PROFESSOR WILLIAMS: sworn.

EXAMINED BY MR LE MIERE

MR LE MIERE Perhaps it's best if I can take you to the section of your outline which begins with the heading submission on Herdsman Lake on page two, there you first give a definition of conservation, you define some other terms that follow there, you then go on to say "with regard to the conservation of inland waters and bearing in mind the above definition of conservation, conservation has seven recognisable values" and you set out the seven values, and then you say "different localities have different degrees to which these values operate, however so far as Herdsman Lake is concerned it is clear that values 2, 3, 4, 5 and 7 rate particularly highly". I'll take you to those, the first one you mention value number 2 is the recreational value, again. Perhaps one thing I should have covered before moving on to your specific comments on Herdsman Lake. Can I ask you when your involvement with Herdsman Lake began?--- Well I have been indirectly involved with Herdsman Lake for some years because I am a trustee of the World Wildlife Fund and before I was a trustee I was a member of the Scientific Advisory Committee. 

And what does the World Wildlife Fund's connection with the lake?--- The World Wildlife Fund were one of the bodies directly concerned with soliciting funds and recognising the value of Herdsman Lake and I think were instrumental, or at least very important, behind the creation of the observatory that is now in place there. 

And when did you become a trustee of that fund?--- I became a trustee of that fund two years ago, I believe, two or three, I think about two years ago. 

Yes, I think you mentioned some other involvement with.--- Before that I was a member of the Scientific Advisory Committee, I'd been a member of that for some three years. 

And what was that body's connection with Herdsman Lake?--- Well the Scientific Advisory Committee of the World Wildlife Fund is a committee of various experts throughout Australia, whose function basically is to provide advice to the World Wildlife Trustees on the sorts of projects that the World Wildlife Fund of Australia should support. And one of the projects that World Wildlife Fund had before it was the support of Herdsman Lake's observatory, and so that came before me as a member of the Scientific Advisory Committee some four or five years ago. So I have been involved indirectly with Herdsman Lake to some degree for some years.

1 PROF WILLIAMS XN 21.8.85
Right, of course you live in Adelaide, but I think you spent some time yesterday at Herdsman Lake?--- I did.

Inspecting it and looking at it, can you tell us what you did when you went out there?--- Well I went first of all to the observatory and I talked to the Warden and I observed the birds and I discussed various matters with people present. I was then taken on a conducted tour of the Lake around the perimeter, stopping off at various places looking at the birds and discussing other matters, and then I took a sample because I am interested in what was present and for other reasons, and that's what I did.

Alright I take you now back to the part of the submission I indicated earlier where you set out the different areas recognisable values. And you have said that so far as Herdsman Lake is concerned it is clear that values 2, 3, 4, 5, and 7 rate particularly highly, now value 2 is the recreational value, bird watching, fishing, duck shooting again, can you tell us in relation to Herdsman Lake what is it or why is it that those features rate highly at Herdsman Lake?--- Yes I can. I should perhaps first preface my response by saying that there are various sorts of recreational lakes. There are those recreational lakes which are set up for boating and for swimming and active forms or recreation and they are very important lakes, there is no question about it. But there are other types of recreation which are just as important to the Australian community and I believe are of increasing importance to the Australian community and they include the more passive forms such as bird watching and nature study and so on and so forth, and that's what I mean by this area, the value of recreational lake so far as Herdsman Lake is concerned. Perhaps I can explain, to answer directly your question I can turn to page three of my submission and point out that Herdsman Lake as it now is provides a significant breeding locality for the supply of water fowl and other birds to the Perth Metropolitan area. It's particularly important of course because it is full of highly productive bullrushes which are important for refuge areas for breeding in particular, of a wide variety of bird life, that I believe that it is in a very natural condition and localities like that I think should be treasured within the Perth Metropolitan area because to escape to such places one otherwise might have to travel some considerable distance outside. So the point of course of having a reasonably natural area within the Perth Metropolitan area, it is a marvellous resource to have from a variety of view points. It should not be underestimated.

2 PROF WILLIAMS XN 21.8.85
How common is such an area as Herdsman Lake within Australian Metropolitan areas? Well they are not common at all, I mean I cannot think of an equivalent of Herdsman Lake in any Australian Metropolitan area. There is certainly not one in Adelaide and there is certainly not one in Canberra, or Melbourne or Sydney. And Hobart, that's in Australia?!, that doesn't have any at all. The answer is direct and simple there is no equivalent of Herdsman Lake in any Australian Metropolitan area.

The next value you refer to is the aesthetic value of the Lake, again briefly what can you say about that? Well I mean that areas of natural landscape are very attractive to a wide variety of the Australian Community. A lot of the literature of Australia, its history, relates to areas of natural bushland, the Murray, Billabongs, Waltzing Matilda, and people relate to areas of what they perceive to be natural and they have an aesthetic pleasure in looking at such areas, and that basically is what I mean by aesthetic in terms of Herdsman Lake.

You went on to refer then to the scientific value. What scientific value does Herdsman Lake have? If I could just go back to the previous point, I might make the point that a great many people like living at the sides of lakes and are prepared to pay vast amounts of money in excess of other for blocks of land in excess of what they might pay for other blocks of land. The real estate value of lands adjacent to or near to areas of aesthetic appeal, water, are greatly increased. What do I mean by scientific value, I mean the provision of localities for the study of the natural environment, biology, zoology, environmental studies at University. Those sorts of pursuits require localities for study and if we destroy all those that are readily available of course we therefore lack easily accessible sites for study. We live on a very complicated planet, we are living on a spaceship of which the plumbing and the electricity systems are not very well known. It is in our long term interest to understand how the plumbing and electricity and whatever operate. We can only do this by looking at areas where the landscape is not covered by concretes and houses and roads and all these other necessary things.

You have referred to having taken some samples yourself, again is that, you started to tell us, is that for some scientific study of your own? No it is not for my particular scientific study, my own particular area of scientific interest is in salt lakes, I have a watching brief so to speak upon the fauna of
Australian freshwaters, broadly, and I always have colleagues who are interested to receive material from me, collected from wherever I go. So it was not taken directly for my own scientific study. For my own scientific interest and for possible use to colleagues.

You mentioned the Scientific Advisory Body that you were a member of and involved with, again has that body derived some sort of scientific research value from the involvement with Herdsman Lake?--- The Scientific Advisory Committee which I mentioned before is an advisory committee to the World Wildlife Fund, it is not of itself directly involved in scientific studies, its function is to provide scientific advice to the World Wildlife Trustees.

I see, alright, if I might move on, the fifth value referred to is the educational value, again what educational value do you see Herdsman Lake presents?--- Well particularly because it provides an accessible resource within near reach of the tertiary and secondary institutions within Perth. To study natural ecosystems is usually very difficult. It is particularly difficult in any other metropolitan city within Australia because one needs to travel a long distance and that means money, that means transport costs. To have an area like Herdsman Lake within easy reach of most Perth High schools, most I think the three, two Perth Universities is the resource of inestimable value.

Professor from your own experiences in the Department of Zoology at the University of Adelaide, do you seek out such localities for the use during your, as part of your courses at the University?--- Yes, I do, and the nearest locality that we go to that is in any way natural is 250 kilometres away, and it costs $600 to hire a bus and because it costs so much money we have only one expedition a term.

The final value that you refer to is the ecological value of the Lake, could you explain that for us please?--- Yes I can, and that is much more difficult to put a value upon. I'm concerned that if the world is finally covered with concrete then perhaps the world would not be able to survive. I'm concerned that if we eradicate all of the diversity of animal and plant life to a minimum, if we reduce it to a minimum then again we are in a less viable position to survive. And so it is difficult to put a value upon the ecological value of a particular water, but there is not question that there is a value, there is a value. The value of wild fowl and waders in the total context of what makes the world a viable entity. It's very difficult to assess but it's important nevertheless.
Professor you carry on, continue in your submission "it is because of these five values that the possible destruction or lowering of the present state of Herdsman Lake should be opposed", you then say "the use of mining as a tool to rehabilitate the lake is highly questionable". Could you explain that sentence you have there when you say "the use of mining as a tool to rehabilitate the lake is highly questionable"?--- Well I use the verb to rehabilitate because it was a term that was used in the submissions I'd read on this matter. And it seems to me that the use of mining, which would involved I understand, dredging and increase of turbidity and similar activities, is an activity that I would believe to be a not very satisfactory way of creating natural areas.

Right, perhaps if we go further you say "whilst Herdsman Lake once had large area of open water, there were then also many marshy areas and adjacent water bodies, these no longer exist. Shallow open areas in their present form in the lake are particularly important for migratory birds". The present situation, to what extent does the Herdsman Lake consist of large open areas and to what extent does it consist of marshy areas or shallow water areas?--- Well I don't know exactly what the relative proportions are, but that can be gained quite easily by mapping and by the maps that area available. It is important though I think to emphasize that at a time when the number of marshy areas within the Metropolitan area has greatly decreased, it is important to recognise that those that are left have an added value. There was a time when I, from my own readings, that there were large areas of marshy land surrounding Perth and they were supportive of ducks and wild fowl and the value of Herdsman Lake then I support would not be very great. But with a decrease of marsh lands and an increase of course of open water, those marsh lands which survive have got an increased value. That's what I meant by the sentence of there were then many other marshy areas.

What sort of bird life or wild life is supported by the marshy areas?--- Well the whole range of vertebrate and invertebrate aquatic life, including both the fish that are aquatic vertebrates and the bird life themselves but of course extremely important are the small animals that live within the water between the reeds and the shallow areas of water which acts as the food chain, the food base for the ducks, that's what I mean by the total animal life component.

You said the small, you are referring in particular to the small animals, what sort of animals are they?--- I mean the aquatic insects the small planktonic crustacea, the worms, the bacteria.
And you said they provide the food or a link in the food chain...  
--- They provide a link in the food chain and the direct food of many of the species involved.

And what sort of species do they support?--- There's a food chain which involves the progressive use of animals present and plants of course too, the very basis of the food chain ultimately must be the microscopic and macroscopic plants and these are fed upon by certain animals, herbivores, these in turn are fed upon by carnivores, primary carnivours, these in turn are then fed upon by other carnivours, ultimately of course the animals will form food for the ducks. That's what I mean by the, I'm sorry.

What, which animals and which wildlife in particular are found in the marshy areas that are not found in other areas, in particular in the open water areas? --- Well particularly those that are related to the bottom. Some of those will be found in the very deep areas but of course not to the same degree. Many animals of course are related to the nature of the substratum, to the depth of the water, to the presence or absence of plants. They are the ones which will be particularly abundant and important of course in the shallow areas. I'm thinking now of the bottom living crustaceans, the bottom living insects.

So far as the ducks, the water fowl, the waders are concerned, which of these animals are found particularly in marshy areas?--- Most of them will be found at some time or other in the marshy areas, but a particular value of the marshy areas is not only for the production of food and I might say by the way that emergent macrophytes, emergent plants of this sort are by far the most productive areas of the world, they are far more productive for example than tropical rain forests in many cases. They are amongst the most productive of all plant communities. And I'm sorry, I've forgotten the initial question.

I was asking in which particular, animal such as water fowl, waders, ducks are found in marshy areas and are found particularly in marshy areas rather than say in other open water areas.--- The majority are found in marshy areas because the marshy areas provide areas for feeding and for breeding. Open water areas are much more valuable as refuge areas for some species, for landing areas, but if one is to compare open water areas and marshy areas then by far the greatest value attaches to marshy areas. That's where the food is, where the shelter is, where the breeding localities are, open water areas are far less valuable. They have a value but they are far less valuable.
What adverse effects would come about as a result of removing or mining the marshy areas and turning them into open deep water areas?--- Well clearly the emergent macrophytes, the bullrushes and so on would be destroyed, so in effect you are destroying part of the lake which is valuable as a feeding resource, as a breeding resource. Additionally of course by creating large areas of deep water in a lake that is highly productive you are likely to create, during the summer time at least if not at other times of the year, pockets of water which are de-oxygenated. The bacteria will attack the organic matter and this will result in a decrease in the oxygen present. And large areas of de-oxygenated water are not good for a variety of reasons. Particularly when, as sometime often happens, over turn takes place and we have massive fish kills and other sort....

What does over turn mean?--- I'm sorry, when the upper layers which are oxygenated mix with the lower layers which are de-oxygenated, the result of course then is that we get massive fish kills, kills of other sorts of animal.

And what effect does that have on the ducks, the waders, the water fowl?--- A serious one, it kills the food supply, and creates smells and odours and other noxious things.

Now again, mining operations which lowered the depth of the lake down to a depth of say 9 or 10 meters what effect would that have on the food supply for the ducks, water fowl, waders in the area?--- In the area it would greatly decrease the food supply.

What effect would it have on the breeding of those animals?--- A negative one.

You say negative one, would it remove it or would it just simply... --- It would remove it, there are no bird in Australia that I know of living in aquatic inland waters which breed in open water. I think even the Albatros which is an oceanic bird needs to come to land to breed, it doesn't breed in the open ocean. There is no bird that I know of that breeds in open water, they all breed in protected areas.

And similarly so far as shelter is concerned, again it would... --- Yes the same applies.

Right. You said in this outline Professor, shallow open areas in their present form in the lake, are particularly important for migratory bird life, again can you tell us more about the bird life you are referring to?--- Yes I can, I'm really referring to those which migrate long distances. As you probably do know the bird life of inland waters in Australia
comprises a variety of sorts, some which remain resident in a particular locality over a long period of time. Such as Cootes and the like, and then there are others such as many ducks which are nomadic or which migrate reasonably long distances within Australia often in response to local regional changes in climate and the prevalence of water. And then there are others which migrate huge distances, the Red Necked Stint, for example, migrates from here through Japan, vast distances, so they are the sorts of bird life I am referring to when I talk about those things.

Why are shallow open areas in the present form in the lake particularly important for those forms of bird life?--- Well shallow areas as opposed to deep areas are of course much more productive of food and I meant the value in that sense.

You went on to say, "disturbance to these by mining operations will be highly deleterious and destructive", again in what form will they be deleterious and destructive?--- Well they will be deepened they will therefore no longer be shallow, they will therefore no longer be productive and moreover of course, very often involved in dredging operations, operations of that sort, there is a release into the environment of small particulate matter which tends to make the water turbid, and that in effect, that has an impact beyond simply physical impact, it often decreases the extent to which light can penetrate and that has an impact upon the production of the lake.

You are saying that that impact being what, that it causes less vegetation to grow on the bed of the lake?--- Yes, well in shallow areas.

Yes. Now you say when you went out to Herdsman Lake, I think you, did you see the area on the south west of the lake where mining and dredging operations have already taken place?--- I did, yes.

And what sort of effect has that had, the sort of operations that have been carried out in that south western part of the lake, what sort of effect does that have on the animal life, the wild life of the lake.?--- Well...

WARDEN
When you say the south west I want there to be a capacity to refer to a map to follow along.

MR LE MIERE
Yes, I wonder if, I've got your worship an aerial photograph here which may be I think of some assistance to Professor Williams, I think Professor Williams my have a copy of a similar....--- I have this particular map.
WARDEN  Could I compare it with one that I have got.— I take it that this is the south east just here, yes, Floreat Waters.

Common to all maps I imagine will be the lagoon that shows at the south west corner and the line which shows the boundary of the, no this doesn't show the boundaries of the application areas. Perhaps if you referred among other things to the lagoon and distances and areas of it, that would be at least one common feature that all maps will show in the south west portion, I am only concerned that whoever refers to the transcript will not necessarily be looking at any one particular map.

MR LE MIERE  Yes Sir, I'm wondering, yes I'm wondering your worship, perhaps, Mr Kerfert has handed to me a map of Herdsman Lake from the region open space used for development plan, it perhaps may be a useful, in the sense that it's probably one that is commonly, common to the parties.

WARDEN  Could I see that.

It seems to be an excellent map to refer to, providing its suitable to Professor Williams, would you have some thoughts on that.

MR LE MIERE  Yes, perhaps if Professor Williams if you could have a look and see if you could identify the, or recognise the features of the lake on that map.

WARDEN  How widely distributed are those maps, can you lend one to the Warden for example?

MR LE MIERE  Yes, perhaps if that one can be tendered to be into the record.

WARDEN  Yes. This map is issued under the auspicious of the MRPA, it can be regarded as an MRPA map?

MR LE MIERE  Yes. Mr Williams you are able to recognise the features on that map?— Yes.

Now the area that you saw when you were at the lake where dredging operations have already taken place, can you indicate on that map where those areas are?— In the south west corner, yes, I can indicate it yes.

Is that the shaded area in the south west corner that represents the...

WARDEN  Deep water areas?

MR LE MIERE  Yes, I think with the, it is an area marked with shallow water and then deep water area on the map.— Yes.
And is that the deep water area there that you are referring to as the area where the operations have been carried out?--- As I understand it yes.

Those sort of operations Professor Williams, what effect do those operations have on the bird life and wild life of the lake?--- Many and varied, they would have clearly destroyed part of the natural areas previously present, thereby of course destroying part of the food resource of the wild fowl, thereby destroying part of the breeding area of the wild fowl. So so far as the water birds are concerned the impact would have been a negative one. There are other shallower areas which of course are more important, but the deeper waters will simply have destroyed part of the habitat, it will therefore have been a negative impact.

Right. I'll take you Professor to the third page of your, the outline of your submission, you make some particular points there. The first one is the destruction of other wetlands on the Perth coastal plain has greatly increased the value of those few that remain, could you elaborate on that at all?--- Well I have already made some mention of that earlier, there was a time when there were more waters around in the metropolitan area than are now present. As these have gradually been destroyed because of housing and other needs of the community of course it means that those remaining have added value. And that's what I meant by point one, that by the loss of these marsh lands in previous ages, previous times, to fulfill the needs of the community in other perceived ways, I make that point.

Is that likely to have any effect on the decrease or disappearance of any particular species of wild life?--- Yes it will have. I know there is considerable concern in Australia for the preservation of endangered species, but of course it is nonsense to attempt to preserve a species unless one preserves the habitat. There is no point in being sympathetic about the preservation of a particular duck, the Freckled Duck for example, or whatever, if one is not at the same time sympathetic about the preservation of its habitat. One cannot preserve, except in zoos and that's a very artificial and very unnatural way of preservation, one cannot maintain species unless their natural habitat is maintained.

You referred to the Freckled Duck and I think that, is that an endangered species in Australia?--- It is regarded as a species at hazard and it is found at, but I gather not very common at Herdsman Lake, it has been recorded at Herdsman Lake.
And are there many suitable habitats for the Freckled Duck say around the Perth Metropolitan regions?--- Very few indeed.

And would the removal of marshy areas or shallow water areas at Herdsman Lake have any effect on the continued presence or existence of the Freckled Duck in Perth Metropolitan region?--- Yes.

Tend to make it less likely?--- It would tend to make it less likely to remain here. There are a very few thousand left of the Freckled Duck, for example, it's one of several of course, and it's a question of attrition, the gradual erosion of that parts of the natural environment remaining.

You go on to say in point two Professor is "an important reason to retain Herdsman Lake is that it provides a significant breeding locality for the supply of water fowl for the Perth metropolitan region". Are you indicating there that some of the water fowl that breed at Herdsman Lake may move on to other areas within the Perth metropolitan region?--- Yes I am meaning that, but I don't think there is any question that the public like ducks and swans and waders and things of that sort, I know my own children do and my family does, and they like these things to be present and but of course, these sorts of animals can't always breed in the places that they are found at. What I'm making the point of in point two is that, Herdsman Lake provides I would....

So if they breed at Herdsman Lake are there other areas where they can live and survive but which are not suitable for breeding?--- Yes. In a restricted way, for example Monger's Lake.

What that's an area where water fowl are found?--- Yes.

And exist, but is that an area suitable for breeding?--- It's certainly very much less suitable for breeding than is Herdsman Lake, very much less.

And do you see a pattern whereby if water fowl breed at say, Herdsman Lake and then move on to other areas?--- Yes, a characteristic of the ducks and the geese is that they do migrate long and short distances.

Now the third point we pull out there Professor Williams is you say "Australia has international treaty obligations to maintain wetlands", can you tell us about those?--- Australia's, the Federal Government has entered into a variety of agreements, RAMSOR is one that springs immediately to mind, which essentially provides the preservation of areas within Australia where animals that migrate long distances can survive and breed.

11 PROF WILLIAMS XN 21.8.85
And is Herdsman Lake one such area? --- Herdsman Lake is an area where long distances migrants do breed and feed, yes.

Point four, you say "deep water does not provide suitable feeding grounds for most species of water fowl", again I think you have told us something about that and again is that, why is it... --- The most productive areas of standing water bodies are the shallow areas where emergent vegetation is abundant and so deep water of course clearly is less useful as a feeding resource for water fowl.

Do you find, is it because the food supply simply doesn't grow in deep water or is it because the ducks, it's too deep for them to dive down and get at or what exactly is the problem? --- For the most part it is that the food supply is not as abundant in deep water.

Again does the, is this something to do with the light penetrating or failing to penetrate the water to certain depths? --- It is something to do with that yes, light doesn't penetrate very far, it penetrates a distance depending on the turbidity of the water. It very rarely penetrates more than a few metres and in a very turbid lake perhaps even less.

And what sort of depth is sufficiently deep to cause the food supply to significantly diminish? --- One metre is about the depth to which most emergent macrophytes go, so as a direct answer to your question I would say one metre.

And if we came down to depths such as about 9 or 10 metres what, would you expect to find much... --- That's too deep for the establishment of aquatic emergent macrophytes, bullrushes, its too deep.

In point five you say, "the history of the extraction of the lake thus far indicates that depths may exceed nine metres and thus may produce water quality problems", I suppose you are referring there simply to the deep water area that you have indicated to us earlier? --- Yes I was.

And you say that such depths may produce water quality problems, what are you referring to by water quality problems? --- I meant what I'd said earlier that in large deep bodies of water there is a tendency for the water to stratify so that the upper layers are warm and oxygenated and the lower layers are colder and de-oxygenated and particularly does that happen frequently when there is a large amount of organic material present, as I think is the case at Herdsman Lake, so there is a real possibility that during the summer time in conditions particularly
of still warm weather, there would be the development of anoxic conditions, and of course a decrease therefore in water quality. That's what I meant.

Point six you say, "with increasing recreational pressure on natural areas surrounding Perth, the value of any such areas within Perth itself is greatly increased and relieves pressures upon outside the areas." Again what sort of areas are you talking about here that can be found outside Perth, are you talking about similar areas, marshland areas?--- Yes I'm talking about natural areas in a more general sense and I essentially was talking about the educational and aesthetic value of Herdsman Lake. As I mentioned earlier to travel to a similar locality in Adelaide takes many dollars and many miles and much time. That's what I meant.

The point seven you refer to, Tourism, now from your experience is the, does, in fact you can tell us what that experience is, does an area such as Herdsman Lake have any tourism value?--- Perhaps I can tell you what the experience is to begin with. I recently, last year, went up to Darwin and the Northern Territory is contemplating the setting up of the University in Darwin and one of the proposals that is before the planning authority in Darwin is that there be a faculty of tourism. Now I have to be honest and say that that as a long time academic I was somewhat, I found this move somewhat unusual. My attitudes changes however when people began to speak in favour of such a faculty, in particular my perceptions were much altered by what I'd heard from the Professor of Tourism whose name I believe was Professor Lee from Hawaii, and the point that he made, much supported by many other members of the conference, was that within the western world tourism is one of the fastest growing industries and by tourism I ought to say he meant, and I understand this is the case, the service industries, the bus operators, the airlines, the restaurants, the hotels, and so on and so forth, and the point that was made and I believe is true, I have no direct evidence that it is untrue, and I understand the Minister for Tourism in Canberra has made the same point, that tourism is an extremely important part of the western economy. Vast numbers of dollars are transferred between countries and within a country, between areas, and it should not be undervalued as an activity that we now are part of. Now tourists come to Australia for many reasons, but many of them come to Australia because they perceive it as being a natural area with a varied and important wildlife, with lots of kangaroos and koalas and parrots and waders and water fowl and so on, and I believe that if one city has such an area it has a resource of
immense tourist potential, so does that answer your question your honour, I have given you my experience and my perception of what you mean by that particular point.

Point eight you go on to say, "many Australian townships plan, or have recreational lakes. Many of these lakes include provision for large areas of fen or marsh. It is ironic that Perth, which already has a natural area of marshland should allow operations to proceed which place at hazard the value of this marshland. If we go back at the beginning I think you told us something earlier when we were discussing your experience in consulting, your consultancy work with engineers in relation to recreational lakes, your refer here to a number of places, now these cities or townships in which recreational lakes have actually been created. ---The recreational lake in Alice Springs has not been created, we are at phase two of that, the phase one has been undertaken and we are now, the authorities are in the business of further planning, so there has not been created yet a recreational lake in Alice Springs. One has been ....

Is there a plan to create one?---Yes of course, yes. A recreational lake has been created in Tennant Creek.

Well if I can take you, if first of all we still deal with Alice Springs, does that involve as any part of it any marsh land or fen land?--- Directly not because of particular problems in the Northern Territory involving obavirus deseases. That is not a good example to select because of the differences in climate between here and Perth.

Alright, well perhaps if you could take us to some of the better examples.--- Well I think Canberra is much more...

Such as Lake Burley Griffin that you were describing earlier?--- Such as Lake Burley Griffin, yes. And I make the point as I made earlier that the National Capital Development Commission has been at some pains to create within Burley Griffin areas of natural marsh land, specifically to create a natural environment, specifically also for other reasons I might say.

Thank you, your worship I might just take one moment to...

WARDEN

While there is a break, Professor Williams, I am going to have a transcript made of the, of your evidence, not from the very inception because your qualifications etc can be accepted here but from the time when I estimated you were beginning your discourse on the particular aspect of Herdsman Lake. Now that transcript is of course the evidence, and the evidence can't be altered but
there is a danger when evidence is extensive that somebody will summarise it. And in summarising it perhaps the important aspects of it can be lost. So what I propose to do to enable your submissions to go to the areas where they will have the greatest impact in the purest possible form, is to have a copy of the transcript sent to you and I am wondering whether you will be prepared to highlight the portions of it, to edit it in other words, bearing, not because it is a desirable thing to do so, but I think it is inevitable that somebody sooner or later is going to summarize it for somebody else's benefit and if anyone has the ability, should have the opportunity to summarize it I think it should be you. If you were prepared to highlight certain portions or summarize certain portions that you thought could be made more concise, counsel of course has always got the right to make a closing address and he could present your summary. Now whether it is done by you, by you in conjunction with the Conservation Council, I am quite prepared to offer retyping facilities if these are necessary, if your resources don't run to that. But then counsel could present your edited summary of your evidence as part of counsel's final submissions in the case. I think it would be desirable because while the evidence is the evidence and that can't be altered, and I of course will be dealing with the evidence, it is inevitable in parliament, in government, that somebody will summarize things and it may have a serious impact on the quality of the things you have been saying. Now are you prepared to look into this, to consider this question?--Yes I am prepared to summarize it and to retype the sections Sir, yes.

Good. Then when the transcript is done, I can't say exactly when that will be done, but we will run a copy of it off and perhaps send it direct to you at the University of Adelaide and you will, that will be your property, but when it is summarized you will send a copy to counsel or to Mrs Churchwood or whoever are the appropriate people to be part and parcel of any closing addresses that might be made, because I am aware that your evidence is not finished and we may be quite a while on it and human nature being what it is, I think a summary would be important. Yes Mr Le Miere.

MR LE MIERE

There were a couple of questions which I will endeavour to take up with the witness your worship.

WARDEN

I am not, nothing in this is by way of criticism, in fact I think the evidence is so important that it should be available in a form which is going to receive due consideration instead of anything which might represent summarising and there hasn't been a
wasted word, I'm not saying that at all, but we have to look at this in a realistic sense.

MR LE MIERE

Yes, I appreciate those comments. Professor Williams a couple of further matters I wanted to try and take up with you. Would you say that the removal or disturbance of sediments from the lake could effect the ability of the lake to absorb and buffer the influx of nutrients from surrounding areas?--- I think without more knowledge if this particular lake, I am not sure that I could answer that directly. Indeed it may be that nobody could because the degree to which particulative matter is important in nutrient recycling is still a very indeterminate area within freshwater ecology. There will be an impact I feel sure but to the extent of that and the direction I think I cannot at this stage say much about it.

Does the removal of peats or clays from the lake have some effect in that way? Does that again tend to effect the ability of the lake to absorb the nutrients?--- Yes an important removal mechanism in lakes frequently involves macrophytes, increasingly we are becoming aware that large stands of macrophytes are important nutrient removal mechanisms. Indeed many sewerage authorities around the world now are artificially creating areas of standing bullrushes and so on and so forth, specifically, not for the breeding of water fowl or to create natural areas, but specifically for the removal of phosphates and nitrates and I know indeed of a study in Australia where that has been the case. They have been doing that at Thredbo in the Kosciosko area and the CSIRO Division of Irrigation Research is involved at the moment in a large scale study involving macrophytes as nutrient removal mechanisms. So of course with the removal of macrophytes in that lake by deepening the body of water, does in fact mean that you are removing nutrient removal articles.

And the effect, if that happens, does that cause the growth of some algae blooms in the water, or does it lead to that?--- There is a correlation between that, the removal of macrophytes and an increase in the photoplankton. It is a loose correlation but by and large if there are lots of nutrients into a lake and there's lots of sunshine and there's lots of water, plants of one sort or another will make use of them. And if there are no macrophytes to do that then photoplankton, the small macroscopic algae, will. One cannot predict with certainty in this area, but it's likely.

And what effect does that have, the algae growth?--- Well algae have many effects, and not all of them are deleterious. By and large the artificial fertilization of lakes which results in blooms of
algaes, excess amounts of algal production, is viewed as being disadvantageous, putrification in the term that is applied to this phenomenon. And it is disadvantageous because if often looks unaesthetic, it often looks displeasing. It can lead to smells and bad odours. It can lead to fish kills when vast numbers of them die and de-oxygenate the water, and of course then kill the fish and other life inside the water. It can lead to even to deaths of water fowl and cattle, indeed the very first record to my knowledge of cattle death caused by excess algal production, by algae, resulted from an Australian expedition in Lake Alexandrina in 1878, published in Nature. I think that is the very first example of cattle, a cow being poisoned by algae, so the effects are many and varied and they are often disadvantageous, or perceived as being disadvantageous.

Yes Thank you Professor Williams.

WARDEN Mr Beneman.

MR BENEMAN Professor you familiarized yourself with the environs of the lake yesterday?---Yes.

Have you had occasion to inspect it previously?--- No, I have been to Perth on several occasions, but I have not previously visited Herdsman Lake.

Were you aware of the nature of the lake, I suppose you would have to say no, prior to the present development and dredging that has taken place in recent times?---I was aware of the importance of the lake.

You were aware?--- I was aware of the importance of the lake, yes prior to the visit, but I had not visited before yesterday.

So you are not able to compare the before and after of the present development?--- Not directly.

No. Have you studied the MRPA Herdsman Lake Concept Plan?--- I seen a copy of it and I have read it, if that is the same as study then yes I have.

Well I don't know, I simply ask you if you have studied it?---Yes.

And are you aware of the Department of Conservations Environmental Bulletin on the management of the lake?---I am aware of it, but I have not read it.

And have you studied the region use and development plan for the lake area?--- The one published in 1976?

Yes.--- Yes.

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And are you saying that, I mean as I gathered the evidence that you have given is incontrovertible as a general statement of philosophy of the management of lakes of this nature, but are you saying that the plans that have been proposed for the management of the lake area are inadequate?—- No I am not saying that.

You are aware that the Metropolitan Regional Planning Authority has taken this project on to manage the lake in, consistently with environmental considerations and matters of the type that you have brought to our attention this morning aren't you?—- Yes, I am aware of that.

So you are not saying that those measures which are proposed and have been formulated are necessarily inadequate?—- No.

I mean it may well be may it not that those proposals and those safeguards and controls are entirely consistent with what you have brought to our attention this morning?—- It may be, and if they are that's fine.

Thank you Professor.

WARDEN Thank you Mr Beneman. Do you have occasion to put questions.

WARDEN I am quite aware that this can't be the last word because the Professor's evidence has been taken in mid stream and I can only say that the matters that arise from it, the matters that extend it, matters that summarize it etc., are still to follow and for example I don't necessarily, if you happen to be in Perth on another occasion of course that, not necessarily even the last time you would be in the box, but probably that won't be the case, it'd be a very great coincidence if it was. But what we can expect at some time in the future is a summary of your evidence to be delivered as part of the closing address and whether it extends further than that I don't know but I regard it as vital that I have this as part of my report to the Minister and that seems to complete this stage of the proceedings and we will look now for an adjournment of two months.