



PARLIAMENT OF TASMANIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

**Tasman Highway, Maclaines
Creek Bridge and Approaches
Redevelopment**

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

MEMBERS OF THE COMMITTEE

Legislative Council

Mr *Harriss* (Chairman)
Mr *Hall*

House of Assembly

Mr *Best*
Mrs *Napier*
Mr *Sturges*

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INTRODUCTION

To His Excellency the Honourable William John Ellis Cox, Companion of the Order of Australia, Reserve Forces Decoration, Efficiency Decoration, 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: -

Tasman Highway, Maclaines Creek Bridge and Approaches Redevelopment

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

BACKGROUND

The Tasman Highway is the principal road access route along Tasmania's East Coast. It carries a significant amount of heavy vehicles and is used widely by tourists. The Department of Infrastructure, Energy and Resources (DIER) manage the road. The importance of this section of Tasman Highway south of Triabunna within the Tasmanian road network is recognised by its classification as a Category 2 - Regional Freight Road within the Tasmanian Road Hierarchy.

The Maclaines Creek Bridge is a critical element in Tasmania's Strategic Road Network. The Bridge is located on the Tasman Highway near the southern entrance to Triabunna.

The existing bridge is narrow, in deteriorating condition, and not suitable for increasing permissible vehicle mass limits. On the northern approach there are two sub-standard road junctions in close proximity for access to Triabunna, and there are significant road safety concerns associated with these. DIER has therefore decided to replace the bridge and improve the road alignment and the junction arrangements. Four options for replacement were considered. The preferred option (55m long bridge on the eastern side of the existing bridge) was selected after consideration of the following assessments:

- Road alignment and junction arrangement;
- Noise level at Woodstock residence;
- Impact on foreshore and Woodstock property;
- A flora and fauna habitat assessment;
- An aboriginal cultural assessment;
- A historic heritage impact analysis; and
- A hydraulic assessment.

PROJECT OBJECTIVES

The overall objective of the project is to provide a cost effective replacement of the existing Maclaines Creek Bridge in accordance with current best practice and to improve road safety at the southern entrance to Triabunna township, with minimal environmental impact.

Project Location

The location of the proposed works is on the southern side of Triabunna township spanning Maclaines Creek. The development is within the bounds of the Glamorgan Spring Bay Planning Scheme 1994.

Project Justification

Maclaines Creek Bridge is a 21 span bridge consisting of 3 tee beams per span with an in situ reinforced concrete slab deck. It was designed for the H20 loading. It is in poor condition and requires extensive repair and strengthening works or replacement.

The Tasman Highway is the primary transport link with the East Coast and the existing structure is becoming a limiting factor as transport loads increase and the structure continues to deteriorate. Having only 3 beams per span gives no redundancy in the structure so any problems will be fatal to the structure with no easy bypass available.

Replacement of the bridge is required to ensure continued access for general and permit vehicles to the East Coast. This section of highway carries 2200 vehicles per day. The Tasman Highway is a popular cycling route (with approximately 12,000 cyclists travelling along the Highway per annum), and the existing limited road width is insufficient for safe passing of cyclists. The Tasman Highway Planning Study also identified the Vicary Street junction as a site requiring safety improvements.

Bridge Improvement

The existing bridge is narrow, in poor condition and has inadequate load carrying capacity. This project will replace the existing bridge with a new 2-lane structure with a design life of 100 years and provide a 2.5 m footway/cycleway. There will also be improvements to approaches that will be upgraded in accordance with Austroad Road Design Guidelines. The bridge will be designed to SM 1600 Design loading in accordance with Austroad Bridge Design Code.

Access to Triabunna

On the northern approach there are two sub-standard road junctions in close proximity to the main access to Triabunna (Vicary Street), and there are significant road safety concerns associated with these. The project incorporates safety improvements for road users including:

- Provision of through lanes (3.5 m wide) on both sides of the highway at the Vicary St junction and a 3.5 m right turn lane into Vicary St from the south;

- Increased safe intersection sight distance and approach sight distance to 70 km/h standard for access to Vicary St;
- A wider pavement with sealed shoulders reducing the likelihood of run-off-the-road crashes;
- Improved signage for Triabunna; and
- Closure of the sub-standard Franklin Street junction.

THE EXISTING SITUATION

The Bridge

The current bridge has a length of 260 m and consists of 21 spans. Individual spans range from 12 to 18 m with the largest span located over Maclaines Creek. The bridge is in poor condition and requires extensive strengthening works or replacement.

Access to Triabunna

Currently there are 7 accesses into Triabunna township. The two southern sub-standard road junctions in close proximity are Vicary St and Franklin St.

Traffic Conditions

The 2001 DIER traffic data for the Tasman Highway 550 m south of Vicary Street are: Annual average daily traffic (AADT) of 2200 vehicles per day (vpd) including:

All truck traffic	254 vpd (11.5%)
Semi-trailers	105 vpd (4.75%)

However, Gunns Limited recently advised AADT log truck movements of 150-160 vpd. This indicates that since the DIER readings in 2001 truck movements have increased significantly. With the advent of the second Melbourne to Devonport Ferry it is reasonable to assume that tourist vehicle traffic has also increased significantly since 2001.

The Road Surrounds

The area is essentially alluvial flats and floodplains located on the northwestern margin of Spring Bay. The surrounding area is predominantly cleared pasture, with some areas of native vegetation remaining along Maclaines Creek north of the Woodstock homestead and on the low lying marshy coastal margin. On the southern side and surrounding the bridge the land is privately owned and is used for farming. On the northern side of the Vicary Street junction is the Triabunna District High School.

THE PROJECT

Proposed Works

The replacement bridge will be located approximately adjacent (east of) and parallel to the existing bridge, and will require a realignment of the existing highway. The

Vicary Street junction will be shifted slightly to the north and upgraded. The bridge and road works will comprise:

- New concrete bridge with 55 m minimum length between abutments, located to the east of the existing bridge;
- New road approaches;
- Relocation and upgrading of Vicary St junction to Austroads Type C;
- Termination of Franklin St with a new cul-de-sac;
- All necessary adjustments to public utilities;
- Improved signage to the Triabunna township;
- Provision of remedial stone pitching to river banks;
- Demolition and removal of existing bridge structure.

It is expected that the works associated with the replacement of Maclaines Bridge will secure the following objectives:

- Value for money outcome.
- An aesthetic finished product, with acceptance by the community.
- Provide a durable bridge, with minimum maintenance requirements during its service life.
- Improved road safety.
- Processes to ensure minimal environmental harm and conform with the requirements and undertakings of the Development Proposal and Environmental Management Plan that will accompany a development application, and with conditions of approval of the project by government authorities and any environmental protection notices issued by relevant authorities.
- Traffic disruptions to be minimised.
- Minimise disruption to all bridge users during construction including pedestrians and cyclists.

Clearance Requirements

The proposed bridge structure is required to provide for the passage of livestock and farm vehicles within a clearance envelope under the bridge and above the riverbanks (at times of normal flow) on both sides of the crossing. A horizontal clearance of 5 m and a vertical clearance of 2.7 m is required as the minimum for each access track.

DESIGN CONCEPT

The Bridge

The bridge will be designed for SM1600 traffic loading in accordance with AS5100 Bridge Design. The design service life of the bridge will be 100 years.

Traffic barriers will be designed to AS5100 regular performance level requirements, and will be provided on each side of the road carriageway, located at the edge of the shoulder, to the end of abutment wing-walls. The barrier will be provided with a minimum of two horizontal rails.

The traffic barrier between the footpath and roadway will be increased to a height of 1.2 m to also serve as a pedestrian barrier. A separate rail will be provided at this height.

The principal structural components will be reinforced concrete (including pre and post tensioned concrete) and will be designed, detailed, selected, specified and constructed to meet the durability objectives.

Asphalt running surface of 50 mm minimum thickness will be provided on the carriageway between kerbs.

The Roads

The new road sections of the Tasman Highway will have the following standards:

- 3.5 m sealed lanes
- 1.0 m sealed shoulders
- 0.5 m verge (0.5 m where no guard rail required)
- Min horizontal curve radius 500 m
- Guard rail where embankment height exceed 2 m and batters steeper than 1:4.

The new road sections of Vicary St will have the following standards:

- 7.0 m seal width
- 3.0 m sealed traffic lanes
- 1.0 m shoulder
- 1.0 m verge (0.5 m where no guard rail required)
- Guard rail where embankment height exceed 2 m and batters steeper than 1:4.

Bridge Length and Width

The new bridge will be 55 metres long (the current bridge is approximately 260 metres but studies have shown that the current length is beyond hydraulic requirements).

The bridge is required to carry two lanes of traffic, 3.5 m wide each, with a 1.0 m shoulder on the outside and a 2.5 m footway/cycleway on the eastern side. The width of the bridge structure will be 9.0 m between the barrier fencing. The width of traffic barriers will typically be 0.5 m, resulting in a total bridge superstructure width of 12.8m.

Access to Triabunna

To improve safety and reduce traffic delays on the Tasman Highway, Franklin St will no longer access directly onto the highway. A cul de sac will be constructed at the end of Franklin St.

This closure will enable the construction of turn out lanes for the new junction and is part of a rationalisation program to reduce the number of accesses onto the Tasman Highway.

The new Vicary St junction will provide the safest and most efficient access to Triabunna. A Type C junction will be provided at Vicary Street, consisting of 2 x 3.5 m wide through lanes, and a 3.5 m right turn lane turning into Vicary Street from the south.

Cycleway

A new 2.5 m wide cycleway/foot path will be constructed alongside the new bridge. A pedestrian barrier of 1.2 m height is to be provided on the outside of the footway/cycleway. This is to be either of baluster type or of solid panel type, with provision for drainage under.

CONSTRUCTION PROGRAM AND COSTS

The construction works will be undertaken in two basic stages:

- Stage 1 Construction of the new Maclaines Creek Bridge and sufficient roadworks to enable transfer of traffic.
- Stage 2 Following transfer of traffic to the new bridge, demolition and removal of the existing bridge, and completion of all other works.

Preliminary estimates indicate that the construction cost of the new bridge will be approximately \$1.25 million, and the cost of the associated roadworks approximately \$1.11 million total \$2.36 million.

Cost Area	Estimated Cost (thousands)
Preliminary Planning	\$73
Project Management	\$27
Design	\$60
DIER Costs	\$120
Acquisition	\$10
Contingency	\$300
Construction:-	
Bridge	\$1,250
Road	\$1,110
Utilities	\$50
Sub total construction	\$2,410
Total	\$3,000

ENVIRONMENTAL AND SOCIAL IMPLICATIONS

Environmental Issues

There will be limited impact on the natural or built environment by the proposed works. The following processes and actions will be incorporated into the project:

- The weed areas will be identified and requirements for treatment of the various declared weeds included in the tender documents.

- Water quality and the estuarine ecosystem associated with the area of the bridge will not be compromised as a result of construction works on the bridge or approaches. During all construction and demolition works the main creek channel will not be constricted in any manner whereby normal free flow of water through the bridge site is retarded.
- The bridge design will allow for the movement of terrestrial fauna beneath the bridge structure.
- Preventative measures will be taken wherever practicable to minimise turbidity and water pollution from oil and fuel.
- Remnant native vegetation will not be disturbed outside the limits of the contract.

There are no known sites of Aboriginal significance.

During bridge construction and during bridge demolition, procedures will be implemented to contain any concrete spillages, concrete and other wastes, spoils from saw-cutting and the like.

The Contractor will develop specific measures for the control of incidents involving spillage of hazardous materials used during the construction period.

The historic remains of an earlier bridge over the main creek channel on the eastern (downstream) side of the new bridge will be preserved in place and not damaged by the works. The Contractor will place a layer of Class C geotextile over the wall faces prior to placing any fill against them.

The Contractor will include, in the Contract Management Plan (CMP) for the project, an environmental section that addresses all environmental requirements of the project arising from the assessment and approvals process.

Routine monitoring of construction activities will be carried out on a regular basis to ensure that the contract area is maintained in a clean and tidy condition. Such monitoring will include all environmental requirements specified in the contract.

Flora and Fauna

A flora and fauna assessment was conducted by Greening Australia.

Threatened fauna likely to occur in and surrounding the area include: Swift Parrots, Great Crested Grebes, Tasmanian Masked Owls, Australian Graylings, Eastern Barred Bandicoots, Forty Spotted Pardalotes, Green and Gold Frogs, Hooded Plovers, and Spotted Tailed or Eastern Quolls.

The Department of Primary Industries Water and the Environment's Threatened Species Unit does not consider that the bridge construction will have an adverse impact on threatened fauna in the area. The main risk to fauna in the area is destruction of native vegetation and habitat. Important fauna habitat contained within the area includes the saltmarsh area, the riparian vegetation strip, and two

¹ Sinclair Knight Merz Environmental Effects Report November 2004

large white gums (*Eucalyptus viminalis*) that are in a paddock to the north west of the current bridge.

To prevent any impact on fauna in the area the two white gums will be preserved and any impact on the blue gums and other native species within the riparian environment will be minimised.

The bridge design allows for the movement of terrestrial fauna beneath the bridge structure.

Flora

There were 3 distinct vegetation communities identified by Greening Australia within the area including:

- Land modified for pasture – of little conservation significance;
- Succulent saltmarsh vegetation – located outside the construction area
- Remnant riparian vegetation – mitigation measures detailed below.

Threatened Species

Three threatened species were identified by Greening Australia in their flora and fauna desktop assessment as being likely to occur in the area. These include *Lepidium pseudotasmannicum*, *Limonium baundinii* and *Scleranthus fascicularis*. During an on-ground survey, the threatened species *Lepidium hyssopifolium* was also identified on site.

Lepidium hyssopifolium is listed as endangered under the national Environment Protection and Biodiversity Conservation Act 1999 and the Tasmanian Threatened Species Act 1996. The Threatened Species Unit within DPIWE has advised that any impact on this species will be detrimental to its long-term perpetuity, and that this species must not be destroyed and needs to be protected at all costs.

The close proximity of the population of *Lepidium hyssopifolium* to the new alignment means that some impact upon this species either directly or indirectly is possible. Further advice and management actions required for protecting this species is being sought from Greening Australia.

Although not officially listed as a threatened species, *Limonium baundini* is a Tasmanian endemic species only known from 3 populations, all of which occur in Triabunna and so it has high conservation significance. The populations of the species are all outside the construction area, and measures in relation to erosion control and environmental management will minimise any impact on this species.

Hydrological Flow/Flooding

The bridge and the proposed crossing are located on a floodplain. Historical records show that the area is subject to inundation and flooding during intense rainfall events. Hydro Consulting carried out a hydraulic review. The review consisted of:

- Review of the provided documentation for the proposed bridge design;
- Review of the SKM HEC-RAS models and modelling results for the proposed concept design;

- Hydraulic modelling (using revised HEC-RAS models) for the 1:100 AEP and 1:2000 AEP flood events to provide flood levels and flow velocities for existing and proposed conditions;
- Assessment of the proposed bridge on upstream flood levels;
- General hydraulic assessment of the proposed bridge in view of the significant changes to flow conditions associated with the proposed design.

The hydraulic review concluded that the initially proposed length of the bridge (35m) did not meet the design requirement of a maximum 3 m/s flow velocity through the bridge (a velocity of 3.7 m/s was estimated), and the bridge as then proposed was likely to increase flooding upstream of the bridge by approximately 0.32 m for the 1:100 AEP flood event. This is equivalent to an increase from 0.68 m to 1.0 m; this upstream land consists entirely of paddocks.

On the advice of Hydro Tasmania Consulting the bridge span was increased to 55 m to mitigate the flow velocity and prevent scour and erosion of the creek channel.

A full Hydraulic Modelling Review was undertaken by Hydro Tasmania entitled Maclaines Creek Bridge Hydraulic Review 2005 this report was submitted by the Department as Appendix C to their submission.

Tasmanian State Policies

The relevant provisions of the State Coastal Policy 1996, State Policy on the Protection of Agricultural Land 2000, and the State Policy on Water Quality Management 1997 will apply to the proposed crossing and will need to be addressed as part of an intended Development Application.

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Oyster Farming Operations

There are oyster farms located in Spring Bay to the south east of the proposed crossing. The recommendations in relation to erosion control will assist in minimising transportation of sediment and potential impact on the oyster farms.

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Historic European Heritage Issues

The following historic structures and places were identified by the historic heritage impact analysis within the study area:

- Woodstock property;
- Maclaines Creek Crossing 1 (pre 1863);
- Maclaines Creek Crossing 2 (1911 and/or earlier).

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There will be no impact on the Woodstock property or homestead; there will be some impacts on both crossings with the bridge construction. The impacts on Crossing 1 are minor due to the condition of the site (degraded by the construction of Crossing 2). The southern minor flood opening of Crossing 2 will incur the most significant impact. To mitigate this the remaining abutments will be covered with geotextile before covering them with road fill, meeting the requirements of the Tasmanian Heritage Council.

Public Consultation

Public consultation with a display on the details of the new bridge was run at Triabunna from late January through to the middle of February and all potentially affected property owners have been contacted and have been asked for input into the process. A copy of the report describing the public consultation was appended to the submission of the Department as Appendix B.

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A total of 22 people attended the two public consultations and the feedback on the replacement itself was extremely positive. The vast majority of the comments/suggestions received centre around the associated works (Franklin Street closure) or junctions outside the scope of the project (in particular the safety concerns over the Victoria Street junction).

Property Matters

The works will only impact on two property owners. John Salmon owns the land on either side of the existing bridge and has been extensively consulted during the design phase. A detailed Hydraulic Modelling Study was undertaken to determine the potential impact the bridge may have upon flooding of his property, and was appended to the submission of the Department as Appendix C. The necessary parts of his lots have been acquired. There is a small parcel of Education Department land on which the proposed northern section of the road travels.

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Planning Approval

The Glamorgan Spring Bay Planning Scheme 1994 (the Scheme) defines a Road Zone to be any land that is a road, irrespective of any other underlying zoning. A road is defined in the Scheme to be:

Land over which the general public has permanent right of passage including the whole width between abutting property boundaries, all footpaths and the like, and all bridges over which such a road passes, being a road which is the responsibility of the Minister administering the Roads and Jetties Act 1935 or, a road for which the Council has accepted responsibility.

Council considers the proposed works to be Major Road Improvement, as defined by the Scheme. Major Road Improvement is a permitted development within a Road Zone, but a prohibited use or development in every other zone.

Accordingly, the Department has proclaimed and declared the area a road under sections 9D and 7 of the Act respectively.

One representation was received during the public comment period from an adjoining landholder in relation to the potential effect the replacement bridge may have upon flooding of his paddocks. The matters raised in the representation were addressed in the Hydraulic Modelling Report undertaken by Hydro Tasmania.

Representatives of DIER met with Alan Daley (General Manager) and David Masters (Planner) of Glamorgan Spring Bay Council on 5 September last to discuss and clarify

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a number of conditions in the planning permit, particularly in relation to lighting of the bridge structure, demolition and disposal of the existing structure and the potential impact the bridge may have upon upstream floodwaters. These matters will be clarified with Council prior to construction works being undertaken.

EVIDENCE

The Committee commenced its inquiry on Wednesday, 5 October last, the following witnesses appeared, made the Statutory Declaration and were examined by the Committee in public:-

- Graeme Nichols, Project Manager, DIER;
- Evan Boardman, Consultant, Pitt & Sherry;
- John Salmon, Landowner; and
- Frank Walker, Manager, Complete Agricultural Consulting Services

Overview

Mr Nichols provided the following overview of the project:-

The Tasman Highway is the principal road access along Tasmania's east coast. It carries a significant amount of heavy vehicles and is widely used by tourists. The Department of Infrastructure, Energy and Resources manages the road. It is recognised with a classification of category 2 at the site, as an entrance into Triabunna. Category 2 is a regional freight road within our Tasmanian road hierarchy. Category 1 is higher than that and that generally covers the National Highway.

Maclaines Creek bridge is located just south of Triabunna and is a critical element in the strategic road network. There is no other entrance from the south to Triabunna apart from across the existing bridge. The existing bridge is narrow; it is also 260 metres long. I have been with the department now for 30-odd years and was with the old hydraulic section of the old Public Works Department. Even at that stage, 30 years ago, it was unknown why the bridge was built so long. The general feeling at that time was that the person who had done the hydraulic calculations had been in error. The bridge, being 260 metres long, is 20 metres longer than the South Esk River bridge at Hadspen. In its present form it is quite a substantial piece of infrastructure. The catchments are quite different: one is the creek and the other is a major river in Tasmania.

The bridge is in a deteriorating condition and not suitable for our increased vehicle mass limits. It was strengthened about 20-odd years ago - and I was involved in that work, too - to stop cracking through the back of the beams. The structure also had a bad longitudinal grade on the bridge that was very up and down, like a rollercoaster. That was fixed in the early 1980s. On the northern approach there are also two substandard road junctions in close proximity to

the access to Triabunna at Vicary Street and Franklin Street. There are significant safety concerns with the accesses.

The project has been not only to replace the existing bridge and upgrade it to current load limit standards but also to upgrade Vicary Street junction and close Franklin Street junction. Four alignments were considered in the project. We looked at two upstream and two downstream. One upstream option was favoured by the council - immediately upstream. We discounted that because of noise problems with Mr Salmon's property. We looked at the downstream options: one was starting to move a little bit far down into the estuary and there were environmental problems with that. We have come back to the preferred position for the bridge, which is immediately downstream of the existing structure. That way we achieved minimal impact upon the estuary and we also achieved a reduction in noise for Mr Salmon's property. That seemed to be a good option and the council is accepting that option now.

The bridge is really on the south of the outskirts of the urban Triabunna township. This diagram of the township shows the high school and the RSL hall and virtually south of that is currently a rural area. All the land that we are impacting upon is owned by Mr John Salmon.

Maclaines Creek Bridge itself is presently a 21-span bridge consisting of three beams per span with in situ reinforced concrete slab. It was designed for the old H2O loading. As I said before, it is in poor condition and requires extensive repair and strengthening. In this case it is generally not considered viable to strengthen bridges like this, particularly as it is such a long bridge. The cost of doing so would be extensive.

Also if we did strengthen the bridge we would not be able to upgrade the Vicary Street junction because the bridge comes almost to the junction. There is a little bit of engineering type talk about how there is only three beams per span and the effect that has. It is not a good configuration to only have three beams in a bridge. It is better to have four. It gives you a little bit more residual strength for the structure.

This section of the road carries 2 200 vehicles per day. In 2001 about 11 per cent of those were trucks. We have also noted that there is quite a number of cyclists who travel this road. If they are through cyclists, the benefit of upgrading this section of road is that we will be providing 2-metre sealed shoulders and they can use that shoulder to cycle on at least over the short stretch of road.

At the request of the council we have made an extra provision for cyclists. At this stage we do not know how the council is going to connect to their system and they are still considering that. It may be that they come this way around the bottom of the road embankment. A previous idea was to go across the wetlands but we are not involved in those deliberations. We have widened the

bridge at some cost to provide a footpath and we are providing ramps at each end so that we can bring them back down to ground.

That is not a facility I would envisage would be used by through cyclists but it would be a facility that they are planning so as to connect through from Orford to Triabunna.

Sealed shoulders

The Committee sought clarification of the width of the sealed shoulders of the proposed works. The following exchange took place:-

Mrs NAPIER - They (the sealed shoulders) are going to be 2 metres on either side?

Mr NICHOLS - Yes, except at the bridge where they will be 1.5 metres. We have just done a little bit of a trade-off with the width of the bridge and putting that extra width into the yellow cycleway.

Mrs NAPIER - If we are talking about the through cyclists, predominantly tourists et cetera, then they will not necessarily be able to access this, although the council may determine a way of facilitating that, so if they are using this part of the road the edges of the road outside the white line - and I understand they are going to have 1-metre sealed shoulders so that there will still be a 1-metre sealed shoulder on either side of that road.

Mr NICHOLS - There will be 2 metres each side here and 1.5 metres each side there.

CHAIR - We needed to clarify that because your plan suggested 1 metre shoulders across the bridge.

Mrs NAPIER - On page 6 it actually refers to 1-metre sealed shoulders and 1 metre verge, so what I am interested in from the cyclists' point of view is that they need as good a quality bitumen as might the car drivers. Separate from the issue of this cycle pathway, which I very much welcome, I asked whether there was going to be 1 metre on either side but you are saying that there will be 2 metres on either side.

Mr NICHOLS - That's correct, a sealed shoulder.

Mrs NAPIER - So we should amend this to refer to a 2-metre sealed shoulder. It might be worth noting that. I would welcome the 2 metres because I have driven that road a lot in the summer and there is a very high usage by cyclists both in terms of organised statewide events as well as local tourism. It fits with the Premier's Physical Activity Council's directions, that is also happening nationally, and I would certainly be very supportive of every move

that we can make in construction projects to make sure that we provide a proper allowance for cycling.

Mr NICHOLS - I must admit I have made a mistake there. The thing is correct. I am working across a few projects at the moment and some had 2-metre shoulders. It does say 1.5 metre shoulders on the entrance and a 1-metre shoulder on the bridge, so you are correct and I am sorry about that.

Proposed works

Mr Nichols outlined the proposed works:-

The proposed works are: a new concrete bridge, 55 metres minimum length between abutments, located downstream or to the east of the existing bridge; new road approaches; relocation upgrading of Vicary Street junction. It says 'Austroads type C' - that indicates we are going to have a right-turn slot, but we are not providing a left-turn slot here because the amount of traffic turning left into Vicary Street is fairly minimal. There are other opportunities to turn off into Triabunna before you get to Vicary Street. It is mainly used as the southern entrance to Triabunna. We are also terminating Franklin Street. There is a planning study going on to try to reduce the number of entrances to the highway from Triabunna, so this is being done as part of that planning. That has received council approval.

All necessary adjustments will be made to public utilities - water, power and Telstra. Telstra has already been done and power has also been undertaken. There will be improved signage to Triabunna township and remedial stone pitching to the riverbanks because there is a lot of erosion occurring on the northern side of the creek at the moment. We will undertake demolition and removal of the existing bridge structure.

What we are trying to achieve is a value-for-money outcome: an aesthetically finished product; a durable bridge with a 100-year service life; improved road safety and minimised environmental harm to conform with the undertakings of the development proposal and the environmental management plan that was submitted to council with the development application; minimised traffic disruptions; and minimised disruption to all bridge users during construction.

The bridge structure required is such to enable the passage of livestock and farm vehicles underneath because Mr Salmon still owns land to the south of the bridge.

... What we are providing there is passage for his vehicles into this area and also passage into those southern paddocks.

... It is 2.7 metres which is sufficient for a tractor.

... The width will not be a problem because we are providing a full span each side of the creek so we are using one span of bridge for those purposes. On the bridge there will be traffic barriers provided to separate the footway from the roadway and a separate rail to provide sufficient height so it can be fully utilised as a pedestrian barrier. Asphalt will be provided on the bridge.

We have been through most of what the road section looks like and Vicary Street will also be upgraded from the highway back into town somewhat where we can get a run-out. The existing bridge is 260 metres long and if we were to replace that bridge it would add a further \$5 million to the project so it would be quite a significant cost with very little justification.

There was some debate about the flow in the creek and we had two separate hydraulic analyses done - one by our hydraulic expert at DIER and also another one, SKM. We also undertook to do another hydrology review and this was done by Hydro Tasmania. The Hydro have gauging stations on three of the nearby rivers to this creek so they had reasonably good information. The result of those three independent studies of hydrology was that they all got exactly the same result, which was quite good in that there was not a wide range of results. We gained confidence on the flow in the creek from those three studies of the hydrology, particularly the Hydro one. They did about six different analyses on the different ways you can do the hydrology and then made an assessment of the flow and arrived at the results.

Following that, in December last year, we also got the Hydro to extend their work to include the channel hydraulics. At that stage we had a 35-metre bridge, which satisfied the flow in the creek, but we wanted to make sure that that was correct and also to allay the misgivings of Mr John Salmon. So in December last year we got Hydro to extend their work to include the channel hydraulics. Their work pointed to the flow in the creek for the 35-metre bridge being too high, the speed of the flow being too fast. Whilst the bridge could take the flow it needed to be widened to bring the speed of the flow down to our design criteria and from that analysis they worked out that the bridge needed to be increased from 35 metres to 55 metres to limit the speed of the flow going through the bridge for a once in 100-year flood, so we accepted that.

... We also checked the bridge out for a once in 2 000-year event for an ultimate condition; in other words that is the size of a flood that would probably destroy the bridge. That is fairly normal. The Hydro design their spillways now for a one in 10 000-year flood. These are enormous events but there is a certain amount of risk built in to minimise the risk to the public.

... I just might mention too that in May John Salmon and his engineer approached the minister with a number of questions regarding the bridge. We engaged Hydro Tasmania again to look at the staging heights and what have you with regard to the proposed design of the 55-metre bridge and a copy of

that report is included in the Parliamentary Standing Committee report that we produced. The report for that was finalised in September of this year.

We feel that we have covered both the hydrology of this catchment plus the hydraulics of the bridge extremely well and also covered the concerns of the local landowner as well in the studies that we have done.

From the work that was done by the Hydro they provided various graphs here that show the stage heights of the existing bridge against the new bridge - this is the 100-year flood. We also considered smaller floods than that. Whilst it does show in this expanded scale, that there is a difference in staging height at the bridge, the 100-year flood was transferred to a contour map to see what the difference really was. On this map we have the existing bridge, and the green line represents the one in 100-year flood contour of the existing bridge. We also plotted on this a pink line for the proposed bridge, the 55-metre bridge, and also a red line for the proposed bridge with blocked culverts. We are also providing two 1500mm pipes to cater for two low points.

Flood events

The Committee questioned the witnesses regarding the effectiveness of the proposed design in alleviating floodwaters. Mr Nichols responded:-

The effect of the culverts is really minimal. Most of the flow is going to be taken by the 55-metre bridge, but we do need to relieve the water that is in the two low spots.

... These photographs were provided to me by John Salmon - I will pass them around - and show downstream of the existing bridge in the channel. The water is moving very quickly there. As you can see, looking upstream it is an extremely fast-moving creek, but it is also worth contrasting that with the area to the north where it is a fairly gentle flow. You can see the water coming in across the fields and it is a fairly quiet event, at the same time as that raging flood is going through the main creek. We felt, whilst this water was sitting in this area, there didn't seem to be any evidence that there was a major waterway here at all. It looks fairly quiet and not of great consequence at all.

The Committee questioned Mr Nichols as to what weight had been given to local knowledge of flood events when designing the new bridge. Mr Nichols responded:-

We have had a lot of discussions with Mr Salmon. We have taken aboard his concerns: one, by having the hydrology review; and we have had two hydraulic reviews as well, at his instigation. I am happy to take aboard the concerns as long as there is technical reason to undertake further work and spend additional public moneys. I think, at the end of the day, we have to have an actual technical reason why we need to do additional works. We have already found that the hydraulic review done by Hydro Tasmania last December

pointed to an increased size of bridge. We took that aboard and they have also looked at the staging heights and the need for a structure. They have indicated that that is not required. I think, without additional technical reason to provide another bridge there, which was what was mooted by Mr Salmon, I cannot really justify spending another \$1 million on another span there, for hydraulic reasons.

The Committee questioned Mr Nichols as to why the existing bridge was designed to be quite long. Mr Nichols responded:-

In the 1970s and 1980s we did have a hydraulic section in the Department of Main Roads and the Public Works Department. We had experienced engineers and this was a topic of conversation from time to time because there was a lack of understanding why it was so long. It is a big bridge for a creek, even for an east coast catchment. East coast catchments can have quite high flows in them from time to time. The flow that is in this - 152 cumecs - is quite a reasonable flow. Most of the time it is a small creek with very minimal flow but, as we know with east coast catchments, they do have high rainfall instances and large floods.

The Committee questioned the witnesses as to the extent of the area of the catchment for the creek. Mr Nichols responded:-

The area is 65 square kilometres, so basically it is certainly not square, but it might be 10 kilometres by 6 kilometres. The main stream length is 17 kilometres. It is very typical of this coast in that you have the coastal plain and then you have not mountains but certainly steep rising hills beyond the plain which tend to make that rush of water out of the catchment.

When questioned by the Committee as whether the effect of a high tide and a simultaneous significant flood event had been taken into account, Mr Nicholls responded:-

... It will not have a great effect on it, though. It will have some effect but the tide is really contained within the stream and most of the flood will be taken in the stream but there is more capacity outside the stream between the abutments so most of the area of the bridge for the passage of flood is really above the high-tide line.

The Committee questioned the witnesses as to how the size and number of culverts had been determined. Mr Nichols responded:-

We provided culverts on each of the low points that are adjacent to each of these branches here. The size of the culvert really is just to provide some relief and I think there was a recommendation from our consultants to make them 1500 diameters and we have gone with that.

... We are providing floodgates on the downstream end to prevent stock wandering through so there will be just a black hole as far as stock is concerned. On the upstream side Mr Salmon was concerned about the effect the flooding will have on his fences and we determined to move the fences 2 metres up the road embankment, so the red line you can see is actually the property we are buying but the fence line will be along here and up above the 1500mm-diameter culverts so the fences will be clear of any kind of rubbish that comes down and the flood itself, so the fences will not get damaged, but then there was the problem of stock going through the culverts and coming out and wandering up the pedestrian ramp so we decided to put floodgates on the bottom end.

... They have quite a few (floodgates) in Launceston to prevent the tide coming back up the culverts, particularly on the East Tamar. I am not sure whether they have them on the West Tamar Highway. It seals off the culverts and prevents the floods inundating the stormwater system. When you have a flood of course the water just lifts the gate and flows out so we thought that was a good idea to stop the stock too. I don't think they will enter a completely sealed-off pipe.

We have talked about the clearances and the roads. I have talked about the studies and why we came to a 55-metre long bridge. We believe that this span will provide better access to Triabunna and building the bridge where it is enables us to widen the road here to provide this right turn slot into Triabunna. We have improved signage for that type of junction.

Demolition

The Committee questioned the witnesses as to how the demolition of the existing bridge was to be funded and what was the proposed use of the material. Mr Nichols responded:-

Answering your second question first, at this stage we are going to leave that to the contractor to handle because sometimes we go to a lot of trouble to try to anticipate what the contractor will do with the old bridge and it tends to tie us in quite a bit. At the Sorell Causeway bridge we basically left it to the contractor to remove the material and put it somewhere. The beams are being used everywhere by Hazell Brothers; they are using them at their quarry as dividers between their gravel pits for their products. I have also seen them in Kingston town for traffic management. I think we shouldn't anticipate. If we decided to prescribe what was to happen with these beams we could miss the opportunity for the contractor to use them with a little bit of innovation. They could be used for any number of farms for access across creeks and so forth. They will find a lot of good ways to use them. If we did this ourselves we would probably negotiate with a landowner where he has an old quarry or a pit and we would instruct the contractor to take the beams to that quarry or pit and fill up the pit. Any reuse of the beams would probably then be lost.

For the first part of the question, I think the demolition is included in the roadworks.

Mr Boardman added:-

We've drafted the design and construct specifications and included within them, which the successful tender will have to adhere to, are requirements in relation to demolition of the existing bridge structure. As Graeme said, how the contractor determines to dispose of or re-use the material from an existing structure is up to the contractor. However, the contractor will have to meet whatever legislative requirements there are in relation to disposal of material.

Environmental and social implications

Mr Boardman made the following submission to the Committee in respect to the environmental and social implications of the proposed bridge and realignment:-

... As you would appreciate with a project of this size, there were a number of background studies and supporting information undertaken to determine the most appropriate location for the bridge and for the realignment to be undertaken. As Graeme pointed out originally, there were four preliminary design options which were considered. As a result of consideration of the supporting documentation, this is the proposed option that you have in front of you at the moment.

*There was a flora and fauna study undertaken by Greening Australia on the site in 2004. That assessment determined that there were two recorded threatened species within the area of the bridge. *Limonium baudinii* - which is Baudin's sea lavender - occurs further down within the estuary of Maclaines Creek. It is the only recorded location of that species anywhere on earth, which is pretty fantastic. It is a lot further down the estuary and is well away from any of the construction which is proposed to be undertaken for the bridge. It was also another reason to move the proposed realignment out of the estuary, which was one of the earlier options considered. So that is the limonium. It was named after Baudin, the French explorer.*

*The other threatened plant species is *lepidium hyssopifolium*. There is a row of *macrocarpas* along the edge of the existing highway, on John Salmon's property. They are quite old and a lot of them are in a state of decline, but during the survey the botanist discovered some *lepidium hyssopifolium*, which is a federally listed threatened species, which I believe is currently in the process of being delisted because it has been found in more locations than originally thought. It is called basalt pepper cress. Once we came up with the final design and established the width of the roads, we asked Greening Australia to go back out and to give us more a accurate location of that *lepidium*. That was exactly a year later than the first survey - I think it was May. It was a different botanist but we didn't discover any evidence of that species in that location.*

The botanist said that did not mean that it was not there; it just may be that there was a different management regime in terms of stock or whatever.

... There may be seeds of the species under the trees, so in order to ensure that we were not going to impact on the species there are requirements again within the construction and tender specifications. The successful contractor will have to protect that species and those requirements have come from recommendations which we sought from Greening Australia, the technical specialists. They are included within that. The contractor will have to abide by them when the works are being undertaken, fencing off the area potentially affected. Because the fence is also being removed along the edge of the highway, it will provide a different and potentially a much better management regime for that species to get the stock away from it so it can live happily under those macrocarpa. However, the macrocarpas, as I said before, are in a state of decline and are dying at the moment, but it is really not a very good location for the threatened species to be in the first place.

... Any safety issues associated with those trees will be managed through barriers or something like that.

As you can see, the majority of the area in which the bridge is going to be constructed is currently pasture and has been significantly modified from its original state. These are succulent marshes down in the estuary, but again there will be no impact upon them. There are specific requirements upon the contractor to ensure sedimentation and erosion control measures during the earthworks to minimise any sedimentation impacts downstream.

Graeme has already gone through, in detail, the hydrological flow and flood modelling work which has been undertaken and, as he said, there are three different studies which have been done.

There are oyster farms located to the south where the Tasman Highway almost touches Spring Bay. There are some oyster racks out there, however the oyster farmer must take those oysters somewhere else to grow them out due to the quality of the water within Spring Bay. The sedimentation controls from the construction of the highway are not considered to have any impact upon the oyster farming operations.

In terms of historic issues, the original crossing of Maclaines Creek is somewhere around the 1860s. The road alignment is quite old and this is the original track up the east coast. The original abutments from the bridge can be seen to the south of the crossing.

... So there were a number of bridges in the past. If you look closely when you travel up the highway you can still see those abutments. Again, we are not going to be impacting upon the abutments to the north. However, one of the abutments will be buried as a result of the new crossing and there are measures

again included within the tender specifications to ensure that the abutments will be kept in place underneath the new abutments, so they will still be there basically.

An extensive public consultation process was also undertaken for the bridge. We ran that through January to the middle of February this year and it was quite well advertised. Twenty two people attended the two public consultation sessions which were held at the Glamorgan/Spring Bay Council Chambers. The major issues which were raised by the representors concerned the closure of Franklin Street. Other representors also raised the issue if the number of accesses onto the Tasman Highway in the location of Triabunna and they were concerned about safety. As Graeme mentioned earlier, that is part of a wider strategy to remove the number of accesses onto the Tasman Highway.

As Graeme also mentioned, this is the Woodstock property owned by Mr John Salmon and also the surrounding land, so the bridge will run across part of his property. Under the Glamorgan/Spring Bay planning scheme roadworks are permitted within areas declared as a road. The area has now been declared as a road under relevant State legislation so therefore the works are permitted within the road area which is now a zone under the Glamorgan/Spring Bay planning scheme.

As is pointed out in the report, a development application has been submitted to the Glamorgan/Spring Bay Council and a permit was received from the Glamorgan/Spring Bay Council early in September of this year. Unfortunately we couldn't agree on a number of minor matters in relation to the proposed conditions which council placed upon the bridge and didn't manage to resolve those issues prior to the permit being issued so we have had to agree with council in the Resource Management and Planning Appeal Tribunal and we have agreement from council now to amend the conditions which they placed upon the permit. We are happy with that and we would imagine that a final consent agreement between the two parties will be reached within the next week.

The matters are minor. The matters are only in relation to the number of lights upon the bridge structure. It is not necessarily DIER's policy to light up highways in rural areas but it is council's wish to light from the beginning of the bridge to the southern end of the bridge right through to the other end of Triabunna.

There were one or two other issues that I wanted to touch on before we conclude our presentation. As Graeme said, the bridge is wide enough for vehicles and stock to travel underneath the bridge so there will be no impediment in that respect. The contractor will be required to undertake preventative measures to minimise any soil disturbance and any sedimentation which may result from the construction of the embankments. There were no known sites of Aboriginal significance determined during the preliminary work

which was undertaken. Finally, the two threatened species which were determined during the flora and fauna studies will be protected and will not be impacted upon as a result of the construction of the new road alignment and the bridge for Maclaines Creek.

Salmon property

The Committee questioned the witnesses regarding the impact of flood waters, if any, upon the property of Mr Salmon in a flood event. Mr Nichols responded:-

I think that (a combination of a high tide and a flood) would wash straight out.

... The flow would just wash it straight out. And even the backwater here that is coming down through will assist with that. It will still be flowing in through the two 1 500 diameter pipes and flowing out into this area.

When questioned on the alternate proposition of Mr Salmon, to enlarge the two 1 500 pipes and to have a 10 metre opening at the northern end of the bridge, Mr Nicholls responded:-

He has mentioned a 10-metre opening to me, too, and a 20-metre opening as well. You need some justification to spend the money.

I haven't the prices but a 1 500mm-diameter pipe probably is about \$200 a metre laid, so we would be looking at several thousand dollars each, I guess. It is a significant cost and 1 800mm is \$250, I think, and so it goes up. I guess they are not huge costs compared with a bridge but once you start to look at a 10 metre span, I am not sure how you would configure it; whether you would just put it here and you would make a square, preferably not skew. You are catering for three lanes so that is 10 metres plus 1.5 metres a side, 13 metres, 130 square metres, probably the cost would be \$2 000 to \$2 500 a square metre, so that is about 130 square metres, \$2 000 to \$2 500. It would be more than that, though. We could be looking at \$500 000 for a bridge like that because when we talk about \$2 000 a square metre and we are talking about a 55 metre long bridge, the cost of the abutments doesn't reflect back up into that square metre rate.

We could look at the culverts or we could look at a BEBO-type arch, a single-span arch structure. That would be more expensive, of course. There are solutions. It is really having the justification to do it that is the thing that we are struggling with.

The Committee further questioned the witnesses as to the potential impact of flood on Mr Salmon's property and the requirements for drainage of such, the following exchange took place.

Mrs NAPIER - ... As I understand it, Mr Salmon is arguing that that is one of his major lucerne paddocks and he can get two and sometimes three crops off

it. There is not a lot of really good land around Tasmania so when you have a decent paddock you like to look after it. If there were a major flood, it was identified as being a problem and it was decided that we needed additional egress facility and additional space, presumably it would be a fairly expensive exercise to go back in and put extra culverts in.

Mr NICHOLS - The flooding analysis that the Hydro did pointed to the whole flooding occurring over eight hours. It is not like the South Esk River where you are looking at flooding for days. From the time the water starts to rise through to when it has fallen again is only eight hours for a 100-year flood.

Mr BOARDMAN - It is a relatively steep catchment and it flows straight down into the flood plain.

Mr NICHOLS - It may only break the banks for four to six hours.

Mrs NAPIER - There was a suggestion by Mr Salmon that the inability of water to get out in the northern end would increase the flow impact coming through Maclaines Creek, which would increase erosion. As I understand it, that is what the argument is. I am just going from the look of the land and it would appear as if a lot of water potentially comes through here. If the solution is to provide either additional culvert space or a u-arch that allows for greater outflow of water, it seems to make sense to put it in now rather than realise it was a problem later on and then have to put it in.

Mr NICHOLS - The Hydro analysis doesn't seem to support an extra span at that end. The photographs tend to support that most of the flood is going through the middle of the creek and alongside the creek.

Mrs NAPIER - ... I suppose the issue is that if you have a large area under which water will move it is not going to rush, but if there is an impediment to water moving under the bridge then presumably there would be a fair bit of pressure on water either coming out where the culverts are or going down to the river. It can't quietly move out through the space that it would have otherwise passed. I guess, from that point of view, to some extent you have to accept the Hydro's advice, but we are dealing with a situation where we are going to be, in effect, forcing water to move on through the river and areas of culverts which, it is argued, are not sufficient capacity to keep the water moving quickly.

Mr NICHOLS - Each of the 1 500mm diameter pipes will carry about 2 cumecs each so that means that we have the capacity to move 4 cubic metres of water a second. That is still a fair bit of water. That is a bedroom full of water every second.

Mr STURGES - I think Mr Nichols may have answered the point that I was going to make. I acknowledge that Mr Salmon has a right to ensure that he gets access to his paddocks but from the photographs I saw before it appeared to me

that there is an existing issue with water at flood time lying in the area. I just want to be satisfied that the abutments that are going to be placed are not going to exacerbate it. I hear what Mrs Napier is saying about putting in additional measures to completely drain the water but at the moment there is an occasion of flooding and water lying in the paddock. The proposed measures that you are suggesting in your report; is that going to maintain the current situation or exacerbate it?

Mr NICHOLS- The stage height will be higher with this new structure. Yes, that means the flood level will be higher by a few hundred millimetres. This is what these graphs are showing us. The red is the existing creek grade and green is the new one and this is the stage height for 100-year flood. In other words, the existing bridge is here and it jumps up from about 1.7 metres up to 2.2 so just at the bridge will be about half a metre higher.

The Committee questioned the witnesses about the effectiveness of alternate designs for the proposed bridge and potential compensation for lost income for the landowner. During this discussion, the following exchange took place.

Mr HALL - Mr Nichols, I accept your proposition that a 10-metre opening is a fairly expensive undertaking but following on from what Mrs Napier said, what would another 1 500mm culvert cost so that we had three instead of two - just as an estimate? Would that really be a safety valve, if you like, another 1 500mm opening in case of a very severe event?

Mr NICHOLS- I guess I was thinking about the cost there. The culverts are fairly long because they are running skew with it so they are probably 20 metres or so long. We are looking at probably \$10 000 a pipe. It is not a huge cost, not in the same way that a full opening would be.

Mrs NAPIER- I am not arguing for another bridge because I accept that they are very expensive, but I am conscious that potentially, if we don't get the safety valve right, it could have a negative impact on the capacity of a farming property. Mother Nature has her way I suppose and, in terms of climate issues, they are saying we are more likely to have more really heavy downpours. Just looking at the topography there and from some of those photos, it certainly shows that there was a fair amount of water coming down into that area, separate from where the creek is going. I guess, from my point of view, if it is a matter of ensuring that we get it right, if part of the answer to that is putting an extra 1 500 mm pipe through as part that safety valve, I reckon it is better than running the risk that you might end up having to have major works there later on.

Mr HALL - Or two of them.

Mrs NAPIER - Yes.

CHAIR - Graeme, if your design proceeds and there is residual inundation of Mr Salmon's property to the extent that cropping is damaged, where does it leave the department in terms of liability?

Mr BOARDMAN - If you look at the photos you can see the flood event. I am not entirely sure when that was; I am assuming it was 2004... as you can see, with the existing structure the paddocks are already flooded. It is quite obvious they are flooded with the 260-metre bridge. There is a lot of area for the water to flow over, very slow-moving water, and this is where it is rushing through. If you decrease the opening, the area would still have been flooded. As shown from the plan before, the only impact is going to be that rather than the flood being along this line it may be somewhat further up. The impact upon the paddocks from a flood event, regardless of the size of the opening or the number of culverts, is going to be the same. A flood event will flood the paddocks.

Mrs NAPIER - I don't think there's any question about that. The issue is how quickly you can ensure the water gets away. I don't deny there will be a flood.

Mr STURGES - With the new structure, is that going to exacerbate the current situation?

Mr NICHOLS - There would be a very slight effect, I think, because the flood durations are only very small anyway. In real terms, from the time we start to get water coming down to the time it is finished is eight hours. At some stage the creek will break its banks and water will start to come down; it will not be for the full eight hours.

Mr STURGES - I acknowledge that and I am sorry to labour the point, but I think it is a reasonable expectation of a landowner where modifications or changes are going to occur - and I agree with the bridge; I have no problem with that - that his current use of the land is not going to be diminished and the problem is not going to be exacerbated with flood waters as a result of the changes. I just need to be satisfied that the no-disadvantage test, if I can call it that, is going to apply?... what I would like to be assured of is that the landowner is not going to be disadvantaged in that situation as a result of the new works that are proposed.

Mr BOARDMAN - The potential disadvantage would arise in relation to the potential increase in area that may be affected by a flood event and also the potential increase in length of time in which the paddock may be inundated. They are the two potential impacts. As we showed before, the area will really be quite insignificant in terms of the overall size of the paddock and the length of time that the water sits on the paddock is quite minimal. We imagine it would be less than an hour.

Mr NICHOLS- I would probably need some more figures to justify that but we are looking at very short duration events. It is interesting: you have got a copy of the once in 10-year flood too and there is very little difference between the proposed design and the current conditions so it is the more serious -

Mrs NAPIER- It is the more serious floods that you are talking about?

Mr NICHOLS- Yes. It is starting to look more significant when you look at the once in 20-year flood. To answer the Chairman's question, I guess it is a matter really for a valuer to try to determine. I know Mr Salmon is arguing for compensation on this basis. I am not qualified as a valuer and I guess they are the ones who have the experience to determine what compensation should be paid.

Mr BOARDMAN- If there is a lucerne crop standing there when the flood event occurs the duration of the flood is not going to have any increased impact as a result of a shorter bridge. If there is a flood event the lucerne crop has gone, regardless of the structure.

Mr HALL - I do acknowledge what Mr Boardman says about catchments which are relatively short in length, they do have a fairly short flooding period. On the other hand, if you get an east coast low which hangs around for two or three days, then I would expect that it may well be inundated for more than eight hours... I know you don't want to go down the issue of compensation, it is somewhat separate at this stage, but lucerne is a deep-rooted crop and sometimes some legume crops don't like prolonged inundation. It can cause the lucerne actually to die out in that situation.

Mr NICHOLS- I don't know. We haven't done any analysis on the impact of a long-term low intensity flood event.

Mr HALL - We are talking about worst-case scenarios but potentially that could occur.

Mr Salmon made the following overview of his submission to the Committee:-

If I could have those two aerial photos passed around, there are a couple of clarifications I wish to make. I have marked on the photos 'north' and I have marked with an x the creek where it is tidal. The rise and fall of the tide at Triabunna and Spring Bay is about 1.3 metres to 1.4 metres, so the tide comes right up alongside the river flat.

The flood photos shown in Mr Nichols' submission were taken in August 2003 with a monthly rainfall of 113 mm. I don't have the daily rainfall, only the monthly rainfall records. If we start at the first page, you will see the rainfalls from 1938 - in March there was 209 mm in one month... It shows you that there is over 40 inches of rain a year. You can see there was 279.9 mm in one month,

in March 1945. This flood only shows you only 113 mm... It was 167 mm for that month, December 1948. If you go on down, we notice quite markedly that after 1974 there was a drop in the rainfall which we noticed on the east coast with the drier seasons. It just shows that 130 mm of rain is not much of a flood whatsoever.

What I have done here is show where the water breaks out and that is shown on these photos anyway. When there is a big flood there is very little of that paddock that is not inundated - very little of it.

It has been eroded out over many, many years. You can see the depression in the paddock where the water has actually run. Back to the north end of the current bridge, the abutments started to wash away in the 1950s - it was finished in 1953 - and that concrete wall was put in there because there was so much water coming through there it actually washed the abutments.

This is why I feel that the proposed culvert pipes are just grossly inadequate. The last lot of photos put out show you the debris, which is quite prolific. In the old photos it is quite prolific and there is no reason for it not to be prolific now because the creek is still lined with timber, even in the paddocks and in the bush. Nothing has changed in 100 years. They still keep falling over so when you get a big flood this debris comes tumbling down and the pipes were blocked.

Mr Walker added:-

I think one of the critical points is that you can look at the rainfall data but it is the intensity of falls that is important. Whilst the rainfall data that John has tabled show the monthly falls, it is the intensity of the falls and they can vary quite significantly over short distances on the east coast. My practical experience as an agricultural consultant is that you have to look at the rainfall data to get some broad background to it and then you have to come back and look at the local environment that you are dealing with to really work out what should or should not be happening on the land. John has aptly put together some pretty good information. He talks about the intensity of the falls and so forth. That is what has to be taken on board. In a lot of the stony country within the catchment, the rainfall is not absorbed. It runs off quite quickly and you get these intense flood periods. The pictures show the water flooding out over that flood pan adjacent to the bridge. From an agronomic point of view, I would like to just go on record and say that I disagree with Mr Broadman's expertise as far as lucerne goes. You can't flood lucerne for anything more than a short period and that is on the surface. It is what is happening in the soil profile that is the critical thing in the longer term. If water is not draining adequately out of the soil profile the lucerne plant suffers significant damage. What you are doing is drowning the roots of the lucerne plant.

I would classify this soil environment as class 4. It is almost class 3 land. It is not class 3 land because of the frequency of flooding that takes place, but it is

high-value agricultural land. The soil profile is not greatly deep in that the water table can rise and fall significantly during the year and lucerne roots, whilst they can go down a fair way, are impeded by high water tables from year to year. So you are really relying on the lucerne productivity from a shorter than normal root depth and it is critical that what root depth you have is not drowned out for long periods. If it does suffer drowning, the plant basically has to reconstruct its root system and root reserves before it makes top growth so you are losing significant productivity...

There will be a significant problem in that if the flow is lessened and hence the speed of water getting off the area is slowed, more debris and siltation must occur over this land site over a period of time and that would have a detrimental affect on the farming scene. With past floods John has been able to remove significant debris from the area in a couple of hours, certainly less than half a day. A couple of men can move it. I believe that more debris, larger pieces of wood and timber, could sit across the area and it is going to take longer to clean up. It is just another impost on this farmer. Whilst the area isn't in lucerne at the moment, it is intended to move it into lucerne in the not too distant future because Mr Salmon's farming practice is going to move towards carrying more cattle. As you appreciate, on the east coast you need a good fodder reserve for safety to maintain cattle over extended dry periods and lucerne stands are going to refeature in his farming program into the future. So you want to get the most from productive areas such as this.

The flood events often occur over the summer period and it is critical that any losses are minimised and that lucerne production is not impeded in any way. Thus it is necessary to move all the water as quickly as possible, both from the surface and the soil profile.

The Committee questioned the witnesses on the typical duration of flooding in the area. Mr Salmon responded:-

Not very often for more than eight hours. I probably passed over the 1984 situation before - it wasn't marked on this particular rainfall chart. The figures for July, August and September were: July at 103 mm, August at 151 mm, September at 104 mm. That was quite a problem at that time because it didn't stop raining. That is when I got some debris on the paddock.

The following exchange took place:-

Mr STURGES- If I may, on average, now with the current configuration of the bridge, how long would that sort of water lie there for?

Mr SALMON- Depending on the tide but probably overnight at the most.

Mr STURGES- Overnight? Eight hours? Twenty-four hours? The reason I am asking the question, Mr Walker, is that you made mention before of the

impact of water lying not just on the topsoil but in the subsoil and the crop. On average now, with that situation you have shown in the photo, are we looking at 12 hours, eight hours - using that photo as an example?

Mr SALMON - That was probably only five to six hours, eight hours at the most, but in the past this paddock has had lucerne in it and it has not been affected by floods before, so it has a history from 1977 to 1983 -

Mr STURGES - Given the long period of time that you have been associated with this property, on average would you see flood waters lying there for more than 12 hours. Would that be an exception?

Mr SALMON - You wouldn't see it longer than 12 hours. If a lot of rain comes in the course of the evening; it comes at night and it does not last long.

Mr WALKER - With these flow lines, if the water is not moving out of them quickly this proposed structure would pond the water for longer periods.

Mr STURGES - In your expert opinion, Mr Walker - and I am not trying to pin you down - what would be the longest period of time that water could lie there without causing significant damage to the land? Is 12 hours perhaps the maximum period of time? I have no knowledge of land management.

Mr WALKER - With lucerne you wouldn't want any more than, say, 48 hours - that is the crop under water. John has indicated that with the present bridge structure there is plenty of flow. If you have high tides the water is largely gone after half a day - 12 hours or something like that. That is okay, it is off the surface, but we still want water to be draining out of the soil profile. We don't want water sitting in ponds on the paddock, still sourcing the high-water table.

As the Committee questioned the witnesses about alternate plans for the works, the following exchange took place:-

Mr HALL - You obviously heard the discussion we had about additional culverts and the 10-metre opening. In your opinion, if a couple of additional 1.5 culverts were put in, would that alleviate the problem in the longer term?

Mr SALMON - I am against culverts, the reason being that the timber comes down and blocks them up and you have got nothing. They are just a trap. In those photos I showed you the timber that is lying downstream now will not go through a culvert. It will just block it and when it blocks up the water banks up. When it finally recedes the floating timber will just be deposited where it feels like depositing it. It will just leach away the water and leave some timber right up against the causeway and the culverts. It will be quite a mess and that is why a free-flowing bridge is needed right next to salt water to let the stuff go. That is my view.

Mrs NAPIER - Talking of the build up of debris, do you not have problems with debris building up against the bridge anyway?

Mr SALMON - Not now, because the piers are only so wide and it just flows through. In the old photos you can see how much debris is in those; it is stacked up against the handrails. I have no problem with upgrading the road, the land acquisition and so forth, but I have a problem with the type of construction.

CHAIR - You see the battering of the roadworks on the northern end of the bridge as creating a dam wall, if I can put it that way, and therefore an ongoing problem of the dissipation of water from your property?

Mr SALMON - The water will lie there longer with the situation they are proposing. There is no doubt about it.

CHAIR - You heard Mr Nichols' comment about somehow striking a balance in the public good, recognising that you cannot just spend with an open-ended cheque book. What is your reaction to that, given that a balance needs to be struck somewhere along the line and to replicate the existing-type structure is an unreasonable proposition? What would be your solution?

Mr SALMON - My solution would be bigger openings. You could still have causeways between, but just more openings to let the debris go through.

Mrs NAPIER - If you used that formation, which is like a u-culvert, I suppose, rather than a number of pipes, would that perhaps alleviate the situation?

Mr SALMON - Anything is better than the pipes, because the bottom of a pipe is very narrow. You have trouble with culvert pipes in bush roads with them blocking up with sticks and bark and so on. It just becomes a problem. A square opening is obviously going to be better for the length of the timber and the size of the wood - that is why I mentioned that 10-metre opening. If we had that plus another one it would probably be all right. To me, it is inadequate. The water flows are really quite strong and when it gets stopped you have problems.

CHAIR - Mrs Napier hit on it earlier and has reinforced it now, there is substantial roadworks preparation to be done so, rather than prepare the road work with fill, why don't we prepare the sub-base with a series of box culverts and span the road with them, as is done on a number of occasions all around the State. Would that then overcome the problem? So you have a heap of apertures through there; they are not 1 500mm diameter culverts, they are nothing different from preparation under the road...

You have both heard what the previous witnesses told the committee. I hear what you have said, Mr Salmon and Mr Walker, that you can take account of any amount of technical information but the realities of life are sometimes a little different than that. Nonetheless you did hear their presentation and the fact that, based on their hydraulic surveys and analysis, the water will come and go in a pretty quick turnaround time of, say, 8 hours. We have just heard from Mr Walker that 48 hours would be the maximum you would want lucerne to be inundated. I also hear what you say about soil-profile draining as well, but given what we have heard previously, in a normal flood the water will rise and fall over an 8-hour period. That suggests to me that there wouldn't be any particular damage potentially to the crop, but I also hear what you say about debris on your property. That will happen anyway.

Mr SALMON - Eight hours after the rain stops.

CHAIR - Yes, that is significant.

Mr WALKER - This is a significant point - eight hours after the rain stops. You could still have water over the area for a day or so.

CHAIR - We are discussing the possibility of open-box culverts and we have also heard the suggestion of a floodgate at the end of the culvert. What sort of practical problems would an open-box culvert cause to you with potential stock free flow - getting your stock off the property, in under the road, onto the other side and down the creek et cetera.

Mr SALMON - I don't think that is an issue... because you have the tidal flats below it. There is very little fencing required on the far eastern side of the paddock. Cattle are a problem. You are only shifting the bridge, whatever it is, 20 metres; there is no fencing alongside the inside edge of the bridge now.

The Committee recalled Mr Nichols and Mr Boardman to make comment on the evidence given by Mr Salmon and Mr Walker. The following exchange occurred:-

Mr STURGES - I hear what you are saying but the photos that you are looking at now show significant debris that comes down with a flood and what the previous witnesses have said, Mr Walker and Mr Salmon, is that in their opinion the cylindrical pipes, 1.5 pipes, won't allow for the escape of water, given that that debris will block the pipes. That appeared to me to be the most significant issue, quite frankly. The new configuration of the bridge, because it is going to be shorter, isn't going to have those spans there anymore for the water to flow through and the debris to flow through with it. That to me appeared to be the nub of the issue.

Mr NICHOLS - I have also seen this debris here which is downstream by the main creek, which really substantiates that the debris is going through there. I haven't seen the same logs further around the bay.

The embankment is going to trap some debris and logs, there is no doubt about that. Putting one span here isn't going to alleviate the problem, though. It is going to let some logs through. The logs are right along the old bridge and what we are looking at - excuse me for standing - is that span is there and then it goes right along here and there is debris all the way along there. We also heard - from Mr Walker, I think - that after every major flood there is still debris to pick up off the flood plain anyway.

Mrs NAPIER - With due respect, though, if you are indicating that there is already a debris issue but that the new dam wall will in effect catch pretty well a big percentage of the debris that would otherwise have flowed under the existing bridge-

Mr NICHOLS - I think most of the debris will still go down the main creek. That is where the main flow is and that is where the speed of the creek will take them with it. At the moment, if you can appreciate, this is only flooding half a metre or so deep. You are not going to get much debris over there... It is not a problem you can get away from, certainly not on any of these catchments. It applies right along the east coast.

Mrs NAPIER - If we come back to the u-shaped culvert, equivalent to cattle underpasses and tractor underpasses and whatever, what distance are they?

Mr NICHOLS - A stock underpass is about 2.4 metres square... I don't know whether a box culvert would be the best answer to a debris problem.

Mr STURGES - Mr Nichols, before you respond, if I can add quickly to what Mrs Napier was saying, when Mr Walker and Mr Salmon were at the table giving evidence - and I am pointing on the map just adjacent to Vicary Street on the northern side of the bridge, for the benefit of Hansard - they indicated that you can see the dark colours and that is the flood plain of where the water lies and drains. At the moment, given the configuration of the existing bridge, the water and the debris can flow through hence this is the productive area. That is my understanding. This is the productive area where they want the water and the debris to drain from. That was why, at the risk of putting words in Mrs Napier's mouth, I think she was asking your opinion in relation to the establishment of box culverts - I didn't know they were 2.4 - say here, here and here. The chairman might want to elaborate now but he did indicate, or make the point, that when the roadwork was going on would it be possible to put those configurations in hence addressing the concerns raised by the two previous witnesses.

Mr NICHOLS - Yes, but I don't think I would build a box culvert. If I was going to put in something more substantive, I'd probably go to a pre-cast arch system such as BEBO which is made by Humes.

Mr STURGES- What sort of width? What sort of size?

Mr NICHOLS- They would be probably 10 metres at the bottom but it is clear width and then it comes to an arch.

Mrs NAPIER- Okay. If there is such a structure - I guess that is what we are after too.

Mr STURGES- Is that a feasible option to look at?

Mr NICHOLS- Yes, it is a feasible option but it is also a costly option. We are looking at -

Mr BOARDMAN- Another \$200 000 on a \$3 million project.

Mr HALL- \$200 000 per arch?

Mr NICHOLS- Yes.

Mrs NAPIER- Would you need just the one, though? If they are 10 metres wide, if they will give you 10 metres clearance, in the original presentation of Mr Salmon he said he needed a 10-metre bridge, so that would give it to him.

Mr BOARDMAN- Again we don't have, from the modelling that we have done and the modelling that we have undertaken - and we appreciate what John was saying before - to substantiate the need for such a large opening. Obviously it is not our decision to make in relation to the overall cost of the infrastructure but the more things you add on the more costly the bridge is going to be, obviously.

Mrs NAPIER- This photo which shows the overflow from Maclaines Creek across this paddock that we are talking about. It tends to make sense to me that you would get flood coming down this semi-formed creek which leads to that 10-metre bridge area that we are talking about. These two spots on either side are the two big gum trees that are in the paddock.

Mr NICHOLS- We don't debate that. We accept that there is an overflow. It is just the effect of that overflow and the need to provide something substantial. We haven't really been able to substantiate that, not in a technical sense anyway.

Mrs NAPIER- My understanding would be that with the flow pattern that is being indicated here, and with the topography of the section that is north of Maclaines Creek near the existing bridge being at a higher level than the rest of the paddock, then whatever overflow is coming from Maclaines Creek is actually draining towards that point where we are discussing whether there needs to be a 10-metre bridge or culvert or something?

Mr BOARDMAN - The fall of the paddock is to the south. There is probably a rise on the flood plain levee.

Mrs NAPIER - I accept that it is coming from there but if it does come over here it will not necessarily go back there. It is going to keep going in the direction of where the creek is feeding.

Mr STURGES - I think it is a reasonable issue that has been put on the table. It would appear to me that the landowner has every right to seek not to be disadvantaged. Therefore, what I am requesting is that we look at - and I hear what you are saying about cost - an option that is going to take the water away within the time period that it currently takes. We were advised on average that it would be lying there for no more than 12 hours after the rain stops. I take note of that. It would appear to me that we are effectively building a dam wall there with 1.5 metre culverts, and the argument is that the culverts are not going to sufficiently take the water away as is the case now. I want to be satisfied that what is being proposed will not disadvantage the landowner. That is the only real issue I have, Mr Chairman.

CHAIR - I guess that begs a response.

Mr NICHOLS - We believe that what we have proposed will not disadvantage him and will provide for those flood events. We have looked fairly long and hard at this northern span after John suggested and we were not able to substantiate the additional span and the costs associated with it.

Mr BOARDMAN - As this map shows, we also showed a plan with the culverts blocked and the impact that would have on the area that was inundated. Again, it doesn't substantiate the change in the one in 100-year flood event.

Mrs NAPIER - I accept that the level wasn't going to change but it did not indicate what the increase in the time would be for that water to escape under a blocked culvert situation.

Mr BOARDMAN - The flow in the creek during a flood event is high, as you can see from those photos. We are talking about 150 cumecs going through the creek and about -

Mr NICHOLS - It is 150 cumecs per 100-year flood... The peak flow in the middle of the creek would be 3 metres per second. That is going quite fast and that is substantiated by these kinds of pictures.

Mr BOARDMAN - The flood event is going to be over within the period of time which it would ordinarily have occurred within, regardless of the width of

the bridge structure. The only question is: will it drain if the culverts are blocked?

Mr NICHOLS - It will probably still get in there, regardless of whether the culverts are blocked or not. It won't be sealed off. We had a hay bale in a pipe recently at west Ulverstone, in a 375 mm pipe, and the water was still getting into the pipe, so it doesn't block things off completely. In fact further down the pipe was full. The contour over here is 1.25 and the 1.25 contour is coming through here. There is not much difference in the grade.

Mr BOARDMAN - The paddock can still drain... There just happens to be a couple of little low points there, but it doesn't show up as a substantial drop in level into this area. It is fairly much the same all the way across.

Mr NICHOLS - With the contours that we have plotted, which were surveyed, the edge of the bank is 1.25 in here and the contour for the 1.25 comes right round.

Mrs NAPIER - So the issue is, taking into account the contour, can the water get out there?

Mr NICHOLS - Yes.

Mrs NAPIER - My concern is how much water you are going to have lying around, that's all.

Mr NICHOLS - We will have the same amount of water as shown here, but it is really how long it is going to take to drain for the residual water that doesn't go that way.

Mrs NAPIER - And that is the argument for having an opening that is less subject to being clogged up with debris.

Mr NICHOLS - The question is really the time it takes to get the remaining water that is below the 1.25 contour - the rest is going to go that way - through those two culverts. I can't answer that because that would take some time to determine. On the other hand I would accept that it might only be 200 mm lower than along here. It is not going to take forever to drain out.

Mrs NAPIER - I might ask one question: what is the cost of the current two culverts as compared to putting in one of those 10-metre boxed culverts?

Mr NICHOLS - Probably much the same but I don't think a boxed culvert would give you the benefit. You are talking about draining a low, wide area -

Mrs NAPIER - You mentioned a structure that you can actually buy that might actually do a better job.

Mr NICHOLS - That is a BEBO arch. That is not a generic term. That is actually a manufacturer's name for it.

Mrs NAPIER - I am interested in what it would cost if we had to put one of those in rather than putting in a couple of smaller culverts?

Mr NICHOLS - I think it would be substantially more. The culverts probably cost about \$20 000 and the arch would probably cost \$200 000, so there is a major cost impost. We are not really concerned about the depth of the flooding - following on your argument - because the water will go that way, but if you were worried about the width -

Mrs NAPIER - Width and blockage?

Mr NICHOLS - Certainly the arch would give you a much better result than a box culvert or a pipe culvert... You have to get depth to make them work efficiently. With an arch culvert you have got your width at the bottom.

Mrs NAPIER - I guess that is the kind of thing that we are after. You are saying that you reckon that will be an extra \$180 000?

Mr NICHOLS - Probably \$200 000 off the top of my head. I work that out on the basis of \$1 000 or \$1 500 a square metre.

Mr STURGES - You are saying it is not necessary?

Mr NICHOLS - We haven't got any justification to do it. From the research we have taken, it would really be just an ad hoc measure to alleviate a perceived problem. I would have to talk to my boss about that and see what our position would be if that is a directive that comes from this Committee.

On Thursday, 22 December last, the Committee inspected the site of the proposed works accompanied by Mr Nichols and Mr Salmon. The effects of a flood event were discussed and in particular, the capacity of the proposed design to facilitate the drainage of flood water from the Salmon property through the road embankment.

Following such discussions Mr Nichols indicated the Department's preparedness to amend the proposed works. In correspondence of 22 December to the Chairman, the General Manager Roads and Public Transport, Mr Phil Cantillon advised the following changes to the proposal:-

1. 1500mm diameter pipe culvert at the northern end of the approach embankment 40m south of Vicary Street junction shall be increased to 2400 x 2400mm box culvert.
2. 1500mm diameter pipe culvert at the northern end of the approach embankment 100m south of Vicary Street junction shall be increased to 1800mm diameter pipe culvert.

3. An additional 1800mm diameter pipe culvert shall be installed approximately 150m south of Vicary Street junction.

DOCUMENTS TAKEN INTO EVIDENCE

The following documents were taken into evidence and considered by the Committee:

- Maclaines Creek Bridge and Approaches Replacement, DIER - Submission – Parliamentary Standing Committee on Public Works, July 2005
- Tasman Highway, Maclaines Creek Bridge Replacement, Mr John Salmon - Submission – Parliamentary Standing Committee on Public Works, July 2005
- Correspondence from Complete Agricultural Consulting Services, dates 27 September 2005
- Monthly rainfall data for Orford South, 1932-2005
- 17 Photographs
- 1 hand drawn flood map
- Correspondence dated 22 December 2005 from Mr Phil Cantillon, General Manager Roads and Public Transport to the Chairman.

CONCLUSION AND RECOMMENDATION

The evidence presented to the Committee clearly demonstrated the need for replacement of the existing bridge at Maclaines Creek due to its deteriorated state. .

Once complete, the works will provide the following benefits:

- A value for money outcome;
- Improved safety and access to Triabunna;
- A durable bridge, with minimum maintenance requirements during its service life;
- Improved road safety;
- Improved load capacity of the bridge; and
- Improved road geometry of road approaches.

Accordingly, the Committee recommends the project, in accordance with the documentation submitted, at an estimated total cost of \$3,000,000.

Parliament House
Hobart
9 January 2006

Hon. A. P. Harriss M.L.C.
Chairman