west of the river.*

*So our preferred option is to relocate the bridge downstream, which would involve the construction of a completely new bridge. It allows us also to improve the road alignment, particularly to the north of the existing bridge on the Smithton side.*

### ***Design proposal***

The Project Manager, Department of Infrastructure, Energy and Resources, Graeme Nichols made the following submission in relation to the design proposal of the project:

*The design proposal involves building the new bridge about 20 metres downstream of the existing. We've achieved some improvement in the road alignment especially to the north where the existing road alignment has a compound curve, which is two radiuses within the curve, which has caused serious accidents in the past.*

*Within the constraints of the gorge where the present bridge is located we've been able to achieve an improvement to an 85 kilometre per hour design speed in that northern curve, and also some improvement in the curve at the southern end of the project. So, overall, the road alignment will be much improved at both ends of the project and the new bridge, as I said, would be 20 metres downstream of the existing but within that gorge area. The bridge will be slight skew to enable us to pick-up both radiuses on the road alignment at both ends. The vertical alignment is very similar to the existing so there will be no substantial change and indeed no change is really warranted.*

*The cross section of the bridge will involve having three and a half metre lanes with one metre shoulders which will have a total kerb to kerb width of nine metres, as opposed to seven metres at present. The present bridge is fairly narrow for its location. The roadway will have a slightly wider shoulder of 1.5 metres sealed*

width with 0.5 metre verges. To enable us to get the required design speed on the northern curve the radius is being set at 200 metres with a 7 per cent cross fall. On the bridge the cross fall will be 3 per cent.

The preliminary design of the bridge. The bridge will be delivered by design and construct contract process. So we've done a conceptual design - which is included in the report - and the final design may differ from that conceptual design depending upon what the contractor envisages, what suits his method of construction. However, we will specify that there be no midstream piers, so that will probably result in there being either one or three spans.

The other factors in the selection of the superstructure type and span as listed are the bridge is to have simple uniform geometry. The superstructure needs to be erected over water, hence precast beams will probably be the preferred method of construction. Also the topographical and hydrological conditions of the river and river bed. We are specifying that the vertical levels, which are in this preliminary design, be adhered to by the contractor and also that he provide for a 1 in 2 000 year flood through the bridge, which still has freeboard on the existing structure. There isn't a problem with flooding at the existing bridge, that's what I'm really alluding to.

Durability is a major concern and we are looking at the use of stainless steel in the concrete to achieve a 100-year service life.

The design that's shown here uses open top 'super T' beams in the superstructure and these have been used on most of the current work up here on the north-west coast. So there's a good history of using these 'super T' beams. There will be five of those 'super T' beams per span and there'll be a cast in situ deck over the top. Overall structure depth, if they choose to use 'super T' beams, will be 1.6 metres.

The bridge overall width including the kerb is 10 metres and our concept design has three spans. So we'll have a very close span - we expect the span configuration to be very similar to what's there at the moment. That doesn't really preclude the contractor from some innovative ideas with the superstructure or the substructure but we will be defining some requirements which will stop him from having undesirable elements in the design.

Piers and abutments. Our proposed pier type is the blade pier with a spread footing. Rock is at the site so we don't expect the contractor to use piles, nor do we want him to use a multitude of columns, for aesthetic reasons. The blade pier, as I said, with rounded ends is considered to be a more aesthetic solution.



*Proposed abutments probably will be shallow wall-type abutments founded on pad footings.*

*The durability. At this stage we're considering using stainless steel reinforcing in the structure to enable us to get the durability that we require. The replacement structure will be built naturally from reinforced and prestressed elements, except for the fences which will be black or stainless steel. Black still having been galvanised and painted. An asphalt surface 50 millimetres thick will be placed on the deck.*

*One of the key elements of this project will be the demolition of the existing bridge and that will be a very carefully considered element of the project because of the fact that there's a possibility of adverse environmental effects on the river. We'll be looking for very careful methodology from the contractor to enable him to take the existing bridge apart without excessive turbidity or siltation or other effects from the demolition process. There's a number of risks listed in the report on that, but we expect him to cut up the existing deck into discrete parts so he can crane them off the site and also to lift out the beams from the centre and then do the end spans by crane.*

*As far as the social impacts are concerned, there are two property owners involved. The property K and Thorp owned by the Thorp family north of the bridge. The only issue there is really that he requires a 12-metre strip to be cleared from the new fence line as per the existing and that we reinstate the gate with padlock and also to indent that gate so that they can drive off the highway.*

*South of the highway Roslind Pastoral Company owns that, Mr and Mrs Malley. The issue there has been the existing cattle yard which incorporates a cattle crush and loading ramp and that'll need to be relocated further south or to the east of the existing - there's another access back towards the Black River turn-off. We need to incorporate an access road into that with a hammerhead to enable semitrailers to access that cattle yard. At the moment there's a bit of a pull off and a backing lane. Our dealings with the property owners has been amicable and the affairs are going well there.*

*We're also providing parking for the fishing activities in the area and a hardstand to where we parked this morning on the southern side of the bridge. We're providing for up to eight cars in the hardstand. We haven't provided a pedestrian crossing on the bridge. There's none at present and we don't really want to encourage pedestrian traffic across the highway at that point.*

## **Environmental assessment**

The Environmental Consultant of Millin Environmental Management Services Pty Ltd., Mr Philip Millin, provided the Committee with the following evidence in relation to the environmental considerations of the proposal:

*I'd like to outline the environmental setting of the proposed Black River bridge. It's located close to the mouth of the Black River, as we saw on site, and it's located within an estuary which is classed as an 'A' class estuary by Tasmanian standards in that it has high values for conservation. Located downstream is the Peggs Beach recreational area; upstream there are relatively unspoiled estuary areas. There's some key values in the aquatic environment there. One species of significance is the Australian grayling, which we've considered carefully, and the construction methods and demolition methods will aim to minimise impacts on water quality so that that species can still gain access to the sea. I'd just point out that the Australian grayling relies on open access to the sea for its spawning so one of the key elements with the design is to maintain the waterway and the interchange between the upper estuary and the lower estuary around Peggs Beach.*

*The other potentially critical issue is high turbidity in the river during the migration of that species back into its habitat and, again, turbidity controls will be an important issue during construction.*

*With respect to the vegetation: on either side of the river there's riparian vegetation which provides a corridor for fauna and plant dispersal from the lower estuarine areas up into the upper parts of the Black River catchment. On the south side there's a designated river reserve which is used, as Mr Nichols pointed out, by recreational fishers and has other recreational users.*

*With respect to water quality: it's important to minimise impacts on the water quality and in particular the existing bridge structure has lead-based paint in it so there will be care taken during demolition of that bridge to minimise loss of the lead particles to the waterway. It's also one of the reasons why those steel girders need to be removed because if they were left there they would require long-term maintenance and cleaning off which would release lead into the waterways.*

*Other construction controls to preserve water quality will be focussed on containment of spoils wherever possible - containment of oils and greases and avoiding refuelling and those types of activities near the waterway.*

*I'd like to move on to the community issues. Before moving on there's one other issue: the actual vegetation on either side of the road will need to be cleared up to the limits of construction on the south side and on the north side there's the landowner's request that a special 12-metre additional width of clearing for fire hazard and access by stock and machinery.*

*With respect to the community values, Mr Nichols spoke about the landowner requirements and dealings with the dealings with the landowners. The other community issue there is to ensure protection of that reserve area and continued access to the foreshore for fishing.*

*With respect to heritage matters, the site was assessed for its heritage. Black River at that point represents the boundary of the old Van Diemen's Land properties and on the south side was the first private landowner grants. There are no specific heritage remnants within the vicinity of the bridge relating to that period of history. Downstream about 80 metres there's a historic landing point and that area was used as a small port in the last century. None of those features will be impacted upon by the proposed works.*

*The other heritage matter is the bridge itself. As we indicated on site, the present bridge has a hinged pier - in other words, there's a hinge in the pier column, which is an unusual engineering feature. It hasn't really been adopted elsewhere and it might be considered as not being a particularly effective or efficient way of constructing a bridge. However, it is unique and we are presently liaising with the Tasmanian Heritage Council on how we might preserve at least the records of that particular hinge joint.*

*There's a geological site nearby again which will not be impacted on by the works.*

*In terms of Aboriginal heritage, an assessment was done by an Aboriginal cultural heritage consultant and there were no specific Aboriginal relics or evidence of their occupation of the area in the past. However, care will be taken in the event that heritage relics are uncovered during construction works.*

*As far as the specific construction and demolition site controls are concerned, the edge of clearing will be marked on site to minimise unnecessary or additional impacts on the remaining vegetation, being the riparian forest on either side of the river. The run-off controls will be insured to minimise turbidity in the receiving waters and, in particular, during demolition of the existing bridge, the steel girders will be removed with ensuring containment of any potential lead loss into the waterway.*

*A lot more detail of the environmental assessments and the environmental controls that will be implemented are outlined in the report to the committee.*

### ***Demolition of existing bridge***

The Committee questioned the witnesses regarding the demolition of the existing bridge and the costs associated with such demolition. Mr Nichols responded:

*The existing bridge will be removed down to the rock level. It's our intention to scarify - that is, dig up - the existing pavement and plant low shrubs into it. bearing in mind that there is a sight distance problem. So probably half the existing road will be planted out with prostrate natives. There'll be no height as such because of the sight distance, you have to be able to look over the top of them.*

*(As to the final cost) we haven't got a very good handle on that side of it at this stage. We feel that, based on the demolition of Sorell causeway, it'll be around about \$200 000 - that just gives us \$50 000 to play with if that estimate's out. It's a little bit harder to estimate the demolition than the construction of a bridge or road but we've put some quantities down.*

### ***Concept design and documentation***

The Committee questioned the witnesses as to why \$100,000 had been allocated in the project budget for planning, concept design and documentation when the contract for the project will be on the basis of 'design and construct'. Mr Nichols responded:

*... the \$100 000 for planning, concept design and documentation is the process we're going through at the moment. This is the concept design and we've done the planning. We're starting to do the documentation for the contract and that has \$100 000. The detailed designer services will be included in the contract. What we've done is we would usually allow about 10 per cent for all those phases - design, planning and documentation - in which case it'd be round about \$200 000, but because we're going out in a design and construct contract we're really halving that cost between what we've already paid out so far and what the contractor will need to pay. We'd still have to pay the same amount of money, regardless of whether we did it by a total design phase followed by a construction contract or we did what we've done so far, which is just the conceptual design and documentation followed by a design and construct contract. The*

*cost is really the same to us, it's just the split-up changes. If we'd done all the design and all the documentation upfront it would've cost \$200 000 to the department.*

Mr Todd added:

*... that \$100 000 is for all the botanical surveys, the Aboriginal heritage surveys and all of that work that has gone into that as well. So it's not just the road design component of it but it's all of the background work that we need to be able to put into a contract so that we can specify, particularly the environmental requirements that Mr Millin talked about, because unless we do that work we can't put that into a contract. We need to do that sort of work upfront and then that becomes part of the requirements of the contract.*

*That \$100 000 really is about the process we've been through to get this point and to have this work completed so that we could then proceed with a proper contract. I think one of the things we've experienced with making these design and construct, particularly with bridge contracts, is that we find that if we go out and, as a department, do a final design ourselves that incurs something in the order of \$100 000 ... but then we find the contractors come back to us with an alternative design, so we find that we may have wasted that design cost if we then accept the alternative that the contractor has come back with. So that's why we tend to, particularly with bridge projects, go with the design and construct so that we're minimising duplication.*

### ***Bridge alignment***

The Committee questioned the witnesses as to what emphasis had been placed upon the achievement of the best possible alignment of the bridge. Mr Nichols responded:

*Yes, we prepared three options to look at. One of the options was to increase the radius of the northern curve to not give a 90 kilometre per hour design speed and that pushed the bridge right out of that gorge. On the southern side, at least where the fishing point is, the bridge would be over the top of that fishing point and out of the gorge area. So we determined that we would stay within the gorge, just downstream of the existing bridge, to minimise that effect and the effect on the landowners as well. To get the full 90 kilometre per hour design speed would mean that we would end up going - we would not be able to get the road alignment within this boundary that we've drawn and get back onto the straight.*

The Committee sought evidence on the effect the proposal would have upon the manner in which heavy vehicles would need to 'set-up' for the approach to the bridge. Mr Nichols responded:

*The existing corner has a compound curve; it's got a tighter radius as you approach the bridge. So at present you'd be driving around the curve and you have to tighten up. It's a tighter radius just as you approach the bridge so that if you stay on the setting you have your steering wheel, you're holding your steering wheel, you'll actually miss the bridge, you'll run off the road. The new radius is a constant radius, so once you enter the curve the truck will track round the curve on the one setting. You don't have to pull tight. The worry is on a dark or wet night that a vehicle will miss that tightening of the curve and tend to run off. That's what makes the existing curve very dangerous. During the daytime you can pick up the change but at night it is so much more difficult.*

Mr Todd added:

*also with the increased lane widths and the sealed shoulders and the camber on the road it will certainly improve the safety of that curve.*

### ***Disruption to traffic***

The Committee questioned the witnesses as to the anticipated disruption to traffic as a result of the works. Mr Todd responded:

*Obviously there'll be some disruption, certainly nothing like if we had tried to upgrade the existing bridge. The main disruption will be, of course, when the roads are tied into the existing roads at each end. I don't think that will cause an overly great amount of disruption to traffic movements. We will carefully specify what the contractor can and can't do within the contract to minimise the impact on the movement of traffic. There will, of course, be some disruption but we'll be endeavouring to minimise that as much as we can.*

### ***Final design solution***

In reference to page 3 of the submission which states 'the design and construct contract process will offer a range of alternative designs for the bridge', the Committee questioned the witnesses as to the likelihood that the final design solution would differ from the specifications submitted. Mr Nichols submitted:

*(It would) not necessarily (be different) because we're still able to specify in the documentation the specification of what our basic parameters are. One of our parameters, I think I mentioned, was the fact that the vertical and horizontal alignment of the road is not to change - basically that's it. That really means this preliminary design will almost be the final design. They just need to put in the drainage and the hardware and the signs and line marking. What we're looking at now will virtually be the final design, plus the landscaping. We need drawings for those.*

*As far as the bridge is concerned, again, the horizontal vertical alignment is set and so are other parameters such as the piers, the type of abutments - they can't use, for instance, reinforced earth. We've got fairly tight parameters. We're expecting the piers to be on the shore not in the midstream, so we've said that there will be no midstream piers because of the disruption to the flow. So we've got fairly tight parameters on the bridge. We don't expect it to be totally different; we're expecting it to be reinforced or pre-stressed concrete because that's what we'll specify.*

### **Aboriginal relics**

The Committee questioned the witnesses as to what effect, if any, the discovery of aboriginal relics would have upon the project. Mr Millin submitted:

*The potential is there that the works could be ceased by the Tasmanian Aboriginal Land Council until a full assessment of the site has been done. This has happened on projects in the past elsewhere, which is one of the reasons why we get an Aboriginal survey done, to scour the area to as great an extent as possible to reduce the risk of that happening. There is a potential that if during excavation works some relics are discovered that the works could be ceased and that could have a significant impact on the construction program.*

*... I would say that if it got to the worst-case scenario where the works were ceased and the Tasmanian Aboriginal Land Council determined that no further works would be allowed to continue, I think there are political ramifications there that would need to be dealt with at the time.*

### **Pedestrian access**

The Committee questioned the witnesses as to why no provision had been made for pedestrian use of the proposed new bridge. Mr Nichols submitted:

*I suppose it is a cost, isn't it? We'd be looking at \$200 000 to \$300 000 to provide that facility for probably very little usage.*

Mr Millin added:

*At Detention River as well there is river reserve on either side of the river, whereas at Black River the northern boundary is to the high-water mark, so there is no actual public land on the northern side of the Black River bridge, whereas on the south side there is. There would be little use of a footway across the bridge itself.*

### ***Use of bridge by cyclists***

The Committee questioned the witnesses as to the adequacy of the bridge for use by cyclists, citing observations made during the site inspection of the clear danger to cyclists crossing the bridge in the event two large trucks were crossing simultaneously. Mr Millin responded:

*The shoulder of the approaches would be about 1.5 metres, across the bridge there would be a shoulder of 1 metre, whereas at present there is less than a 300mm shoulder. You would not want to see a cyclist going across the bridge at the same time as two trucks were crossing, I would think. There is adequate space in a one metre shoulder for cyclists to use the bridge.*

*... one of the other aspects of road use and sharing the road with cyclists and traffic is consideration by truck drivers and the travelling public for bicycles on the side of the road. If you had a continuous lane of one metres when passing cyclists traffic is generally required to slow down if there is oncoming traffic.*

*There would be refuge for the cyclist within that one metre shoulder, so it is not as if the cyclist would necessarily be obliterated if two trucks did pass. I guess I was referring to the fact of a cyclist travelling along there and it would be an uncomfortable experience for that cyclist. I think the refuge is there for a cyclist to avoid it.*

The Committee sought advice as to the cost of providing a 1.5 metre shoulder on the bridge rather than 1.0 metre, as specified. Mr Nichols submitted that the cost would be an additional ten per cent equating to \$120,000. The Committee then questioned the witnesses as to whether any savings identified could be directed to the provision of the additional width. Mr Todd submitted:

*The decision to narrow over a bridge is a fairly normal standard and a fairly (common) practice. A strange quirk is that the longer the bridge the more you narrow it. But at this point we are actually only narrowing it by half a metre. I think we need to recognise that*



*the lanes will actually be wider than they are now. I think they are only three metre lanes at the moment, so we will be getting a three and a half metre lane, plus a metre, so in actual fact the width across the bridge will be three metres wider than what is there at the moment. While we are not encouraging pedestrians, I think it will certainly be safer if people chose to go across within that sealed shoulder. I think also with the provision of a car park on the southern side we would be encouraging people to use that area and go down and fish in that area. As Mr Millin indicated, there is no river reserve on that northern side so in actual fact access to the river, I would understand, would be trespassing on that property. So there is no formal fishing access on that side of the river.*

*we ... look at certainly the usage and that would be the thing that would impact on whether we provided a separate facility, as we saw at Detention River where there is a large pedestrian movement across there, particularly with those houses on the other side. We would use those factors to determine whether the marginal cost of providing that additional service is warranted based on the potential usage - whether it be cyclists or whether it be pedestrians. The provision of lane widths and shoulder widths is based on a systematic approach across the State roads depending on the level of service that that road needs to provide, the traffic volumes including heavy transport. The widths we take across bridges is really an Australian standard and that is what we base it on.*

*... If in future the demand does increase to that extent you could retrofit additional lanes similar to what they have done at Detention River, the walkway there has been retrofitted in the last five or six years, I believe. So it is possible to go back and retrofit low-load structures like that on the edge of these types of bridges.*

## **CONCLUSION AND RECOMMENDATION**

The evidence presented to the Committee clearly demonstrated the need for replacement of the existing bridge at Black River due to its deteriorated state. The new bridge will also provide for anticipated increases in vehicle masses and the proposed works with new alignments at each end will enhance road safety.

The Committee is strongly of the view however, that an additional 0.5 metre added to the specified 1.0 metre shoulders of the bridge pavement would significantly improve the bridge for any use by pedestrians or cyclists, and in addition, for the drivers of large trucks and agricultural equipment. The Committee accordingly recommends that additional funds be applied to

address this issue, whether from any savings achieved from the scheduled works or from the contingency provision.

Accordingly, the Committee recommends the project, in accordance with the plans and specifications submitted, at an estimated total cost of \$2.5 million.

**Parliament House  
HOBART  
9 October 2001**

**Hon. D. G. Wing M.L.C.  
*Chairman***