This series of reports summarise the papers presented to the 2004 Australian National Plumbing Forum held 3 to 4 September 2004 at the Sheraton Perth Hotel, Perth Western Australia and also provide conclusions reached by the attending Plumbing Professionals from Australia and the World. The Forum was hosted by the Institute of Plumbing Australia Incorporated.

Note: The following has been transcribed and condensed from audio recordings and notes of the forum proceedings and not from written papers provided by the speakers. As such, matters in these reports do not constitute advice of any kind but provide a general overview of items discussed. Anyone reproducing, quoting or acting in any way on items contained herein do so at their own risk.

Friday 3 September 2004 – Perth's Water Future, Security Through Diversity

Dr Jim Gill Chief Executive Officer Water Corporation Western Australia

Thanks very much everybody, thanks for inviting me, it is terrific to be here because we are all in the same game really at the end of the day aren't we- the plumbing game - and we've got this mutual dependency on each other. Without you there is no way the Water Corporation would be in business in either water or waste water, and without the Water Corporation you probably wouldn't be in business either, pretty unlikely. So we certainly do depend on each other and we cooperate and I think we have always done that and I thank you very much for the invitation – because I do think that we have a - we've actually got - especially in this neck of the woods - in little old Western Australia, in the south of WA, we have a mutual problem. You, we, we have the same problem and that is this drying climate business and the need to get the community to understand what's happening and to really adapt and I think that we in WA must become world leaders in adapting to a drying climate.

So first up what I am going to cover in this presentation – first up: climate change across Australia and in particular Western Australia; the impact of climate change on water supplies in the scheme; Perth's integrated water supply scheme and the sort of activity we're undertaking to secure the future against the drying climate. And we refer to the approach as security through diversity which means not just relying on one source of water but looking at a multitude of sources - including most recently desalination - and in fact not just relying on sources of water but tackling the customer demand for water and in fact try to influence the future urban form, the future of suburbia if you like, and the way it pans out in future because it is a must. What's causing it all? Well, you've all heard about the greenhouse effect and I've read about it to make sure I believe it, and I can tell you I actually believe and I think that all the sceptics have long since gone now. It is here, it does involve the sun's rays getting through and hitting the earth and then the earth re-radiating energy of a different type which actually hits the outer layers of the atmosphere and gets bounced back and all that causes a concentration of energy in the earth's atmosphere and it means it is actually 33 degrees warmer than it would otherwise be. In other words if the greenhouse wasn't there the average temperature on earth is 15 degrees and if it was not for the greenhouse it would be minus 18 degrees which means life as we know it on earth would not exist. So the greenhouse effect is actually fundamental to life on earth and what we are talking about when we popularly talk about the greenhouse effect is just a minor variation, so it is a small increase on it

but big enough to have a profound effect on the way we live – and especially on water supply.

Graphs show the increase in carbon concentrations in the atmosphere and if you look at the temperature graphs they show a similar sort of variation – only small variations but exactly the same shape of graph. In WA we became pretty strongly aware of this in the mid nineties and kicked off a major research programme IOCI – Indian Ocean Climate Initiative. It's a lot of outfits- The Bureau of Meteorology, CSIRO, various universities and the state government – to study climate variability and climate change and to increase the pool of knowledge. As far as Western Australia is concerned, it has shown, well Australia as a whole – this is what the preliminary results have shown up. It shows that: in the sixty-year period between 1970 and 2030 we will end up with a change in rainfall. In south west WA its saying to us that we could get a rainfall drop of up to 20 percent. We could actually get a rainfall increase, a tiny one, and this is the remaining uncertainty – but the trend will be negative, quite strongly negative over sixty years. The amazing thing though, is that, what the scientists haven't been unable to explain, we have, is the fact that we seem to have copped all of this rainfall decline already. We are only half way through the sixty-year period, it was all meant to happen by the year 2030 and seems more than that seems to have happened already.

The result of it in terms of the impact on customers, well in Perth we have had two day a week sprinkling, for three years now, but look at what's happened in the rest of Australia, it hit us early, the fact that we started anticipating it earlier but the rest of Australia basically got caught with its pants down. You know you've got Sydney, Melbourne, and Canberra there and the Gold Coast - with total bans on watering lawns, not even with a hose. There are some variations in Brisbane and Adelaide and you can't even wash your car with a hose in Melbourne or Sydney, so they didn't plan, they didn't anticipate climate change and in fact there hasn't been a new dam built in the Eastern states for twenty years and of course, they don't have ground water at all. So they have been coasting along in a pretty sad state.

(Dr Gill used graphs to illustrate the reduced run off into hills dams.) This is stream flow this is actually the run off into the set of dams we have up in the hills at this point. You can see from it that this is the average stream flow right up until 1974, it was 338 gigalitres, but then from 1975 onwards this is the average, and guess what? - it is only half what it used to be up to that time. And then the scary thing is though, if you look at the last seven years all of a sudden we've got a new average, we're only operating about a third of what we had up until 1974, and so where on earth is it heading? So that's a pretty scary situation. The top graph is actually not stream flow but it's rainfall and it actually shows a slightly different pattern the same pattern but a bit different. See the rainfall hasn't fallen off by fifty percent and then by another third, it's dropped off, but not by as much. And the reason for the difference is that the run-off into the dams is kind of what's left over after the trees have got in for their cut, after some of its evaporated, some of its soaked in, that sort of thing. Run-off is what's left over after everything else has had a go, and so if the rainfall declines a bit, then those other demands are still there and you end up with a bigger drop in stream flow.

What I wanted to explain is that in about 1995, we sort of started - in the Water Authority as it was then – getting fairly concerned about the stream flows of the previous twenty years. In other words this period here is sending us a message – up until then we had plenty of water, things had been down a bit, but it wasn't looking too bad, we'd built a lot

of dams in those years and then increased ground water. But we actually, in '96, we decided we were kidding ourselves with the amount of water we expected from the dams, and we de-rated the system. Now, in 2004, because we are saying this now eight-year period including this winter – this is sending us another new message about stream flow decline, then we are going to de-rate the system yet again.

The year 2001 was a disastrous year it was the lowest stream flow since 1914, we've got some doubts as to whether the bloke who oiled the stream flow gauge in 1914 actually did his job. But in 1914 they were there. I just want to focus on the 2001 and the following couple of years up until the present. 2001 was a disaster and then the next two years was some recovery but not a lot so, the stream flows, in fact in 2003 we actually had an average rainfall but the stream flows were still well below average, still well down. And then you look at the current winter up to August, so a couple of days ago, and you can see that we are not doing too well. We usually make some progress, during September but you can see that these four years are looking pretty grim, so climate change is alive and well.

The integrated scheme in Western Australia, it is a very expansive one, it covers the Perth metropolitan area, and up to the Goldfields, that six hundred kilometre pipe up to Kalgoorlie. All of that is integrated with the new dams down at Harvey and very extensive. Most of the ground water is clustered north of the Swan river, that's the Nangara mound effectively. Several different aquifers, but that is where the water comes from, to the ground water. There is also one more field much smaller down in Jandakot. By and large the ground water comes from the north and the hills water comes from south of the river. The amazing thing about this, you know as I say, Sydney and Melbourne and Canberra have no ground water they don't have the sand that we are built on, we ain't called Sandgropers here for nothing. We've got a tremendously diverse range of different sources there, we've got ten major dams and five minor ones and we've got 202 bores in total, including some very productive deep artesian ones.

We are putting a lot more ground water into Mundaring Weir and in fact the summer before last, it was about 85 percent of the water that Kalgoorlie was getting was coming from Wanneroo ground water, they didn't know it but that is what they were getting. You can see that hills water is more limited and the mixing zone is much further south. So much for that and water quality and if anyone wants to talk about that I'd be happy to do so.

Right now we are actually supplying well over 50 percent of Perth's water from underground, and that is because the dams haven't been performing. You can see where the demand dropped off which is right there or there. That is where in 1977/78 we actually had a fourteen-month total sprinkler ban and a lot of things changed at that time – we introduced a different pricing structure for water – so you paid for what you used rather than water rates. There was a heck of a lot of private bores put down, native gardens took off and Perth actually became a far more water efficient community then, under a total sprinkler ban, which is to be expected I guess. It took twelve years before the total demand got back to where it had been in 1976.

I mentioned earlier that in the mid-nineties we took stock and said "hey we've got to take this climate change thing seriously" and that is when we de-rated the system. We took fifty gigalitres off rating for the system, so it came form nearly three hundred - two hundred and eighty gigalitres capacity down to about two hundred and thirty. So we de-rated the system and then we got our skates on and we developed a whole bunch of new water sources, we spent over six hundred million dollars – Harvey dam, a lot of new

artesian bores north of Perth, expanded bore fields, new water treatment plants and so on. In total if you take the period from '93 to 2003 we actually doubled the water supply capacity to the system. You'd think that would be pretty good, you'd think we would be home and hosed and I could go and play golf. But then what happened was that we got hit by that disastrous winter of 2001 – the worst since 1914 – and we put on water restrictions and they've been on for three years. When we first put those on we thought – well it's the worst since 1914, it will probably recover – it's a natural assumption to make but, just in case we got two more winters like that in a row we started to worry about actually running Perth out of drinking water, you know, forget outside watering – you can ban that completely, but there was some risk that you'd run out of drinking water. So we developed a whole lot of new options including desalination, we had a lot in our plans and we brought them forward. Then, I showed what's happened since 2001, the winters haven't been very good, so we've now assumed that we are not going to get a recovery. We've assumed that the years, the last seven, now eight years are the indicator of the future. And so, we have now de-rated our system yet again. We're not kidding ourselves – water is too important to play Russian roulette with and so we've taken another hit. A month ago the state government declared that they were about to build a desalination plant which if we had it today would be one of the two biggest operating in the world. That is going ahead and that plant will take supply back up over demand yet again. As far as I know we are the only water utility in the world that has actually done that – it has happened in southern California cause it's been de-rated for them. Here we've actually done that, the rest of Australia keeps coming over to see what we are up to because we are ahead of the play.

Let me come to desalination, the plant that we propose is going to be on a block of land just south of new Coburn Power Station down Kwinana, it's a land that Western Power have. It will use the reverse Osmosis technology, which is basically very very high-pressure filtration through fine membranes. It will be similar to plants, a lot of islands around the world have got these things cause they've got no catchments, so if you go to Trinidad they've got the other big one that is actually operating well. And if you go to places like Cyprus and Rottenest – close to home – they've got a desalination plant there. The sizes vary from things that you can have on the back of our boat right up to things that are major public water supply facilities. Reverse osmosis has improved out-of-sight over the last ten years, it has become far more energy efficient, part of the secret has been actually recovering energy from the waste stream that comes out, which comes out at very high pressure – and you can drive turbines and so on with that - so that it is now very energy efficient. The knowledge of the sea-water and its characteristics and how to pre-treat it so that it goes, it slips through the filtration membranes easily – that's improved out-of-sight. So really, the amazing thing is that you know, it would have cost – ten years ago – we'd be talking maybe $2.50 a kilolitre and today we are talking a $1.11, which is getting down towards an economic level. This plant, the Premier kicked it off at the end of July and the intention is that within two years it will be on stream and producing water.

Another thing is because it uses electricity the Water Corporation has actually made a commitment to offset the greenhouse gases which electricity generation produces and we are going to do that by planting trees. A few thousand hectares of trees and we are going to kill two birds with one stone because as you know a lot of our dam catchments especially Wellington Dam, the water is pretty salty and we've been cleaning it up over the years, we've reduced the salinity in Wellington Dam a lot – the idea being to make it viable as a public drinking water source and by planting trees in some of the more saline

catchment areas we can drop the ground water table and reduce the salinity of the run-off. We'll kill two birds with one stone with the tree-planting thing.

A lot of people ask me about – what is the impact in Coburn Sound of the fact that you are putting in to the ocean. You take out a certain amount of water – half of that emerges as fresh drinking water from the plant – the other half goes back into the ocean as water, which is twice as salty as seawater. The answer is that there'll be specially designed defuses sitting on the bottom of Coburn Sound with holes which will actually jet the water up at an angle of 60 degrees where it hits the surface and it actually mixes in a sort of a scientifically determined fashion – by the time it is 50 metres away from the diffuser, it has actually been diluted 45 times. It is a well modelled and studied process, it won't cause any increase in Coburn Sound salinity of any significance at all. It has been ticked off by the EPA as ok and it won't have any effect on fish or crabs.

The water it produces will be better than existing scheme water – it will be down to 200 parts per million of total dissolved suburbs. Whereas typically ground water supplied suburbs would be getting 500 parts per million. It will taste more like hills water than like ground water and it will actually need less chlorine because it is so pure. It is actually a nicer water.

I also mention that future sources and one that we've been looking at and one that was an alternative to desalination and was a bit cheaper but we had some trouble getting the scientific side of it sorted out – is South West Yarragagee . That shows you the possible bore field – and South West Yarragagee is a massive aquiver with a very, very high reliability of rainfall. The capital cost of this project would be about the same as desalination but the operating cost – the energy used and so on would be quite a lot less. The water, I mentioned $1.11 for desalination – we'd be talking 0.85c for water from this source. There is a fair bit of opposition down there to transferring water out of the region, so our commitment is to make sure the needs of the region are look after in the long-run, before we even think about taking it up to Perth.

This is just a bit of an illustration - we have spent eight million, I think it is nearly ten million dollars on – we drilled at least one hundred and twenty bores down there, including a major production bore. We pump tested that to make sure we are responsible environmentally. The map on the right there shows, the pale shade of the area shows where the aquifer is on the land and it shows that the water that falls on it currently makes it way, over the years, out into the Indian Ocean to the north and the Southern Ocean to the south. So effectively what we intend doing is intercepting that water that would otherwise go up to the ocean. So it is a very good source – we expect to get the science sorted out by the end of this year, after that, it will go for approval. As I say we would have preferred that, for economic reasons, to go before desalination, but you've got to get the science right, therefore this comes after desalination.

There is one thing that everyone asks you about, everybody asks me about, and sometime that is very much to the fore of people's minds here and that is the Kimberley pipeline – which Ernie Bridge has been pushing for many many years and Ernie to my mind is just about my favourite West Australian – he is a fantastic bloke! And I've got to say this is a very very visionary idea and I've had this discussion with Ernie often. The problem with the Kimberley pipeline is that it isn't sustainable, and what's actually really knocked it out of contention is the economics of desalination. When you look at it the pipeline – it would cost about ten billion dollars and admittedly that is for a very big source – three hundred gigalitres a year – which could supply all of the integrated system at its current level – but the unit cost of the water would actually be $5.50. So it

is five times as much as desalination. The amount of power it would use would be 600 megawatts – which is about 25 times as much as the desalination plant would use - but that is for a bigger supplier of course. It would also involve damming the Fitzroy River or one of the tributaries to it and I don't know if whether you have been up and looked at that Kimberley country but it's very rich and - Aboriginal art and Aboriginal heritage – and to get approval to throw a dam across some of those magnificent valleys – it would take you a life-time – you still wouldn't do it.

It's a great idea – we could bring water from the Kimberley – two or three thousand kilometres, the other thing is of course, we have a dirty great pool of water just off Perth called the Indian Ocean and nowadays it just happens to be cheaper to take that, take the salt out of it and use that than it does to pipe water over such a long distance. As you can see – South West Yarragabee, $0.85c, Seawater $1.10 / $1.11, and Kimberley $5.50 – A lot more energy is required to pump that water south. Some people think that since it's up north and we're down here it should flow down by gravity – and if the earth was flat that would be true. I wanted to just move on to the broader thing the broader scene security through diversity.

So we are not only looking at new sources we are looking at a very large range of things. Surface water and ground water I have talked about those you have got desalination but we are also looking at catchment management how can we improve the performance of existing catchments. We are looking at industrial water recycling being smarter about our use of water, water trading with irrigators as I mentioned and their will be many more initiatives. So just dealing with those, first up catchments.

Well a lot of the, there are a few issues. A lot of the area up in the hills that is water catchments were clear felled, certainly heavily logged in the earlier part of the twentieth century and a lot of the bush up there is actually regrowth. And this slide sort of shows out on the right what mature forest looks like. You have got fewer bigger trees with not nearly so much undergrowth and actually they have a much lesser thirst for water than regrowth forest. So in the middle is a picture of, which you can't see very well but it is actively managed forest. The idea is what we are going to be doing we are moving towards a trial in the Wungong catchment to thin out the forest, firstly taking out the foreign species but then actually thinning it selectively to return it to pretty much like a mature forest and to increase its run off.

We haven't started this thing yet we have got to take a lot of people along with us a lot of community consultation because a lot of people have reservations about it. We have got to work with Department of Environment, the Conservation Council, communities and so on. But it is something we are working towards we believe it could bring up to an additional 40GL a year. This slide show is also, so the Wungong trial is mentioned in the middle there, but also on the Perth coastal plain there is actually a huge area of pine trees that there has been a contract between the State Government and a laminar veneer lumbar mill west beam, which is being built now at Neerabup to over a period of about three or five years take these trees off and convert them to lumbar and not replant them but continue the mill going after that with trees planted further away places like Moora and so on.

But that will release, those pine trees have a huge demand for water and so that will release more water for the public water supply system. And after the Wungong catchment we also intend going on to other catchments and South Dandelup, North Dandelup, Serpentine there is considerable potential in that.

I mentioned briefly water trading, we have already done a small trade with the Harvey irrigators to take water which they have released through more efficient irrigation putting water in pipes and they are very keen and we are very keen to progress towards more trading with them. They have got a pretty big water allocation down there, and the water is transported around the irrigation area basically in open channel a lot of them are earth channels so you get a lot of losses through evaporation and through seepage and so on. They are very keen, what we are talking to them about is that we help them pipe their system rather than having open channels and that we therefore get, gain the efficiency we actually take the water that is released through those by eliminating those losses and take that for public water supply.

And they in turn end up with an irrigation system, which isn't in open channels, but it is actually pressurised so they can use irrigation techniques that are a lot more efficient. Set of pivot sprinklers and advanced stripper systems and that kind of thing so they can make much more productive use of water. And irrigation Australia wide using huge amounts of water, we see this as a very very promising initiative very much a win-win sort of approach.

We are getting more and more heavily into water recycling, see those little pie charts down on the bottom right there, one of them shows the country where it is more than 40% of waste water is recycled and that is mainly on things such as golf courses, ovals and some tree lots with tree harvesting, so it has been very productive in the country. The other pie chart shows that only about 3.6% currently recycled out of the metropolitan scheme and most of the treated wastewater goes out through ocean outfalls. So our aim, by the year 2012 is to achieve a 20% reuse of wastewater statewide and we are pretty confident we will beat that.

The other picture is people playing soccer on McGilvray oval which is a UWA sports playing field and it is right opposite the Subiaco waste water treatment plant so it is now irrigated by water which is taken from that plant and it is highly treated water so it's safe.

One of this most exciting things on at the moment is that down at Kwinana we are in the process of commissioning a brand new water recycling plant for industry so this plant is going to take water from the Woodman Point Waster Water Treatment Plant. It will take 6GL or 6 billion litres if you like. And it will produce water for Industry and it will use micro filtration and reverse osmosis. So actually the thing you see down the bottom there is actually a reverse osmosis plant, which is exactly the same as a desalination plant in fact, this is about a ninth the size of the big one that we are going to build not far from it. But it will produce a water which is actually better than scheme water even though it is treated sewage, and we will actually get a premium price for that from industry because they can use it in minimal processing, chemical processing boiler feed and that kind of thing.

So, and it also reduces the effluent outflow in our Cape Perron pipe line and part of the deal with industry is that we will take some of the stuff that they currently discharge into Cockburn Sound and put out through the pipe line in the space that is freed up in that pipe line. So that is a big step forward. It is being commissioned right now it will be in action within a month or two and I think we will be expanding that as well.

I wanted to run through some of our demand management initiatives the Water Wise programmes, national labelling schemes, the rebate scheme. The studies we have done of domestic water use and so on. So just getting into that the Water Wise programmes, they are aimed at behavioural change in the community and we are spreading, we try to spread the message through industry partnerships and alliances. And the programmes

include, Water Wise garden centres, irrigators, plumbers, display villages and schools, and Water Wise partner programmes so just illustrating those.

If you go down to the bottom end of Kwinana Freeway as far as it goes and you hang a right out towards safety bay, then on your left is the new Settlers Hills display village. It has just opened and it has got about a dozen water wise houses in it and those houses are all, they have all got flow controlled taps and so on they have all got AAA rated appliances. When you buy the house you actually also buy a packaged front garden package and it has got about four or five different types of them, tropical, native, coastal and so on, and you can customise those, they have got big areas of paving, they have got water efficient plants they have got the right sorts of mulch, zoned irrigation and if there is any, there is grass and that is all one of the species that was identified at some trials we did at UWA.

So the whole thing is a Water Wise package and so that is the first of the Water Wise display villages and there are 14 villages have been signed up to be part of that programme. So that is a pretty exciting development and it is just one way I guess that we are trying to influence the way the community thinks and lives. Water Wise garden centres are another initiative we have done this in conjunction with the Nursery and Garden Industry Association and there 18 centres participating and our aim has been that wherever you are within the metropolitan area within 10 minutes you will have one of these Water Wise garden centres and the anchor man behind all that has been John Brennan who is sitting down, stick your hand up John. And that is a terrific thing embraced with a lot enthusiasm by the Nursery Industry.

Water Wise garden irrigators, this was a collaboration with the Irrigation Association of Australia and the intention has been to train contractors who install irrigation systems to meet certain minimum water efficiency standards and we have got 20 companies and 36 irrigators are credited to date. And there is an industry standard to assist.

Water Wise plumbers I guess you know much more about that has been developed in conjunction with the Master Plumbers Association and it facilitates promotion of the message around the community. There have been 106 plumbers and 74 businesses accredited to date, the Water Corporation actually provides a 33 dollar rebate on household water efficiency assessments so householders can have audits and will pay half the cost. As part of the deal if anyone rings the corporation asking for a plumber, recommendation of a plumber then we give them somebody off the list of Water Wise plumbers. Our website also links customers to their local Water Wise plumber. We promote Water Wise plumbers through TV, radio and local and state newspapers through our own messages on holds. If you ring the Water Corporation and get put on hold then you get talked to about using Water Wise plumbers. We also do brochures, which we send out to customers through the billing process. So it is a bit of a two-way thing, by working with the plumbing industry we believe we will make significant steps forward. And we have had terrific co-operation from the plumbing industry.

There are rebates offered by the State Government on various plumbing products so for tap flow regulators there is a $10 rebate. For grey water systems there is up to $500 provided they are authorised by the Health Department and not a lot of progress has been made on that but it is an important area to pursue. Showerheads and rainwater tanks, also get rebates. One of the very important things we have been doing for some years is trying to get the community through kids through primary school kids. And this has been a terribly popular programme, the Water Wise schools programme. We have now got 176 schools recognised as Water Wise and over 20% of the students

throughout the State. We aim to expand that up to the point where 50% of schools are accredited by 2008. We really want to become role models in their communities. So we put a lot of effort into that and the teachers love it because we give them some pretty high quality curriculum materials and save them a bit of work.

There is a national labelling scheme and more and more products have to comply and products that are non-compliant will be phased off the market by the year 2008. There is also a smart approved water mark scheme which is developed by the water services association in conjunction with industry bodies and that is aimed at reducing the, assisting to reduce the per capita water consumption. So that is in areas of outdoor water use for products that are not covered by the rating scheme. So things like irrigation controllers.

Our own State government a year and a half ago introduced the water rebate programme I have mentioned some of those tap timers and shower heads, that programme is still in place and I guess the most notable part of that has been the washing machines because until February last year before the scheme was introduced there were less than 10 AAAA rated washing machines available on the market. By last month there were 140 AAAA washing machines. So the market, the number of available machines has expanded from 10 to 140. So we believe we are driving the market and we hope to change the market permanently.

You might be interested in some work we have done on studying household water use because it forms the basis for marketing to make our community more efficient. We have actually run a domestic water use studies, four years ago and we did one about 20 years before that as well. So, and the one we did four years ago we had a special smart water meter and various computerised data loggers and they could sit on the water meter and by the pattern of usage, the pattern of flow, through the meter they could tell what appliance or what use the water was being put to. So whether it was toilets or showers or washing machines or whether it was watering or filling a swimming pool.

So that was a good study to understand our customers. Toilets have actually declined in their usage, and washing machines have gone up. Washing machine usage has increased from 18% of the total to 26% of the total of in house use. Baths declined off and but the washing machines was the most significant one. Part of what has happened is that the ownership of automatic washing machines has increased over that period from 64% to 99% for households. So that is why the rebate scheme targeted washing machines and why its success is so important.

Just another graph, another chart on the same subject, you can see that the upper table there shows what happened in the early 80's study and what happened in the current study. In-house use hasn't changed that much, washing machines increased but toilets decreased and so on. The most notable thing is the way external use increased from 41kilolitres per year, up to 77. So that is why you know the best demand management approach is to go for the gardens, there are sprinkling water restrictions first. And there are some statistics done there on the right showing the change in washing machine ownership and the incidents of high efficiency showers. Early 80's there were no high efficiency showers now it is 35%. Dual flush toilets now 65%. So we are just tracking the changes in household usage.

So I don't know whether we will go that far but it is an example of the sort of thing we can do and I think we can go a lot further than we have so far. We have been running a personalised marketing programme we have been tackling customers with high consumption and we have been trying to achieve a voluntary change in behaviour of 3 to

5% across this target population without actually adversely affecting people's lifestyles. The households that have participated in this project have reduced their consumption by 11 kilolitres per person per year. So I guess we are having some success there. We are trying on all fronts.

Importantly and people, household customers always want to know well we are doing our bit what is happening with Industry. We do have a Water Wise business programme and it works on a number of different fronts. We have got business relationship managers managing the accounts of the top 150 business customers in the metropolitan area and working with them. We have got a water achiever diagnostic programme which is a lap top based diagnostic tool which helps business customers evaluate their performance in water management and it addresses water management as a business management issue rather than as a technical sort of engineering issue.

We have a lot of Water Wise business information sheets and check list and those are aimed at again at business customers not the top 150 managed by the business relationship managers but at the rest of the customer based. They are a Internet based self-assessment tool for various businesses. We also now have a one to five advanced diagnostic programme which is a tool designed for customers who have well established quality procedures in their businesses relating to water. That is targeted at specifically large customers like manufacturing, mining, and process industries who are willing to enter into a partnership with the Water Corporation to achieve water saving goals.

So we are working pretty energetically with bigger industry, and that is important that people know that although it hasn't got much PR. Look I think I have just about run dry of that, but just summing up the climate change has already hit South West, Western Australia really really hard with the stream flows only one third of what they were when the system was designed basically and it has got potentially big consequences. We believe we got in early by de-rating the system in the mid 90's and getting our scopes on the new Worthmore water source development, but that is the source side of it. We are very active on, in collaboration with the demand side of it but we have a long way to go to establish leadership as a water efficient community, and we must become world leaders.

So we are very keen to continue to work with industry and I guess that is it, so thanks for listening through all that and I would be happy to answer any questions or address any points you would like to raise.

Q. Mr Gill, A lot of my students raise questions with me, and as with other TAFE lecturers and people within the plumbing industry here. Getting back to that issue on the North West pipeline. I cannot understand nor can many people within the community understand why you won't look at that issue consequence, CY O'Connor took a pipeline 700km up to Kalgoorlie a hundred years ago, it is year 2004 we have put men on the moon, whatever, we can't bring a bloody pipeline down to Kalgoorlie. You could also take that water across to the Northern Territory. They would buy it. South Australia would buy it.

You are not developing the north, there is nothing in your speech about the North West for people up there or the development of that huge track of land up there. We have got a damn there that is eight times the size of Sydney Harbour, water all year, and yet still you are tinkering around the edges here talking about washing machines, taps, valves, whatever. But you are not looking forward into another hundred years ahead of our time. There is a National Strategy that has been put forward by Ian Betty; if you watch Landline on Sundays you will pick it up there. You probably have I don't know.

There is nothing in your speech about future Industrial development for WA you have talked about conservation and recycling of water, nothing there. Were, we have got massive amounts of ore up North, we could produce that ore, turn it into a top grade export quality item, a finished product, but the State Government looks at nothing more than digging it out of the ground, putting it in a ship and sending it overseas for processing.

The people down the South West are very concerned about your policy and I am speaking for people from Collie, Nannup, Dardanup, Bunbury, about your issue of pumping the water out of the South West out of the ground from underneath their farmland. They have got grazing country there, I don't know if you have got a history or background of farming but if you dry that land out you turn the place into a desert.

You're other idea of taking, thinning the forest out and trees and the back country behind Kalamunda in the damn area Pickering Brook further out there right through the Dale country. Taking, thinning forests isn't the answer. You get your heaviest rain over the most dense forests. I live in the hills I know what I am talking about and I have been up there for about 35 years. You also didn't discuss anything about the other 78% of water that we are talking about. Perth uses 12% of the water supply. Do you understand that? We only, Perth residents only use 12% of the water supply. The other 78% is used in agriculture. You know. Some of the figures you are throwing around here to me don't add up mate.

Okay anyway I will leave you with that and I will let some of these other people jump in.

Ok, thanks for that. Well if I could, maybe I should touch on some of those points just briefly. I mean with the Kimberley pipe line, as I said the cost per kilolitre would be $5.50.

No, we have, I accept what you say that it is a, that the community is very very interested in it, and don't think the proposal will ever be dismissed at all and we have taken it very very seriously. We have had several looks at it with some of the best consultants, consulting engineers, and we have looked at different routes as you say. But at the end of the day, it is $5.50 and it does have an enormous energy use and desalination, you have got the Indian Ocean sitting off our doorstep. With technology today, it is much cheaper and much easier to take the salt out of the Indian Ocean and desalination is a very definite part of Western Australia's future.

Well look that is fine and you can say that about any key piece of infrastructure in our community including CY O'Connor's pipeline and Perth Airport and so on, the narrows bridge, and we do have contingency plans in place. There are alternative ways of getting power and it is a very robust solution. Desalination is not a quick fix, it would be permanent increase in Perth water supply, if plant lasts for 25, 30 years we'll build a new one that is about the life we expect. This one we build now wont be the last I guarantee you within 20 years time there will be at least another one and it all depends on what the climate does. There is nothing wrong with desalination; it is a technology that has come of age, like having PC's and mobile phones. It is here. Mobile phones didn't exist 20 years ago now everybody has got one. Desalination is the same kind of technology. It is just here. It knocks a lot of other sources out of contention. Even ones you might think, you know even a bit further a field you wouldn't do it because desalination is cheaper and that is why Kimberley pipeline is a terrific idea but it won't get off the ground for economic reasons unless people actually want to pay, six times as much for their water or something like that. I don't see that happening.

Some of the other things you mentioned you know like we do have plans way ahead for new water sources to facilitate the growth of WA and one of the graphs I showed you there looked out to the year 2050 and we have got sources earmarked including more desalination plants for that period.

One point you mentioned you said that residents only use about 12% of all up water resources and I think that is probably true if you get the numbers out of the State Water Strategy. But come back to the scheme, the integrated scheme that serves Perth, Mandurah, down to Harvey and right out to Kalgoorlie and in the scheme that we know, residents use about 71% of the water. Industry uses only about 20%. Irrigation uses nothing because they are all separate schemes. So that is why it is important for the scheme sources to be going for washing machines, helping householders be efficient, helping Industry be efficient and it is important to look further a field to agriculture because that uses a lot and to look at trading opportunities and that is what I said we are doing with the Harvey irrigators and the Gnangara mound.

So we are tackling it on many many fronts. There will always be lots argument.

Q. [Inaudible] Is that and the quality of water you assure us is better than what the scheme water is? Why can't you use that or is there any strategies in place to reuse that to backfill your damns or set it out to the general public for flushing toilets or whatever?

Yes, look what you say is quite true you could easily take the water from that Kwinana water recycling re-use plant. You could chlorinate it but it would need an extra, that extra bit of treatment and you could put it back into the scheme. Why doesn't that happen? Because really it is a community perception thing. It is education. I don't know whether that will happen in the future. You know in Singapore right now they actually do treat wastewater and they call it new water. The Prime Minister up there drank a bottle of it when they opened the plant. But even that, it gets feed back into drinking water reservoir and about 2% of what is supplied through the taps I believe is that kind of water. I think it is a community psychological thing. It is a possibility for the future but I think we got a fair… they tried it in Southern California and Sid might be able to talk about this. In Orange County they tried it, they actually tried it through an aquifer with a three-day retention in the aquifer, and there was a big campaign against it and the catch cry was 'from toilet to tap'. Everybody got pretty turned off by it.

Q. [Inaudible] You were very quick to have a crack at other states including Victoria. I really have some difficulties with your comments about states coasting along, states being caught with their pants down. I really have some difficulty with your comment about people not being able to water lawns, it is not England. Lets be honest, it is a dry continent, it is the driest in the world so if we want English lawns we really shouldn't live here. I would ask you the question you also have a crack about Victoria doesn't build anymore damns. My question would be why should they? That would be number one. Secondly I would ask you, is Western Australia actually regulating to achieve water reductions in domestic use or are they only talking and trying to encourage?

There is no regulation to do it, there certainly is a state target and I think is a pretty resolve to achieve that. There are of course regulatory measures to help that happen for example we have had mandatory dual flush systems for I think 20 years. We have had a daytime sprinkler ban since 1996; we were the first to introduce that. We have had a rising block tariff structure for many years now and the rest of Australian is just coming on to that. To be honest though, as you say, Western Australia is actually drier and has been for a long time than the eastern states, it rains more often in Melbourne and a daytime a total sprinkler ban isn't nearly such a disaster in Melbourne as it is in Perth

because you get more frequent rainfall. So circumstances I agree with you are quite different. I think with the damns and I mention that no new damns have been built in the east for 20 years. They probably simply haven't had to be built but it is climate change that is now coming and affecting all of us and I know Canberra is about to start building a new damn.

But I put it to you Sir, with greatest respect that build a new damn and you immediately stress the environment, the streams and you cut people like me out of my irrigation water which I pay for because you are diverting that into a XXXX water supply. Where it might far better for governments to consider treating the water and pumping the treat water to agricultural areas rather than use the natural rainfall that is caught in places like XXXX for irrigation they may divert that.

No I agree with that point totally in South Australia they are using treated effluent for irrigation and we are doing here to an extent. So where it is achievable I think it has got to be done.

You touched on Industrial talking to assisting companies in managing the way they I suppose utilise their water sources and that, but what about incentives for those sort of commercial industrial mining sectors to recycle their water and reuse it. I don't think there is enough incentives for those sort of people to go down that avenue because water is so cheap for them, why bother? So I want to know, I mean you touched on that one item there and the rest of it you spent on talking the households and I tend to agree with these guys over here that the domestic water source is not, it is a problem, but I think it is that other percentage out there that is a major problem that I don't know whether we are addressing sufficiently.

I guess as I say from the scheme point of view nearly three quarters of the water is the householders therefore they get the first focus. But we are working with Industry, I mean one of the things we have found in working with Industry is, I mean, they whether you are talking about a food processing company or a mining company or whatever, industry tends to take a very keen look at all costs, and they tend to systematically go through their cost structure and kind of screw it as much as they can and therefore Industry does actually do a fair bit of Water Wise behaviour without our intervention or interest at all. Industry is also, gets into a fair bit of recycling as well. I don't know what the best examples of that are but there is a lot of Water Wise behaviour on the part of Industries.

The other thing I should say though in Western Australia most Industry actually sell sources water so in other words a lot of the plants up and down the Perth coastal strip will have bores straight into the ground and that is where they get their water. Not to say that they are being XXXX in the use, usually they are pretty careful. But you know there are other incentives on Industry I don't really think it is a massive problem from what we have observed with the Water Corporation one of the greater concerns has been indiscriminate use of ground water by people like local councils and universities and those sorts of things. They attract a lot of public consternation when they use their sprinklers in the middle of the day and so we have been trying to put pressure on those sorts of parties to you know get their act together as well.

Just one thing what about the recycling, promoting that more with the Industry, Commercial and Industrial sector out there so that they are reusing their own water? I don't think there is enough of that being done.

Q. [Inaudible] In NSW, in Sydney we have very little use very little access to aquifers. Where does the water for the aquifers actually come from in around Perth and you noted

that it was going to be a continuous usage, sustainable over a number of years and I was just curious as to where it all comes from to ensure that sustainability. The other point that I was interested in is that you mentioned briefly the use of tanks in households and I am wondering how far you got with that idea and why that is not being pushed perhaps more strongly? Is that a likely scenario in the future?

Yes ok thanks for that. Aquifers. The graph I showed with the green bars at the moment we have an allocation from ground water I think it is 158 gigalitres which is about three fifths of the total that we require in a year. That is actually probably higher than sustainable and that is recognised and we intend to come back to a usage of 135 gigalitres per year. So to recognise that there is a bit forgiveness in a ground water resource in that when the going gets tough you can actually pump it more than you could in the long term. But if you do that you have to let it recover. We are kept honest on that point by our environmental regulators. The other thing I should say about the Aquifers is they have actually been effected by climate change over the last twenty five years and there has been a steady decline in aquifer levels. There would have been as it happens even without public water supply using it. But that is something, which is very closely studied by regulators and by ourselves. We don't want to do things that are unsustainable in the long run.

Sorry, yes look most of the recharge from the aquifers is actually direct precipitation to the on top of them. I mean there aren't any great underground rivers or even surface rivers it is mostly just direct precipitation and the interesting thing is that the hills catchment areas that run off into the damns in a good year will only get 2 or 3% of the water that falls on them, the rainfall in the water body and available for water supply. On the coastal plain with the aquifers it is more like 22, 23%. So they are actually much more productive aquifers in terms of making the precipitation available than the traditional aquifers.

You asked about rainwater tanks, well there is a part of the rebate scheme relates to rainwater tanks, so we and the state government are encouraging them. Not for drinking water because there are health issues with that and the Health Department advises against using them for drinking purposes although some people do. But it is something that is being encouraged. Another fact in Perth is that most roof drainage actually goes off into soak wells, goes down into the superficial aquifer and that's the water that in fact garden bores are sucking up and reusing. So there is, at least directly a form of rainwater tank right underneath us.

Just as an interesting comment I find it somewhat amusing to hear the debate not be at the core of the discontent so I appreciate that leaf from a travellers perspective. I do want to say though that as we look at this arena for water – no life is sustainable without water. In the Southern California area – the region I'm from - we don't have water, we're stealing it from everybody else. We've been stealing it for 200 years and we've had rights and we've sustained those rights – when you look at it in the whole context, I mean if you can get above the fray of having the combated ness in it. In reality when you look at Southern California it's probably the economic hub of the west coast.

When you look at the metropolitan Los Angeles area in the Department of Water and Power – that I'm a commissioner on there – we service 17 million customers and we do it in about a 88 square mile area – so we don't have near the territory you have but we have a tremendous amount of customers. And we're bringing it from up north – we're bringing it from the Colorado river. In areas such as Sacramento where the state seat is for the state of California, they don't even have water meters today. So there is free

use and nobody has any idea what the usage is there – I know they have very green lawns. But when you look at the whole economics of the state – they say California is probably either the fourth or fifth largest economy in the world when you figure the region of Southern California and the Los Angeles area – it is either the seventh or the eighth largest economy in the world. It's what's driving things for everybody in the entire nation but we ought to talk about whose got water and where we're getting it and whose paying for it, and whose losing it because of it.

I think one thing you need to be concerned about is their security with water too. We're looking at things at the Department of Water and Power that we never envisioned just twenty years ago. I mean even when you talk about open water storage being subject to evaporation – we now have security concerns about that in the latest wake of environmental and terrorist activities. So things are concerns but I think if you look at it Will Rogers probably said it best "Whiskey's for drinking, water's for fighting over."

Q. Back to a local issue we talk about aquifer water and ground waters being two distinct separate supplies – correct? We always talk about aquifer water being the water we take out of the ground for consumption – which is what the Water Corporation's been drawing on. And yet around the metropolitan over the last 15 to 20 years we see a number of local lakes that have completely disappeared. Gnangara is one, and the other one I've seen more recently, the last ten years would be down there at City Beach underneath Bold Park. What was once only ten years ago a nice lake – completely gone. Is that due to reticulation or is that again the removal of aquifer water that is letting the ground water drop through?

Well the main cause of that is in fact the changing rainfall pattern, the changing climate. A lot of those lakes would dry up and stay dry for a matter of years anyway – and climate change – the fact that the aquifers have been on a downward slide for about twenty-five years has been a contributor to that. I think that garden bores would be a contributor – I don't think there's any doubt that.

Out at Herdsman Lake for instance, that's got a discharge that runs through the back of Churchlands and runs twenty four hours a day.

So that's artificially emptied in fact.

Well it's continuous – it runs into the ocean at City Beach all year.

Where is that coming from then? In only ten kilometres further south you've got the other lake there that's completely dried up – I wonder if there is any research.

The people from the department of environment know all about that – but the main factor is I say drying climate – but there is no doubt we've changed the whole nature of the ecosystems up and down the Perth coastal plain just by building houses and roads and knocking over trees and that kind of thing. Knocking over trees to build houses and roads has actually caused the water table to rise. Garden bores and so on cause it to lower, climate change causes it to lower as well. So there is a lot of factors in it.

So this water that is discharging out of City Beach from Herdsman Lake twenty four hours a day, fifty two weeks a year – has there been any consideration to grab some of that? Because that is obviously ground water but surplus.

I'm not actually aware of the answer to that – do you guys happen to know? It 's not one of the problems of the Water Corporation actually – I liked to know the answer but I'm not really the one to answer.

It is probably having a drying affect all over the area actually the drain, is not ours. Look there is one point I wanted to make that I always think it is worth thinking about in the water game, that's this. That is how much water you get out of your tap for the sum of one-cent right. They don't even make cents anymore but that's a cents worth of water – 20 litres. That's for the first hundred and fifty kilolitres and after that it's one and a half cents. That's one of the issues – we know it costs a cent – but if we think it is only worth a cent – then we have a problem.

I've got another container here, which is this – that's actually a teaspoon and that is how much – if you go to your local deli or supermarket and you buy a popular brand of bottled water that's how much water you get for one cent. Somewhere in between the two lies the value we ought to ascribe to water. Thanks.