MLRA Webinar 1 of 2: LVRRS Implementation Actions - Climate Change Guidance (Action 1) and Water Sharing in the Latrobe Valley (Action 3)

Tuesday 2 February 2021, 5:30pm AEST

Emeritus Professor Ray Mackay, Chair Mine Land Rehabilitation Authority Board

Welcome to the Mine Land Rehabilitation Authority's, first webinar. My name is Rae Mackay, I'm the Chair of the Mine Land Rehabilitation Authority Board and I'm going to be the host for this evening. First of all, I would like to begin by acknowledging that we are hosting this webinar from the traditional lands of the Braiakaulung people of the Gunaikurnai nation, and I want to pay my respects to their elders past and present. I'd also like to acknowledge the traditional custodians of the various lands on which we are all located today, and any Aboriginal and Torres Strait Islanders who may be online with us today.

Then before we begin, I'm going to just go through a little bit of the housekeeping. Obviously as participants you are not able to turn on your camera or microphone. This helps limit interruptions, but it also improves the audio and video quality for everybody attending, so I hope that what we're saying is coming through clearly. We're going to be going through a Q&A session after the two presentations. For the Q&A session, we will need you to access the Q&A function; that's the little speech icon with the question mark on the top right hand corner of your screen. When you click, the Q&A chat bar should open and you will be able to type in your questions. You won't be able to ask any questions through voice. We will obviously try and get through as many of the questions today as we can and any questions that we can't cover we will deal with through written commentary through publication on our website. Today's technology isn't going to be perfect, so if you do have any problems, just put a note in the Q&A box and we will endeavour to help so you can see what's going on. We are delighted to have so many attendees today. We actually had over 160 people register for this event and I'm hoping most people have been able to attend.

At that point, I think I will just kick off the session. This webinar and the next week's webinar are all about the Latrobe Valley Regional Rehabilitation Strategy, and in particular about the implementation actions that were initiated as part of the strategy and will be mostly completed by the middle of this year. We're going to cover four of the actions over the next two weeks. Two actions this week and two actions next week. Next week's webinars are going to be very strongly focused on exploring alternative water sources that might be used for mine rehabilitation such as, recycling water. And we're also going to be potentially looking at the options for implementing non-water based options, so either keeping the pits empty or finding another way to actually rehabilitate them without water. The final part of next week's meeting is to look at future water supply options becoming potentially too scarce. So even if we did start with the water supply based rehabilitation we may have to actually terminate it at a lower water level. So looking at those as well, so that's next week. But this week two very important actions need to be covered. The first action is really looking at the issues of climate change and how we might expect the water availability within the region to change, and we want to see how things will evolve over time. The second action is to look at what that means potentially to the availability of water and the allocations of different water uses.

So we have two people from the Department of Environment, Land, Water and Planning to talk to you today. The first of those to look at the guidance on climate change scenarios for the purposes of mine rehabilitation planning is Geoffrey Steendam. He's the senior manager of the Hydrology

and Climate section team, and I'm going to hand over to him to give his presentation. So welcome Geoff. Thanks for giving us this time and we look forward to hearing what you have to say. Thank you.

Geoffrey Steendam, Senior Manager, Hydrology and climate, DELWP

Thanks Rae. I'll talk through the Implementation Action 1 Climate Change Guidelines, and as Rae said, I manage the hydrology in climate science team in DELWP. We work closely with scientists on climate science and water hydrology science, and then we work with stakeholders right across the water sector to help apply that knowledge to inform resource planning, resource decisions and so that's certainly what we've been doing here with their work on this action. So the presentation I'll run through today should take around twenty minutes or so. I'll start by talking about what we know from the science and so looking at past observations as well as future projections. And I'll work through temperature, rainfall and then stream flow. And what we know from the science all feeds into the guidelines that's part of this action. And so I'll talk then about the guideline that's being developed by DELWP Department of Environment Land Water and Planning for assessing water availability. And then I'll finished with talking about the status of this action about delivering climate change guidance to inform the rehabilitation decisions in the Latrobe Valley.

So firstly, just wanted to give a quick history of the water sector investment involvement in research in this area. So since the middle of the millennium drought in 2006, the Victorian government's been supporting research in climate science and hydrology to better understand what climate change and climate variability means for water resources. So there's been multiple research projects, and there's the three key ones showing here. The current project is the Victorian Water and Climate Initiative, and so in December last year we released the report shown on the right here called Victoria's Water in a Changing Climate, and so that's available on the website. And the Victorian Water and Climate Initiative is one of the actions in water for Victoria and that's the Water Plan that was released in 2016. And so a lot of the images in the talk today that you will see are taken from that report.

So firstly with temperature, this shows for Victoria mean annual temperature in red, from early last century through till the current day. And you can see that it does vary obviously year to year, but there is that underlying long-term trend of warming conditions over time. And it's the last step below average year of temperature across Victoria was 1996. It's now been about 23 years of above average temperature. So a strong growth in temperature there over time and that's consistent with what we've seen globally with temperatures as well. So temperatures in Victoria on average are around a degree or more above earlier records, depending on the baseline period that you choose for that comparison. In temperature, temperature is important for water availability because it can impact on water demands. So different water demands can potentially increase with higher temperatures. But it also impacts on runoff from catchments because vegetation in the upper catchment can with higher temperatures also use more of the rainfall and mean less runoff.

Although temperatures are important, rainfall is more important as the primary driver of water availability and like temperature there's a lot of variability and very much a lot of variability year to year and month to month in rainfall that we see. This figure shows rainfall for Victoria divided into two parts of the year. So at the top there is the rainfall for April, the April to October period, which are the cooler months of the year. Often we refer to this as the 'cool season' and then at the bottom is the November to March rainfall and so that's the warmer months of the year, and often refer to that as the 'warm season'. And so what's showing in this diagram is the average depth of rainfall for each of these two periods. And rainfall during the cooler months the April to October period is particularly important for runoff because at that time of the year, with lower temperatures, catchments tend to use less water, so there's more of the rainfall that can actually become runoff. In addition to the fact that we just get more rainfall during that time of the year. And so rainfall is separated out into these two periods because we've actually observed different changes between these two times of the year. And when we look to the future, we expect to see different changes for those two times a year as well. So this diagram, these figures here show the observed rainfall changes that we've seen in those two periods. So the three maps along the top, there, are the rainfall during cold season, so the April to October period. Whereas, the three maps

along the bottom are the changes in rainfall during the warmer months of the year. So red being a reduction where it's below average and blue where its above average, and white is somewhere in between. And so you can see that in the period since 1997, for the cool time of the year, so that figure in the top left, that a lot of Victoria's been very, very much below average. Whereas in the warmer months, so the bottom left diagram, parts of Northern Victoria have actually been a bit above average, whereas southern Victoria has been below average. And so we had the millennium drought from 1997 to 2009 which is showed in the middle panels there. And then the panels on the right hand side show the rainfall since the end of the drought and you can see that still many parts of Victoria, that cooler time of the year where we've seen reductions in rainfall. Although there's some parts of southern Victoria, including parts of Latrobe where we haven't seen quite those reductions.

So the Bureau of Meteorology which is one of the partners in this research, has been doing a lot of work on understanding the drivers of those changes that were observed. And they found that the changes that we've seen in rainfall in Victoria and southern Australia is associated with changes in climate, including from increases in greenhouse gases.

The Bureau has found that during the cooler months, we've actually been getting, in Victoria, fewer low pressure systems over the state and less rainfall from each of those systems. The Bureau has mapped that, so they've actually analysed how much rain we've actually received from those systems, and this map shows the percentage change over recent years compared to the earlier period and you can see that really across all the Victoria the amount of rain that we're getting from lows and fronts has significantly reduced, so red being a reduction here. And when you look at the Latrobe Valley, it's in this 20 to 30% range down here. So in the Latrobe Valley we've seen over recent years a 20 to 30% reduction in the amount of rainfall from lows and frontal systems.

So I just talked briefly about changes in rainfall extremes. As the world warms, we know that the atmosphere can hold more moisture, and so we do know that we can expect an increase in the amount of extreme rainfall and extreme rainfall events. So even though we're expecting these overall declines in rainfall in southern Australia and Victoria, we do expect an increase still in these extreme events. And so this is again looking back at what's been observed in again work by the Bureau. The map on the left shows the annual maximum daily rainfall and how that's been changing over time, and it shows that for many parts Victoria there's just been a slight increase in that maximum annual daily rainfall over recent years. Although that's not the case on this map for the Latrobe Valley. Looking at a more extreme sort of rainfall into the range, so hourly extremes, and this is that 100 year type event. The Bureau's analysed, where they can, records across Victoria shown here on the right and you can see that comparing the lighter shade bars which is earlier period with the darker bars for each of these sites, there's been an increase, particularly in a couple of sites there, but there's other sites where there's been little or no change. And the closest site here is Glenmaggie Weir.

And so, we've done a lot of work with the Bureau and trying to understand well, what do we know from the science about the future and these changes in extremes. And we put together a fact sheet that's available on the website there. I've got the link on the slide. What that work has shown when they've looked at all the sites available. It's really clear that it's only those very extreme short duration events where we expect to see an increase due to climate change. And so when it comes to large rural catchments like the Latrobe catchment, the increases in extreme rainfall as a result of climate change aren't expected so they're not expected to have a significant impact on water availability. So it's really those overall reductions in rainfall that's pretty much going to dominate the water availability picture.

Now looking at stream flow, again observed stream flow, what we've seen over the past years and decades. So this is a stream flow gauging site in the Latrobe catchment, so this is a gauge that's located just near the Willow Grove Road Bridge that goes over the Latrobe and this is data from 1950. So annual data with each year shown at the blue column there. And you can see that a lot of variability, of course year to year, but there's also here you can see there's a downward trend over time, and if we compare the two black horizontal lines there's one that is the period prior to 1997 on the left, and then there's another line lower down, that's the period, the average of the period after 1997. And there's 45% reduction between the averages between those two periods,

and so this is obviously a very significant reduction, and it's quite consistent. When you look at other gauges around the Latrobe catchment we see a very similar story.

And when we look around Victoria, this is just another example of locations around the state you can see again it's the same comparison and a significant reduction during those two periods.

So looking at the bottom left there is the Wimmera Basin, where the graph is showing just before at the top right for the Latrobe, but looking at the Wimmera you can see there's even more variability in the stream flow there, but there's been an over 70% reduction between those two periods for the Wimmera. And even though we had some years like 2010 with the floods at the end of the drought ,since then stream flow conditions have still been very low in many years, and that's the case all around the state including the Latrobe.

With the lower rainfall, obviously during the millennium drought, we would expect to see reductions in runoff over that time. So that's obviously expected with the lower rainfall, but we actually got a more of a reduction in runoff than we would have expected. And so there's actually a downward shift in that relationship between rainfall and runoff. Obviously, it was a very long extended drought for thirteen years, but there was a significant shift in many catchments across the state.

So looking at the Latrobe here, you can see there are some sub-catchments in the top of the Latrobe in green, and this is work by the University of Melbourne as part of one of our partners in the Victorian Climate Initiative. And so, in terms of the catchments that they could analyse, you can see a lot of those shown in green there for the Latrobe. And so what that indicates is that during the millennium drought for those catchments there was an observed reduction in that relationship between rainfall and runoff during the drought compared to what that relationship was like prior to the drought. Whereas, because it's green, it's actually recovered and so since the end of the drought, that relationship in those catchments has recovered.

Whereas if you look at some of the trends in Central and Western Victoria in red at least up to the period that this analysis was done, those catchments hadn't shown a recovery. And so this is something that we're still trying to better understand so we're still doing more research and work on this. But we do expect that during dry conditions, in extended dry conditions in the future that this issue would compound any reduction in rainfall.

So now looking to the future and projecting water availability out to the future with climate change, obviously we can't forecast the weather on any particular day over long periods into the future. But we can get an understanding of what climate is going to look like, and then what that means for water availability.

So there's a number of steps to do this that are summarised in this diagram. Firstly, there's different scenarios around the path the world takes with emissions, and then concentrations of greenhouse gases in the atmosphere. And then with each of those scenarios we need to understand well, how does the Earth's climate system respond to those changes in greenhouse gases. And so that's that second step, and there's a number of countries, many countries around the world that invest in this, and lots of models that exist to try and understand how that plays out. Those models are very good at getting global temperature quite right, but when it comes to rainfall, particularly for quite a relatively small part of the globe like Victoria, it is a much more challenging exercise. Those models are quite coarse because they're modelling the whole globe. Each sort of grid cell they're modelling is quite a sort of large special area, so that information needs to be downscaled to make it more regionally useful, and then to understand what it means for hydrology and water availability. We then have to look at how do the catchments and the landscape, and how does that interplay with these changes in the climate variables rainfall.

So the CSIRO, which is our third partner on the Victorian Water and Climate Initiative, has done that work, and worked that through to see what it does mean for stream flow for Victoria. And so what you can see here is the results of that modelling and analysis by the CSIRO. Red indicates again, drier conditions, whereas blue indicates wetter conditions. And so this was based on the higher of the emissions scenarios, but it only goes out to the years 2040 and 2065. And so if we focus on the longer timeframe there, that's the 2065 time frame, you can see that there are some

catchments with the sort of more optimistic or low end of the range of projections, where there is even a slight increase, although that's not, that doesn't include the Latrobe or many other catchments in central Victoria.

And then if you look at the mid range in the middle or the higher end on the right hand side, you can see that we're getting to very significant reductions in runoff and therefore water availability under those scenarios. So there is a large range of possible futures and we do have to plan for that large range. But that there's some multiple lines of evidence that give us confidence that the future is going to be drier, and so we do expect dry conditions and we do have to plan for that. So I've just presented a lot of slides there, but thought it was worth summarising those.

So in terms of what we've observed, obviously higher temperatures, reduction in rainfall, particularly during the cooler time of the year. We've seen significant stream flow reductions in many catchments shift during the drought, in that response to rainfall though some have since recovered since the end of the drought. Over the longer term future, we obviously can expect to continue to see a lot of variability in climate. So we can expect to see dry periods and future wet periods like we've seen in recent months. But underlying all that variability we will see this trend for increasingly dry conditions over time. So we do expect to those reductions during the cooler time of the year over the longer term to continue. Maybe that we see increases in summer rainfall, but increases in the warmer time of year in rainfall that wouldn't be expected to offset those reductions during the cooler time.

And so I guess there isn't, much good news there from a water availability point of view, but of course there's a lot the world can do to mitigate the drivers of climate change. And by understanding the science we are able to make sure that the decisions that we make are well informed and robust under a range of possible futures that we can expect to experience. And that's really where the guidance comes in. So in December we also released the Climate Change Guidelines, so that shown in the image in the middle here, that was very much informed by the science, of course so including the science from the Victoria Water and Climate Initiative in that document there. And what these guidelines do is provide a consistent basis for water source planning across Victoria. And so they contain all the information needed to model the impacts of climate change on water availability in different catchments including the Latrobe. And so there's, they are flexible, so there's some flexibility there so that they are appropriate for range of applications and given the range of possible futures that you've seen from projections, I put up, it is important that planning decisions are robust under that range of future climate and water resource conditions that we might experience. And so the guidelines contain different scenarios that cover that range of uncertainty along with guidance on things like stress testing and sensitivity testing approaches.

So this is a schematic just to give an example I guess of the scenarios and how they can look on a diagram, these scenarios from the guidelines. And so shown in the dotted blue lines here are really those CSIRO projections I put up in an earlier slide. So at the top in the low climate change end of the range, the one in the middle being the mid range. And then the high end at the bottom here and you can see that over time obviously this envelope is very much all on the dry end. But one of the challenges that climate change poses for water resources in Victoria's is we have seen those significant reductions since 1997, and so one of the questions is well, could we have experienced a step change in climate, rather than a more gradual change, over time? And so that's one of the possibilities. So in the Guidelines we do have a scenario that's shown in red here that's based on the possibility of that situation continuing out into the future.

So now, just the status of this implementation action one from Latrobe Valley Regional Rehabilitation Strategy. So the Climate Change Guidelines of this action being complete were provided those guidelines to the mine licensees. We hosted an information session with the mine licensees also the Department of Jobs, Precincts and Regions, and the Mine Land Rehabilitation Authority. And so we had the scientists come along and present at that meeting, there's about 30 attendees at the session, covered things like understanding science behind the guidelines, how they can be used to apply for long term planning across the industry, and also how they can apply in the context of mine rehabilitation. And so ultimately, the outcome of this action one is about enabling the mine rehabilitation planning to be undertaken in a way that builds on what's known

from the science about changes in water availability now and into the future, so that the rehabilitation activities are robust under that range of possible future climate conditions.

This is my last slide. Just some further resources that you can go to, obviously there is a lot more information beyond what's shown here, but these are some of the key ones relating to this action, and what I've talked about today. So firstly at the top is a link to the report that a lot of these images are taken from, so that's Victoria's Water and Changing Climate report. Tomorrow our team in DEWLP, the hydrology and climate science team is hosting a webinar with the scientists from the Victorian Water and Climate Initiative. And where they will talk through the science that's presented in that report and the findings from that four years of research. And so that's at 1:00pm tomorrow, and if you go to that link at the top there, at the top of that web page, you'll find a link to the tomorrow's webinar if that's of interest. So there's also a link to the previous webinars the teams put together. So last year we ran a series of webinars on particular topics of the research, and so they're all still available on the website. There's a link to the Guidelines there and also a link to a report that was done by consultants Jacobs along with University of Melbourne and CSIRO that looked at climate change projection information for the Latrobe Valley Regional Rehabilitation Strategy as well. And so that's my last slide, so now I'll stop sharing and hand back to you. Thanks, Rae.

Rae:

Thanks very much for that Geoff. An excellent presentation. Some excellent resources at the end and we'll make sure that we make those available through our website and perhaps will pop them up on Facebook if people haven't been able to write them down, or maybe even put them into the Q&A's so people can see them going forward. So wonderful. Thank you. I want to remind everybody it's great if you can put your questions about anything that Geoff has presented into the Q&A section as well as popping them in for Anna as well. I think it'll be good to be able to have a really robust Q&A session after both presentations.

So I would now like to introduce Anna May, the director of Water Resource Assessment and Planning at DELWP, and she's going to take us through an overview of how water is currently shared in the Latrobe Valley. So, Anna is going to present on the framework and principles that underpin water sharing arrangements in Victoria and she's going to discuss how those apply to all the users in the Latrobe Valley. She will also talk about the water resources planning processes that exists to help ensure long-term water security. So building out of the issues that making sure we have enough water even though we seem to be going into a drying climate. So over to you, Anna.

Anna May, Director, Water Resource Assessment and Planning, DELWP

Firstly, I would also like to acknowledge the traditional owners of the land in which I'm located, as well as the Braiakaulung people who are the traditional owners of the Latrobe Valley, and I pay my respects to elders past, present, and emerging. Before I get started, I did want to provide some context for my presentation. One of the key principles of the Latrobe Valley Regional Rehabilitation Strategy is that any water used for mine rehabilitation must not have detrimental impacts to existing water users, which include farmers, town water suppliers and commercial users, as well as traditional owner and recreational values.

As part of the LVRRS, DELWP is conducting modelling and analysis work to determine how water and the Latrobe river system can most effectively be shared between different users. We are in the early stages of this, and so I don't have those results to share with you yet but we are in conversations with key stakeholders to ensure we have the information required to inform this work. So to put this work into context, it's really helpful to understand how water is currently shared between the different users in the system. So with that in mind today or tonight, I'll run through this process and arrangements that are in place that govern water entitlements and water sharing and how they relate to the Latrobe Valley. So I'll touch on the legal framework and the principles that underpin water in Victoria, provide you a snapshot of the different uses in the Latrobe Valley and their entitlements to surface water, and provide an overview of that long term planning process. So we currently kicking off the Gippsland and Central Region Sustainable Water Strategy. So I'll finish on touching on that and how you can get involved.

So the Water Act is the key piece of legislation that underpins water resource management in Victoria. It defines how water is shared across different consumptive uses including town water supply, agriculture, industry, as well as traditional owner environmental needs. It establishes processes for allocating water entitlements as well as other water management functions like trading between different users. It's important to recognise that while traditional owners don't currently hold any entitlements for water, particularly in the Latrobe system**,** Water for Victoria, which was released in 2016 includes some key actions that require us to recognise and manage water for Aboriginal values. As some of you may know, the Gunaikurnai Land and Waters Aboriginal Water Corporation has recently been granted access to two gigalitres of water from the Mitchell River in the east of Gippsland and as part of the LVRRS, or the strategy. Government is committed to partnering with the Gunaikurnai people to better understand traditional owner and needs for water and how they would like to use and access water into the future.

So sitting under the Water Act is the Victorian Water Entitlement Framework. This framework sets out the rules about how water is shared and it establishes entitlements in the context of the limits, so that water taken under one entitlement does not necessarily reduce the reliability of supply to other entitlement holders or adversely impact environmental values. It also provides the entitlements with integrity as it outlines a clear and transparent consultative process to inform water entitlement decisions. We know that confidence in the security of water entitlements is fundamentally important for economic prosperity so that entitlement holders understand and can make sound investment decisions. Because water is limited and a precious resource we do keep track of it. Victoria's Water resources are carefully measured to ensure that everyone only takes their fair share and planning is underpinned by robust data and trends in water availability.

So water entitlements do apply for both surface and groundwater, and one of the key primary functions is to provide certainty and flexibility to entitlement holders while making sure that water taken under one entitlement does not impact others.

So these are the principles of the water entitlement framework and really the bottom line here is that entitlements it out how much water can holders can take and the circumstances for when they can take it.

So moving on to focus on the Latrobe River system. As many of you on the line tonight will know there's many uses of water across the Latrobe region. Bulk water entitlement are held for things such as power generation, which is the focus of tonight, urban and industrial uses, farming, and the environment. There's also a drought reserve in the Latrobe system and that's in the Blue Rock Reservoir, this underpins reliability of supply. This presentation, which I'll go through tonight, will explore these different uses separately. But before I get into these, I did want to mention a few things. So similar to most water resources across Victoria, surface water in the Latrobe River system and aquifer system is fully allocated, so all consumptive water is currently allocated. So this means there's no more water that can be converted to an entitlement. Any water not already allocated for consumptive purposes has been set aside to maintain the environment or water reserve, and I'll talk more about this when I talk about environmental water in the Latrobe system. There are also values supported by the Latrobe River for which no entitlement is currently held, and I've mentioned them here on the slide. For example, there are operating rules in place to create recreational benefits in Lake Narracan to support water skiing activities, and also traditional owners have strong cultural connections to the river system and associated wetlands, and they also have rights under the Water Act.

This pie chart shows how water is shared in the Latrobe River system as broken up against those different uses which I've already mentioned. The large blue section is water above the consumptive use, and this contributes to flows you'll see down on that Latrobe River ending up in the Gippsland lakes, or some of the wetlands. A key difference in the Latrobe River system compared to other systems across Victoria is that most consumptive water is allocated for power generation. So in other systems in rural Victoria we often see consumptive use being predominantly used for agricultural purposes or in urban settings, like the Melbourne system, used for consumptive waters is primarily used for urban town water supply. So this system is quite unique across Victoria.

I've popped this slide up just as a bit of a comparison. It's an equivalent chart for the Mitchell River which is to the east of the Latrobe. Compared to the Latrobe the Mitchell River has a far smaller proportion allocated to consumptive uses. So those two blues that you see there is water that goes to the environment. And so the predominant part of that consumptive use is for agricultural purposes.

So moving back to the Latrobe Valley and just going through the different uses and how they are different demands and how they used within the Latrobe system. So firstly I wanted to talk about water for power generation. This is because the history of water management in the Latrobe River system closely follows the development of coal fired power stations. The Latrobe River provides a very high reliable supply of water for power generation. Because power generation contributes a significant portion of Victoria's energy needs and are the largest consumptive use of water in Latrobe Valley. A high reliability water supply has been absolutely critical to literally keep the lights on and across Victoria and make sure the electricity needs are maintained. So since 2006, the Latrobe power stations have used on average around 78 giga litres of surface water from the Latrobe River. This is been used for purposes such as the cooling towers, which you can see in the picture on the slide here and for comparison sake, this is about 6 times the amount of water used by all the towns across the central Gippsland region. Power stations have typically released around 23 giga litres of water back to the Latrobe River system, so you may have heard of the term 'return flows' and this is what it's referring to. So that's water that goes back to the river system after it has been used. So this means that net use of water from the Latrobe river on average has been around 55 giga litres per year for power generation. These return flows can be available year round including during summer when this water is used by irrigators and provided to the environment.

Gippsland Water is responsible for supplying potable water to towns in the Latrobe Valley, this water also comes from the Latrobe River system. They do hold a bulk entitlement to water in Blue Rock and Moondarra Reservoirs, as well as Narracan Creek. The total water supply from the Latrobe River excluding industry is typically around that 13 giga litres a year mark. So Gippsland Water also provides water to major industrial customers who support the regional economy of Latrobe Valley, such as Australian Paper, but also others.

Every five years, Gippsland Water refreshes their urban water strategy, which includes an updated water supply and demand projection based on water use efficiency, population growth, and the latest water availability projections under their bulk entitlements. And they used the climate guidelines that were mentioned earlier by Geoff.

The Latrobe Valley is home to a large food and fibre industry. I probably don't need to tell most of you on the line tonight that dairy is one of the predominant industries in Gippsland. But there has also been rapid growth in production of high value horticulture, cattle, sheep, lamb, wool, and poultry are also significant. So to take and use water from a waterway farmers and irrigators must have a section 51 license to authorise them to do this. Southern Rural Water is the responsible organisation for allocating Section 51 licenses along the Lower Latrobe River. Using water from their bulk entitlement, which is held for this purpose. So Southern Waters bulk entitlement provides for a share of inflows in storage capacity in the Blue Rock Reservoir, a share of influence in the Latrobe River, so including unregulated flows that come from Lake Narracan from that Upper Latrobe area, as well as a 50% share of return flows. which I mentioned earlier.

We know access to water is important for farmers and the LVRRS, the strategy makes it really clear that current access to water for the agricultural sector should be protected from any possible impacts associated with mine rehabilitation. On average, about 7 giga litres a year of surface water has been used by irrigators along the lower Latrobe River. Which is a relatively small volume compared to the water used for power generation. Before we jump off for agricultural use, I did want to quickly mention here that the Victorian Government is currently investigating ways to ensure agriculture and Central Gippsland has a strong and resilient future. Southern Rural Water again is currently leading a feasibility study to examine potential infrastructure options for expanding irrigated agriculture in Central Gippsland based on customer demands and willingness to invest. This information will not necessarily feed into the Latrobe Valley Regional Rehabilitation Strategy, but will inform broader water planning in the region, including the sustainable water strategy, which I'll touch on a little later.

In the Latrobe system, there's also water that has been set aside for the environment. The Victorian water environmental water hold currently holds two environmental entitlements which are mentioned here on the slide, and it allows water to be diverted from the Latrobe River to priority wetlands that form part of the Gippsland RAMSAR site. It also provides shares of influence into the Blue Rock Reservoir. This allows the targeted environmental water delivery, such as optimising outcomes for native fish, so especially the Australian Grayling, and allowing for migration and spawning.

The Environmental Water Reserve also includes water that is set aside for the environment by placing limits on how much water can be taken from the system for consumptive purposes. So any water that's left over is known as 'above cap'. In the Latrobe River, above cap water is by far the biggest contributor to the long term availability of water for the environment. So when we saw that pie graph that was the Big Blue chunk. This above cap water makes up 95% of water for the environment in the Latrobe Valley, so it's a really important component, but it is the first to be lost when climate does get dryer. The Latrobe river system contributes to around 23% of catchments of the Gippsland Lakes System which is well regarded for its environmental and cultural values. The lakes also provide significant recreational and tourism opportunities.

The Gippsland Lakes are internationally recognised as a RAMSAR site for their significant environmental values, including providing habitat for threatened species. This means the ongoing flows from the interconnected waterways that feed into the wetlands in Gippsland Lakes including the Latrobe River are and will continue to be important. Today, as it happens, is World Wetland Day, which is celebrated internationally each year on the 2nd of February. I was lucky enough to visit the Sale Common and the broader Gippsland Lakes recently, and given it is International Wetland Day I would like to take this opportunity to encourage you all to visit one of your local wetlands. Whether they're one of the natural beauties in the Gippsland Lakes system, or a constructed wetland within your local neighbourhood, which is really important for filtering out pollutant loads before they go into our waterways.

Okay, so this is similar to the graph that Geoff had shown earlier, but this is water availability in the Latrobe River. Since 1997, annual average inflows to the Latrobe River has declined from around 800 giga litres per year to around 600 giga litres per year. So a 200 giga litre reduction. So that's from the 1997 to the 1975, to present period. The recently released long term water resource assessment, which showed that this decline has fallen disproportionately on the environment, meaning that the environment now receives less water, such as from spills from reservoirs then it has received historically, so that's something we're working through. But important to note in the system.

Finally, from a surface water perspective, I wanted to mention the Latrobe Reserve. So this is quite unique compared to other systems across Victoria. Southern Rural Water manages this reserve in the Blue Rock Reservoir and it may be accessed for the Latrobe system entitlements. The primary purpose of the reserve is to underpin that high reliability of water supply, particularly to energy generators to ensure continuity of energy production in the face of declining water availability. It ensures there is water available to keep the electricity generators and industry running even during extremely dry conditions. The reserve also provides water to keep Lake Narracan at levels suitable for water skiing for up to three events per year, and they were the rules that I mentioned earlier.

Okay, I'm going to go a bit broader now and talk about long-term planning. So as I mentioned at the start of this presentation DELWP is currently commencing long-term water planning through the development of a Central Gippsland Sustainable Water Strategy. This will include the Latrobe Valley Sustainable Water Strategies established by the Water Act. They do provide a robust consultative planning process for long-term regional water security. The strategy will consider how water resources in the region are best shared to provide for all users and values for water, including agriculture, communities, the environment, traditional owners, towns, and business use. The Gippsland community will have an opportunity to provide input into the strategy later this year. And I would really like to encourage you to all be involved in this process, because there are two quite significant pieces of work being developed in parallel, being both the LVRRS implementation actions and the Sustainable Water Strategy (SWS). I just wanted to touch on the

key differences and areas of alignment between these strategies. So the LVRRS provides information and policy direction to support rehabilitation of the Latrobe Valley Coal mines to achieve safe, stable, and sustainable landforms. It considers options for mine rehabilitation that involve both a dry void or a less water intensive void, as well as options for water based mine rehabilitation. In contrast, the Sustainable Water Strategy looks specifically at water security at a regional scale for all water users. It will examine management of water in the region and look for ways to improve the reliability of supply for users and ways to improve the health of waterways. So while these two strategies serve different purposes, the new Sustainable Water Strategy will be consistent with the Latrobe Valley Regional Rehabilitation Strategy. Both will consider long term planning and both will encompass Latrobe Valley, although SWS will cover a much larger area as it stretches from across southern Victoria from East Gippsland through to the west of Geelong. Both will need to consider the risks to future water availability including climate change and both involve local community and traditional owners in decision making.

So I think this is my last slide. So finally I wanted to circle back to the Latrobe Valley Regional Rehabilitation Strategy. We do have an implementation action which looks at water from the Latrobe River system. To achieve a safe and stable rehabilitated landform we know we must plan for a drying climate and that landform must be climate resilient, and that's one of the principles of the Latrobe Valley Regional Rehabilitation Strategy. We heard from Geoff earlier about the latest climate science and how the recently released guidelines can be used by mine licensees and government as a tool to plan for that drying climate. In order to protect environmental and traditional owner values, and the rights of existing entitlement holders, the LVRRS is also clear that water available for from the Latrobe River for mine rehabilitation is likely to be limited to the volume smaller than the power stations current net usage, should the current or future minister for water approve such an application.

So as part of this action that we'll be implementing as part of the LVRRS, we will be continuing to engage with stakeholders to represent traditional owner environmental values of the Latrobe River system and interconnected systems, as well as the rights of existing users. We will continue to look at what it means to limit the maximum annual supply of any potential future water for mine rehabilitation to no more than the power stations current annual net usage. And we will consider other factors such as climate change projections and ensuring the entitlements and needs of existing users, including communities, farmers, and the environment are protected. So through this process we will be providing guidance on potential water sources and access arrangements for mine licensees to undertake rehabilitation of those coal mine voids. Alongside the work we will be doing along the Latrobe River system, and because of the expectation of a drying climate we will also be investigating the feasibility of using climate resilient water supplies, such as alternative water. DJPR are also focused on investigating non-water based or less water intensive mine rehabilitation options. And the LVRRS commits government to collaborate with mine licensees to explore these options further, and this will be the focus of next week's webinar hosted by the Mine Land Rehabilitation Authority. So finally, I would like to thank you for your time tonight. I hope I've given you some useful information on how water is shared in the Latrobe Valley. And thanks to the Mine Land Rehabilitation Authority for giving us this opportunity and hosting this really important webinar. I would like to hand back to Rae Mackay who I believe will facilitate some discussions.

Q&A Session

Rae:

Lovely thank you very, very much indeed Anna. That was a nice presentation and a good a connection to the previous one about a drying climate and also an increasing set of demands and a long term set of demands for usage. So I think that's great. While you've both been talking we've had a number of questions put into the Q&A question space which I think is great. For those of you who are looking at those it would be lovely if when you actually look down the set of questions that have been asked if you could actually like them or not, as the case may be, then that gives me a way of actually addressing those questions that are the most importance to our audience.

So I'm going to pick out the questions as we go through. They won't be in the order in which they were asked, but hopefully they will be in the order in which they're preferenced by our audience. So just a real quick reminder, we may not get through all of the questions that have been asked. Please feel free to continue asking questions, of course, throughout the Q and A session, and we'll try and get through as many as we can. If we don't get through them all we will definitely do a follow up by providing written responses to all your questions. Let's see how we get on. I'm going to try and focus if you don't mind also on questions that directly relate to our two presentations, so questions that are slightly outside of that content we may not get to, but we will we answer them with within the follow up.

Rae:

So the first question I have is really one for you, Geoff. It says, *"There definitely seems to be a change in the water in the rivers following 1997."* Another question was asked in the similar vein around this, *"Was there a change in how the rivers were managed at this point or are there other features that could explain why the changes in river flow are occurring?"*

Geoff:

Thanks Rae. So good question and I see there's a few there along that line. So it's really, that I guess I showed, for example, gauges around the state there, and I had that one for the Latrobe. In the catchment upstream of the Willow Grove Bridge. So that catchment and the other one shown are taken from a set of catchments. So DEWLP is one of the parties and invests a lot of money in getting that stream flow information and recording it and sharing it. But also the Bureau of Meteorology also plays a role. And so those gauges, the Bureau of Meteorology has gone through looking at all the catchment, all the gauge locations we have across the state and across the country to workout which of those gauges where there's minimal impact of other things going on. So other activities within the catchment that could influence your stream flow beyond just what you get from climate and the natural catchment alone. And so I think that does answer a lot of those questions. It is when there's some of those catchments where there's no cleared land at all and it's all forested catchment and they show a very similar response. And I guess the one I showed in the Latrobe there, so it is upstream of any of the big dams, that's the Upper Latrobe Catchment from that point up it's largely forested. Like there is some cleared land, but it goes right up to Noojee and up there. So there's a lot of forested land up there that is a very large part of the catchment upstream of that gauging point. And so that's one of the reasons why the Bureau of Meteorology has selected that as one of the gauges that does give us an indication of what's going on from climate and rainfall without it being having a large influence from other activities. And there were a couple of questions about the other catchment activities as well that I could sort of follow on with, or come back to.

Rae:

Super, thanks for that Geoff. I'm going to follow up with another question too if I can. The question is, *"In the event where a full pit lake option is viable and has been achieved, do water availability prediction models indicate whether or not a full pit lake can be sustained?"*

Geoff:

So that that's a good question, Anna might have comments in this too. So I think because we know that the future is expected dry there is a large range of possibilities about when that could get drier and then just how dry. But I think it there's certainly questions over how achievable some of those options could be, but I might if it's okay, I might throw it to Anna on this one who is more involved in the details around the applications work here.

Anna:

Thanks Geoff. I think climate change and climate variability is definitely Geoff is the guru of that within DEWLP, but as it relates to filling the mine pit and things like that there is a lot of uncertainty associated with that. So the evidence that Geoff presented showed that over the longer term that

water is likely to decline and may not be available in the volumes required at the times needed for mine rehabilitation. And that would include water for sustaining pit water bodies by making up for evaporative losses and things like that. So we did find during the development of the strategy itself that surface water availability has decreased. As I mentioned from that 800 gigalitres per year since 1975 to 600 giga liters per year from 1997 until present. So there are definite uncertainties about future water availability due to climate change and climate variability. And that's really why the actions that we'll be talking about next week around looking at climate resilient water supply, looking at alternative waters, but also alternative mine rehabilitation options. The work that DJPR is doing with less intensive water rehabilitation is really, really critical and important for the rehabilitation of the three coal mines in the Latrobe Valley because we know we want safe, stable, and sustainable rehabilitated mines down there, and we want to make sure that is the case. So looking at these climate resilient water supplies really will provide that certainty, hopefully, that's needed for the rehabilitation.

Rae:

Lovely thanks for that both Geoff and Anna. I guess my quick comment on that is of course that groundwater does remain as an alternative option to surface water, and therefore might be considered for long term maintenance if all else fails, but let's figure that one out as we go forward. But we've got first of all to make a decision on whether we're actually going to fill these pits with water or not, and we have a lot to do to get that sorted out. That brings me to a question that was raised by Jess, *"So how can the rehab strategy plan for increased variability?"* I guess both Anna and Geoff you may have a few a few thoughts on that.

Anna:

So I can take that one to begin with Geoff and you can jump in if you like. So, currently where we got to with the Latrobe Valley Regional Rehabilitation Strategy was recognising that we have seen a decline in water availability, and we have observed that step change in water availability in the Latrobe River system. So it does demonstrate that less water is currently available than we had previously thought, and that we are going to have to be planning for that drying climate to really create that certainty around achieving a safe, stable, and sustainable mine, rehabilitated mine void. So we also recognise that it's really important for mine rehabilitation to have a secure water supply, particularly if they're filling that mine void with water at certain seams, in certain intervals of that filling process. So having reliable water supply is really important and I guess I've really reiterate again those climate resilient water supplies like alternative water, recycled water, or desalinated water are things that will be able to provide that resilience that's needed for the significant investments which will have to happen for mine rehabilitation. Geoff, did you have anything else to add there?

Geoff:

I could just follow on a little bit from there. So I guess there's modelling approaches that can be used to kind of assess different scenarios around different possible futures. Including not just the changes I was talking about in terms of the shift that sort of trends over time, and the sort of changes in the averages, but also changes in the sequencing and the variability itself that we experience. And so there's a lot of modelling approaches that could be applied to shed more light on that. And ultimately I guess it's looking at different scenarios, looking at sensitivity testing, and then ultimately making sure that the solutions are robust under the range of conditions that could be experienced.

Rae:

Perfect thanks Geoff, thanks Anna. I might just add in here, of course we know that when we are using water for power generation we have to be very consistent with that supply of water, but when we go to mine rehabilitation consistency is not as demanding as it is for power generation. And we can probably be a little bit more flexible in terms of when and how to actually take water so that other people aren't affected, and it fits with the climate variability. And I think we probably are seeing around the world climate variability is getting greater and greater, and I can't imagine

that this area of the world will be exempt from that from that change. So, that's great. Thank you very much for that.

I'm going to actually run down and just pick out another question. This should be a very quick one. I don't know whether you know this Anna, but *"What's the decrease in water for power generation following the closure of Hazelwood?"* I think it comes down to a broader question about how much water the power generators used therefore won't be used in the future when they close.

Anna:
Thanks Rae and whoever asked the question. I gave those broad numbers within the presentation itself. So talking about how much water in total the power generators have used in the return flows and so on average it was around 55 giga litres net use across the three power generations and that information is in the strategy. In terms of Hazelwood Power Station during operation they were provided water by Gippsland Water under their bulk entitlement. So Gippsland Water also provides water for a range of urban users and industrial uses. Hazlewood did have access to, I think, around 14 giga litres of water during that power generation phase but I'd have to confirm that one.

Rae:

Yes, that's good, it's the differences between bulk water supply and network supply for the power stations are quite interesting. Each power station takes a very different amount, so good answer, thank you. Another one that's come through, I think this is an interesting one, and it may come to the sustainable water strategy as well as perhaps towards the next meeting. But I'm going to ask it now anyway. *"Will the overall water strategy from Geelong to East Gippsland including Melbourne, using recycled water as a drinking water source?"* That's an interesting question you may, or may not want to answer that, but I'm going to ask it anyway.

Anna:

Thanks Rae for putting me in the hot seat for that one. The Central and Gippsland Sustainable Water Strategy will look at water security for the broader region, and it isn't current government policy to look at drinking recycled water. And that's because there are there are certain risks which need to be managed. So at this stage that Sustainable Water Strategy will not be looking at drinking recycled water. But as you know, the question about recycled water use is very difficult to answer and very sensitive, it does create a whole lot of I guess reactions from people. And so we do need to plan for all water needs across the region and consider if that water is fit for purpose, and acceptable to the community.

Rae:

Lovely, thank you very much for that. A question number of questions which actually relate to alternative water sources, and I'm actually going to suggest that we might delay answering some of those questions until next week. Apologies if there are people who are attending this week, you can't attend next week, but the whole question of alternative water sources will be picked up then and dealt with in a fair amount of detail. Alternative water supply is clearly are a very important. part of the conversation but for this week we're really concentrating on what's happening in the Latrobe Valley climate wise and in terms of river flows. So I'm going to try and stick with the questions that relate to those, if people don't mind.

Just trying to pick out another question. One is kind of an interesting one, it says, *"I was led to believe last year that we would have to have the pit lakes at least half full to keep the pit stable. And also the pits were expected to be at roughly half full within a period of about 15 years. Are those assumptions now not right?"*

And so again, I think this might be a useful one for you Anna, but I might preface it a little bit if you don't mind Anna and then you can fill in the gaps. The answer is if you can take water out of the river system and then yes you can fill to about half full within 15 years subject to there not being

any deterioration from where we are now. And I think that's true. Anna you may want to tell me I know I need to wait and see, but the other feature that is that stability comes in a number of number of parts, and one of the issues is can we actually switch off the pumps that are currently taking water out of the aquifers to maintain stability. And if we want to do that we need to put weight into the into the mines, and one of the easiest way to do that clearly is to use water. But if you don't have water, then you can't do that, and the option then is to keep pumping the aquifer system. But not only would you need to keep pumping the aquifer system, but you actually need to provide a way to also maintain the stability of the perimeter walls of the mine and that means you need to go to an alternative. And then the question is, how much are you willing to pay to actually maintain that alternative design if you can't use water. And so it's a question which follows into the next period. But it's also a question which is highly relevant to our current mine which is closed, which is Hazelwood who is looking to use water as part of their rehabilitation option, and then the question really comes to can we do it? And Anna, I guess you'll hopefully be able to flesh out an answer about where you think we're at the moment based on the evidence we have.

Anna:

Thanks Rae. It's a complex one, and I think the key question that Rae's raised here is really about mine stability and what would be required to rehabilitate those mine. So I guess geotechnical stability isn't my forte, so I probably won't be commenting on that. But in terms of expecting the pits to be half full in 15 years that really comes down to what water they can access and how it can be supplied. Whether it's a climate resilient water supply with an alternate water supply, if it's a groundwater supply, or if there's another surface water allocation from the Latrobe system. So Rae did mention groundwater is currently accessed by the mine licensees to make sure those mine voids achieve as safe and stable condition, and so we would expect that groundwater would still continue to be required to depressurise those aquifers to make sure the mine does stay safe and stable. So the license allows for water to be used to fill the mine void to achieve safety and stability. So then it comes down to, okay then are there any top up water suppliers that the mine licensees can use to be able to fill their void as well. And it really comes down to each individual circumstance. I'm not sure where you've heard that the pit lakes have to be filled half full to be stable. That is a geotech questions so I'm not going to jump on that. But then it comes down to **where will?** the mine operators be able to access water. But we're doing some work around that at the moment around the Latrobe River system. I've given you some indications about how water is currently accessed and how it's currently shared. Geoff's giving you a bit of a picture around climate variability and climate change, and the declining water availability. So in terms of nominating a 15 year mark, I think that's pretty challenging to do right now.

Rae:

Thank you very much Anna. I think, I was hoping you would just pick up those issues around actually, can you get the watering quickly or not? And I think you've answered that very succinctly in the final thing, it's challenging. That's a good thing. Stability is obviously something that is a big issue and we are looking at different ways of thinking about that. And obviously we're responding through the Regional Rehabilitation Strategy to a lot of commentary that came in, in the development of the strategy around can you do something else? You know, what other things can you do? And that's again something will be picking up next week.

Rae:

I'm just going to pick on you again Anna, I do apologise for this, *"You summarised what water is used, but there's been no nothing mentioned about the water allocation that was put aside for the proposed site for further power generation sites three and four bench. How does this non-used allocation of water play into the future planning?"*

Anna:

Thanks Rae, I thought this one might come up tonight. So there is for those of you on the line here unfamiliar with the water that has been set aside for future power generation on the three four

bench. So in 1996, the Latrobe Loy Yang benchmark entitlement was established with an allocation of around 25 gigalitres per year of water to meet future power generation needs.

So at the moment we're working with different parts of government to really try and understand. what we think that future generation need might be to understand both what the current benefits of this water allocated under three four bench could provide and possible future power generation demands for that water. And how it could be used both for future power generation needs that then how could it contribute to other uses and demands within the system as well. So this is I guess, some really early work that government is doing around the Gippsland and Central Region Sustainable Water Strategy and preparing for how water might be shared into the future in the Latrobe Valley for all users. So at the moment we need to do some work around what that actually means for the plan and how that currently benefits different water users. But we also need to be really clear around those future power generation needs as well, and the original intent of that bulk entitlement. So I don't think I've really answered the question, but it is an important part of the picture that needs to be worked through as well.

Rae:

Lovely. All of these issues around reserves are quite important and the way in which the Water Act works, **within** the water framework works to access water. I think you've given a good introduction so there is plenty more that we could actually delve into there. That's great.

Again I have a question for you Anna because again, it's about water availability in the Valley at the moment. A question, and I don't know whether you'll be able to answer is, *"How much water does Australian Paper at Maryvale use? Where do they get their water from?"* But secondly, and I think this is another important one, *"Where does the factory water, the treated water, go after it is treated? Is it already being repurposed, or is it just disposed of?"*

Anna:

I really don't have exact numbers at hand in terms of how much water does Australian Paper use at Maryvale. I know Gippsland Water is responsible for supplying water to Australian Paper under its bulk entitlement in Moondarra and Blue Rock Reservoirs, so I guess that's the point of truth there. And I don't have those exact numbers on me. In terms of the second part of that question which was, I think, around the Gippsland Water factory. So the Gippsland water factory treats the sewage, the wastewater coming from the township in that area up to a certain standard, and I understand that some of that water is. recycled and some of it is returned back to the river system as well. But again, I don't have those specific details on me tonight, but it is definitely an opportunity there as well as a source of water.

Rae:

Lovely thank you very much. I'm going to just ask one more question and then we'll wrap up the session. I think it's been a pretty good. A question, sorry Anna it's going to come to you again. It says, *"If the mines pump the groundwater, where does that water go to?"*

Anna:

So if the mines pump the groundwater, where does that water go to? So as I said, the mine operators currently have licenses to extract water to achieve both safe and stable mine voids, and that's really, really important. They extract, I should have these numbers on hand, I think they're just over 20 giga litres of water in total. And then I'm not exactly sure, how they are used on site, but then they contribute to some of that return flow to the waterway. So I don't know the actual mechanics within the mines themselves, and that's probably a question more for the mine licenses themselves, but I know that alternately, a portion of that water returns back to the river as return flows. Some of it goes up into the air as steam, so I'm assuming that's probably where that water goes.

Rae:

Lovely thank you. There was a question about why can't we actually condense the steam to bring it back into use, but I'll leave the thermodynamicists to figure out whether that's a good idea or not. Thank you very much Anna. Thank you very much, Geoff. Thank you very much to everybody for attending and participating today.

Just a few wrap up comments. A recording of today will be available, and we'll put it up on our website as soon as we can get that processed. I think a questionnaire has been put out to ask for your feedback on this event. vAnd that survey also asks you what else you would like to hear from us about.and I think that would be very useful to help us plan events into the future. So I think that's great. If you have pressing questions or if you feel we haven't answered all those questions just do continue to add them to the Q&A session at the moment so we can catch them. And we will provide written answers to all the questions that have been asked today. So that we actually can capture everything that people have interest in and issues around.

We plugged it pretty well tonight of our webinar next Tuesday evening at the same time will be held and that will be a really good if people were able to attend. I think it again it will be adding flesh on the bones of the work that's being done under the LVRRS across a whole range of issues to try and bring them all together over the coming year in to help us move forwards.

There was one interesting question that I didn't actually get to ask which was, *"So you've been doing all this work for years, you got some more work to be doing, and you still don't have all the answers."* I hope tonight probably will have demonstrated that it's difficult to get the answers and get for something that is actually a pretty complex problem. It's a complex social problem, it's a complex economic problem, it's a complex environmental problem, and we want to get it right. So we continue to do the work that we need to do to actually make sure that we don't make a mistake and find what we regret the decisions that are made as we go forwards. And there are a lot of stakeholders to be involved in that.

So I hope everybody has managed to get some really useful information from tonight. Feel free to contact us through our website if there are any questions you want to raise.

Again, it's just really up to me to say thank you to everybody for attending and in particular to thank Ann and Geoff for giving what I think were excellent presentations, with excellent amount of information that provides us with new knowledge and gives us a clearer picture about what is being done around the Latrobe Valley water system.

I also want to thank the team that's behind the scenes here because they've been working pretty hard to make sure that we moved the cameras from one person to another get everybody in right place in the right, information up on the screen. So thanks very much for that. So on that note, I'm going to say thank you, and goodbye.