2002 (No.)

PARLIAMENT OF TASMANIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

DESIGN, CONSTRUCTION, FINANCING AND OPERATION OF THE MEANDER DAM

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

MEMBERS OF THE COMMITTEE

LEGISLATIVE COUNCIL	HOUSE OF ASSEMBLY
Mr *Harriss* (Chair)	Mr *Best*
Mr *Hall*	Ms *Hay*
	Mrs *Napier*

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

MAY IT PLEASE YOUR EXCELLENCY

The Committee has investigated the following proposal: -

DESIGN, CONSTRUCTION, FINANCING AND OPERATION OF THE MEANDER DAM

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

INTRODUCTION

Proposals to build a dam on the Meander River below Warners Creek date back to at least 1968. The site was cleared in preparation for dam construction about 15 years ago. The most recent study preceding the 2001 investigation was in 1995 by engineering consultants GHD Pty. Ltd.

The current lack of a reliable water supply for irrigation in the Meander Catchment is seen as a key factor limiting potential future expansion of agricultural enterprises. The pressure on water resources in the Meander Catchment has resulted in the need to limit and sometimes prohibit the extraction of water from the river during the irrigation season.

A water management plan for the catchment is under development and is expected to address environmental flow concerns through the implementation of higher minimum river flows. This increase in minimum flows would result in the need to reduce the irrigation water currently extracted from the river, which would reduce agricultural production and prevent the development of water dependent agricultural enterprises.

The Water Development Plan identified the Meander Dam as a strategic water development project for the State. In the 2001 budget, the Government allocated financial resources to carry out final feasibility studies for the Meander Dam as part of the implementation of the Water Development Plan. The Government also allocated $7 million towards dam construction in recognition of the community benefits associated with the project.

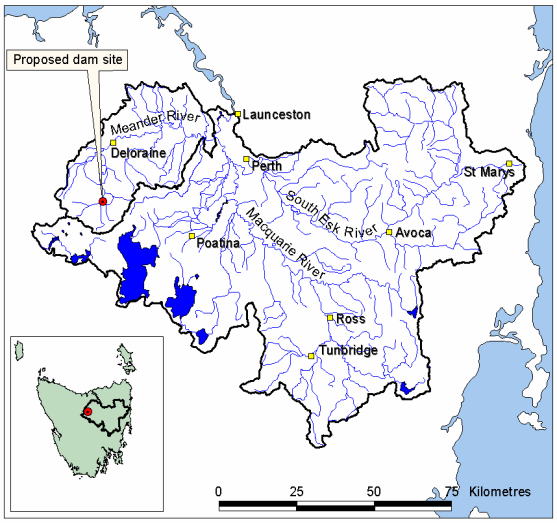
The proposal for the Meander Dam is to construct a dam wall with a height of 48 metres to contain 43 000 ML of water. Due to commitments to supply environmental requirements and domestic water users the dam will reliably supply 24 000 ML for irrigation purposes. The topography of the site results in the majority of the capacity being in the top few metres of the dam so a large dam is required to make the site economical. If the dam wall height was reduced by 3 metres the dam would have a capacity of only 34 000ML and small construction cost saving of $1.9 million.

The Rivers and Water Supply Commission (RWSC), a Government Business Enterprise, has ownership of the majority of the land that will be inundated by the dam. The remainder of the land to be inundated is State Forest.

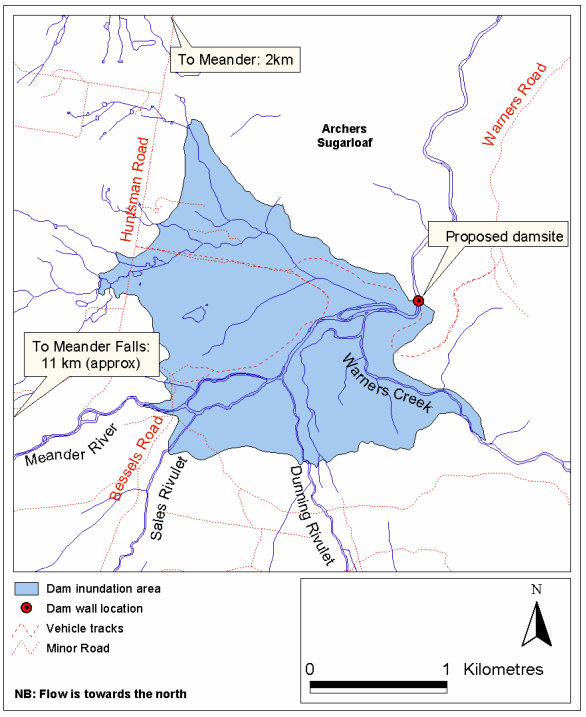
PROPOSED LOCATION

The Meander River is in Tasmania's central north at the foot of the Great Western Tiers. The proposed site of the dam is approximately 50km south-west of Launceston near the settlement of Meander. The dam will be at the southern end of the Meander Gorge, approximately 450 metres downstream of the confluence of the Meander River and Warners Creek.

- **Figure 0-1 Location Map of Proposed Meander Dam**



- **Figure 0-2 Immediate Meander Dam Area**



KEY TECHNICAL DATA FOR MEANDER DAM

A summary of the key physical data relating to the scheme is provided below. The data may be subject to change pending detailed design.

Dam name:	Meander Dam
Stream:	Meander River
Catchment area:	159km^2
Dam type:	Roller Compacted Concrete (RCC)
Dam wall height:	48 metres
Dam wall crest length:	170 metres
Full Supply Level (FSL):	402.0 metres ASL (above sea level)
Gross reservoir capacity:	43 000ML
Type of spillway:	Centrally located conventional spillway 28 metres wide with 4 off “Flowgate” spillway gates.
Type of outlet works:	Multilevel offtake built into the dam body with five intake valves and an emergency dewatering valve.

EVIDENCE

The Committee commenced its inquiry on Thursday, 7 November 2002 in Deloraine. The submission of Sinclair Knight Merz was received and taken into evidence, and the Committee proceeded to the site. At the completion of the inspection, the Committee returned to the Deloraine Community Complex. The hearing of evidence continued on Friday, 8 November.

The following witnesses appeared, made the Statutory Declaration and were examined by the Committee in public:-

- Jeff Gilmore, manager – Water Development, Department of Primary Industries, Water & Environment;
- Bill Lawson, Tasmanian Principal, Sinclair Knight Merz;
- Lance Davey, Davey and Maynard Consultants;
- Pat Price, Senior Civil Engineer, Sinclair Knight Merz;
- Ron Wyburn, Principal Engineer- Dams, Sinclair Knight Merz;
- Craig Woodfield, Tasmanian Conservation Trust;
- Sandy Tiffin;
- Kevin Knowles, Group Leader, Upper Meander Catchment Landcare Group;
- Donald Badcock, Meander Valley Dam Action Group;
- Neil Johnson, Meander Valley Dam Action Group;
- Marcel Jansen, Meander Valley Dam Action Group;
- Ned Terry, Meander Valley Dam Action Group;
- Tony Wadley, Meander Valley Dam Action Group;

- Warrick Holmes, Board Member, Meander Valley Enterprises Centre Inc.;
- John Tabor, Manager Meander Valley Enterprises Centre Inc.;
- Ron Nagorcka, Central North Field Naturalists;
- Rodney Stagg, President, Meander Resource Management Group;
- Lloyd Evans, Member, Meander Resource Management Group;
- Neil Atkins;
- John Hayward;
- Kerin Booth;
- Paul Ranson, General Manager, Meander Valley Council; and
- Ian Howard, Technical Services Manager, Meander Valley Council.

Background

Mr Gilmore gave the following background of the project to the Committee:

> *… the dam proposal has been around for an awfully long time. It was very nearly built back in 1989 when the then Government committed to building the project and cleared the site and purchased all the private land that was to be inundated but then a change of government came along and the project was put on the backburner.*
>
> *The current Government however has a well-stated goal to double the value of primary production in the State by 2008 and, as part of that, the Government commissioned a water development plan for the State which was going to provide a strategic framework for water development and agricultural development. It also covers a whole range of other aspects of water development, including the domestic and industrial use of water. It also covers many of the environmental aspects associated with our fresh water ecosystems. That provided a strategic context for the Meander dam which was identified during the Water Development Plan as a major regional strategic opportunity and, because there had been quite a lot of work already done, it meant that there was a substantial body of work already available to consider.*
>
> *In terms of the project structure, the Government asked the Rivers and Water Supply Commission, as a government business enterprise, to act as the proponent for the dam. In some ways this was a matter of convenience. The Rivers and Water Supply Commission does have a charter to develop irrigation and, as it turned out, the Rivers and Water Supply Commission was the body that owned the titles to the land that was to be inundated. As I say, it was as much for convenience as anything else that the Rivers and Water Supply Commission became a proponent.*
>
> *The Water Development Branch of the Department of Primary Industries, Water and Environment, for whom I work, is acting as project manager on behalf of the Rivers and Water Supply Commission during this feasibility phase. Hydro Tasmania was*

chosen as a consultant to conduct the feasibility studies through a public tender process, and this was nearly 18 months ago now. In last year's Budget the State allocated $7 million to the project, the Commonwealth has allocated in this year's Budget $2.6 million to the project out of a $24 million project.

... I want to make it clear that the project we are talking about is the construction of the Meander dam itself. That will be used to release irrigation water down the river where it will be up to the farmers to pump the water out of the river and utilise the water on their properties … The primary focus of the project is on irrigation. There are two elements to that. The first element is insuring that the current levels of production in the valley are sustainable into the future and also providing opportunities for future growth. The current levels of production, in our estimation, are not sustainable. There would need to be a reduction in the volume of water currently being used over the longer term and this has been shown not last summer but over the previous two or three summers prior to that, where irrigation had been severely constrained by water restrictions. So what we are hoping to do is use this project to allow current levels of production to continue and for there to be substantial growth in production.

There are secondary benefits to the project, with a substantial increase in the environmental flow that will be going down the river in summer. That will provide some community and social benefits. There are some broader regional benefits from the economic activity as well and there are also opportunities for power generation with, as I said, the mini hydro not being part of this project in a formal sense, but the environmental flows coming out the dam will be used by Hydro Tasmania to generate electricity.

Investigations

Mr Lawson outlined the investigations that had been undertaken regarding the project:

The desktop review has been undertaken at previous studies, of which there have been several. In the late 80s studies were conducted, as Jeff has said earlier, and the site was cleared. In 1994 there was an investigation of alternatives including the farm-dam options and again Jeff has already mentioned those. Then last year a major engineering environmental and economic study was conducted by Hydro Tasmania and their subconsultants into the dams, so it is not a recent thing. This is a project which has been on the books and has been looked at from various directions by various parties and it is significant of course that it has always proved robust enough to come up with ticks in the appropriate boxes from all those points of view.

In terms of stakeholder consultation, the Meander dam was proposed in 2001 as one of the responses to a call for water development projects that were made by the Government.

Meander dam was one of those. There has been a wide level of involvement in terms of sharing information with stakeholders and people who may be interested. There has been a very substantial newsletter process. The statutory DP and EMP (Development Proposal & Environmental Management Plan), has been advertised nationally for public comment, the community meeting in Deloraine discussing feasibility studies has been well attended and well subscribed. Importantly, too, there have been meetings with people who have seen some downsides to this and there has been an endeavour to understand all those viewpoints and to take those on board and do what can be done to accommodate those without compromising the project proposal.

Risk

Mr Lawson made the following submission in relation to the risk management of the project:

There is a very formalised process now in major projects for identifying risk and importantly identifying the consequences of those risks, what can be done to militate against that and control that. Sometimes of course in some projects those considerations might arrive at a point of intolerance where really a project is not able to proceed because those risks are so bad or so high.

That has not been the case in this project. Two major risk analyses have been done. One has been done for the entire project involving stakeholders, consultants and DPIWE staff. When we came on board we were very interested to see how far that had gone this is before we were heavily involved. We came on board then and got heavily involved in looking at the technical risk, particularly the dam engineering, and that is where we have relied very heavily on our pro and Ron Wyburn in terms of understanding those risks and making sure that the advice being given to our client or to Government is at world's best-practice levels. Those risks have been very carefully weighed up. As a consequence of assessing the risks, there is an allocation of risk in terms of who is to handle certain risks - this is all part of mitigating the risk - and what can be done to offset the particular risk. In the document that you have with you, there has been some allocation in terms of land ownership and Hydro Tasmania, certainly in terms of the granting and undertaking of getting funding approvals. You have heard something of the Federal and State Governments and Hydro funding of the project, and of the area of water agreements, which is all about taking up the available water. So that opportunity can be created but it must be taken up.

Then in terms of risk allocation, there is of course the actual project execution - the design and construction and financing - I probably should have had that at the front - as well as all the commercial risks. It is important to stress that risk analysis has

been undertaken in a very formal manner in accordance with Australian risk standards.

If we now move to the area of project delivery, there have been many changes to project delivery during the 30 years of my professional practice. In the last 10 or 15 years, there has been an acceleration of various permutations and combinations of project delivery. Gone are the days of somebody doing a design and saying, 'I want this built'. Often today we are seeing people specifying a functional requirement, saying to the markets in the widest possible sense, 'How might you fulfil this functional specification for this thing that I want?'. So what we have is a project which is seeking all aspects of the project in terms of some 50 per cent of the funding, the design, the construction and the operation. So it is seeking to be procured or have the project delivered in that sort of environment.

The first step of that is a call for expressions of interest. The call has been made and, as you've heard earlier, those expressions of interest - I think seven in all - have been received and are unopened in secure care of Treasury. We can't open those until this committee takes its considerations. Once they are opened, they will be assessed against pre-set criteria which are focussed on the objectives of the project, and I won't go back across those.

The role of Sinclair Knight Merz in that process is of professional adviser, and there is also a probity auditor appointed. At this point I declare to you that Sinclair Knight Merz has no other involvement in this project and it is important that we are able to offer impartial professional advice to government. Once that assessment process has been undertaken, there will be short listing of consortia. As I have said, they are unopened; we only know the titles and the makeup of the bids as provided within the expression of interest process, and obviously there are some interesting groupings of interested parties within that. They will need to be short listed and they will be invited to tender. So that will be a request for a proposal, and the tendering process will encompass the agreements, the permits and approvals that will have been undertaken as part of the risk mitigation measures by government. It will be a commercial proposal that is being sought. So it will be, to repeat, the funding, the design, the construction and the operation.

So it's a long way from just asking somebody to build a dam to this design; it is a procurement process which is very current and very open to drawing the best possible response from the commercial players out there. Moving now to the project description. To state the obvious, the dam is to be constructed to increase irrigation and to use the irrigation flows to generate electricity through the Hydro scheme. There are supply-pipe priorities in terms of that irrigation employment. There is the domestic and stock-water environment.

The environmental flows are very low during the summer so it will create a more environmentally sustainable flow through the river during the summer months. And then there are the irrigation and the commercial aspects and my colleague will come to those in just a short while. We have been to the site this morning so the location is well known to you.

The Committee questioned the witnesses as to what, if any, assessment had been made of the risk of leakage of the dam or its potential impact upon any karst systems in the area. Mr Lawson responded:

The Huntsman Saddle area is the area of greatest concern in the sense that the top surface level is driven by the landform that we drove out to and looked at. The distance from the surface down to solid rock represents a zone in which leakage could occur. However, the terrain is very flat and hydraulic gradients are such that it is not very conducive to leakage. However, one of the approval conditions … is that there be a monitoring regime set up in that area, which is established before the dam is filled, to understand the ground-water flows in that area before the dam is filled and then afterwards, and that that be undertaken by a competent and independent body, I think it says, to understand and report on that so that any such monitoring is a condition of the approval.

Mr Wyburn added:

All dams leak but the amount of leakage ranges from something too small to see or measure to something that would concern you. On good foundations or less than good foundations, if there is concern about leakage around or under the dam then you drill a lot of holes into the rock and you pump in a mixture of cement and water and sometimes sand at very high pressure which finds its way into joints and hopefully seals them all up. Leakage around the dam is something that can be investigated and largely avoided. What little might still occur is really of no great consequence in relation to karst phenomena. I am not personally familiar with the geology of the area, but I do note that there is a reference in one of the geology reports to the fact that there are no known areas of karst typography in the vicinity of the dam site and storage area. In the Huntsman Saddle area there are interbedded layers of a calcareous nature which could conceivably provide a conduit for water, but on the face of it there would not appear to be any significant loss of water or consequential effects.

Mr Gilmore was recalled and made the following submission in relation to leakage at the dam site:

There's been quite a lot of meshing together of what are separate engineering issues and I think this is a good case in point. Kevin Knowles pointed out that at the place where the dam wall will be built there are a couple of known faults and Hydro Tasmania hired as a sub-consultant a company called Coffey Geosciences Pty Ltd who are well renowned for their geotechnical expertise. They do geotechnical work all over Tasmania and all over the world.

They had a look at those faults - they're there and they're real. But one of the questions that needs to be asked in each of these things is how much money is it going to cost you to fix the problem and how much money is it going to cost you to work out how big a problem you've got? A lot of these issues are ones where you could spend $0.5 million to determine that you needed to spend another $100 000 to fix the problem. So a lot of the professional judgments that we've hired specialist groups to advise us on are about those sorts of judgments. The judgments about the fault lines at the dam site itself are that they are within the normal engineering bounds of a project like this. Typically - and Ron can explain it a bit more fully - they would use this process called grouting to seal up that area of the dam.

The second issue which is quite a separate one is the issue of leakage at Huntsman Saddle and I think as a recent witness - Terry, late of the Rivers and Water Supply Commission - pointed out there are some issues over there where there are some springs and as you can see from this map there are some creeks and so forth going in both ways split by the Saddle itself. Again, you could spend an awful lot of money determining whether or not the water is going to leak out of there. You may not get the right answer but it may not cost you very much at all to fix the problem.

So the advice from our specialist is that because of the lack of water pressure up here - it's only going to be wet when the dam's full - the issue is unlikely to occur. They had a look at the Rivers and Water Supply Commission work that had been done 10 or so years ago and their judgment is that it's not likely to be a problem.

However, they do recommend that we monitor and if there is a problem then that's the sort of area where they may well just put some clay across that part of the inundation area to stop it leaking through. So it's not a big technical solution per se, it's not necessarily going to require grouting or some of the other engineering solutions. It really might mean just be putting an impermeable layer across the ground where it's flooded there. And, again, you'd probably spend a lot more money finding out how big a problem you had than you will ever spend fixing the problem

Mr Wyburn added:

Seepage is possible out of any reservoir, either under or around the dam or from low points around the perimeter of the reservoir. So essentially the two potential areas of leakage out of this reservoir are the ones that have been identified at the Huntsman Saddle where the ground slopes that way in this direction and that way in the opposite and the very low point roughly here is approximately eight metres to nine metres above the full supply level. And it's also perhaps a couple of hundred metres away from the nearest point of the reservoir at which point the reservoir is

very shallow. So the sort of driving energy for getting water out of here and into the down slope towards Meander is very low.

There is no significant pressure driving wa ter out of the reservoir and it is only gravity that really does that so certainly monitoring can be done of the groundwater situation prior to construction. If that is initiated fairly soon that can take account of seasonal variations to see what the benchmark pattern is and then those same sites can be monitored during and after construction. If there is any detectable change in the rate of seepage then there are several possible ways of intercepting and stopping that if it is considered to be detrimental. It may well be that a small amount of leakage that might appear would be not at all detrimental. That is a judgment that could be made when the data was available.

There are several sort of techniques which would be feasible depending, to some extent, on the nature of the soil and the profile of the underlying bedrock, including clay blankets or cut off trenches, as it were, filled with an impermeable barrier. As with any dam project, there are technical issues to be addressed and if there are problems, solutions to be devised, but there is nothing out of the ordinary in relation to this dam.

Similarly, at the dam site itself, on the basis of the surface mapping and the preliminary drilling that has been done in the area of the dam itself - and I think there has been something like 15 or 20 holes drilled down to map the rock structure - it is recognised and known that there are faults which cross the river more or less at right angles and more or less vertically both upstream and downstream of the dam itself. It is normal practice in going from the feasibility stage to the final design stage with any dam to carry out more focussed drilling which is geared to this particular structure in this particular location so, for example, you would want to be sure that there wasn't a significant leakage path from the material in the fault zone upstream to any area downstream.

And so one of the features of any additional investigation would probably be to delineate these particular faults more closely, but because of their orientation it may very well be that they are not significant, that there isn't a direct connection between the reservoir and the river downstream via one or other of those faults. Under the dam itself, as we have said earlier, it is normal to ensure a nearly perfect cut-off by drilling from somewhere near the upstream toe, a series of vertical holes and these holes would typically be about half the height of the dam - 20 to 25-metre deep holes. Initially you would put them in at something like five-metre spacing and you would pump down into them cement and water mix under quite high pressures which would then force that material into any fissures that existed in the rock under the dam. By that means you greatly increase the length of any possible

seepage path and by that means you greatly reduce the extent of any seepage under the dam.

It is a very conventional technique universally used under any dam really - certainly any concrete dam - and I should say if you do get any significant quantity of that grout material being absorbed by the rock, then it is normal to go back and re-drill intermediate holes in between the pattern that you first drilled at, say, five-metre centres. You put down another set of holes and you grout those and eventually you get to the point where you cannot literally pump any more material in and at that point you come to the conclusion that you have effectively created a very good extension, I suppose you could say, of the dam into the material on which it stands.

If, however, having done all that and having filled the reservoir you were to find that you could see flows downstream that were obviously coming from behind the dam then what is commonly done and would almost certainly be done in relation to this dam is to incorporate in it what we call a grouting gallery, that is a continuous passage along the base of the dam to which you can, if necessary, return and from which you can, if necessary, drill additional holes to put more grout into any suspect areas.

So in dam engineering terms the issue of potential leakage out of the reservoir from whatever point or in whatever fashion, is something which is not uncommon. Each case is unique in its own way but there are many common characteristics and the methods for solving such problems are long established and almost always successful. Where they are not successful might be in cases where you have material such as karstic limestone where you can have very large literally caverns, underground rivers and the like which are very difficult to completely plug.

As far as we know nowhere in the immediate vicinity of the reservoir is there any such karstic limestone or even limestone at all, so our assessment, which is essentially of work done by others, is that the conclusions they have reached are rational. They have concluded that there aren't any insoluble technical problems and we agree.

Technical detail

Mr Lawson outlined the technical specifications of the works:

It is proposed that this dam be constructed using a techniques known as roller-compacted concrete. The concrete is placed in a very dry form. It is perhaps best described as the use of earth-moving technique in the placement of concrete. Once it is placed it is then vibrated to produce a dense mass of concrete. The proposed dam is a mass dam. It gains its stability from its mass.

It is stable because of its bulk and the application of gravity through that bulk. The roller-compacted concrete is a preferred technique these days. I have looked into alternative forms of dam construction and the use of this method is clearly, in our view, the best way to proceed. But as I have said, this will be a design construct environment in which the project is delivered. There is the potential for ideas which may give us a surprise to come through the tender process, but we are pretty confident that the roller-compacted concrete dam is the way to go.

We are talking about a dam that is 50 m high and 170 m long on the crest. It has five take-off points. There are five octate points to allow the take-off of the water at the best possible location for the use of the water downstream. So that will be a matter which is monitored. The quarry that will be necessary to produce the stone for the construction, to form the concrete, is on-site. That site will be part of the inundation area so it will be used before it is flooded. The mini hydro station has a single 1.9 capacity turbine proposed with a flow range between 2 and 5.5 hu-megs, which is technical mumbo jumbo for how much water goes through it. It is a significant contribution to the State's electricity, such that Hydro - as you heard earlier - have agreed to a contribution of $3 million - as I recall - into the finances of the project.

The key technical data - I have probably moved across some of this already. The dam proposal has been shown to be technically feasible. The roller-compacted concrete method has been identified as the lowest cost construction and it is a proven technology; there is no guinea-pigging in this.

Environmental impact

Mr Gilmore summarised the environmental impact of the proposed dam as follows:

… a dam does have an environmental impact and we have spent quite a lot of time and effort studying that impact. The impact though comes in three major groupings. The first impact is in the inundation area itself where the plants, animals and the habitat are lost due to the inundation and where Aboriginal and cultural heritage is flooded. And there is also a construction impact with things like roadways and machinery moving around, and the quarry and so forth. So there is a constrained environmental impact in the inundation area itself.

Probably the one where most of our attention has been focused is the dam itself. A dam of this scale is going to have a major impact on the flows downstream. And it is the impact of that changing flow regime that we have studied. Fluvial geomorphology is the technical term to describe how that flow regime is going to change.

The vegetation along the river itself is also an important component in the ecosystem and there will be an impact on that. There will also be an impact on the aquatic ecosystems themselves, the fish and the insects and so forth that live in the river itself.

The third area of environmental impact that we have spent quite a lot of effort in studying is irrigation. We wanted to make sure that the water that was going to be available for irrigation was going to be able to be sustainably used and that the farming practices themselves would be sustainable.

Our view is that the environmental impact of this project can be managed and managed successfully. Already the Environmental Management and Pollution Control Board has issued an environmental protection notice outlining a whole range of measures that the proponents of the project will have to take into account and deliver on. The mitigation and monitoring and adaptive management identified in the approvals process is also locked into that environmental impact management.

The Committee questioned the witnesses as to what, if any, potential existed for upstream landslips to have consequential effects on sediment and nutrient levels in the storage area.

Mr Gilmore submitted:

Essentially the dam isn't going to change any of the activity that occurs upstream. I mean, that is clear. It won't have an impact on upstream landslips. However, the reverse will apply - when there is a large landslip upstream it will have an impact on the dam, and part of the design of the dam is about managing that impact, because the sediment would then move down and essentially be captured by the dam and remain in the inundation area. That is acknowledged in the engineering feasibility study and there are some provisions in that to account for that sedimentation effect. So in a sense whatever occurs naturally above the dam in the catchment will continue to occur. What will happen is the vast majority of the sediment created by those events will be captured in the dam and the townships downstream from the dam will be less affected by the sedimentation effects created by those landslips than they would have been in the past.

The nutrient issue is going to be managed in the dam itself. Bill Lawson pointed out the multi-level off take. That is really about water quality, to ensure that the water quality can be maintained at all times so that the water is taken from a vertical layer that provides good water quality so that you don't get water that has been sitting on the bottom, that remains cold. You can always be taking water off the top that is warm, aerated and oxygenated. So our view of the dam is that the water quality will be improved

downstream from the dam and it won't be having a direct impact on the landslips above the dam.

When asked whether the dam would increase the possibility of landslip, Mr Wyburn submitted:

As a generality, I think you would have to say that it is unlikely ... landslides tend to occur if you have soft material which is on a relatively steep slope. It tends to occur around reservoirs, particularly if the level falls rapidly, locking in the residual water pressures in that soil. My fleeting acquaintance with this particular site is that where the ground is soft tends to be on fairly flat slopes - in other words, where there is deep weathering. Where it is steep it tends to be rocky with very little topsoil cover. The pattern of operation of this reservoir is likely to be such that there will not be extremely rapid rates of fluctuation. As a general observation one would say that reservoir-induced landslides around the perimeter of the pond are fairly unlikely - and that is really as far as one can go

The Committee pursued the matter of the effect, if any, that the dam would have upon river flow, specifically in relation to representations made to the effect that the dam would prevent 'flushing flows'. Mr Gilmore submitted:

… Our view, when you look at the hydrology over the 35 years of data that we have, and size of the dam, is there will still be substantial floods going down the river. In fact, I think over a two year period it will remove about one in three of the floods only, if that, so you are still getting a substantial flood going down the river each year basically. The dams will fill easily, based on the hydrology work that has been done, and that won't be an issue. The flushing flows will continue.

Mr Ian Howard, Technical Services Manager of the Meander Valley Council made the following submission in relation to the environmental impact of the dam:

The Council is of the view that there are three main areas environmentally. One is the effect on the river system itself. The Meander is a fairly highly stressed river at the moment, especially during summer, and we believe there is a considerable advantage in the dam being able to provide an environmental flow during summer. That also has a positive effect on town water supplies at the moment. Especially the Deloraine water supply does rely on putting a sandbag weir in the river each summer just to hold enough water back for the town. It does get that low. So there are considerable positive benefits for the security of those town supplies in a higher summer flow in the river. Similarly for Exton and Westbury, both of which draw their supplies directly from the river. So we believe there's a positive benefit there. As to the winter time benefit, I think the DP and EMP says there should be

approximately a 50 per cent reduction in major floods. That's a significant benefit because at the moment major flooding over the last few years has caused significant damage, both to Council's infrastructure and also to agricultural infrastructure. If that can be reduced that's certainly a net positive effect. One area it does affect is the low lying area through Deloraine especially. So if the frequency of those events can be reduced there's a benefit there.

Our submission does highlight a couple of management issues which Council are well aware of. One of them, which is fairly topical at the moment, is salinity. If there is increased irrigation then that has to be managed. But again, it can be managed to make sure we don't end up with the negative impacts of that. That's probably about all I need to say about that.

So I guess in conclusion with our submission we just want to make fairly clear the Council has been, for a number years, a very strong advocate for the dam. We have been involved in a number of public and community processes to try to bring to dam to fruition. But the actual decision the Council made for supporting the current proposal was made after having been provided with the full DP and EMP. They were satisfied that had gone through a very rigorous process and reached a strong majority around the table to support the current proposal.

Mr Knowles, Group Leader of the Upper Meander Catchment Landcare Group made the following submissions in relation to the impact of the dam upon the fauna of the area:

…in relation to wedge tail eagles. Now, there is a nest with wedge tail eagles - an active nest - within three kilometres of the dam site which is directly opposite the dam site in a U-shaped valley.

Now, blasting - they just dismiss this saying it is not within one kilometre. I am sure in a U-shaped valley if you are blasting, it is going to directly affect the wedge tail eagles and their breeding.

Our submission to this - the swift parrot and the Australian green parrot were not mentioned in the project description but are not addressed in the DP and EMP. There have been sighting of the swift parrot in and around the proposed dam site. The study for the swift parrot was done in the middle of winter. The swift parrot is not present here and this morning I actually came down to meet you at the dam site but I was too early, or you were too late, and I heard two swift parrots calling at the dam site where you would have parked your cars. This has just been fobbed off

The swift parrot feeds on ovata viminalis and basically we don't have any blue gums up here. The DP and EMP states there is no ovata viminalis on the dam site

The fish population: there have been no proper studies. Peter Davies did a study four years ago. He questions the mythology of their freshwater studies. He also seriously questions the effect that it will have on the trout populations. In the DP and EMP it states that there will be a negligible effect on the brown trout populations. But, as the Huntsman is a major spawning area, he considered it is going to have a significant effect on the trout populations, which will have an effect in the local area - as the Meander River is one of the most fished rivers in Tasmania, it will affect the economics of the area. Fewer people will come fishing because there will be not enough fish there.

He also questions the eel populations. There has been no study. There is the question of relocating the silver eel by manual means. There are no studies being done to say how many eels are there. There might not be enough eels to put in there or there might be too many; who knows what the balance is.

Mrs Kerin Booth made the following submission in relation to the impact of the dam:

We have enough evidence that resources around the world have been exploited at the cost of irreparable environmental damage and destruction. There are many instances where the damming of rivers has been regrettable to say the least …

… The Tasmanian technical report on surface and groundwater management, availability, allocation and efficiency of use on the Australian natural resource web site indicates that there is a lack of information on water use, that makes it difficult to estimate natural catchment flows and sustainable yields. The difficulties in monitoring environmental flows arise from the problem of unaccountable water use. I believe that there is an urgent need to install water meters immediately and monitor current water use for a number of seasons to get a realistic assessment of water use. We may be able to achieve environmental flows without the dam, if a realistic price was charged.

Farmers may also lose interest in the dam and find alternative farming practices, instead of paying heavily to irrigate crops and dairy farms. I believe that we are only at the infancy stage of effective environmental monitoring. There is no certainty that there will not be any negative impacts to water quality, riparian flora, aquatic and amphibian fauna and terrestrial fauna. Even with all the best monitoring and application of the conditions of this project, the damming of the Meander River may be proven in the long term to be a significantly threatening process.

Aboriginal and European cultural heritage

Mr Gilmore outlined the impact that the dam would have upon a number of cultural heritage sites located within the inundation area:

> *In the inundation area itself, five Aboriginal heritage sites had been looked at. We got a specialist in Aboriginal heritage to go and look at those sites again, relocate them and provide us with an assessment of them. The assessment was that the best way to manage those sites would be to seek a permit to enable them to be flooded but for there to be no other activity to disturb those sites. That has been incorporated and already that permit has been granted.*
>
> *There was European cultural heritage in the inundation area as well, particularly some old sawmills. Most of the useful equipment from those sawmills has already been relocated to the museum in Launceston. There is one old piece of machinery that is well rusted and quite damaged which we will move out of the inundation area and place strategically along the side of the dam.*

The Committee questioned the witnesses as to whether there was any negative response from the aboriginal community regarding the inundation of the aboriginal sites. Mr Gilmore responded:

> *No, there was not. We started communicating with the aboriginal community right at the beginning of the project and, because these five sites had been identified on the database, we knew there was a potential for sites to be around and we wanted to make sure we knew where those were. We started, as I said, communicating with the aboriginal community very early on and they were quite supportive of the process that we were going through. There was no fallout at all subsequent to the issuing of the permit. I think it would be fair to say that the sites don't appear to be particularly significant nor large but they are there and we now know where they are and we have a much better handle now on the significance of them. It has been very cooperative*

Flora

Mr Gilmore detailed the impact of the proposed works upon the flora of the site:

> *… the inundation area was cleared back in 1989 and what is there now is an enormously rich habitat that has grown back since then. In some places the vegetation is impregnable and in other places there is a rich mosaic of habitat …*
>
> *There are also some pomaderris, which is a one- to three-metre shrub on the national endangered list. There is a group of about*

30 plants up on the side of the inundation area. The plant that I'll go into in somewhat more detail is the next one on that list, Epacris exserta. There's a lot of complex taxonomy about the plant that I will give you a very brief flavour of. But there are about a 120-odd plants actually at the construction site itself, at the dam wall site, and there are populations of them downstream. There are other flora and fauna present but they were not significant. We carried out a range of surveys for flora and fauna throughout the area. There were reports of a number of endangered plants and we went out and specifically looked for those plants and could not find them. We then followed up with other specialists in the field to make sure that we weren't missing something. There have been some transient sightings of various endangered species: swift parrots, wedge-tail eagles and all of these things. But I think the specialists would argue that they are not an integral part of this area; they are just moving through…

Spotted-tail quoll

Mr Gilmore made the following submission in relation to the impact of the dam upon the environment of the spotted-tailed quolls:

… the area to be inundated has proven to be one of the richest hunting habitats for spotted-tail quolls that has been identified in the State … the spotted-tail quoll, is a listed species both in the State and nationally; as I indicated, the cleared area has formed an excellent hunting habitat. While there has been some work done on the quolls in the area, and indeed we received a report from the student who carried out a lot of that work in the feasibility stage, not a whole lot is known about the spotted-tail quolls. But the best estimate is that there may be up to 12 individuals affected in the inundation area. The home range for these individuals is actually in the forested areas surrounding the dam site itself but they move out of the forested areas down into the inundation area to hunt and there is some suggestion also that they migrate through that area as well.

A lot of that information is not clear and the specialists do not have a really detailed handle on the impact that it is going to have but the issue for quolls is that they are very territorial beasts and they are going to sort out their territoriality amongst themselves and that is going to have an impact on the individuals. Our expectation is that over a five to ten-year period with that habitat newly created beside the dam site the population of quolls will return to its former levels.

We have talked about that habitat renewal for quolls but we will also be using that for all of the other invertebrates and vertebrates living in the area that re-creation of habitat will go some way to offsetting the loss in the inundation area. We are also working

with our colleagues in Forestry Tasmania to ensure the forest management plans in the surrounding State forest reflect the sort of activity that is going on in the dam. One of the provisions that has been put in the environment protection notice is this slow clearing of the area to enable the animals to move out in a slow adjustment way.

The reason for clearing the site initially is to get all of the organic material out of the inundation area because as that starts to rot down, if it is covered with water then that will lead to water quality problems. So the area will be cleared of as much organic material as we can and that will include removing, for example, an old tip site at the very southern end of the inundation area and a couple of old sawdust pits from the sawmills. All of that material will be removed from the site. We will also be undertaking research and monitoring to ensure that our activities are having the effect that we are looking for.

Mr Woodfield made the following submission regarding the impact of the project upon the habitat of the quoll:

The spotted tail quoll is … an icon species of Tasmania. Tasmania is the species stronghold; the species is recognised to be in decline and this dam will effectively destroy one of the densest populations in the State. It is conceded that the habitat will be lost and the individuals are likely to be lost as well - a figure of between 10 and 12 individuals is widely accepted.

The mitigation measures that the proponent put forward to prevent this are totally insufficient and the subject of an appeal, the preliminary hearing of which is on Monday. Creating new habitat for a species is a very dicey proposal. It is difficult to see how the proponent could be assured of preventing a loss of ecological value of spotted tail quoll, particularly as the key issue with this inundation area is not that it has been logged or whatever. It is the fact that it is riparian, it is river vegetation and a riverine environment.

The areas that have been put aside by the proponent as new habitats for the spotted tail quoll aren't their habitat. They don't have those valleys, and also, considering the continued decline of the species on a State and regional basis it is difficult to see how that population could then be regained over what is effectively a very long period of time. We are talking 10 or 15 years before the habitat in the new areas would be up to the quality of the habitat in the inundation area.

Epacris aff. exserta (Union Bridge)

Mr Gilmore described the impact of the proposed works upon the plant *Epacris aff. exserta* (Union Bridge):

> *Having looked at those issues in the inundation area we will now briefly look at the issues downstream because, in effect, this became perhaps the most complex of the management issues. I have just dubbed this the epacris story because this little plant that lives in a very small habitat, a metre wide and a metre high from the edge of the river channel, links all the elements of the downstream story together. As I mentioned before, there are some plants at the construction site, about 120. They will be destroyed in the construction process and there is not a lot we can do about that. The other issues are we are making sure that changes to the water flows are not going to affect the habitat of the plants, whether the changes in the flow would waterlog the plants or dry out the plants too much. What our assessment shows is that with the proposed environmental flows, irrigation flows and the like those changes will not have an impact on the plant.*
>
> *The other change to the plant is going to be due to the sediment transport of the river. This will have an effect because the sediment that is transported down the river forms the basis of that habitat. Typically what we are seeing down through the gorge - we stood at the very top end of the gorge today - is that areas of this plant, Epacris exserta, are ripped out during flood events and then sediment is redeposited and then the plants grow back again.*
>
> *The other issue we are interested in is whether erosion and deposition further downstream would change and we have developed a risk management matrix to identify where those risk areas are and to put in place some measures to see whether we can manage that risk.*
>
> *… The reason I have been very careful in my terminology here and have written the botanical name out in full is that there is quite a lot of uncertainty about the species and its status, so this Epacris aff. exserta (Union Bridge) refers to the particular plant that only exists in the Meander River and the Mersey River, and our botanist tells us after quite a lot of study that almost certainly this plant is not Epacris exserta, which is the South Esk heath, and it is either a species of its own or it is related to another epacris species called Epacris maculata. In order to do all that taxonomic work to prove up what we were studying didn't seem to be of much value to us, so we have treated it as a separate species in a study area, and all the study that we have done has been on the basis that it was a species in its own right. That in fact would have lifted it up the scale of how important it was on an endangered or vulnerable status rather than diminish that status, and all of the studies we have carried out have been on the basis that it was a*

very limited population with very, very limited numbers. And so we carried out a whole range of studies on this plant. We did a risk assessment, we looked at where the population was, we mapped the habitat, and we did characterisation of the river to make sure we understood how the different habitats were important to the plant. The plant basically grows everywhere, but what happens is flood and drought events clean it out of those places where the habitat is not conducive, and in those areas where the habitat is conducive it lives to a ripe old age.

We also importantly did what is known as an extension survey. We had a lot of difficulty early in the project because the information that had been used to list the plant on the various registers had been very limited and unfortunately, as with all of these things, when you do a scientific survey the survey is really only as good as the accuracy and the amount of effort that goes into it. There are scientific techniques and statistical techniques that were used, but we in a sense had to provide a lot more information about the plant than had previously been in existence. So we went looking for the plant in other places. There were, I think, two or three populations known in the Meander, and a couple of populations known in the Mersey, but what we did through this extension survey was first of all look at maps and aerial photos and say, okay, where are the likely habitat areas for this plant, and then we went out and searched for them, and basically we found them everywhere we looked.

… At the moment we are aware of 21 different populations of this plant for 7 000 individuals. In the Gorge itself, which is critical in the sense that it is the most upstream population of all and it is also the largest single population, there are about 1 800 plants. There is another Meander population that we drove past today where there are nearly 1 000 plants. But over on the Mersey there are at least two populations that are greater than 1 000 plants, and we think that if we went and looked at all of the other potential habitat areas in the Mersey then there is probably another 4 000 or so plants based on the survey work that we have done already.

So what we are doing here is we are saying, okay, yes, there will be an impact of 120-odd plants at the dam site itself, and these 1 800 plants in the Gorge are at risk - and I will explain why in a moment - but we think carefully managing the other populations will mean that the plant continues to thrive in its very limited habitat. The reason I say that is because if you add in the additional 4 000 plants that we think are out there then essentially the plant is rare, it is not endangered, it is not critically endangered, it is not even terribly vulnerable. If you look at the listing criteria, if we had gone out and found some more plants we probably could have taken it off the list.

So what we will be doing with this plant is we will be managing the populations where the impact is relatively minor and will also be ensuring that off site there are a good collection. We have already entered into negotiations with the Botanical Gardens to make sure that we have genetic material being preserved off site. That was started a long time before we became aware of just how many plants there were out there but we still think it is a worthwhile backstop.

The sort of management measures that we will take, this second Meander population, the one that has 950 beside it for argument's sake, that is down in an area where there are cows grazing nearby, fishermen go and it is about 50 metres from a road so the population is fairly robust but simple vegetation managements and fencing and those sorts of things can be put in place to manage these populations successfully into the future.

The reason that the Gorge is so important and why the population that is in the Gorge is at risk is the point that I made before. Because the dam will trap all of the sediment that would otherwise have flowed down the river in a sense there will be no new habitat created in that Gorge for the plants. By the time you get further downstream some of the other tributaries to the Meander like Jackeys Creek and Western Creek will bring in sediment to the system and that will form part of the habitat renewal but in the Gorge itself the Gorge is constrained by the rocks that form the Gorge and so the habitat is at risk. Our specialists tell us that there is a risk that 80 per cent of the population in the Gorge would be cleaned out but it might take 300 or 400 years to do it. So what happens is because there is no sediment in the water itself, when a flood goes down the flood tends to strip the sediment that is already forming part of the habitat away and exposing the roots of the plants and they are then obviously at risk of dying.

Land management

Mr Gilmore made the following submission in respect of the capability of the land to be irrigated and the production sustainability:

… We did some quite extensive work on this area. It was not work that would have otherwise been demanded of us but we felt it was important to ensure that the Government's commitment to sustainable production was met at the same time as its desire to increase production. There is a large area of land that is suitable for irrigation over 7 000 hectares and we think that the water demand would be well met before you got to the 7 000 hectares.

We did extensive salinity testing using the latest equipment over the whole region and while there is some very localised salinity potential, those areas tend to be away from where the water

demand is or too far away from the river to be economically irrigated and we will be making sure that landowners in those areas are well advised about the salinity potential.

We have worked closely with the Meander Valley Council on this salinity work. The council had already undertaken some survey work and they have done some more subsequently.

The written submission of the Tasmanian Conservation Trust contained a claim that sustainable development of agriculture within the Meander Valley is approaching or has exceeded its maximum limit. The Committee questioned Mr Woodfield regarding the basis for such claim. Mr Woodfield responded:

It should say that it may have been. Is approaching or has exceeded its maximum limit is my statement, so I'll suggest that in the light of the problems with this proposal, in light of the problems with securing definite figures for water, in light of as the proponents claim, all viable farm dam options have been taken, and in light of the fact that the proponent has, as part of the justification for this, had to do something which has never been really done before, and that is split up land classes - I'm sort of digressing a bit here, but I think I've referred to that in a previous point. Land is classed on its suitability for irrigation, class 3 being the most suitable, class 6 being pretty ordinary, and to justify this proposal the proponent has basically split up class 4 which makes up the majority of the land not under irrigation still. It may not necessarily be suitable for irrigation, but the proponent has used it and split it up into three levels and used the highest level, claiming that that isn't suitable for irrigation.

In light of those things, it is possible that sustainable agriculture in the Meander Valley is approaching or has reached its limit. I think that's not an unreasonable assumption to make. Building a large dam is not necessarily the solution for that; it could be that we have to look at other options, or that simply irrigated agriculture, or whatever, in the Meander Valley may not be able to expand much more, and the claim of doubling agricultural production in Tasmania may not necessarily be achievable. That is, I guess, a key point with all this. I am not aware of any holistic study that went into saying that agricultural production in Tasmania could be doubled sustainably, it seems to me to be merely rhetoric. To be clean and green and to be smart and to be expanding into the future really should have been addressed first: how far can we push agriculture in this State, then a target set after that. Unfortunately we started with a target and now we're going to see if we can reach it.

When questioned by the Committee as to whether any qualitative or quantitative analysis had been undertaken to support this assertion, Mr Woodfield replied:

No, but I don't think that comment is an absolute fundamental statement of truth for me, indicating that I'd done the research. I think that is an opinion …

Ms Tiffin also addressed the issue of the sustainability of the agricultural practices in the area:

> *There's been quite a lot of discussion in the past on the alternative of on-farm dams. All the departmental works to date have proven that on-farm dams are the best economic alternative and also provide the greatest equity, and they don't need to use public funds. There was a scheme at one point to assist people to put on farms dams through the Tasmanian Development Authority or whatever it was called at that time. I think it's a perfectly reasonable way to go to assist people if they can't afford immediately to get those on-farm dams in place.*
>
> *In 1993 Professor Hocking looked at this issue and he found that scheme C, which was individual on-farm dams, provided irrigation over the same areas as scheme A which is the 43 000 megalitre dam we're talking about today. It was only going to cost $23 million and would provide a lot more benefit. It said: 'The strength of the relative case for on-farm dams is further strengthened when the results of the analysis related to the objective to increase production of dairying and intensive cropping as part of Tasmania. Scheme C, farm dams, not only has more favourable benefit/cost ratios than the other two schemes which were planned for the Meander River. It also delivers larger benefits more rapidly than either of the major dam schemes and does so at a low cost per hectare than either of them.*
>
> *Now, again, when this proposal came out, the Department of Economic and Agricultural Review within the Department of Primary Industries looked at this and basically concurred. They said that even on a poor site the construction cost would be far less per farmer than cost of having this dam. What we're talking about is 55 farmers benefiting from a scheme which they claim - the price actually goes down; I think it's quite amusing - the price started at $30 million and it's now down to $26 million. I've never heard of a dam ever coming in on budget. The Craigbourne Dam just for example started at $6 million and ended up at $9.6 million and that was completely paid by the Government.*
>
> *The people who use that water at Craigbourne pay $90 a megalitre; why would people in Meander be paying only $55?…*
>
> *… If we want to talk about sustainable agriculture, I would like to see a discussion of how we achieve that. From everything that I know and understand about sustainable agriculture we ought to be aiming towards organic agriculture. It is the only sustainable agriculture that there is. The sorts of issues that organic agriculture can address include the other important place where one ought to be keeping water, and that is in the soil. No one has actually talked about why people need irrigation - because they've already got soil degradation. They need irrigation to make up for the fact that the soil is not holding the water.*

Ms Tiffin went on to describe the 'topo-climate' scheme which has been proposed in the Southland Municipality in New Zealand:

> *It's a very intensive look at land capability. They set up satellite stations to transmit to two satellites. They collated the millions of*

pieces of data together to give them a picture of what the particular microclimates soils were in different areas. They found that even in fairly marginal grazing land it does have pockets of flats and different areas that can be used for other things.

They found that by turning fairly low quality grazing land - 0.5 per cent of that land - only 0.5 per cent of it into high intensity, horticultural areas they were able to achieve those benefits that I described before - $36 million and 3 000 jobs

Economic and social benefits

Mr Davey made the following submission in relation to the economic and social benefits of the proposed works:

Firstly we considered the overall economic benefit and that is the benefit to the overall community which includes both public and private benefits and costs, and this was in the earlier study of the two. We also considered the financing options and the financing viability can be different to the economic viability, we say these are not the same. The financing study has a narrower focus and basically what I am saying is: will the people who put up the money to build the dam get a high enough return from those who use the water and will the people who want to use the water get a low enough price? That is the big issue there.

The overall economic benefit comes from a number of areas: firstly, improving environmental flow - the summer flows; secondly, increasing agricultural production; and, thirdly, generating electricity. It is important to note here that National Competition Council provisions will apply so that is the final test on the economics.

The water demand: we surveyed farmers - potential users in the area - on two occasions. Initially more than 300 letters went out to anybody in the area that we thought might possibly be interested and then later we refined that a bit to those who we thought would probably be more likely to use the water and went back to them when extra information came up through the study. Current water rights on the Meander River itself are less than 2 000 megalitres per annum - and this is permanent rights - and, in addition to that, people have been using over time temporary rights for water of around 4 000 megalitres and possibly there's also been some utilisation over and above that so that perhaps the usage currently on the Meander River is around 7 000 megalitres. If water rights are cut back to just the permanent, we'd see that dropping back from around 7000 megalitres to 2000 megalitres, which would have a pretty significant impact on agriculture in the catchment along the river.

The survey demand on the river itself, and this is the second survey, we've gone back and said, 'In view of the fact that some of

this water may be taken away; in view of the fact that it might be expensive to get it further away from the river than some of the people in the earlier survey were thinking, we came back with this demand of around 15 500 megalitres of water demand right along the river'. That was from 63 farms and it was based on a price of about $55 a megalitre. In addition, there are another 20 farms away from the river who said that, despite the fact that there would be some cost in getting the water from the river, that there is probably another 5 000 megalitres that would be taken up away from the river. All of this remains to be seen. We said to people that they're not actually signing off on this at the time but we want them to be pretty serious about the fact that there will definitely be a cost. It could be on a take or pay basis - even if they don't use the water they might have to pay for it - so we're really trying to get them focused on how much water they would demand at a range of prices. Obviously, at higher prices than $55 the demand dropped - at $75 a megalitre it dropped and at $110 a megalitre it obviously dropped even further … (to) *about 6 000 megalitres. Our view, and it was borne out by the survey, was that as that water price goes up it tends to cut out some of the enterprises such as dairying and livestock enterprises which would use water and tends to get concentrated more on croppers who can afford to pay more. The actual survey showed that about 60 per cent of water at this lower price was for dairying, 10 per cent for other livestock and 30 per cent for cropping, so to a large extent dairying is the one that we would really expect to expand as a result of this scheme.*

As to the economic benefits there - we have put up a table and not everybody will be familiar with this but the NPV is the net present value and this is just a method of trying to take account of the fact that the money is spent up front to build the dam over the first few years and the benefits happen over a long time. Net present value tries to take account of the fact that a dollar in a year's time isn't worth the same as a dollar now so it discounts future benefits and costs back to the present day. For example, if you are after a 10 per cent return on your money, $110 in a year's time is worth the same as $100 today so where we have actually used 5 per cent in this study, they have discounted back any income and costs in the future by 5 per cent a year to bring it back to its present value figure.

Now, just running through those components there - we have split up the benefits into the four areas and the first of those is saying that the first, say, 5 000 megalitres of water is used basically for environmental flow and without that being there the farmers, if they had had that water taken away, would have had their income cut back substantially and in present day terms that is worth about $16.4 million. Just to expand on that slightly, we calculated something like a net loss of about $1.4 million a year to the farmers in the river if that 5 000 megalitres was taken away from

them to give better environmental flow and not replaced so we see this dam as being able to replace that.

In addition to that, we see something like another 15 000 megalitres available to having got back to where we are now with irrigation to actually expand irrigation and we calculated something like $4.2 million net income extra per year and that, if you discount each of those back over the future back to the present, that gives us $42.6 million. Electricity sales - we have put a present value of $7.5 million. I understand that may have changed a bit since this first report was prepared but these were the figures we had at that time.

In addition there are other public benefits, if you like, in terms of flood mitigation, water quality and improved recreation. The Meander River apparently is one of the most popular trout fisheries and this is despite the fact that currently the flow gets very low in the summer in a lot of years so we see some benefits for recreation. Water quality - in high flood periods the water is fairly turbid so that the councils have to accommodate that and in the summer with very low flows there is also a water quality issue.

In terms of the costs of the scheme, the scheme operating costs over the 20-year life that we calculated come back to about $2.6 million in current day terms. The capital costs of the dam and the mini-hydro there, we have got a present day cost of $26 million, which includes the mini-hydro. When we talked about the $24 million figure, that is excluding mini-hydro.

Interestingly, on farm we calculated that to expand this irrigation farmers would need to spend something like $10 million on in-farm capital expenditure - new irrigation systems, new dairy water infrastructure and the works. When we discount that $10.6 million back to the present day, because that will happen over time, it comes to $8.3 million in present day terms. This is sometimes called the benefit cost analysis. We can see the total benefits there are $69 million and the total costs $36.9 million in present day terms so there is a net present value of $32.1 million.

Just to follow on from that there is another study that we looked at briefly. Input-output analysis is a method to try to take account of what happens in all the sectors of the economy as a result of an increase in one area, in this case, agriculture. This work was based on a TFGA and University of Tasmania input-output analysis model and, as I say, it aims to show the income and employment effects of a change in one sector, as in this case, in agriculture. The results from using that were that something like total income for the economy of the State as a whole would increase by something like $44 million a year. That is income not taking account of costs. On-farm employment would increase by something like 60 full time jobs. Employment off-farm is another

60 or 70, which takes total employment up to 130 full-time jobs. Total wages paid would increase by nearly $5 million a year. Obviously most of that would be in this Meander Valley area.

In terms of the employment benefits, about half of them are in agriculture but you can see there things like food processing. The area of vegetable factories and so on, which are in the area, would go up by 20 per cent; construction and utilities by 9 per cent; other manufacturing by 7 per cent and services by 11 per cent.

Mr Woodfield questioned the economic viability of the project in his evidence to the Committee:

… When you are looking through the original agricultural and economic reports, particularly the financial summary prepared by Deloittes, the figure of $55 per megalitre does not stack up very well. In fact, Deloittes found that for a return of 9 per cent and sales of 20 000 megalitres, a figure of $93 per megalitre was actually required. Even going up to 25 000, that figure was still $74 per megalitre. So there is a lot of inconsistency in the actual figure that water will have to be sold at to make this project viable.

The demand for the proposal is also a really key part of this. Again, if we refer to the agricultural and economic report that was prepared by the proponents we see that although 24 000 megalitres of wa ter was identified as a figure for the level of demand, only 11 000 megalitres of that was actually on the Meander River. The other 13 500 megalitres is for off river properties: Rubicon Creek, Western Creek, Quamby Brook and probably a few other places. There will be significant additional costs associated with achieving that level of demand, which will have to be borne by those people, but is unlikely to make it unviable for those people to take up that demand, as is also conceded within the agricultural and economic report. In fact the figure of $1.98 million additional infrastructure for Rubicon Creek and $2.27 million for Western Creek is actually quoted, not including GST. So there are a lot of actual problems with realising this potential. There really has been no justification for this potential usage, which is something else we have a lot of concern with.

Representatives of the Meander Valley Dam Action Group appeared before the Committee and were examined in relation to the potential market for the water. Mrs Dornauf made the following submission:

… it is correct that a large percentage of the survey results said that a lot of the water would go currently to dairy, and I guess the price thing - all the surveys came up with a whole heap of different figures. The fact is we have got a group of farmers prepared to invest in the dam and therefore the cost of the water does not become an issue, and certainly is not something that we could talk about. But, yes, there will be a lot of movement in and out as the world changes in every way

When questioned as to how many farms were interested in participating, given the variation in estimates ranging from 43 to 55, Mrs Dornauf submitted:

None of those figures is correct, and the amount of hectares or acres that are suitable to irrigate does not change, so those figures in the Davey part of the report are useful and can be taken into account. The number of actual farmers depends on how much land a particular farmer is managing, and one of the things that surprised Davey and Maynard, I think, is how much land is under one management. So I guess it is around a figure of 100, but that will change too.

The Committee questioned the witnesses as to the implications to primary producers in the area were the dam not to be constructed. Mrs Dornauf responded:

They are very significant. If this disappeared certainly all the noises from the Government are that any of the water that's being taken without a full licence at the moment will be stopped in order to improve the environmental impact, and that will severely impact on irrigated agriculture and therefore agriculture in general and the State's economy and certainly the district's economy. So instead of creating an upward spiral which we think will happen if the dam is built, it will create a downward spiral and that will flow through to the town and the State, too.

Mr Jansen added:

The possible alternative that has been suggested is on-farm storage and that is becoming extremely difficult. … The Hydro at the moment is not in favour of any more on-farm storage. They really want no water down the river system through Trevallyn especially now with Basslink. There have been a number of cases where farmers in the last couple of years have built dams and have not been able to get permission to fill them because the Hydro opposes it.

The system that's now in place is that when Trevallyn is filling some of these dams can be filled. Of course in dry winters there will be no spilling of Trevallyn and that's the alternative if the dam doesn't go ahead. As Jenny says, it has a dramatic effect but also you can't replace that dam with on-farm storage because that has all changed.

When questioned as to whether agricultural output could reasonably be expected to double as a result of the construction of the dam, Mr Badcock responded:

A meeting we had of farmers that are interested in supporting the dam would indicate that it's another perhaps 7000 megalitres of water that could be used, and if you translate that across to whether it's dairying or growing crops or whatever this is virtually doubling what we have at present.

… And the other scenario is if the environmental flows were implemented throughout the Meander, it's going to impinge tremendously. The year before last we had 65 days where we couldn't irrigate from the river so as to maintain an environmental flow and this, of course, creates uncertainty. You're not prepared

to put a crop in or you're not prepared to have extra stock because you're not sure that water's going to be there. If you're sure that water's going to be there then you've got confidence; the young people have confidence, everybody in the community's got confidence to go ahead and progress and grow crops and the rest of it.

Mr Wadley added:

… there is a process of agricultural farming - a fairly new process - which is now in being here in Tasmania and that is of raised bed farming and that is allowing a lower category of land to be successfully cropped through the raised bed technology. But once again no-one will do that without the assurance of water being available. Another factor regarding the on-farm storage, I think most people here will realise that over the last 30 years the favourable and suitable dam sites that have been on farms have been taken up and utilised and any further on-farm storage would have to take place in sites which are very inefficient and expensive to build when it comes to on-farm storage. So what I am saying is the choice sites have been taken up and that has seen farmers through to this stage but now with bigger areas of cropping needed to sustain an economic farming system, the amount of water that they have is now being limited.

Mr Rodney Stagg, President of the Meander Resource Management Group appeared and made the following submission in relation to the benefits of the project:

The Meander Dam will be of significant social and economic benefit to the Meander Valley. It will increase the amount of renewable water available for agriculture and domestic use. The construction of the dam will see a major increase in employment in the region and will bring long-term sustainable growth to the district's primary industries.

… The current situation in the Meander Valley is that there was a huge investment by landowners in ensuring that their properties could be made viable. That investment has taken a long time and it has also taken a lot of money. In that investment there becomes a social value attached - both to the local farmer himself and the local community, and the flow-on effect to the whole Meander Valley. I think it is important to realise that there is more to the dam proposal than just a number of directions coming within the departments to do with flora and fauna habitat because people are an important equation in all of this. The flow-on effect can be achieved by giving the landowner a continued means of investment. That continued means is currently water. The changes in irrigation practice over the last 20 years have certainly shown an increased production level but also an increased investment level. The potential for growth is there and it has been there for quite some considerable time.

Financing options

Mr Davey gave the following evidence in relation to the financing options of the project:

… there are a number of ways in which the project might be able to be financed. The process itself involves marrying current water usage, projected demand and potential returns from each megalitre of water. The work that we did suggested that at $55 per megalitre it is likely that most enterprises would be able to afford that and make a return. This is supported by the survey work.

In terms of the capital cost of the dam, if we look at the $24 million and take off the $9.6 million of government input it is likely that that funding could be repaid over something like 20 years. If we could get 15 000 to 20 000 megalitres of water taken up at that sort of price then there would be interest by financiers. I guess that all remains to be seen. The work that we did was effectively a base case and we were using a financing of the construction cost less government input through take or pay contracts for 20 years. Take or pay means that the people who take up these contracts to buy water would pay for that water even in years when there was high summer rainfall and therefore less need for irrigation. That sort of thing may well be required for a financier to be comfortable that he is going to get a return on funding.

The other options, other than that, which could be looked at and which may well be amongst these seven expressions of interest are superannuation funds who may not require an immediate high return but would take a long-term view on water and see it as being a very good long term investment. That financing is another option. That's difficult with this type of project because we have a large amount of money up front to be outlaid to build the dam and irrigation uptake might take several years so we have a need to be paying interest for several years before there can be a high cash flow coming in.

Equity finance is another. Quite a few of the farmers whom we have surveyed have expressed interest in wanting to own the dam - that gives them longer term security in terms of water price. Once they have put that money up front they know what their future is and it would probably give them more confidence to invest that $10 million that I suggested on-farm. There are obviously several types of financing options which will be looked at and the expression of interest process which is yet to be gone through completely will bring these options into commercial practice.

National Competition Policy

The National Competition Council (the Council) made a written submission to the Committee in which it outlined its role in national water reform, and second, an outline of the water reform requirements of the Council of Australian Governments (CoAG).

The Council submitted that the primary objective of the CoAG water reform package is to secure water rights and trading arrangements that ensure that water is allocated to the most productive uses, including the provision of water for the environment. The Council indicated that the next National Competition Policy (NCP) assessment of Tasmania's progress against national water reform commitments is due to occur by June 2003. In conducting that assessment, it was submitted that the Council will assess any investments in new rural schemes. This will include ensuring that the viability and sustainability of any new projects has been established prior to construction.

It was further submitted that in previous assessments, the Council had found the Tasmanian Government's mechanisms to assess economic and ecological aspects of new schemes met the CoAG requirements.

The Committee questioned the witnesses as to whether the proposed dam was in accord with NCP and the CoAG water reform policy. Mr Gilmore responded:

> *The Government is obviously committed to the COAG water reforms and the National Competition Policy principles and this project is being considered with all of those issues in mind. We have done quite a lot of work over the last 12 months looking at some of these aspects, knowing always that we would have to meet that National Competition Policy hurdle. Our view is that we will do that and do that easily. Basically, in very broad terms, what we have to show is that there is a broad community benefit that is being met by the Government's contribution to the project. We believe that we can show that there is that and that the project will be fully supported by the NCC when it comes to consider those matters. But we are doing that in a very open way and we are also in regular contact with the Auditor-General here in Tasmanian, who is also looking at those same issues. So we believe that we will meet those conditions and when the assessment is done by the National Competition Council we do not think that we will have any problems at all.*

Mr Woodfield in his evidence to the Committee, made the following submission in respect of National Competition Policy:

> *It is the TCT's opinion and the opinion of a number of experts that we have contacted that the proposal as it stands contravenes National Competition Policy. It is very clear that public money not be used to prop up water infrastructure, that full cost recovery be demonstrated and it is difficult to see how an argument could be constructed as to $7 million worth of community benefit being derived from the proposal as it stands.*

DOCUMENTS TAKEN INTO EVIDENCE

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

- Sinclair Knight Merz: Meander Dam – Submission to Joint Standing Committee on Public Works, October 2002;
- Tasmanian Conservation Trust: Submission dated 1 November 2002;
- World Wildlife Fund Australia: "Comments on Meander Dam Feasibility Study";

- Edwards, N. J.: “Meander Dam Financial Analysis”, dated November 1, 2002;
- Environment Association Inc.: “Submission Points Meander Dam Proposal Hearing”, dated 31-10-02;
- Upper Meander Catchment Landcare Group: Submission dated 20/3/02;
- Meander Valley Dam Action Group: “Submission in Support of Meander Dam Project”;
- Meander Valley Enterprise Centre Inc.: Submission dated 22nd October 2002;
- Central North Field Naturalists: Submission;
- Meander Resource management Group: Submission dated 30 October 2002;
- Hayward, John: submission dated 8 March 2002;
- Booth, Kerin: Submissions dated 30/10/02 and 8/11/02;
- Meander Valley Council: Submission dated October 2002;
- National Competition Council: Submission dated 31 October 2002;
- Primary Industries, Water and Environment, Department of: “Meander Dam Hearing Additional Information”, dated 11 November 2002;
- Map of Quoll habitat; and
- Davies, P. E.:Meander dam Environment Assessment Review.

CONCLUSION AND RECOMMENDATION

The evidence received by the Committee presented a number of matters for consideration: the risks involved in the proposal; the environmental impact of the dam; the impact upon flora and fauna; and potential social and economic effects of a dam.

The Committee received a number of submissions which suggested that there was considerable risk of the proposed dam leaking. It was submitted that such leakages were likely to occur at either the Huntsman Saddle area, or through karst systems, or through faults at the site of the dam itself. In response to such evidence, the proponents of the dam submitted that the Huntsman saddle area, whilst having the most potential for leakage would be subject to the prescription of an appropriate monitoring regime as part of the dam management. The proponents submitted that the geological reports of the area state that there are no known areas of karst topography in the vicinity of the dam site and the storage area. It was submitted that the fault lines at the dam site itself were within the normal bounds of a project such as this and that a ‘grouting’ process would be employed to seal the dam. The Committee is satisfied that these measures will fully address any risk of leakage.

The damming of the Meander River will impact upon the environment: during construction; as a result of the inundation of land; and downstream of the dam as the result of changes to flow and sediment transport. During the construction period of 12 to 18 months it was submitted that a quarry and crusher will be operated at the site to gather material to construct the dam wall, such quarry will be contained within the future inundation area to reduce the impact on the site.

It was submitted that the impacts on the community of the noise and dust generated by the blasting of rock and the operation of machinery at the site

will be mitigated through restricting hours of operation and using water carts to minimise dust. There will also be an increase in traffic when equipment and materials are transported to the site and when workers travel to and from the site.

It was submitted that a construction Environmental Management Plan will be implemented, which will detail standard and site specific procedures for employees and contractors including best practice techniques for the control of weeds, *Phytophthora* and water quality among other aspects.

An area of 332 hectares will be inundated by the dam. It was submitted that a field survey of this site was made in October 2001 to identify significant flora and fauna values. The majority of the flatter areas of the inundation site have been cleared for pasture or logged in the past. Eight vegetation communities were identified at the site, the largest communities include 32 per cent regrowth *Eucalyputs amygdalina* forest on dolerite, 22 per cent improved pasture and 14 per cent regenerating cleared land.

Two threatened flora species have been located within the inundation area, one is *Pomaderris phylicifolia* subsp. *phylicifolia* of which there are approximately 30 bushes bordering the inundation area. It was submitted that whilst some individuals are likely to be inundated, it is not possible to determine the exact number and any plants not inundated will be identified to assist contractors avoiding them during construction.

The other plant that is listed on the State and Commonwealth threatened species list is the riparian plant *Epacris* aff. *exserta* (Union Bridge) of which approximately 100 will be inundated. The Committee is satisfied that the management measures to be put into place for populations of this species in both the Meander and Mersey Rivers will ensure that the plant continues to thrive in its very limited habitat.

Considerable evidence was received by the Committee regarding the impact of the dam upon the spotted tail quoll, a species listed on the State and Commonwealth threatened species list. The quoll is thought to utilise the inundation area for hunting. Evidence was received that a PhD student, Heather Hestermann, had found seven animals to be resident around the site. These animals are likely to attempt to relocate once development begins due to increased activity at the site. It was submitted that as quolls are territorial they are unlikely to survive if they relocate into another quolls territory and for this reason, zoologists do not consider manual relocation to be an option. The Committee is satisfied that the reservation of 137 ha of RWSC land surrounding the inundation area will provide a habitat for the quoll population to re-establish itself.

The Committee received submissions regarding cultural and aboriginal heritage issues at the site. The proponents submitted that two historic steam engines were listed as being present in the inundation area, one engine was relocated to Queen Victoria Museum in the late 1980's, the other engine, which is in poor condition, will be relocated outside the inundation area. The Committee is satisfied that full consultation with the Tasmanian Aboriginal

Land Council has occurred and that the treatment of the sites will be in accordance with the wishes of the aboriginal community. The permit to conceal these sites contains provisions that during construction these areas will be located and avoided to prevent disturbance of the relics.

The Committee is satisfied on the evidence that there is a range of potential economic benefits that will eventuate as a result of the construction of the dam. Total net benefits of around $6.5 million per annum are anticipated once uptake of 20 000 ML of irrigation water is achieved. This is made up of several components:

- Recovery of farm income lost as a result of environmental flow restrictions is estimated at $3.7 million, for a net farm benefit (after costs) of $1.4 million per annum.
- The value of the additional farm income from an extra 15 000 ML of irrigation water has been estimated at $11.1 million ($740/ML), for a net farm benefit of $4.2 million per annum.
- Additional electricity generation valued at $0.7 million per annum.
- Other benefits valued at $0.2 million per annum

The dam will provide high security water for farmers who currently take approximately 5000ML of water through temporary and low surety rights. Implementing an appropriate environmental flow regime for the Meander River would otherwise require these farmers to lose these water rights and substantially reduce irrigation, resulting in decreased agricultural production and a significant socio-economic impact in the Meander Valley region.

The dam will be an amenity for the wider community. The Committee is satisfied with the consultative process that has been undertaken with potential recreational users of the dam. The fishing fraternity will benefit downstream as a result of better summer flows and also a healthy trout population in and above the dam itself. Opportunities for canoeing and kayaking enthusiasts downstream from the dam will be substantially increased, particularly in summer when the irrigation flows are at their peak and access will be easier.

Accordingly, the Committee recommends the project, in accordance with the plans and specifications submitted, at an estimated total cost of $24,000,000.

Parliament House
HOBART
11 December 2002

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