SUBCOMMITTEE OF THE STANDING COMMITTEE ON PUBLIC ADMINISTRATION AND FINANCE

WATER SERVICES INQUIRY

TRANSCRIPT OF EVIDENCE TAKEN
AT BUNBURY
THURSDAY, 29 JULY 2004

SESSION 1

Members

Hon Barry House (Convenor)
Hon John Fischer
Hon Dee Margetts
Hon Norman Moore (Participating Member)
Hon Ken Travers

Committee met at 9.30 am

HARRISON, MS CATHERINE
Manager, Water Allocation Branch,
Department of Environment,
Hyatt Centre,
Perth, examined:

HANNON, DR FIONNUALA
Program Manager,
Department of Environment,
PO Box 261,
Bunbury, examined:

COMMANDER, MR DAVID PHILIP
Principal Hydrogeologist,
Department of Environment,
3-5 Plain St,
East Perth, examined:

Hon BARRY HOUSE: On behalf of the subcommittee, I would like to welcome you to the meeting. You will have signed a document entitled "Information for Witnesses". Have you read and understood that document?

The Witnesses: Yes.

Hon BARRY HOUSE: These proceedings are being recorded by Hansard. A transcript of your evidence will be provided to you. To assist the subcommittee and Hansard, please quote the full title of any document you refer to during the course of this hearing for the record. Please be aware of the microphones and try to talk into them because the hearing is being recorded as a back-up for Hansard.

I remind you that your transcript will become a matter for the public record. If for some reason you wish to make a confidential statement during today's proceedings, you should request that the evidence be taken in closed session. If the subcommittee grants your request, any public and media in attendance will be excluded from the hearing.

Please note that until such time as the transcript of your public evidence is finalised it should not be made public. I advise you that premature publication or disclosure of public evidence may constitute a contempt of Parliament and may mean that the material published or disclosed is not subject to parliamentary privilege.

Would you like to make an opening statement to the subcommittee? If there is no opening statement, perhaps by way of background you could explain your role in the research into the southern Yarragadee aquifer. That might be a good starting point for the subcommittee, because we do not have any set questions. We notice that you have provided an information document. Do you wish to table that and speak to it?

Dr Hannon: Yes, that will be tabled and I will speak to that. The three of us here represent different aspects of the Yarragadee proposal and investigation. Philip is the principal researcher, so he can speak to the research component of the Yarragadee investigation. Catherine chaired the whole process, so she is very much here to present on the process of the Yarragadee proposal. My role in the process was to be responsible for communication and consultation and informing the people of the south west of this work, so I can speak to that component of the process.

Ms Harrison: Will it help to talk about why this project was undertaken in the first place? We did the research and consultation because we received an application from the Water Corporation to take water from the southern Yarragadee aquifer. It wanted to take 45 gigalitres a year. We did not have enough information to make a decision on that licence application. The Water and Rivers Commission part of the Department of Environment makes decisions on licence applications for water, so the Water Corporation and we undertook a joint research program to undertake more work to find out more about the aquifer and the potential impacts of taking that water.

We also used that research program as the opportunity to develop a ground water management plan. One of the other major roles the commission has is to produce ground water management plans that identify the sustainable yield of a resource, how that water might be taken and how it might be shared out among the licensees. To provide the overall picture, we had the licence application. Additional information was needed, which involved a research program. We took the opportunity to develop a ground water management plan for the whole of the Blackwood ground water area so that we could share the resources equitably among all users.

Hon BARRY HOUSE: What was the overall budget for that?

Dr Hannon: The overall budget was $8 million, of which $1.2 million was directed to the specific work that Catherine has just talked about.

Ms Harrison: Actually, $1.7 million was provided to the Water and Rivers Commission for its work.

Hon BARRY HOUSE: Was that provided by the Water Corporation?

Ms Harrison: Yes.

Hon BARRY HOUSE: Perhaps, Philip, you can explain the hydrological aspects of it.

Mr Commander: I will just go back over my background. I first started work on the hydrogeology of the south west in 1975, working in Bunbury as a geologist doing exploratory drilling. Subsequently, in the 1980s, I was the supervising hydrogeologist in charge of the investigations that carried our ground water knowledge further south to the Scott coastal plain, and we completed that work in 1992. By 1992 we had a reasonable reconnaissance-scale understanding of the aquifers in the south west. We drilled the State's deepest investigation bores, some 1 600 metres down, south of Nannup. We were still in fresh water in the Yarragadee aquifer at that depth, so we had the knowledge that there was a very large aquifer system with a very large storage of quite fresh water, at less than 200 milligrams per litre, which is very good quality for ground water in the State.

That was the background to the current investigation, which then commenced in October 2002. This was a joint investigation by the Water Corporation and the Water and Rivers Commission, as it was then. We formed a joint investigation team to determine what new information would be required to assess a Water Corporation proposal to take 45 gigalitres. That investigation consisted of a number of geophysical techniques to determine the dimensions of the aquifer and the distribution of the various aquifer systems, and a large amount of drilling, which was subsequently carried out at some 48 sites, with up to three bores on each site down to a depth of 400 metres, which I think was about the deepest. That concluded with a test pumping bore, which was virtually a test production bore, that was test-pumped for two weeks in October last year. All this information, together with a number of studies on the surface hydrology on the Blackwood River -

including a study on the water quality in the Blackwood River and the interaction of the Blackwood River with ground water and on measuring flows and salinities in the river - was gathered so that we could understand how the aquifers discharged and maintained the river. All that information was then put into a numerical ground water flow model, which would enable us then to simulate the effect of draw down of a bore field of 45 gigalitres, plus the existing abstraction and future abstraction by private consumers.

We are now at the stage at which the Water Corporation has carried out some additional investigations this year, principally into looking at ground water dependent ecosystems, I think exclusively in the Blackwood valley area. That information is still being drawn up and we are in the process of building a third-generation numerical ground water flow model that will have what we think will be a reasonable, predictive capacity.

Hon BARRY HOUSE: Perhaps if we hear the overviews from all three of you first, I am sure members will have some questions.

Ms Harrison: I will talk about the overall process. As I said before, we were doing two things: one was undertaking a licence assessment of the Water Corporation's application and the other was producing a ground water management plan. For the licence application, the commission has a series of requirements in its Act that the corporation must meet. These requirements are applied to any licensee, so they are being applied to the Water Corporation also. They include things such as whether the taking of water will be ecologically sustainable and environmentally acceptable, whether the water could be provided by another source and whether the taking of the water is likely to have a detrimental effect on another person. Those are examples of some of the requirements that we have. In undertaking the assessment of the licence application, we had to answer those questions. The investigation work that Philip has described was designed to help us answer those questions. For example, in looking at whether the taking of water is ecologically sustainable, the commission must look at the environmental impacts of the taking of the water together with the social and economic impacts.

Also, when we are producing the plan we need to find out for the Blackwood ground water area how much water can be taken. Because the Water Corporation is taking such a large amount at 45 gigalitres, we need to look at the impacts the taking of that water will have over the area as a whole. To pull together all the information that we required, we needed the drilling and the other work Philip described. We needed that to understand the aquifer and how it behaved and to understand the surface water. We then used that information to construct a model. That model then enabled us to test the Water Corporation's proposed abstraction and other uses of water and future growth in the region against the criteria we had for determining acceptability, and those criteria related to those requirements that I have just described.

In terms of progressing the application, we had the drilling work done. To identify the social, economic and environmental criteria relating our requirements, we undertook a series of studies. We had consultants undertake an environmental water requirement study that looked at the ground water dependent ecosystems that relied upon the Yarragadee aquifer and other aquifers in the area for their survival and health. We undertook social value studies that looked at the values that the community in that area and Perth placed on the ground water. We undertook economic studies that looked at the current usage of ground water in the area and predicted future growth over the next 30 years. We also looked at the value of that water, how valuable that water was to local industries and the integrated water supply scheme, which is where the Water Corporation intended to take that water. That provided us with an understanding of the environmental, social and economic values that people attach to the water. We then used that to determine a series of criteria against which we would judge the information that we were receiving.

In December we produced a multi-criteria analysis matrix that went out for public consultation. We said, "Here are the results of the work we have to date and the criteria we have developed from this.

We will be using these criteria to assess the information that we receive from the Water Corporation." It is a draft matrix, which has not yet been finalised because the corporation is undertaking further work, but we will use that information to determine how much water can be taken from the southern Yarragadee aquifer on a sustainable basis. We will use that to determine whether the amount of water the Water Corporation wants to take can be taken sustainably within that context after we have also taken into account the needs of the region. That was the process until December: to formulate the matrix and assess the information against our requirements.

When we obtained that information we determined that there was not enough to make a decision. We then let the community know and we wrote to the Water Corporation, saying that the commission was not prepared to make a decision at that time because it had insufficient information, and we asked for further information. The Water Corporation agreed to undertake further work. Since that time the corporation has done additional drilling and other work that Philip described.

The stage we are at now is that we are waiting for the corporation to provide that additional information so we can refine the criteria developed in the matrix and the requirements that we have and then use that additional information to assess the Water Corporation's application against those requirements. When we have sufficient information, the commission can make a decision on the Water Corporation's licence application. That is the licence assessment part. At the same time, we have been using that information to help develop our management plan because, as I said earlier, one of its key components is understanding the sustainable yield of the system. A lot of the investigation work, along with the economic, social and environmental work, will also be used to help determine the sustainable yield of the whole system. The work from the licence assessment will be used to inform the plan, which we will then produce probably in a couple of years; that is our current time frame. I hope that provides a better overview.

[9.45 am]

Hon BARRY HOUSE: Fionnuala, perhaps you could explain your role.

Dr Hannon: The program was initially designed with three streams - the research component, the planning component and the community consultation component. We managed and ran the community consultation component, but we worked very closely with a very significant group down here called the Whicher Water Resources Management Committee. The process, approach and principles of this consultation project were very clinical. We based the approach of this consultation on the philosophy that this is a complex system and that the views and values of many people are needed so that a broad, sensible and long-term decision can be made. That was the hard bit at the beginning to come to terms with because the decision for Yarragadee was originally due in December 2003, which effectively gave only eight or nine months - no more than 12 months anyway - to undertake the entire process of investigation and make a decision. Such a short time frame for such a major decision that potentially had major ramifications for the south west and all its stakeholders did not go down very well. That component in itself caused outrage.

I make it very clear that people do not hold the view that water from the Yarragadee should not be used. They say that if it will be drawn, they want to know that the decision to draw from the Yarragadee is responsible, sustainable and equitable. The community really told us those aspects, which drove strong engagement from the major groups down here. Those major groups included the water boards, the Western Australian Farmers Federation and the Pastoralists and Graziers Association. The combined shires became a group that formed out of the Yarragadee process. I will return to that, as well as the Whicher committee. The combined shires group was very significant for the south west for a number of reasons in my view: it was one of the few instances in which shire presidents and representatives from the five shires actively worked together to debate and hammer out a profile on this very issue. Not very often do we see local government authorities

come together in this way to deal with an issue. That gives you some idea of just how important the Yarragadee is to the people of the south west.

The process that we took in the consultation was very clinical in that we identified the key stakeholders, whom I have just briefed to you. We made sure that those stakeholders were always informed ahead of, or at, every milestone of the project. It was very important that we respected those people and that they received regular updates - and not after the event. Usually, it was very important to us that they received advice on the project ahead of it being released to the media and the news. In doing so, I believe that process brought about a level of trust in a government agency. Why is that significant? I believe it is significant because the social values work indicated that two important variances would sway the opinion of a community about whether to support or change its mind about it. Whether they said, "Yes, take the water" or they said no and changed their mind to say yes, two common factors influenced that decision-making process. The first was a lack of trust in government; that is, they wanted to know whether it could be demonstrated that people could trust a decision that could be made. Secondly, they wanted to know that there would be no unreasonable impact, and if there was an impact, that it would be addressed. Developing that trust was important. We did not realise until that social values work had come through how important that process of consultation and the approach that we took actually was.

I draw your attention to the material that we have tabled. The first one is the public briefings diary. You will notice that the first five events were held beginning on 17 February and ended on 18 March in Augusta. At that event, we knew very little about the Yarragadee as such. We had very little to say to the community, but we had a responsibility to inform the community about what was going on. That was all we did. We gave the community a 50-minute overview, and an hour and 10 minutes was spent asking for opinions and issues. That was captured in the first community update, which you should have -

Hon BARRY HOUSE: Is that of March 2004?

Dr Hannon: No. It is April 2003. All we did in this community update was ask the community whether we have correctly heard what they said. We did not go out with any information or advice. We felt very confident in saying to community, "This is what you regard as being the major issues relating to Yarragadee." This information became very important in the process because we then actively built every single issue into the research process. Therefore, the research process was not just about investigating on the basis of the questions of the researchers, but we also used the issues raised by the community. We were trying to do some middle-ground work. We have also put this information on the web site. We will complete this process by showing the community how each and every one of their issues was addressed. We will close the loop, as it were, in the consultation process. That is what we did. As we have gone along, we have updated the community.

There are community updates Nos 2, 3 and 4 and the March one of 2004 on the process and the major outcomes. These were deliberately presented as they are in front of you - they are not glossy brochures. The community did not want glossy publications; they just wanted the data and information. They were designed with that in mind. Philip has talked about the fact sheets, which have been provided to the committee. At the back of the material provided - we have them in black and white, but we can make them colour if you like - can be found the sort of posters used at field days and various events that try to capture, demonstrate and talk about in a fairly interpretable form the complexity of the Yarragadee matter. We then rounded it off with a number of updates in July leading to the intended time of the decision in October. However, as it turned out, it has been delayed for various reasons. The community is still being informed. We are now seeking its advice not only in the decision but also in the decision-making process. The consultation was not just about informing people, but also about gathering advice and views to inform the process of investigation and decision making. I think that is an important distinction.

The challenges additionally in this project is that the assessment under clause 7(2) of the Rights in Water and Irrigation Act on the taking and use of water requires that we measure social and recreational values. Therefore, it is quite specific that the taking and use of water is really for canoeing, picnicking, swimming, fishing and such things. Interestingly enough, I believe through the consultation process we were able to understand and build into the human values that the clause 7(2) assessment on the taking and use of water has no capacity to measure; that is, all the concerns that people have about the impact of the taking and use of water. Will it cause environmental damage? Will we be compromised as a result of it? It is those sorts of values. We have been able to build those values into the process through the consultation. We have the clinical clause 7(2) social and recreational values, but we have also been able to capture those other very powerful human values in the process.

Did it work? I think so. The social values work said that 87 per cent of the sample was aware of the work and aware of what was going on. In terms of reaching out to the people to make them aware of what was going on, the vast majority of the south west are aware of this process in more than just a cursory form. That is about it, really.

Hon BARRY HOUSE: I realise that the research is incomplete, but I ask the two most important questions for our subcommittee to get a handle on with the whole scene: what is the best estimate of the total volume of water in the southern Yarragadee aquifer, and what is the annual recharge?

Mr Commander: The annual recharge is probably the hardest question to answer. That will come through the modelling process. We do not have a figure on that aspect. In terms of the total quantity of water in storage, we roughly know that there are 400 cubic kilometres. It is a very large amount of storage.

Hon BARRY HOUSE: What is that in gigalitres?

Mr Commander: It is 400 000 gigalitres. We know that that amount of water is in the ground. How much we can safely extract given the various constraints there may be on draw down on ground water dependent ecosystems on the Blackwood River is really a matter that modelling will enable us to find out. It is not a fixed figure. It depends on how we are willing to affect the environment or the water levels in people's bores.

Hon BARRY HOUSE: What is your best guess on the annual recharge at this stage? I know a scientist does not guess!

Mr Commander: In the past we have published estimates of 200 gigalitres for the whole aquifer system in the south west. We now believe that that is substantially less; that is, we do not have as much water as we thought we possibly did have. However, given that there is a very large storage, we are able to withdraw some of that water from storage without seeing effects on the surface. The yield of the system will be a combination of taking some water in storage, which you inevitably do as water levels decline - in the initial stages, some water comes out of storage - plus the annual recharge plus the capture of discharge. The yield of the system will be a combination of taking water from those three models.

Dr Hannon: I draw your attention to "Community Update # 4". On page 2, we had a go at writing what Philip has just said about the water balance and where the draws for water come from. Much of that information is presented in "Community Update # 4".

[10.00 am]

Hon NORMAN MOORE: The aquifer described as the south west Yarragadee obviously extends from north of Perth all the way down. The area that contains 400 000 gigalitres is roughly where?

Mr Commander: The south west Yarragadee is separate from what we call the northern Yarragadee, which stretches from Geraldton to just north of Mandurah. It is absent between Mandurah and Kemerton. The south west Yarragadee extends from Kemerton just north of here

across to Busselton, and then it is open to the south coast. It is bounded by the Darling scarp on the east, so it goes down through Donnybrook and Nannup right on the border. That is the area to which that storage estimate refers, and we consider that to be an entire connected ground water system. This proposal to extract 45 gigalitres must consider the whole area of the Yarragadee between the south coast to Kemerton. The ground water model looks at the whole flow system together with all other extractions in the area.

Hon NORMAN MOORE: How far to the west is it?

Mr Commander: Just to Busselton, and from Busselton essentially southwards to some point just east of Augusta.

Hon BARRY HOUSE: It is bound to the west by the fault line, is it not?

Mr Commander: There is a fault line that runs underneath the Leederville formation that overlies it. That runs virtually north-south through what we call the Busselton fault. To the west, there is no Yarragadee under the Leederville fault, but it is at the sue coal measures and the Lesueur sandstone.

Hon NORMAN MOORE: Does the movement of the water in the aquifer go out under the sea, and then come back under the land?

Mr Commander: We know that the aquifer is recharged south of Nannup, so the highest water levels are just south west of Nannup. The water flows both southwards and northwards from there. It flows northwards as far as Bunbury and Busselton, and we infer that it flows offshore. We do not know quite how it discharges offshore and how far the aquifer itself extends offshore. Given that the original pressure head in the aquifer was 15 metres above sea level at Busselton, it implies that the fresh water extends a long way out to Geographe Bay. Therefore, a substantial amount of fresh water is stored underneath the ocean.

Hon NORMAN MOORE: Does it come up into the ocean water - that is, discharges into the ocean?

Mr Commander: We know that the Yarragadee virtually crops out under the ocean at Bunbury, where the Bunbury basalt occurs on the foreshore at Bunbury. Therefore, the Yarragadee formation is very close to the seabed. There is some discharge at that point directly into the ocean. At Busselton, the Yarragadee is overlain by the Leederville formation; that is, 200 metres of sand shale succession. We are not quite sure how the water in the Yarragadee discharges through. It may leak up over a large area at a very slow rate or there may be some windows out in the ocean we have not identified where water is preferentially discharged.

Hon KEN TRAVERS: Do we not know where it discharges or is it possible that it is sitting there and not discharging? I assume it must be discharging somewhere.

Mr Commander: As it has a hydrological gradient, it must be discharging somewhere. There is some onshore discharge in the Blackwood River, but that is a very minor component of the aquifer system.

Hon KEN TRAVERS: When I looked at the diagrams, I tried to work something out: is the Blackwood a discharge from the aquifer or is it situated on the recharge area of the aquifer?

Mr Commander: The Blackwood River is cut down through the recharge area, so it is cut down through the outcrop area of the Yarragadee. We have recharge to the Yarragadee both north and south of the Blackwood River, and we have discharge into the Blackwood River. Only a small proportion of the river receives discharge. That maintains pools in the summer months. Therefore, there is something like eight metres of artesian head in the aquifer underneath the river allowing it to discharge.

Hon BARRY HOUSE: How much is that estimated discharge into the Blackwood? Is it 12 gigalitres?

Mr Commander: Current estimates are something like 20 gigalitres. That is a rough current estimate. We cannot measure anything directly. We have measured the flow from the pools in March, both this year and last year, when there was no flow through Nannup. We were looking at only ground water discharge from the Yarragadee and added a component as an estimate for evapo-transpiration from the vegetation along the side that leads us to suggest that about 20 gigalitres are discharged throughout the whole area. It is not in the summer months only.

Dr Hannon: One of the good things about the extension of the research is that we have time to better understand the relationship between the ground water dependent ecosystems located at those points of discharge. We have determined a new one with the Reedia swamp as well. We have not only a better understanding of the discharge, but also the ecosystems that are dependent on the ground water discharge. We must understand that in relation to the clause 7(2) provision and the ecological water requirement.

Hon KEN TRAVERS: I guess the final question is: have you identified where you would to try to tap into it and extract it for whatever purpose or is that still part of the modelling that needs to be done? Although we do not know the quantity, are there areas from which you could source that water without having an impact on the Blackwood River or other surface environments? I assume it is fairly locally based from the way you have described how you can source water from specific areas. Do we know where those points are yet?

Mr Commander: The bore field layout that has been modelled lies midway on the Blackwood plateau, essentially, between the Blackwood River and northwards to the Whicher scarp or the Swan coastal plain. It is located pretty much centralised in the state forest area beneath the Blackwood plateau. It is very deep - 150 metres or so - down to the Yarragadee.

Hon KEN TRAVERS: That is the proposal for the bore field. I realise the difficulty that you are still doing the modelling to work out exactly how much water is there and where it is. Is that the only site that is available or are there other sites?

Mr Commander: In our modelling, we have looked at future use of the aquifer by private landholders on the Scott coastal plain, and increased usage of the Yarragadee aquifer on the Swan coastal plain; that is, Busselton, Bunbury and the adjacent areas. Therefore, we are accounting for usage throughout the whole aquifer. However, to minimise the environmental impacts from the 45-gigalitre proposal, yes, we have looked at locating as far away from the Blackwood River as possible, but a reasonable distance from the extraction on the Swan coastal plain.

Hon JOHN FISCHER: I would like to go back to the beginning. Is the $8 million overall allocation yearly?

Ms Harrison: No - it is the total.

Hon JOHN FISCHER: Has $1.7 million gone to the Water Corporation from that $8 million?

Ms Harrison: It has gone to the Water and Rivers Commission.

Hon JOHN FISCHER: Is that to the Water and Rivers Commission from the Water Corporation?

Ms Harrison: Yes.

Hon JOHN FISCHER: What other departments have got money from that $8 million budget?

Ms Harrison: None that we are aware of. The rest of that money is spent by the Water Corporation in its investigations.

Hon JOHN FISCHER: You were not prepared to make a decision on the information you had up to December. Did that mean you had to apply for an increase in your budget?

Ms Harrison: We are using our current budget to continue with our work, which is the assessment of the licence and the production of the plan.

Hon JOHN FISCHER: Key community issues are outlined in the community update of April 2003. The back of the second page refers to "specific concerns raised to date". Seven specific concerns are mentioned. Have you been able to answer any of them to the community?

Dr Hannon: Yes, we have.

Hon JOHN FISCHER: Are they included in these future updates?

Dr Hannon: Many of them are. We have deliberately built in those issues through the updates as well as through the planning. For example, we have been able to talk about the sulfate soils risk, and we have clearly documented the local regional future needs in all that information. In addition, every single report that was generated - I refer to the social values and economics reports, etc - can be found on the web site; they are open for public reading and commentary. If the information is not satisfactorily presented in these updates, it certainly has been presented in all the reports. Nothing has been withheld from the public on this data.

Hon DEE MARGETTS: How many bores source the current 55 gigalitres from this part of the southern Yarragadee? You estimated that the current annual abstraction from the southern basin was 55 gigalitres. If the proposal were compared, we see it is quite substantial - almost double. Do you have any data on how many bores are abstracted to make up the 55 gigalitres?

Dr Hannon: Yes. All that information is part of our licensing database, and it is being built into the model.

Hon DEE MARGETTS: Roughly how many bores is that?

Dr Hannon: That is a really good question. I could not tell you. It is a lot.

Hon DEE MARGETTS: Spacially.

Mr Commander: I could not tell you that. I guess it is something like 100 or 200 bores into the Yarragadee; that is, Bunbury and Busselton's town water supplies, and a lot of irrigation bores. The mineral sands mines are all Yarragadee sourced, as well as some other industries. There is a multiplicity of users at different levels with different bore yields. All that information is licensed. All abstraction from the Yarragadee and Leederville is licensed, so we know pretty well where those bores are and their extraction points.

Dr Hannon: I can provide that specific information.

Hon DEE MARGETTS: For me, personally, it would be fascinating.

Hon BARRY HOUSE: If you could provide it for the subcommittee -

Hon DEE MARGETTS: I was not making a decision on behalf of the subcommittee - but yes.

Hon BARRY HOUSE: Is it public information?

Dr Hannon: Yes. The important thing about the Yarragadee, I understand, is that when you go traipsing around the paddocks, especially on the Scott coastal plain, those central pivots require a substantial head to be driven. That is why the Yarragadee is so important for the growers on the Scott coastal plain particularly. Also, the Scott coastal plain has a potential for dairy development. They are on a cusp of development down there. Water is critical to that development potential, so any suggestion of risk to that supply sends a few ripples of concern through that community.

Hon DEE MARGETTS: I expect that a certain percentage of other licensed water use in this region is not from the Yarragadee, and that some of the surface water is from other subsurface sources. Do you know the total water use in the study area?

Mr Commander: We can supply those figures of estimates of ground water abstraction from the Yarragadee, the Leederville, the superficials, the sue coal measure and others.

[10.15 am]

Hon DEE MARGETTS: That would be good to get into a context of total water use and perhaps even of what might be the potential for percentage savings. I guess determining the percentage savings that might be possible if world's best practice for water use were employed is not really your bailiwick.

Dr Hannon: We can make estimates on world's best practice irrigation systems. For example, best practice for water use is well documented in the Scott coastal plain strategy and it is well known. It is the same with the viticultural industry and the different types of irrigation systems and jets and the location of the jets. A lot of industries can demonstrate improved water use by improving their irrigation systems and timings. A lot more people are using soil moisture meters to improve that practice.

I want to clarify whether you were referring to surface water as well as ground water or only ground water.

Hon DEE MARGETTS: I think it would be interesting to know the total water use in the region, so that would include surface water. That would be so we get an idea of where that 45 and 55 fit into the total mix of water use in that particular region. Over the most recent drought years, what generally has been the impact on ground water levels in the study region?

Mr Commander: We see very little change in the Yarragadee. We have only one bore in the recharge area with 10 years of records that shows a climatic signature, and it does show a slight change; in fact, it was a rising trend through the 1990s. Some areas of the Leederville aquifer are declining through abstraction, but it is not climate sensitive and there is not much change in the superficial aquifer. It is fairly stable.

Hon DEE MARGETTS: Those Leederville figures did not necessarily change. Are you saying that they did not necessarily change noticeably during the drought years?

Mr Commander: Not through rainfall, no. It is mostly abstraction that has the major effect on the Leederville water levels.

Hon JOHN FISCHER: You said that it rose through the 1990s. Were you talking about water level rising?

Mr Commander: The water level in the recharge area of the Yarragadee rose during the 1990s, with slightly higher average rainfall in the mid 1990s. For the most part, where the aquifer is confined below the Leederville aquifer, we do not see a climatic signature or long-term trends.

Hon DEE MARGETTS: In the end, I suppose the kind of information your model might bring out is not just how much is available, but the kind of geographical spread and how much you could take from each location. Is that the kind of information?

Mr Commander: That is the ultimate aim - to have a numerical model that will enable us to put in abstraction points at different levels in different places. We also aim to be able to put in different climatic, rainfall and climate-change scenarios and see what would happen to water levels in the long term.

Hon DEE MARGETTS: Does it include that in your worst-case scenario, if you had 45 gigalitres abstracted in one location and best case -

Dr Hannon: The impact of that draw over the distance, yes.

Hon DEE MARGETTS: Conceivably, how long would it reasonably take to finalise that kind of modelling?

Mr Commander: We are just about to start. The Water Corporation is rebuilding the model, which will take, I think, a couple of months and will be about ready for October.

Dr Hannon: I reiterate the impact of the draw on the systems. We said in the No 2 update that the population growth and the development of the south west is very rapid. There has been 2.4 per cent

growth in the south west, and it makes up 6.8 per cent of the growth in the State overall. Much of that development is in the Busselton and Capel areas, and the applications, especially for domestic supplies, are very substantial. There are a lot of development speculations throughout the Scott coastal plain. The amount of water that is applied for increases all the time.

Hon DEE MARGETTS: Is there a waiting list of applications?

Dr Hannon: Yes, there is a waiting list for water. Thankfully, our licensing process has recently been injected with funds as a result of the Auditor General's report, which means that in some cases we have got on top of the backlog of licence applications. We are now moving into a greater capacity for compliance; we can actually go now and investigate whether people are following the rules, as it were, for abstracting, taking and using water. We are getting better information and a better handle on how responsible our water use is for this part of the world, too. It is a growing part of the world and, yes, we have a backlog of licence applications. They come in all the time.

Hon DEE MARGETTS: You are modelling that you need 10 or 15 bores to abstract 45 gigalitres without having an unreasonable impact. I imagine that would substantially add to the cost of that abstraction. Spacially, if you had 15 or so bores over a particular area -

Ms Harrison: The research and modelling is about finding that optimal balance. I think at the moment the proposal is about eight bores. Is that right?

Dr Hannon: Eight bores.

Mr Commander: The current proposal is for eight bores, because we know that with a bore you can get one-eighth of the yield of 45 gigalitres, and that is an economic way to construct them. The question is how to locate those. Obviously, from an economic point of view, the closer they are to the pipeline to the north, the better it would suit the Water Corporation.

Hon DEE MARGETTS: You are not being asked how many bores would be optimal to be sustainable. You are being asked, given the economics of eight bores, where you could or would locate them and whether that would work.

Mr Commander: It is up to the corporation to propose where the bores are put and we will assess the impacts from them. Obviously, during the joint modelling, the Water Corporation will want to propose a bore field layout that will have the minimal impact on other users and the environment.

Hon DEE MARGETTS: At the moment it has not got to that stage of actually proposing where they should be put. It is waiting on you.

Mr Commander: It is pretty much finalised that the bores will be located along Mowen Road and down Sues Road.

Hon DEE MARGETTS: The modelling and location of the bores was determined in the absence of all the information that you had.

Mr Commander: That would be the optimal position for them, whatever the case.

Hon DEE MARGETTS: How far apart are they spaced?

Mr Commander: Eight or 10 kilometres, or something like that.

Hon DEE MARGETTS: Eight bores eight to 10 kilometres apart.

Mr Commander: Not quite; probably five kilometres apart.

Hon BARRY HOUSE: How much interaction is there between the superficial, Leederville and Yarragadee aquifers?

Mr Commander: That depends on the area. It is very area specific.

Hon BARRY HOUSE: That is a politician's answer!

Mr Commander: For instance, under south Bunbury, the superficials sit directly on the Yarragadee and there is a very good connection because the superficials are sandy and the Yarragadee is sandy. It is virtually one aquifer system in the area south of Bunbury. However, the superficials are very clayey in the interior part of the coastal plain, so they do not have a very good connection with the underlying formations. Most of the Yarragadee, apart from the area of outcrop to the Yarragadee, which is on the Blackwood plateau across the Blackwood River area, is overlain by the Leederville by up to 200 metres of sand shale succession. There is a very poor connection with the surface.

Hon BARRY HOUSE: This might sound naive, but the targeted draw area around Mowen Road and Sues Road, as you were discussing a moment ago, is obviously designed to get the maximum yield from the Yarragadee. The part of the Yarragadee from where the water is drawn obviously makes a difference. If the bore field were located along the shoreline - between here and Busselton - you might not get the maximum yield from those bores but you might have an in-built safety valve in the system if there was risk of a level of salt encroachment on the water that was taken. Would that not be a natural condition that would tell us that that was the maximum yield that we could take?

Mr Commander: Yes. One optimal way of using the aquifer would be to utilise the fresh water offshore, essentially to mine it, which would be to put down bores along the coast. That is one scenario that really has not been looked at, partly because there are other users along this area. The Bunbury and Busselton water supply both come from the Yarragadee. Ultimately, that could be a future scenario.

Dr Hannon: Is it worth saying that it is in the state forest down here? That is, the impact on other users.

Mr Commander: If a major bore field were to be put along the coastline, there would be a large impact of draw down on other users; that is, on the Bunbury and Busselton water supply and the irrigation and mineral sands developments. Putting the bore field in the middle of the Blackwood plateau minimises the impact on existing water users.

Hon DEE MARGETTS: I see the map on the back of fact sheet No 2. Is it the Cowaramup line that has been closed?

Mr Commander: The proposed bore field lies just to the south of the Cowaramup line.

Hon BARRY HOUSE: Does today's announcement giving the go-ahead to a desalination plant have any effect on your research and the work that you are doing?

Mr Commander: I cannot answer for the Water Corporation whether that will change its thinking. From our point of view as ground water managers, we want to have a very good numerical model that will enable us to manage the ground water and the aquifers in the south west. We certainly have an interest in completing the investigations in the State and in having a model by which we can test any new licence applications.

Dr Hannon: From where I am in the south west, the impact that that decision has had on me and the people I work with is very clear; that is, it has been stated that the decision on the Yarragadee is now a research-dependent, information-dependent decision and not a time-based decision, and that is a good thing.

Hon NORMAN MOORE: It says that 63 gigalitres from ground water are currently used in this part of the world. How much of that is for irrigation?

Dr Hannon: That is the economic study.

Ms Harrison: We do not have that figure to hand with us now, but it is in the economic value study report that we have produced, which is publicly available, and we can provide that information to you if you want.

Hon NORMAN MOORE: How much is used by irrigation, how much by agriculture and how much by domestic producers?

Ms Harrison: You want the breakdown of use.

Dr Hannon: Page 6 of the community update No 4 shows that there are 63 gigalitres. That is what you are referring to, is it not?

Hon NORMAN MOORE: Yes.

Dr Hannon: So, what we have there are 63 gigalitres.

Hon NORMAN MOORE: I just want to know how the 63 gigalitres are currently used.

Ms Harrison: We can provide that to you.

[10.30 am]

Hon KEN TRAVERS: You mentioned that the recharge has gone up. Is there any sort of indication of the long-term rainfall figures in the recharge area of the Yarragadee? Coming from Perth, we have a strong psyche about the dramatic decline in rainfall over the past 25 years. Are there any figures, historically, on the rainfall and recharge of the Yarragadee?

Mr Commander: I think we are seeing the same effect as I understand Manjimup has, which is pretty much the same decline in winter rainfall in Perth, which is the major driver of recharge. In our modelling we are using a climatic scenario that reflects that data.

Hon KEN TRAVERS: My understanding is that the effect changes as we come further south. Are you saying it is the same in this area; that is, the same decline has occurred in the south west as in the area around Perth?

Mr Commander: I think it is true to say that it is similar.

Hon JOHN FISCHER: I thought a while ago you said that through the 1990s the rainfall increased. What area were you specifically referring to then?

Mr Commander: I think the same was true of Perth. There was a slight increase through the 1990s.

Hon BARRY HOUSE: It was the early 1990s. We have heard about the seven-year drought.

Hon KEN TRAVERS: It also depends on whether we are talking about the Swan coastal plain or recharge for the dams. They are slightly different, even in Perth.

Mr Commander: There is a slight difference between the change in rainfall and the change in run off.

Hon JOHN FISCHER: In your further work, from the information you had up to last December, you said that you were not prepared to come out with any desperate decisions. Do you have a time frame within which your research will provide some indication of recharge figures?

Mr Commander: Those figures will come out of the next round of modelling, which I think is due to be completed in October. So by October we should have a working model, which will give figures that we will have to use.

Hon KEN TRAVERS: You mentioned at the very beginning that the original time line was eight to 12 months before a decision would be made and that that was too quick. Did you mean it was too quick to do the research or the community consultation? You mentioned then that today's decision has made people feel more comfortable about the research. What was the concern about the eight to 12 months and what would be the ideal time frame for a project like this?

Dr Hannon: It is important to understand what was causing the concern about the eight to 12-month time frame. From talking with people in the south west, it is because places like the Blackwood River and Lake Jasper supply of water to the industries and to households is very

important and water supply is seasonal; it fluctuates. The eight to 12 months did not give a whole season or a whole year even for investigation to see how the water formed in the south west, so people could not trust the data because we were not getting a sense of how water was responding over different seasonal conditions and variations. We need to understand what people are looking for. They are looking for trust in the decision and confidence - because we will never be perfect in our knowledge - that if the impacts are deemed to become unacceptable, the decision will respond to that. Process issues as well as data issues need to be satisfied in that time frame.

Ms Harrison: Given that it is a very complex system, as we obtain more information, we can get a better idea of how complex it is. When we started the research, with the information we already had we knew it was an aquifer that contained a lot of water and that there would be some constraints in current and future uses and potential impacts on environmental values, for example. As we conducted more research through the eight to 10 months, we learnt that more ecosystems might be impacted on, which makes the issue more complex, so we need more information on those. We also recognised that the scale of the model we had was too coarse; it did not allow us to model sufficiently the impacts on those environmental features. We recognised that this process was iterative. If the issues are of low importance, a decision could be made sooner, but if as we go through our investigations we find that there are potentially more impacts, it is more complex or there are more ecosystems, for example, that we need to investigate, the time frame would be expanded. We found this Yarragadee proposal to be more complex than we initially anticipated, so it is difficult to give you a final date, and I do not think we -

Hon KEN TRAVERS: I was not asking for a final date but about the drivers of the concern. It sounds as though it is more about the research, which is open ended, because until you have completed the research you will not know how much research you need to do.

Dr Hannon: Additional to the research, I believe it is also about demonstrating there is good monitoring and reporting so that if there are impacts, measures will be in place. The community must be sure that water is secure in this part of the world. The other question, which one of the shire presidents raised and which the shires do not believe has been adequately answered, is the multiplier effect; that is, towns and communities around Nannup, for example, are dependent on water - not just the growers but also the fuel suppliers, consultants, schools and hospitals. Communities are dependent on the multiplier effects of that primary producing industry, which is water based.

Hon BARRY HOUSE: We have covered a fair amount of ground. Is there anything you would like to say in conclusion?

The Witnesses: No.

Hon BARRY HOUSE: As a member for this area, I believe that the research and the community feedback on this project have been excellent. That will bear fruit in the future for water supplies as well as industrial, commercial and domestic growth in this area. Thanks very much for your time; we really appreciate it.