

**THE PARLIAMENTARY JOINT STANDING COMMITTEE ON PUBLIC WORKS
MET IN COMMITTEE ROOM 2, PARLIAMENT HOUSE ON WEDNESDAY
5 OCTOBER 2005.**

**TASMAN HIGHWAY, MACLAINES CREEK BRIDGE AND APPROACHES
REPLACEMENT**

Mr GRAEME NICHOLS, DIER PROJECT MANAGER AND **Mr EVAN BOARDMAN**, CONSULTANT, PITT & SHERRY, WERE CALLED, MADE THE STATUTORY DECLARATION AND WERE EXAMINED.

CHAIR (Mr Harriss) - Welcome, everyone. Gentlemen, please proceed with your submission. Graeme, you have been here many times before and you are aware that we have had your submission for some time now and we have all had the opportunity to go through it.

Mr NICHOLS - I intend to cover the introduction through to the program costs. Evan Boardman will cover the environmental and social implications and planning.

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 H20 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 2200 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.

Mr STURGES - So the footpath would connect with the proposed cycleway?

Mr BOARDMAN - No, this is a footway/cycleway which is being constructed on the bridge and it comes down on either embankment. At the moment council has not determined how they wish to connect -

Mr STURGES - Yes, I understand that. I am curious why the footpath over the bridge.

Mr NICHOLS - It is a footway/cycleway.

CHAIR - And it is separated by the barrier.

Mr NICHOLS - Rather than the through cyclists that are going from Hobart to Bicheno, we are providing for the local cyclists and pedestrians.

Mr STURGES - So it will connect with the footway/cycleway that the council are planning?

Mr NICHOLS - Council are planning to put a cycleway or footway through from Orford to Triabunna and it will connect with the Solis development.

Mr STURGES - I understand. I was curious as to why there was a footpath if there was no footpath at either end but now you have explained it, I understand.

Mr NICHOLS - We have not seen their plans but we have provided for that connection so that they have a connection across the bridge.

Mr HALL - In the interim you were saying that cyclists would use between the white line and the verge?

Mr BOARDMAN - Through cyclists travelling north or south are probably not going to get off the road and then go into Triabunna and then come back out again; they will just stay on the road shoulder.

Mr NICHOLS - This is more for your children and recreational cyclists out of Triabunna or Orford who are going to use this new cycleway the council is planning.

Mrs NAPIER - The 1-metre sealed shoulders that you are providing on this section of the road -

Mr NICHOLS - They are 2 metres.

Mrs NAPIER - They 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.

Mrs NAPIER - We have just locked you into 2 metres, haven't we?

Laughter.

Mr NICHOLS - My mistake anyway, but that was correct.

Mrs NAPIER - So that will be 1 metre of actual full seal as much as the rest of the road will be.

Mr BOARDMAN - Yes, 1.5-metre sealed shoulders on the entry and 1 metre sealed shoulder on the bridge each side.

Mrs NAPIER - That would be like the Smithton bridge we did.

Mr NICHOLS - That would be fairly close. That was 9 metres and this is also 9 metres between kerbs.

Mr HALL - From my recollection, whilst we have that sealed shoulder for this new project, we are back to square one again either side of that.

Mr NICHOLS - That is true.

Mr BOARDMAN - The pavement has been redone between here and back to Orford as well and the pavement has been widened as well.

Mr HALL - Has that a white line on the shoulder there - it has - because I have ridden a bike along there and it can be quite dodgy.

Mrs NAPIER - Is it now State policy that where roads are repaved that at least a 1-metre seal on either side of the road would be provided for cyclists?

Mr NICHOLS - No. It depends on the hierarchy of roads what classification they are given. The section here south of Triabunna - from Orford to Triabunna - is category 2, which is a fairly high classification. The rest of the road back to Hobart is of a lower classification than that - it is a category 3. It would not achieve those seal requirements at the moment because it is an old road but, as we upgrade it, the idea is to try to upgrade it to those hierarchy standards.

Mrs NAPIER - So you're differentiating between repave and upgrade?

Mr NICHOLS - Yes. The sealing work happens but if we upgrade the road we try to upgrade it to the new hierarchy standards, as money allows.

CHAIR - Can I come back to those sealed shoulders? Mrs Napier referred you to page 6 of your submission and you have just indicated to us that the sealed shoulders on the road approaches to the bridge will be 1.5 metres, yet your submission suggests 1 metre. Can we be absolutely certain that they are 1.5 metres?

Mr NICHOLS - They are 1.5 metres, but 1 metre on the bridge.

CHAIR - Okay. So the submission needs that amendment noted. We may well do just that when we produce our report and note that that is what is going to be delivered.

Mr NICHOLS - Yes, that's correct.

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.

CHAIR - To the south and downstream.

Mr NICHOLS - Sorry, downstream. What we are providing there is passage for his vehicles into this area and also passage into those southern paddocks.

Mrs NAPIER - So it is sufficiently high that a truck can go underneath?

Mr NICHOLS - It is 2.7 metres which is sufficient for a tractor.

CHAIR - That would be along from the abutment to the creek bank?

Mr NICHOLS - Along the river banks. 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.

Mrs NAPIER - So you did use the 100-year flood as your gauge?

Mr NICHOLS - Yes. That is fairly normal for what we call serviceability requirements. 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 1 500mm pipes to cater for two low points.

Mrs NAPIER - Are there currently culverts there?

Mr NICHOLS - No, the bridge goes right through.

We looked at what effect the new bridge would have on the stage heights and also what the effect would be if the proposed culverts are blocked.

CHAIR - Which are on the northern end, Graeme.

Mr NICHOLS - Yes, on the northern end.

CHAIR - That is for *Hansard* if we want to get back on that.

Mr NICHOLS - You can see here that the green line and the red line are not all that different and about 150 metres north of the bridge there is no difference in the stage height at all. There is a little difference there where there is a bit of a flat area, but the creek in flood is

very constrained between the southern escarpment and the rise on the northern side. There is very little difference in real terms between the contours.

Mrs NAPIER - I have received representation from Mr Salmon on that now. It is unusual to me that we would think that a couple of culverts would do the same as having an open area under the bridge for allowing the water to go through.

Mr NICHOLS - 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.

Mrs NAPIER - Were you saying that there is very little through-water flow along here?

Mr BROADMAN - During a flood event.

Mr NICHOLS - Yes. 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.

Mrs NAPIER - Just looking at the image here, there appears to be a waterway and one would almost think that it comes in over here as well. I assume a culvert goes through there?

Mr NICHOLS - Yes, a 1 500mm-diameter culvert.

Mrs NAPIER - Just looking at the topography of the land and the colours, you would think there would be quite a bit of water coming through there.

Mr NICHOLS - Whilst a lot of water is lying there, that there doesn't seem to be very much flow coming in across this area.

CHAIR - Graeme, you are saying that from photographs there doesn't seem to be much evidence of that event. What account have you taken of local knowledge, such as discussing these matters further with Mr Salmon, as a landowner in the area who would understand what goes on?

Mr NICHOLS - 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.

CHAIR - I just want to pursue that for a moment, if I can, and I am sure other committee members will have similar or following questions. I think you said at the outset of your presentation that, as to the existing bridge construction design, nobody seems to know in detail why it was so long. It may well have been just the topography of the area and it seemed like a practical response to the water from that flood plain on either side of the creek and so on, and it was just a practical construction method, without any hydraulic analysis. Am I right in recalling that was essentially your opening contribution?

Mr NICHOLS - 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.

CHAIR - And yet on the Midland Highway, west of Ross, we have a similar situation. I don't know whether it is the Elizabeth River or the Macquarie River or whatever, but we have a large bridge for a very small creek because at times of flood we have that flood plain and we need to disperse the water quickly. I look at this and I see the embankments you are constructing upstream, as opposed to the open nature of the existing bridge, and I then cast my mind back to the Deloraine problems - and Mr Hall might like to speak about that at some stage. There were some suggestions with the construction of the highway there that all we did was make a big dam, which caused massive flooding problems for the area, and I see us constructing a dam wall to the northern end of the creek with this proposal.

Mr NICHOLS - Certainly the catchments you have referred to are both rivers and here we are looking at a creek. That would point to what the difference may be; we are looking at a much smaller catchment.

Mr BOARDMAN - It is also at the bottom of the catchment.

Mr HALL - What is the extent of the catchment to the north? Is there a watershed not far up there? You talked about east coast rainfall events and they can be localised and very heavy. In square kilometres, is that a very big catchment there and under freak conditions could it then cause a significant amount of flooding?

Mr BOARDMAN - There are two other smaller creeks within the vicinity.

Mr NICHOLS - 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.

Mr HALL - And it is obviously tidal coming back up.

Mr NICHOLS - Yes. This is all tidal in here.

Mr HALL - Yes. I can't recall from the hydrology studies but was that taking into account the effect of a high tide and a significant flood event at the same time?

Mr NICHOLS - Yes, that is right. 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.

Mrs NAPIER - Coming back to the culverts, how did you determine the size and number of the culverts?

Mr NICHOLS - 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.

Mrs NAPIER - That is 1.5 metres?

Mr NICHOLS - Yes.

Mrs NAPIER - In diameter?

Mr NICHOLS - In diameter. 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.

Mrs NAPIER - What is a floodgate?

Mr NICHOLS - It will just be a flap, sorry. On the end of the pipe you put a flap and when the flood comes through it just lifts up and then when the flood finishes it comes back down so it is closed off.

Mrs NAPIER - I had to ask that question.

Mr NICHOLS - That is okay. They have quite a few of them 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.

Mr STURGES - From memory, I don't think there is a right-turn slot at the moment, is there?

Mr NICHOLS - No, there is nothing. It is not really adequate. Until recently they have had very inadequate lighting there. Hydro has already provided a 250-watt light here. There was an 80-watt globe here and another here and we have upgraded these already to 250 watt and an 80 watt back up Vicary Street. We will retain that and the 80 watt here has been removed. I think the council has plans to light right through this bypass as well.

What we are looking at in terms of cost is a bridge of \$1.25 million, a road of approximately \$1.1 million, plus all the other cost fees, acquisition and some contingency, the estimated cost of the project is \$3 million.

Mr HALL - I will ask a question on costs while Mr Nichols is dealing with those. You have an existing bridge there of some 260 metres and I would imagine that would be a significant demolition cost.

Mr NICHOLS - Yes.

Mr HALL - Obviously this is a stand-alone project, but how will that be funded and what will happen to all that material?

Mr NICHOLS - 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 - 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.

Ms HALL - Just to clarify that, in the table of estimated costs, does demolition come into one of those categories?

Mr NICHOLS - I believe it is included in the costs for the road.

Ms HALL - In that \$1.1 million?

Mr NICHOLS - Yes.

Mrs NAPIER - Does that include an estimation of what financial return a person could get for selling off parts of the bridge or is that just a zero factor?

Mr NICHOLS - That's a zero, unfortunately. That ends my submission.

CHAIR - Thanks, Graeme.

Mr BOARDMAN - I will concentrate on the environmental and social implications of the proposed bridge and road 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 an 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.

Mr HALL - They were actually growing under the macrocarpas?

Mr BOARDMAN - Growing under the macrocarpas, which is a very disturbed area.

Mr HALL - Not a lot grows under macrocarpas as a rule.

Mr BOARDMAN - That's right.

Mr NICHOLS - Pythiums tend to like disturbance before they will grow and then they are only seasonal.

Mr BOARDMAN - 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.

Mr HALL - If those macrocarpa are going in that direction will they provide a safety issue if they are fairly close to the edge of the road there?

Mr NICHOLS - No. We have checked the clear distance and they are okay.

Mr BOARDMAN - 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.

Mr NICHOLS - They come through here and it actually goes up that channel to the other abutments there.

Mr BOARDMAN - 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.

Mrs NAPIER - They've done well.

Mr NICHOLS - They have only asked us to light from the bridge to the junction.

Mr BOARDMAN - The junction was proposed to be lit and there were no other lights proposed to be placed upon the bridge. Council is seeking another three light poles. That was the main sticking point, which is quite minor in relation to the overall size of the project. We have worked very closely with council to come up with the solution that we have, particularly in relation to the proposed footway/cycleway and also in terms of the proposed realignment of the highway from the four original options which were placed in front of us.

Mr HALL - There is also a water main, from recollection. Are there any issues with that at all?

Mr BOARDMAN - That was another issue in relation to the permit. Council has hung a water main across the bridge. They didn't necessarily follow the rules of the law and didn't seek any permit or approval from the road authority to place that water main underneath the bridge so it has basically been hung there illegally, but that is really neither here nor there. We were going to provide a trench from the southern end of the bridge to the northern end of the bridge and place a water main within that trench. Council wants to hang the water main underneath the proposed new bridge so the water main will be trenched within the embankments and then come up, hung underneath the bridge and then down again and through the embankment. We have negotiated with council and council will be contributing towards the cost of that water main. At the moment it is only a 100mm pipe and they want a 250mm pipe to upgrade the ability to get water from the Prosser scheme through to -

Ms HALL - The water is heading north, isn't it?

Mr BOARDMAN - From the Prosser? North to the dams above Triabunna and there is also movement afoot further south, as you are probably aware, with the Solis development and the Gunns pulpmill, and council are also negotiating with Rivers and Water to take over that scheme. That has also been agreed to as an amendment to the conditions so that council are contributing to the upgrading of the water main and DIER will be providing the brackets to hang the main off the new structure.

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.

CHAIR - Thank you, Mr Boardman. Further questions, members?

Mrs NAPIER - I might take this opportunity to raise a couple of the questions that Mr Salmon had raised. He makes the point that this river is subject to high tides and presumably that also implies that there can be a degree of salt water that makes its way

back up Maclaines Creek and raises the point that if there is not reasonably quick drainage from that main paddock there, which is a highly productive paddock I am informed, it can decrease the productivity capacity of that paddock. What is your technical advice in relation to the impact of high tides on the rapidity with which water can escape that paddock?

Mr NICHOLS - I don't think salt water is getting into this paddock. I think the tide finishes somewhere here.

Mrs NAPIER - I was thinking of a flood - if you get a combination of a high tide and a flood.

Mr NICHOLS - I think that would wash straight out.

Mr BOARDMAN - The tide would not have any impact during a high-flood event. It would push it out.

Mrs NAPIER - It would not be able to overcome the flow coming down Maclaines Creek?

Mr NICHOLS - No. 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.

Mrs NAPIER - You would argue that that is not a factor. He had argued that he would prefer to have much larger pipe combinations. He recognises that there are two 1 500 pipes but quite clearly the tenet of what he is saying is that he would want that to be bigger. He wants a 10 metre opening at the northern end.

Mr NICHOLS - 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.

Mrs NAPIER - How much does one culvert cost?

Mr NICHOLS - 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.

Mrs NAPIER - I accept what you are saying in relation to the cost of a bridge - bridges are expensive, I accept that - but is it possible that the solution is actually to provide the equivalent distance being requested using culverts? If the main issue is letting the water get out then more culverts might be a way of meeting that concern.

Mr NICHOLS - 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.

Mrs NAPIER - The reason I am pursuing the issue is that if it is a matter of putting additional culvert space in, if the problem does emerge it would be much more expensive presumably.

Mr NICHOLS - Could you say that again. Sorry, I got lost.

Mrs NAPIER - If by chance we put in the two 1 500mm culverts and there is a major flood and it quite clearly shows that it is increasing the erosion impact on the river. It is also causing the water not to be removed from that paddock as quickly as you had hoped, if it is going to be a good, ongoing, productive paddock area. 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. I thought the photographs were very supportive of what we were doing.

Mrs NAPIER - I agree with you about the photos. 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.

Mr STURGES - I understand. So you are not building a mini dam wall and there is still the capacity for it to drain?

Mr NICHOLS - Yes. The flood event is fairly short though.

Mr STURGES - Yes, I heard you mention that.

Mr NICHOLS - I can't remember whether they provided a graph. There are many different types of floods too. Some are shorter than others. It depends on how the rain falls - whether it teems down or is more gentle. If you get a high intensity rain then the event will be high peak but a shorter duration.

Mr BOARDMAN - With the majority of the creeks on the east coast it is the same thing - a high intensity event and then it is all over and done with.

Mr NICHOLS - So that half-metre stage height is at the bridge and then once you get back to here there is no additional stage height. What happens is the grade of the creek is coming up and, as the flood plain widens, that stage height meets the grade of the creek. It kicks up at the bridge and then it virtually stays flat until it reaches the grade of the creek and that is why it runs out after 150 metres or so.

Mr STURGES - I can see that, thanks.

Mr BOARDMAN - The contour plan, which Hydro did from the hydrology report, shows the location of the 100-year flood event in the current condition and then also the

100-year flood event with the proposed bridge and the proposed bridge with blocked culverts. There is quite a steep embankment running along there, so this is where the flood event always would be, regardless of whether there is a structure here or not. Also the 100-year flood event comes here regardless of whether or not there is a 260 metre bridge there or a 55-metre bridge there.

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 - So \$10 000 would give you an additional culvert right through?

Mr NICHOLS - Yes.

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.

CHAIR - Mr Salmon will tell us later.

Mr BOARDMAN - I assume that is the 2004 flood event and, 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?

Mr BOARDMAN - The impact is going to be caused by the flood when the water gets onto the paddock.

Mr STURGES - I acknowledge that, that we are not going to stop the rain coming down onto the land, but I will use the terminology 'no disadvantage' and 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 effected 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 appreciate what has been said. My recall is that with this new structure it will increase in a major flood event, the height by about 200mm I think it was, Mr Nichols?

Mr NICHOLS - In a 100-year flood, the stage height at the bridge would be half a metre.

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. Is that a fair comment?

Mrs NAPIER - I had two weeks at Coles Bay about two years ago and I think we got out of the shack twice. There was water everywhere.

Mr HALL - 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 - The feedback we are getting from Hydro is that the duration of the flood will be much shorter than that, not several weeks.

Mr HALL - No, I am not alluding to several weeks but I am talking about potentially some days if it is a slow-moving east coast low. Mrs Napier just talked about her holidays being interrupted.

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 NICHOLS - I am not sure I could really speak knowledgeably about that because I haven't considered it, even whether it breaks the banks. I really don't know at this stage.

CHAIR - Thanks gentlemen. If you would like to make room at the table and we will have Mr Walker and Mr Salmon come to the table.

Mr JOHN SALMON, LANDOWNER, AND **Mr FRANK WALKER**, AGRICULTURAL CONSULTANT, WERE CALLED, MADE THE STATUTORY DECLARATION AND WERE EXAMINED.

CHAIR (Mr Harriss) - Thank you for coming along, gentlemen. It is important that we hear your submission. If the committee feels it is appropriate, we can recall the departmental people to respond, but we cannot spend all day going back and forth. We need to take the evidence and make our assessment as we proceed. Mr Salmon, you have provided a number of photographs to our secretary. Do you wish to table them as complementary to your written submission, which we have already received?

Mr SALMON - There are some extra photos over and above what have been tabled before.

CHAIR - We need to be specific as to what you intend to table for us to consider and keep as part of what we already have as a committee to consider. Do you want to leave any of these with us or table them as part of your evidence?

Mr SALMON - They can stay here. All I require returned are the three originals.

CHAIR - Mr Salmon, please proceed as you feel comfortable. We have had your written submission before us for some days now. We have had the opportunity to read that and, as you would have detected, Mrs Napier has been referring to that so we are familiar with what you have said in writing to us previously.

Mr SALMON - 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.

CHAIR - If I can go back to the department's plan, that is somewhat opposite your house?

Mr SALMON - Right below the house. It goes up further but there is a drop-off in the stream the other way.

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. I have marked them all off in green but 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. In 1947 my father was trapped with the sheep. 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.

The older photos were taken, I can only presume, in the 1920s. One is of the north end of the bridge -

Mr WALKER - That is the proposed culvert site end.

Mr SALMON - This is the 55-metre span piece, and you can see that the bridge has been swept away. There is another abutment, which I cannot be sure of, but there may have been another bridge swept away.

Mrs NAPIER - That is Maclaines Creek?

Mr SALMON - Yes.

Mrs NAPIER - And the other one is the culvert area?

Mr SALMON - Yes, the old bridge was there.

Mrs NAPIER - When you see this section here, is there a creek or something that runs up there? Where does that actually stop?

Mr SALMON - You can probably see it on this photo, just under the bridge. 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.

Mrs NAPIER - So it actually comes from the creek and washes out from the creek banks.

Mr WALKER - It breaks out from the creek we have got there.

Mrs NAPIER - I thought it might have been coming from down the hill.

Mr SALMON - No, it breaks from here and breaks up here also. It just goes berserk. It keeps going down.

Mrs NAPIER - There is actually a creek through there, isn't there?

Mr SALMON - 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.

Mrs NAPIER - Which section is this on?

Mr SALMON - Right on the northern end where you come from the bridge.

Mr WALKER - We are talking about this extra space for culverts or extra bridge. This is a problem with it.

Mr SALMON - 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 - 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.

The one question that the Chairman asked, and it wasn't addressed - well, I did not notice it being addressed by the other party - was that of liability. My belief is that if flooding were to occur on this area, Mr Salmon would have a strong case to sue for damages. On the information that I have passed to the Secretary - you can see from my line of work that I get involved in agricultural losses, damage and litigation and appear before courts as an expert witness - I would be strongly encouraging my client, John, to go for the maximum if he suffers any damage from flooding over and above the flood levels that are occurring now.

CHAIR - If I could clarify the point there, Mr Walker, from my perspective - and the reason I didn't pursue that any further was that I was satisfied with what Mr Nichols had indicated. If he didn't say it, I think he alluded to the fact that a claim for compensation could well be made but he wasn't in a position to quantify or make any guess of valuation of that. I accepted that as his evidence at the time because that would be a situation which needed to be played out in a different arena to this.

Mr WALKER - Fair enough, I didn't pick that up.

CHAIR - It was a point that I wanted to clarify so hence the question.

Mr SALMON - All I wish to say is: please read that last note that I have presented. I live alongside the river, as our family has done since the 1860s, and all the technology of models and so forth may be okay, but what we see and what I have shown you is what happens to a layman's eye. To have culvert pipes and a large causeway would be a tragedy.

Mr WALKER - 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.

Mr HALL - Roughly, how many hectares are involved in where you grow your lucerne?

Mr SALMON - Eight or nine hectares in that flat.

Mr HALL - In regard to the water and the duration of the flooding, Mr Salmon, how many hours historically have you seen? Is it more than eight hours that water will lie on those paddocks at a time?

Mr SALMON - 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.

Mr HALL - Going back to Mrs Napier's question in regard to the tidal issue, Mr Salmon, I think you marked it on the map. With flooding, do you get any back-up of salt?

Mr SALMON - Salt water comes up quite -

Mr HALL - Yes. In a flood do you think you get any salty water going back across the paddocks at all?

Mr SALMON - I don't think that is an issue. The salt water comes in underneath, the fresh water is on top and that just breaks the bank because that is pushed out of the creek. If you look at the photo of the erosion of the creek, you will see that the creek isn't very

deep. It is quite a shallow creek so you end up with a 1.4, 1.3-metre tide - the rise and fall - and there is not a lot of water left in that. That section of the creek from the house down is really a part of the estuary.

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 - We were just talking about the size of those cattle underpasses. You can get a tractor and a trailer through; they are on the Midland Highway. Are they about 3 metres or 5 metres wide?

CHAIR - We can check with Mr Nichols later.

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.

Mrs NAPIER - If you were to put them there, what are the key points that you would identify as being the main creek flows?

Mr SALMON - Other than the main creek?

Mrs NAPIER - The main creek is fine.

Mr SALMON - This is the north end we are talking about. It is coming straight through to there.

CHAIR - Mr Salmon, so that we can refer back to this when we look at the *Hansard*, if we can describe that as almost opposite Vicary Street.

Mr WALKER - That is right, Mr Chairman, you are virtually opposite Vicary Street. There is a flow line that goes back to the north-west. It continued out where the printing is on this map.

Mr SALMON - You can see where the water goes - you can see the colour of the lower area.

Mr WALKER - I would emphasise that there is a significant breakage point if it does break out at the creek. You are getting this significant flow into this corner. I find it hard to understand why John's information cannot be accepted. The flow on the abutment of the bridge when it was first constructed had to be re-attended to, so that emphasises the fact that there is a problem there. You can play with hydro models and theoretical models as long as you like but you have to come back and look at the practical on-ground situation in the immediate environment. I think there is plenty of evidence to show there is a major problem.

Mr STURGES - Just for my benefit, referring to the plan of the proposed bridge, here we are here with this flow line, where is it going now with the existing bridge?

Mr SALMON - It goes straight underneath and out through there. There is nothing to stop it.

Mr STURGES - Just for my benefit, are you saying you need a couple of 10-metre new culverts?

Mr SALMON - Something like that to get rid of that water.

Mrs NAPIER - Following up on that, from the point west of the house, if you are getting some water flowing through there onto the paddock, the argument is that that would then flow back down under Maclaines Creek bridge.

Mr SALMON - No, it actually goes straight down through there. That is higher there.

Mrs NAPIER - Okay. So the area you are saying that is north of Maclaines Creek is higher and therefore the water is pushed across to be caught. That is potentially going to impact on your abutments as well.

Mr SALMON - There is a 400mm variation across there but the basic average is about 200mm difference. You can see the two breaks as shown.

Mr WALKER - This is the existing bridge photographed with the paddock looking down the flow line and this is what is going to happen. Largely it is going to be blocked in underneath.

Mr STURGES - Building a dam wall, effectively.

Mr WALKER - Exactly. It is not unreasonable to put some significant culvert structure or underpass structure in here. Can I put it to the committee that if you are going to start pandering to cyclists and people walking and everything along here, what is the cost of that compared with putting a special structure in here? Where are our priorities?

Mrs NAPIER - Are you saying then that these are the key points where the shaded area is or are you also saying there is an argument here?

Mr SALMON - There is one there. This is photo of the small flood. I was standing there and it was taken along that line of the bridge and you can see the water is all the way.

Mrs NAPIER - Where is the fence line that is shown there?

Mr WALKER - That's down there.

Mrs NAPIER - Okay. So that is there.

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 - At the moment?

Mr STURGES - Yes.

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 - And that would cause the damage to the land?

Mr WALKER - Oh, yes.

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.

Mr STURGES - Thanks. I have a better understanding now.

Mr WALKER - The productivity of lucerne has been quite high in that area. In some years John has been able to take two cuts, in others it has been one or two. If you average two cuts a year, with the present value of lucerne from that area it would be about \$11 000 from that 8 hectares per annum. You do not want extra problems brought about by having to move debris and so forth, impeding the effective harvest of the crop.

CHAIR - Is there anything else you wanted to say as part of your submission, Mr Salmon? We can proceed with further questions. I am just conscious of the fact that you may have some other points to make to the committee.

Mr SALMON - No, I think I would only be going over it again. It is the water lying on the paddock and it is the timber lying on the paddock.

CHAIR - 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 - June, July, August 1980.

Mr SALMON - Yes, a classic. It won't get away with blocked culvert pipes; it won't get away until someone cleans them out.

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.

CHAIR - Why not?

Mr SALMON - 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.

CHAIR - I accept that.

Mr SALMON - There is only a fence right at the waterline.

CHAIR - In essence, with the existing bridge you have a heap of box culverts.

Mr SALMON - Exactly, so nothing will change there.

Mr STURGES - The same configuration, the same area.

Mr SALMON - Yes.

Mr STURGES - Mr Walker, was that \$11 000 per annum with the lucerne crop?

Mr WALKER - That covers the value of the hay off there. You have the value of the grazing which I haven't put in to it.

Mr STURGES - Just the lucerne, is that \$11 000 each cut?

Mr WALKER - That is \$11 000 over, say, the December/January period; the hay taken off that over those two months or three months. That is the gross value and that is based on current prices of lucerne.

Mr STURGES - It is not insignificant, though.

Mr WALKER - It is not insignificant and the basis of that pricing is \$7 a small bale equivalent whereas Roberts are buying it into store and delivered in Hobart at the moment at \$9. That is gross value of course.

Mr STURGES - And then I take your point there is the grazing value too.

Mr WALKER - Yes.

CHAIR - Graeme and Evan, you have heard the presentations of Mr Salmon and Mr Walker. Is there any comment you would like to make to further substantiate your case, given what you have heard?

Mr NICHOLS - I might just mention I didn't quite see the figures that he provided regarding flooding. I have seen other figures that are based on monthly or weekly events but we are modelling 18 mm per hour over eight hours - in other words, we are modelling an event for a 100-year flood that is almost 150 mm over eight hours.

Mr STURGES - Chairman, can I just pick up a point there.

Mr NICHOLS - This is all fairly trivial.

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.

Mrs NAPIER - That is obviously debris up against the bridge at this spot here.

Mr NICHOLS - No, the spot is down there.

Mr STURGES - If I may, at the moment it is coming through there now because they have those archways at the existing bridge.

Mrs NAPIER - You are saying that the photo I have just given you is of the old, old bridge?

Mr NICHOLS - Yes, that is right. That is the old bridge, which was a fairly low affair.

Mr BOARDMAN - The existing bridge is much higher.

Mr NICHOLS - 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.

Mrs NAPIER - I accept that that is the old bridge, not the existing bridge but the older bridge, but there is certainly quite a deal of debris that was stacked up against it.

Mr NICHOLS - 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 HALL - The box shaped, you mean.

Mrs NAPIER - Yes.

Mr NICHOLS - A stock underpass is about 2.4 metres square.

Mrs NAPIER - Okay.

Mr NICHOLS - Why would you prefer a box culvert to something else?

Mrs NAPIER - I guess I was looking for a structure that would provide the greatest width that would not only cater for the water but also cater for a reasonable amount of the debris, given the point that was made by Mr Salmon that culverts are round and therefore tend to restrict at lower levels of water more so and you get a build-up of a few bits of

obstruction so when the water comes through a bit harder, you already have your culvert partly blocked because the bottom of it is round and it doesn't allow for rubbish to go through as well.

Mr NICHOLS - 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 NICHOLS - Yes.

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.

Mr STURGES - Water running that way from the rain, I think.

Mr BOARDMAN - It falls to the south.

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.

Mr BOARDMAN - How quickly, though?

Mr NICHOLS - 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.

Mrs NAPIER - Yes, I accept that it is much faster in the creek.

Mr NICHOLS - I reckon that is getting up around 3 metres per second, just as a guess, without having seen it. One metre per second is your average sedate flow for a bridge.

Mr BOARDMAN - The question you asked is how much longer will the water be there as a result of -

Mrs NAPIER - Particularly taking into account that this area here is higher than that.

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.

Mrs NAPIER - You are assuming that the paddock can still drain across here?

Mr NICHOLS - Yes.

Mr BOARDMAN - 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 - I think John was saying it was 200 mm.

Mrs NAPIER - He was saying there is a 200 mm difference overall and one spot where it is 400 mm.

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.

CHAIR - I am conscious of the time and that we have been deliberating for quite a while. You have travelled from the north and it has been a while since you have eaten. Is there a feeling amongst members that we are going to proceed much longer in taking evidence, because if we are we probably should break for lunch, but if we are getting close -

Mrs NAPIER - I don't think we will be that much longer.

Mr STURGES - I am pretty well satisfied at the moment.

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 STURGES - The arch.

Mrs NAPIER - You came up with an arch.

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.

Mrs NAPIER - I accept that. I have only ever seen the box culvert, that is all.

Mr NICHOLS - 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.

CHAIR - Two points, if I might. Graeme, you commenced this particular part of your contribution by referring to these monthly rainfall data provided by Mr Salmon. You further indicated that your modelling has been done based upon 18 millimetres over eight hours and then you said, 'So therefore this table is trivial'. Can I challenge you on that? I don't see that table as trivial at all because if I look at any one of those figures - if I take May 1969, which shows 210 millimetres - that may well have been 18 millimetres over eight hours so it is not trivial at all and you might like to reconsider that.

Mr NICHOLS - Producing a chart that says we have 300 millimetres over a month may not produce a major flood.

CHAIR - But it may? You concede that.

Mr NICHOLS - Yes, your point is that it may and I accept that point.

CHAIR - Finally, I think it is important for me to make the comment, particularly for Mr Salmon and Mr Walker, who I hope can hear with the speaker system operating, that you need to understand that the jurisdiction of this committee is one of only approving or rejecting any proposition which comes before us. We don't have the capacity to say that

our report is predicated on some amendments to the design. We either reject the design which is before us and therefore force the Government and its department to produce a new design, or we accept the design which is before us. That is the legislated mandate under which we operate. You need to be aware of that so that you don't go away from here today thinking that our line of questioning will be such that we might come out with a report which says we require amendments to the design. We may be able to use our best negotiating skills to prevail upon the Government but we can only do one of two things, approve or reject, so please don't go away with a misunderstanding of anything that has happened here today.

With than, thank you all very much for your presentations. We are going to keep the information which Mr Salmon has provided to us and return it to him at some stage, and thanks very much for that.

THE WITNESSES WITHDREW.