

# TRANSCRIPT

## LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

### Inquiry into the 2022 Flood Event in Victoria

Melbourne – Tuesday 21 November 2023

#### MEMBERS

Ryan Batchelor – Chair

David Ettershank – Deputy Chair

Melina Bath

Gaelle Broad

Wendy Lovell

Samantha Ratnam

Sonja Terpstra

Rikkie-Lee Tyrrell

Sheena Watt

#### PARTICIPATING MEMBERS

John Berger

Ann-Marie Hermans

Joe McCracken

Evan Mulholland

Rachel Payne

**WITNESSES**

Dr Peter Stone, Chief Customer Officer, and

Dr Chantal Donnelly, General Manager, Decision Support Services, Bureau of Meteorology.

**The CHAIR:** Welcome back to the committee's public hearing for the Inquiry into the 2022 Flood Event in Victoria. We are joined by representatives from the Bureau of Meteorology.

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All evidence is being recorded. You will be provided with a proof version of the transcript following the hearing, and then transcripts will ultimately be made public and posted on the committee's website.

I might ask members of the committee to introduce themselves, starting with Ms Lovell.

**Wendy LOVELL:** I am Wendy Lovell, Member for Northern Victoria Region.

**Melina BATH:** Good afternoon. Melina Bath, Eastern Victoria Region.

**David ETTERS HANK:** Hi. David Ettershank, Western Metropolitan Region.

**Samantha RATNAM:** Afternoon. Samantha Ratnam, Northern Metropolitan Region.

**Sheena WATT:** Good afternoon. Sheena Watt, Northern Metropolitan Region.

**Gaelle BROAD:** Hi, I am Gaelle Broad, Member for Northern Victoria.

**The CHAIR:** I am Ryan Batchelor, Member for Southern Metropolitan Region, chairing these proceedings.

Thanks very much for coming along today and contributing to this inquiry. The basic format is in a moment I will ask you to introduce yourselves and make an opening comment. If you would like to do so, 5, 10 minutes is what we have pencilled in, and then we will have about 8 to 10 minutes of questions each for you. Then we will be done. So I might hand over to you. I am not sure who wants to start or how you want to start, but I am in your hands.

**Chantal DONNELLY:** Hi, everyone. I am Dr Chantal Donnelly from the Bureau of Meteorology. I am the General Manager of Decision Support Services. We are the front-facing arm of the bureau.

**Peter STONE:** G'day, I am Peter Stone, the Chief Customer Officer at the Bureau of Meteorology.

**The CHAIR:** I invite you to make an opening statement if you would like.

**Peter STONE:** Thanks for the opportunity to meet with you. The Bureau of Meteorology provided a written submission relating to inquiry terms of reference 1, 2, 6 and 8. We also provided 240 pages of material relating to the forecasts and warnings issued by the bureau in the period 11 to 14 October 2022, so we are very happy to elaborate on our submission and answer your questions.

**The CHAIR:** Thanks very much. Did you want to say anything, sorry?

**Chantal DONNELLY:** No, that is fine, thanks.

**The CHAIR:** I might get started following on from some evidence that we have just had. One of the critiques that we have had across the course of the inquiry is the timeliness of rainfall data from clearly your gauges to the incident control centres. We had evidence given just now that it can take upwards of an hour or an hour and 10 minutes for the rainfall data to be updated in the incident control centre. I was wondering if you

had any comments about the length of time it generally takes, in what can be relatively dynamic, changing environments, for latest information about current rainfall to be provided to incident control centres.

**Chantal DONNELLY:** The bureau provides its rainfall data. I have to take on notice how long it takes for it to leave our systems, but it is generally the responsibility of the agencies who are ingesting our data. They are signed up as registered users, and they have direct access to our data. It is I suppose how long that data takes to get from our data outputs into their systems. That time thing is certainly not on our side, I do not think.

**Peter STONE:** Just to elaborate on that, in Victoria the flood warning infrastructure network comprises 764 assets. Of those the bureau owns 169. The rest of the assets comprise rain gauges and river gauges, and they are typically owned by state government entities. Some are owned by water authorities; some are owned by local government. That information all comes together and arrives at the bureau, and we publish it. That is the process there.

**The CHAIR:** Okay. It would be useful, because I think it is going to be a point of contention in the evidence, for us to know where to find the answer to the question of how long it takes for the information, once it hits your gauges, to get out of your system, and if it is someone else taking the time to consider these things.

**Peter STONE:** So would it be helpful – I mean, there is a lot.

**The CHAIR:** You can take that on notice if you would like.

**Peter STONE:** No, absolutely. I am just wondering what it is that we would provide – it is just that, you know, there are 764 bits of kit. I am just wondering –

**The CHAIR:** If there is an average amount of time, if there is a benchmark amount of time – I do not know what your system tells you, but essentially we are interested in, from the time when rain falls and hits a gauge, how long it then usually takes for that piece of information to be reported out.

**Peter STONE:** No worries. What I will try and do is provide you with a range. Some will be more or less instantaneous, and some will be slower. So we will provide information and averages on that.

**The CHAIR:** That would be great. I am also interested in – you mentioned you have got 700-and-something-odd assets –

**Peter STONE:** Yes, 764 bits of kit.

**The CHAIR:** 764 bits of kit – the technical term. Are the rest generally owned by other levels of government or government agencies? Do you rely on any private sector –

**Peter STONE:** If it was, it would be a perishingly small proportion. In Victoria, the overwhelming ownership is state government and then a bit of local government.

**The CHAIR:** A bit of local government. With the local governments, would that be a direct provision of the local governments themselves or would they be contracted out to third parties, do you know?

**Peter STONE:** I do not know. What usually happens across Australia is that councils own assets and arrangements for maintenance vary. So sometimes the council maintains the kit themselves, other times they have a contractor do it, but almost without exception if it is a council asset, they own it.

**The CHAIR:** Again, we just had some evidence or someone suggesting there was a third-party product that several councils were getting involved in. So I was just interested to know, if they were, how common the use of rain gauges owned by third parties are.

**Peter STONE:** There are a variety of components in the system. You have got the actual measurement device, whether that be a rain gauge or a river gauge. You then need to accumulate that data. It then needs to be sent, so transmitted via 5G, internet et cetera. Then often people want it sent to them so that they can visualise it. So at each of those steps, there are opportunities for varieties of ownership methods, basically. People typically will have access to off-the-shelf material for visualisation, for example.

**The CHAIR:** That is all coming from a source of the gauge, so one of these 764 bits of kit?

**Peter STONE:** Yes. So a common scenario is that a local council will own some kit. They put it in so that they can see the data. They will have a computer with some visualisation software. They will do that, and as well that data gets sent to the bureau.

**Wendy LOVELL:** So you get all 764 pieces of data, not just the 169?

**Peter STONE:** Correct; right.

**The CHAIR:** Okay. That is useful. Because one of the things that strikes me is we just to make sure that the sort of public asset that underpins this information – I am concerned in general terms about ensuring that pieces of quite important public information, like the collection of meteorological data, are done largely by governments, and that is sort of an obligation that we think government should have. So I was just interested in that – your practice at the moment across the system and across the network. That is probably the extent of the questions that I have right now about weather matters. Ms Broad, did you want to –

**Gaelle BROAD:** Thank you very much for coming in. I am just interested, and I guess Mr Batchelor has kind of touched on this, but can you tell us a bit more: how does it work with the information in the practical sense? How do you receive information and disseminate it? I am just thinking in terms of, Goulburn–Murray Water mentioned that they now inform you, and particularly we heard about massive releases of volumes of water, which previously was not included in warnings and now, from feedback, they have indicated that the levels will be included in warnings. So can you talk to that pattern of how it works in reality, and a bit more detail on that element as well?

**Peter STONE:** No worries. There are a few bits there. There is the bit about the handling of the data, I think, and then there is the bit about the process of going from data to warnings, is that –

**Gaelle BROAD:** Yes.

**Peter STONE:** No worries. So the handling of the data, if you think of a network, there are just all these bits of measuring stuff out there and typically they will read every minute, and whether it comes straight to the bureau or goes to a –

**Gaelle BROAD:** Water authority?

**Peter STONE:** local government or a water authority, typically we get it sent to us at the same time as it gets sent to the owner of the kit. It comes through to us, we accumulate all of that and it gets basically then put into our river models to be turned into – sorry, it gets published as observations. So you can go onto the bureau website and see the observations in very near real time in most instances, and in addition to publishing the, if you like, raw observations, we ingest the data and stick it into our river models, and that is the basis upon which we provide flood forecasts. The flood forecasts – what the bureau is up for on that is to actually forecast the height of the water in the river channel. That is what our job is. From there that information goes to a range of sources who turn that into what that means at a local level. We do not do that bit. We do, ‘Here’s the height at certain points in a river,’ and then it is, as I say, other authorities like SES et cetera, who take that information and say, ‘Okay, well, if the river gets that high at this point, here’s what that will mean in terms of inundation and the need to respond.’

**Gaelle BROAD:** Okay.

**Chantal DONNELLY:** Do you mind if I jump in just now for a little bit?

**Peter STONE:** Go for it.

**Chantal DONNELLY:** The bureau does warn for the river level. We have minor, moderate and major thresholds for each river, and those are locally determined for each river together with the catchment management authorities and then the state government authorities relevant in each jurisdiction. So we do warn for those, but that is, as Peter was saying, only for the river level. Then the emergency services, their role is to step in and understand what the impacts of that river level are and put out a warning that has an action statement on it. So there are quite distinct roles there.

**Gaelle BROAD:** Sorry, who puts out the warning about the action?

**Chantal DONNELLY:** The emergency services agencies in each jurisdiction.

**Gaelle BROAD:** Okay. I am just thinking in terms of many years ago when I used to work at ABC radio, you would read your weather things and the emergency warnings for weather, but does that come from the bureau directly to media channels? I guess that is live on your website, the weather warnings?

**Peter STONE:** Again, the weather warning, and if you like, the river warning, so height and flood watch – minor, moderate, major – comes from us. But then ‘Here’s what it means locally and here’s what you should do’ comes from emergency management agencies.

**Gaelle BROAD:** Okay. Now, Goulburn–Murray Water we heard from, as I mentioned, a significant amount. Do you want to speak to that, because they mentioned the messages – that they were passing the information on to the Bureau of Meteorology, but the community feedback they had had was that people wanted more than just moderate and minor indications; they wanted to know volumes, like, ‘17,000 megalitres of water are coming.’ I had the impression from Goulburn–Murray Water that that process was in train with the bureau. Is that your perspective?

**Chantal DONNELLY:** I guess our role and what is agreed with is that we will provide forecasts for the river and warnings for the river levels. Actually there is a direct relationship between the volume and the level, but the standard for that in Australia is to provide river levels. That is what most people in the community understand. During those events we were working continuously and frequently with the water storage operators and the river operators. In terms of understanding the water coming down a river for a river model, rainfall is one input, but the other input is understanding what has been released from storages. We have standard operating procedures that ensure we have that information coming into us, and that is used to then understand what the forecast river level will be at the agreed points in the river. What is in our service level specifications is to provide communication on those river levels in the rivers at the agreed locations.

**Gaelle BROAD:** Okay. So it is more river levels. Just quoting back from the Hansard, Charmaine Quick had indicated that the community was saying:

‘We want to know the volumes,’ so I suppose that is the contextual stuff that we have now asked the BOM to include – not just say ‘It’s going to be moderate.’ In the last one we said it was going to be between 17,000 and 20,000 megalitres per day coming out, and then the BOM would say whatever that was.

So you are not aware of that?

**Chantal DONNELLY:** No. Our service level specifications – we have some river sites for which we have been asked to provide quantitative forecasts, and if we provide a quantitative forecast, then we will say it is going to be a ‘moderate flood’. If it is going to exceed the moderate, we will say that, and then we will say what the expected range of river heights is, in terms of level that we expect to forecast.

**Gaelle BROAD:** Okay. Interesting. We might have to take that further. I guess I just want to know – we refer to you as the ‘BOM’, hopefully not ‘bombed’. There seems to be a discrepancy between the river level values that are published by BOM as opposed to Melbourne Water. We saw that during the floods. There was feedback that we had on that, the discrepancies there, but also in October this year there were flood warnings, the timing of flood warnings, and there were definitely discrepancies in the river level values between Melbourne Water and places like Olinda Creek at Lilydale, Mullum Mullum Creek at Doncaster East, Bunyip River at Headworks. The levels were quite different between what was published on your site and Melbourne Water, and that seems to have been happening for about 10 years or more. Why is there such a discrepancy between the two levels?

**Chantal DONNELLY:** I do not know. Are these sites within Melbourne Water catchments?

**Gaelle BROAD:** Yes, yes. Yes.

**Chantal DONNELLY:** So that is their responsibility.

**Gaelle BROAD:** And we have heard evidence before the committee. Certainly it impacted Maribyrnong.

**Chantal DONNELLY:** The bureau does not have a role in issuing flood levels and flood warnings for Melbourne Water catchments.

**Gaelle BROAD:** Just the actual river levels, though.

**Chantal DONNELLY:** As far as I know the only things we have are the observations that are published, but I can take that on notice.

**The CHAIR:** It might be useful to take that on notice. If you could tell us what you do for the Melbourne Water areas, that would be very useful.

**Gaelle BROAD:** Yes.

**Chantal DONNELLY:** I have just got the memorandum of understanding between the bureau and Melbourne Water. For the Melbourne Water catchments, our role is simply to disseminate the warnings that are done by Melbourne Water. So Melbourne Water are the ones who run the flood models, who make the judgement as to whether or not a flood threshold has been crossed and decide that a warning is to be issued, then we have an agreement that they will then let us know what the warning is to be and within 30 minutes we will publish it.

**The CHAIR:** Your time is just about up, so I might turn to Mr Ettershank, who unsurprisingly will have further questions.

**David ETTERS HANK:** The Maribyrnong and Melbourne Water are literally in my backyard. We have heard some significantly contradictory evidence, so we are quite keen to dig into this a bit. Can we go back to 2022 and the arrangements you had with Melbourne Water at that time which, as I understand it, have now changed.

**Chantal DONNELLY:** No. There is an implementation group that has been stood up to plan how we will transition the flood warnings to the bureau for the riverine catchments for the Melbourne Water catchment sites.

**David ETTERS HANK:** Well, that shoots down my next three questions.

**Peter STONE:** We can be unequivocal. Melbourne Water is currently responsible for flood warnings in the greater Melbourne catchments.

**David ETTERS HANK:** Okay. There were obviously some pretty disturbing results in the 2022 flood in terms of the warnings, and by that I mean literally in Melbourne people being told on the night before that the water was going down when in fact the water was going up – that sort of extent of wrong. So in terms of the advice that you were providing to Melbourne Water on that 11, 12 October 2022, what information were you providing to Melbourne Water?

**Chantal DONNELLY:** Our role at the time was just to provide them with the meteorological observations, forecasts and warnings. So they had access right through to the pre-season briefings, where they were provided a pre-season briefing on what we thought were going to be the quite unusual wet conditions for the season, and then they would have had access to all of our rainfall forecasts that were coming out and the observations that they ingest – all that information – into their systems.

**Peter STONE:** So fundamentally rainfall data.

**Chantal DONNELLY:** Yes.

**David ETTERS HANK:** But that would not have been rain gauge data, it was purely forecasts?

**Peter STONE:** No, both.

**David ETTERS HANK:** Okay.

**Peter STONE:** Typically forecasts we provide go out seven days in advance, and then the observations in very near real time basically.

**David ETTERS**HANK: Okay. So, for example, the Darraweit Guim rain gauge in Keilor – is that yours or is that Melbourne Water's, do you know?

**Peter STONE**: I do not know.

**Chantal DONNELLY**: I could not say that specifically.

**Peter STONE**: There are a lot of them. I do not know who owns which.

**Chantal DONNELLY**: I have sort of got the detail here. What we did was we issued a severe weather warning at 10:48 on 12 October. We issue rainfall in the form of both, as I mentioned, observations and forecasts but also in the form of severe weather warnings that warn for very intense rainfall falling. So we had warned for 6-hourly rainfall totals between 30 and 50 millimetres being likely, with isolated heavier falls of 65 millimetres, and then we had also followed that up with 24-hour rainfall totals during Thursday, because for flooding and for catchments it is the total accumulated rainfall that is important. Those 24-hour rainfall totals during Thursday were expected to reach 50 to 80 millimetres, with isolated totals to 120 millimetres over higher terrain. What we found was that rainfall that was observed on the following two days was within the bounds of that severe weather warning. So yes, what we understand is that we provided a pretty good forecast for that region.

**David ETTERS**HANK: Okay. Are you across Justice Pagone's report on Melbourne Water, the inquiry?

**Peter STONE**: No.

**David ETTERS**HANK: No. Okay. All right. There is another line of questioning shot. I have still got 5 minutes.

**Melina BATH**: Here is something I preferred in pink.

**David ETTERS**HANK: That is right. He is. That is fine. Okay. Actually, I will come back if it is possible, thanks.

**The CHAIR**: Yes, sure. Ms Watt.

**Sheena WATT**: Okay. Thank you. Now, I am not actually sure how to pronounce this word: Indian Ocean – is it 'dipole'?

**Peter STONE**: Dipole.

**Sheena WATT**: Dipole. You know what, I read about it, and I was a little bit interested in the submission. I just need to know a little bit more about it and what the impacts of IOD – I am just going to go with that – would be on flood conditions in our state.

**Peter STONE**: Yes. It seems a long way away.

**Sheena WATT**: You did talk a fair bit about it, so I am interested to know more.

**Peter STONE**: Yes, no worries.

**Sheena WATT**: And how do you say it again? Dipole.

**Peter STONE**: Sorry?

**Sheena WATT**: Dipole.

**Peter STONE**: Dipole.

**Sheena WATT**: There we go, thanks.

**Peter STONE**: Yes, Indian Ocean Dipole. In essence across the Indian Ocean you can get – it is a little bit like the El Niño–Southern Oscillation index. Across an ocean you get gradients of water temperature, so

sometimes it is hot water off the coast of Kenya, sometimes it is hot water off the coast of Indonesia and north-west Australia. When it is a negative Indian Ocean Dipole, it is warm water parked off the coast of north-west Australia. The short version is that increases the amount of rain, and it surprises Victorians a great deal, but a lot of the rain in Victoria actually comes from the north-west. If you are looking at a map of Australia, it comes down and across southern Australia. The Indian Ocean Dipole, even though it is the Indian Ocean and a lot of the physical manifestation of it is off the coast of, you know, let us call it Broome, the rain bands actually come down in a south-easterly direction and then across and significantly influence rain in south-eastern Australia. That and the Southern Oscillation index, which is basically a similar sort of thing that operates in the Pacific Ocean, and there is another one, the southern annular mode, that changes the degree to which easterly winds hit Victoria – the three of those work in concert and basically, if they are all pulling in the same direction, increase the amount of rainfall you can expect in Victoria.

**Sheena WATT:** Is it that with this we should be expecting more? What are the sort of impacts on the Victorian landscape from this Indian Ocean Dipole?

**Peter STONE:** It cycles.

**Sheena WATT:** Okay.

**Peter STONE:** So just like the Southern Oscillation index, the warm water will move from off the north-west coast of Australia and show up off the coast of Kenya, more or less. That just is in a constant cycle, as is the Southern Oscillation index. It is when they become strong and both result in high rain – that and the southern annular mode – that you tend to get the high rainfall and intense rainfall. So it is the strength of each and their coincidence that impacts rainfall in Victoria, if that makes sense.

**Sheena WATT:** It does.

**Peter STONE:** They are the big drivers.

**Sheena WATT:** It was a very detailed submission, I have got to say, that one. It stumped me a bit, so I appreciate that.

**Peter STONE:** They are the big drivers. They are climate drivers that predispose the environment to weather that gives you the high rainfall.

**Sheena WATT:** Okay.

**Chantal DONNELLY:** There are things that we monitor and calculate. Basically, we monitor and then we calculate these indices, like the Indian Ocean Dipole, and that helps us give those pre-season briefings that give us an indication of what we think the season is going to be like, and we also use other methods.

**Sheena WATT:** And I assume it was accurate.

**Peter STONE:** The bureau provides, in addition to seven-day forecasts, which say we expect this much rain on this day and this temperature and this much wind, outlooks that run out four months in advance and that we update every fortnight. They give a pretty good indication four months out of the general type of weather that we expect over that period. In relation to the October and November floods, the outlooks actually had what we call a high degree of skill – accuracy – as did actually the weather forecasts, so the forecasting stuff was working pretty well.

**Sheena WATT:** I might just go to your briefings now if I have got time after that one. You mentioned in the immediate lead-up to the flood that you gave daily briefings to Victorian emergency services. Can you talk to me a little about the detail of those sort of briefings, just to get an understanding about what sort of information is being received by Victorian emergency services.

**Chantal DONNELLY:** Yes, absolutely. Of course. So we have a person who is actually embedded in the operating centres of the emergency services, and their role is –

**Sheena WATT:** Is that a permanent arrangement?



**Chantal DONNELLY:** Yes. It is not the same person; we rotate people through that role.

**Sheena WATT:** No, but that role is.

**Chantal DONNELLY:** It is a permanent arrangement, yes. The role of that person is to provide decision support to the emergency management. While everyone can read what official products the bureau is putting out, this person is there to provide updates of information directly from the bureau as soon as they see what is happening – basically uplifting the level of situational awareness and what is coming in in terms of observations. Also, we actually do not just run one forecast model for Australia. We create an ensemble of predictions, and that is uncertainty. So when we provide, say, that severe weather warning that said the rainfall is likely to be between – I do not have the exact numbers there, but just say it was 80 and 120 millimetres, the decision support meteorologist can have a look at that range of outcomes and talk about how they might play out as different scenarios both in terms of rainfall and in terms of flooding, and it helps the emergency services.

**Sheena WATT:** Do you have any reflections on the sort of effectiveness of the briefings and the person that is embedded in there? Is there any opportunity for improvements or things that we should consider about the role of the bureau with the now broader emergency management?

**Chantal DONNELLY:** Certainly those decision support roles, as far as what I hear – and I speak to the different emergency management agencies around Australia – are highly appreciated and play a very important role in these events. So certainly, continuing what we are doing is incredibly important.

**Sheena WATT:** Okay. No, that is helpful. Is there any more time, Chair?

**The CHAIR:** You have got a minute and a half.

**Sheena WATT:** A minute and a half – there you go. There is an embedded meteorologist – that is right – and hydrologist, correct? Is that right, in emergency services?

**Chantal DONNELLY:** I am just trying to remember. I think in Victoria we just have the embedded meteorologist, but the emergency services can also be briefed directly by our hydrologists in the Victorian office.

**Sheena WATT:** You also detailed the communication with your community that is undertaken by the bureau – I am talking more about community communications now. Are there any areas for improvement, do you think, for the bureau in terms of your community information and what you provide to people?

**Chantal DONNELLY:** That is a good question. I think it is always –

**Sheena WATT:** I am kind of interested. I have six weather apps, and I cannot work out where to go for the right one and what is going on. So I am interested to kind of hear if you have got any – perhaps that is best for you, Dr Stone – reflections on that.

**Peter STONE:** Yes. I will just make a little stab. If you want to add, please feel free. Only one of those apps is authorised to issue a warning, yes?

**Sheena WATT:** Good to know.

**Peter STONE:** The bureau is the legislated provider of warnings for floods and related in Australia. In addition to the forecasts, the app, just by way of example, has warnings that are issued and updated specific to all of the various weather hazards as well as floods.

**Sheena WATT:** Do you have a sense about community understandings changing around the very detailed nature of weather warnings and such?

**Peter STONE:** Yes. Look, it is challenging –

**Sheena WATT:** My grandparents knew the ins and outs of highs and lows and what they mean, and I must confess that I am not sure that there is necessarily that same level of community understanding in the younger generations about weather and weather impacts. I am just interested if you had any reflections on that.

**Peter STONE:** Yes. If you are using the app, for example, it does not go on about highs and lows. It is pretty simple. It says here is the day, here is the rainfall we are expecting, here is the wind and here is the temperature. It is a challenge to be providing information that has got numbers in it – not everybody is comfortable with numbers – and in a situation that is changing. So you have got numbers and they are being updated. There is a good reason for updating them – it is because the situation has changed, so the information provided needs to change. People’s capacity to simply deal with that is a challenge, and we absolutely recognise the challenge of having people absorb and do something with that absolutely gets greater when they are under stress, such as when there is severe weather on.

**Sheena WATT:** Thank you.

**The CHAIR:** Thanks, Ms Watt. Ms Bath.

**Melina BATH:** Thank you. I am just looking to update my BOM app as we speak – always a good time. Look, just help me understand: 170 pieces of kit, you said, which will include rain gauges and river flows. That is under the BOM’s jurisdiction – you own that or are responsible for that. Then I will go to the additional. That is about 20 per cent of the overall assets. How often do you do an audit of those? Is that something that needs auditing, first of all?

**Peter STONE:** Well, we maintain them.

**Melina BATH:** Yes, the workability of them.

**Peter STONE:** Oh, yes, absolutely. By and large, because they are sending data roughly every minute, we find out pretty quickly – if there is something, it shows up.

**Melina BATH:** If it does not work, there is a black spot.

**Peter STONE:** Absolutely.

**Melina BATH:** Okay. There is no interruption. They are real-time, live monitoring: there you go, you look it up and you find river X, number 1 gauge, and away you go.

**Peter STONE:** Generally, yes.

**Melina BATH:** You know, I am simplifying it.

**Peter STONE:** Yes. Sometimes there is a time delay. I know – I live in a flood zone, and my river gauge updates I think every 12 minutes.

**Melina BATH:** Okay. Yes. Good. Is there any greater length than that?

**Peter STONE:** Not that I am aware of.

**Melina BATH:** So it would be within 1 to 12 minutes?

**Peter STONE:** It is pretty quick.

**Melina BATH:** 1 to 15 minutes, maximum. Righto. Then we look at the other – I am saying roughly other – CMA, state government or local government. They are responsible for that asset and the maintenance of it. Do you get live, real-time data coming in to you from those?

**Peter STONE:** Yes.

**Melina BATH:** So we are not saying yours are green coloured, and they are blue and red.

**Peter STONE:** No.

**Melina BATH:** But you know which one is what. So that is again real-time monitoring going into the BOM, and somebody very clever is sitting in front of that just assessing these all the time?

**Peter STONE:** Yes.

**Melina BATH:** Okay. And then they are responsible for their maintenance and upgrade. Can you see at any time how many are offline? Can you see that there are gaps where you know there should not be in the spreadsheet or whatever?

**Peter STONE:** Yes.

**Melina BATH:** Roughly, at any one time what percentage is offline?

**Peter STONE:** I cannot give it off the top of my head – it is very small.

**Melina BATH:** Right.

**Peter STONE:** It is a highly functional network.

**Melina BATH:** So workability. We have just had the gentlemen in who live at Traralgon, and they are very passionate about their stream flows, and you may have already heard of them anyway. And so that data is – every 12 minutes at the latest, you are getting information in?

**Peter STONE:** Provided it is part of the network. So there will possibly be instances of people who have their own rain gauges and so on and so forth, but if it is part of the network – if it is part of the 764 – we are getting the information.

**Melina BATH:** I am dealing with the facts on the ground, so that is good.

**Peter STONE:** Gotcha. Yes.

**Melina BATH:** So you are getting it every, at the latest, 12 minutes. So how often is that read and assessed then? Let us say in a more peak-flow event, for example, when there are buckets of rain raining over Mount Tassie in Traralgon – I am just using that as an area that I know – how often are you assessing that?

**Peter STONE:** Assessing –

**Melina BATH:** How often are you going, you know, ‘When we are going to make a warning, or an assessment of heights?’

**Chantal DONNELLY:** Do you want me to speak to that one?

**Peter STONE:** Yes, go for it.

**Chantal DONNELLY:** Our people who analyse that information and issue the flood warnings are continually monitoring it. They are working 24/7. What they will do is: just say they have issued a warning at a certain point in time – and usually they try to issue warnings as many days as possible before we know of the event, but there are agreements on what is a standard lead time – they will issue the warning and then they will say when the next warning will be issued. If they think that river is going to be fast moving, they might say the next warning will be issued in 3 hours, and they will be working between those two warnings to monitor the rainfall that is falling. As well as those gauges you mentioned, it is also radar and also what is coming in – we have what is called modelled analysis. So the forecast models that forecast the weather also provide an analysis of the current situation, and that is because we can only measure certain points within the catchment. So that analysis also helps us understand what is happening between those measuring points. We also have radar data in there, and within that analysis there is satellite data, so there is lots of redundancy in that gauge data. If one rainfall gauge goes down, there are so many other pieces of information that help us fill in that picture of rain that is falling over the catchment, and that is being continually monitored both from a severe weather perspective, by meteorologists, and from a flood perspective by hydrologists.

**Melina BATH:** Okay. I am just using the local example because I am a Gippslander, but it will apply to other areas that have been severely affected by the floods in 2022. So on a busy night when the rain is bucketing down, you are looking at the radar, you have assessed the forecast, you are looking every 3 hours –

will that be ramped up then? I do not want to verbal you – tell us, when there is a rain event or a storm event, tell us then what happens?

**Chantal DONNELLY:** We are not looking every 3 hours. What we are doing is that there is a process between issuing the previous warning and issuing the next warning where we are looking at the flood models to understand what rain has fallen already in the catchment and what rain is forecast to fall. You basically run the models and look at different scenarios. For example, you might have a range of rainfall scenarios from the forecasts, from that low, most likely to a high. You run those and you look at assessing if this river is likely to hit the different flood thresholds and when do we think it is going to hit those flood thresholds. We might have said we will issue the next warning in 6 hours, if that is how long we thought it would take to ramp up, but if it is going to ramp up quicker, we will monitor more and we will issue the warning quicker.

**Melina BATH:** Because different rivers do, and you are the experts –

**Chantal DONNELLY:** Exactly. They have different response times.

**Melina BATH:** Again, there are flash rivers like upstream at Mount Tassie in Traralgon, whereas with some downstream you have got long lead times. So then you provide that information. You have done that assessment. It looks like it is going up. We need to sit on this very carefully. Is that the choice that you make – as in during rainfall?

**Chantal DONNELLY:** If the intelligence changes – if we have issued a warning and we have said it is going to hit the moderate flood level at 6 pm and nothing has changed in between, then we will reissue the warning when we said we would. But if things are changing – the situation, the intelligence that people need to know – then we will reissue the warning. And in between remember we have those operational decisions that support people, keeping the state emergency service up to date on everything that is happening in between. But if there is anything that will change for the community in terms of that flood level, then the flood warning is updated sooner rather than later.

**Melina BATH:** Sure. Then you provide that information to ICCs, incident control centres? How does Traralgon ICC, which is down in Franklin Street – again, I am trying to apply it across the board – get your information?

**Chantal DONNELLY:** The SES have registered users for the bureau's warnings, so as soon as a warning is issued there is an automatic transfer of that. I cannot say what they have in their systems, but my understanding is that they have a system that reads that and brings it in. They also of course have access to it immediately on the bureau's app and the bureau's website, and a lot of the emergency services agencies use those. We also have that person in the state operational control centre and often they are able to give a heads-up that that warning is going to be issued before it is updated, and of course they say, 'Here is the new warning out, let's talk about that.'

**Melina BATH:** Again, I am not trying to verbal you, I am just trying to understand. You said, 'I'm not sure what the EMV has.' Can you just explain what you meant by that?

**Chantal DONNELLY:** Well, I do not want to speak to what software they might have that reads our warnings, but I have been in the state operations control centre where they ingest our warnings with a piece of software that then allows that to be displayed as soon as possible for their people.

**Melina BATH:** Thank you. My time is running out. They are reading your information and then they are issuing warnings. We have heard evidence that people in Rochester and elsewhere just feel that whatever the information gap, there is something missing. They feel that they have not been served well. How can you advise Emergency Management Victoria? How can we make this system better? Is there any information that you know that you could provide to EMV or to us? What could we do to make it better?

**Chantal DONNELLY:** I think it comes down to what Sheena was saying about that information out to community and how we can improve that, and it is across the whole emergency management continuum. It really comes to helping the community understand when and where to find the right information at the right time, because inevitably there are some catchments that will respond really, really quickly, just even before that understanding that you live in a catchment that is high risk and then understanding what you need to be

monitoring in that case. Because there is a severe weather warning that is already telling us in the preseason outlook you have got a high risk of flooding this season. When we put out a severe weather warning, we are already calling out the risk of very, very high rainfall. And it is not just us, it is the emergency management sector.

**The CHAIR:** Did you want to say something?

**Peter STONE:** Yes, just very briefly. There is a challenge in having people understand when we say it is going to be – I will completely make it up – 5.16 metres at this point in the river –

**Melina BATH:** That was going to be my next question.

**Peter STONE:** When is it getting to the scout hall and when is it getting to my front step? That is the challenge, and it is actually a major technical challenge.

**Melina BATH:** Is it about terminology?

**Peter STONE:** No, no. The difficulty is in –

**Chantal DONNELLY:** Modelling that.

**Peter STONE:** actually being able to predict it across the landscape that is constantly changing, because people build things and vegetation changes and all the rest – actually converting this river height to here is where the water will go beyond the river is just technically difficult. It is technically difficult to do rapidly as well. It is a challenge.

**Samantha RATNAM:** Thank you very much for the work that you do and being with us and your submission as well. I just want to understand a little bit, picking up on the questions that have been asked before, in terms of the bits of data entry that you are getting – and you are getting that from everywhere. Are you then publishing observations, adding to your river models, providing flood forecasts for all areas or just the catchment areas you are responsible for?

**Peter STONE:** Twofold. In Victoria we currently do all of the catchments except those that lead into Port Phillip or Western Port bays, and within those catchments we forecast points in the river and those points are agreed under a service level agreement that we do.

**Samantha RATNAM:** And that is the flood forecast level. Great. And then it is up to other authorities, emergency services, to assess the likely impact or what it means for you, and they issue the warnings to the public, basically. So you are kind of part of that chain. In terms of an interaction with the Melbourne Water areas, are you publishing observations for those areas that Melbourne Water is also responsible for? So there is a point at which you are getting the data in and you are publishing observations. Ultimately Melbourne Water will issue their warnings, but you are still publishing observations for those areas. Were there any discrepancies that you all observed from the 2022 event from what you all were publishing as observations and ultimately then Melbourne Water issued warnings on that you all have audited post the event? Were there any inconsistencies, or was it completely consistent with what you all were publishing as observations?

**Chantal DONNELLY:** We have not done an analysis of the performance of another organisation's warnings during that event, no.

**Samantha RATNAM:** Okay. You have got a couple of bits of data dissemination: the observations and then the forecasting. We have heard people provide evidence that they felt like they were relying on the bureau's flood warnings, but as I understand it now, you are not ultimately responsible for that impact warning. You are doing the observations, you are doing the river level warnings – mild, moderate, major – and then the agencies are then issuing the ultimate warnings of impact. Is that a correct summation?

**Peter STONE:** Correct, except – I mean you have mentioned Melbourne Water – in the catchments that flow into Port Phillip Bay or Western Port Bay, Melbourne Water is currently responsible for issuing the flood forecast, the actual river height.

**Samantha RATNAM:** The river height, yes. Excellent. So at that point, you all do not do any of that modelling work. That river height – that is when the roles change. You hand over that role, basically, to Melbourne Water to do that.

**Peter STONE:** For a long period of time it has been a Melbourne Water responsibility to do the river height forecast in the catchments leading into Port Phillip Bay and Western Port.

**Samantha RATNAM:** For the areas that are not Melbourne Water, we had some people saying they were relying on the bureau's app, and in some ways it felt like they were saying, 'We thought that would be the ultimate source, and it was not timely. It was delayed.' This is anecdotal. It was presented to us that it was delayed and it was not keeping up. It was not reflecting what they were reading on the gauges. Some of them were in properties where they could access the gauges et cetera. Do you think in those instances, in those communities, people should be looking at your app and basing the likely impact for them on that, or should they be waiting for the emergency services to then disseminate that final warning? 'Who should they rely on?' is the question, because it seems to be about expectations.

**Peter STONE:** People vary in their decision-making behaviour. Some people like to stay abreast of the situation at technical level – so how much rain is there, where has it fallen, what the river level is doing and so on and so forth. Other people just want to know: 'What should I do?' Emergency services is where you go for: 'What should I do?' The bureau is where you go for 'Here's what's happening' basically. So that is the delineation.

Just on the lead time given, for the floods in October and November in the vast majority of instances a major flood warning was issued three days before the peak. That was not always the case, but in the majority of cases it was about three days of lead time for major flood warning. Before that, usually a day or two in advance, there was a flood watch issued. And often around the same time as the flood watch is issued there will be a severe weather warning saying, 'Lots of rain'. The typical path is to just do it in forward motion. You typically say, 'Gee, it looks like there's a lot of rain coming.' If we think that there is a possibility that will result in flooding, we tend to go 'flood watch'. It is when the rain is beginning to fall and we are getting a sense of what that will actually mean in terms of river levels that we tend to go into the flood warning side of things. As I said, not in every case, but in many cases for the floods in Victoria, there was about three days between major flood warning and the peak being reached.

**Samantha RATNAM:** So in terms of your role, the non-Melbourne Water parts, you are responsible for issuing information about 'here is what is happening', and then somebody else is responsible for the warning of 'what you should do'; we have heard from some people who said that in some ways they thought they should be relying on you for the 'what you should do' based on 'here is what is happening', so it is about expectations as well. We are trying to understand so we can make some recommendations about how we make it really clear to the community about who you go to for what information.

**Peter STONE:** We understand.

**Samantha RATNAM:** Have you had people come to you saying, 'We thought your statement about "what's happening" was actually not what was happening' – basically that it was not congruent with what they were seeing on the ground with their own water gauges? Have you had direct feedback from individuals in the community about that? We have had some evidence; I am just asking whether they have come directly to you to say, 'That wasn't the right data, here is what is happening'?

**Chantal DONNELLY:** I mean, I cannot comment exactly on these events, but yes, we often will get feedback into the bureau of that, and we collate that feedback and analyse it and monitor it and make sure we respond to it when it is – you know, we check things. I think – yes, if you want to say something.

**Peter STONE:** Yes, it relates to what I was saying earlier: so there is a river that is this long, we have an agreement that says 'We will forecast for these points in the river', and it is very common that there are places along the river that are important to locals that we do not forecast for. That is just common, and so it is not uncommon for us to hear, 'You didn't forecast such and such', we go, 'Well, no, we don't.' But for these floods our forecast performance was exceptionally high, so I am not aware of there being feedback, for the points at which we provide forecasts, that the forecast was not good. But they were between 95 and 99 per cent accurate.

**Chantal DONNELLY:** Yes. Sorry, my point was more that, for the rainfall, we generally get feedback that people feel like the rainfall was not exactly what was measured. But that is a small amount of the feedback that we get.

**Samantha RATNAM:** Yes. Could I also ask in terms of the question Mr Ettershank asked before about the transitioning; so ultimately you are now going to be responsible for, in the future, once this committee is set up et cetera, across all catchments. Can I ask in terms of the antecedent for that transition, is it to get a more consistent approach across all the catchments, basically, so you have got consistent observations?

**Peter STONE:** Yes, pretty well.

**Chantal DONNELLY:** Yes.

**Samantha RATNAM:** Okay, great, so that is a system improvement.

**Chantal DONNELLY:** So it is national consistency, that we do flood warnings across the country.

**Samantha RATNAM:** Final question – post the 2022 event in Victoria, understanding you have got a national role as well, have you done any sort of global audit or analysis of one, you are saying your modelling performed well, but in terms of how that was disseminated, who received it, were people satisfied with how they received it, how quickly they received it; have you done any of that audit or assessment work?

**Peter STONE:** We always do post-event reviews.

**Samantha RATNAM:** And those post-event reviews are internal, are they? They are not published anywhere? Is there any way for the public to be able to understand what you learned from that about what you did well or what you could do better in the future? Just also thinking about it in the context of, there are going to be more climate disaster events, we are going to have to be better at this across the board. So from your agency's perspective, are there any lessons that you have learned about what you might do differently next time that you could talk to?

**Chantal DONNELLY:** I mean, you have asked about a few different things there. One is the actual forecast performance, so absolutely, as you can see in the submission here, we have done an evaluation of the flood forecast performance and we are consistently monitoring those performance indicators. I think they are published in the annual report at a national level. We probably do not publish anything locally specific for individual events because there are so many, but absolutely it is something that we monitor as part of our regular continual improvement processes, and we do make public what we can at that larger scale and use that to drive our own internal improvement processes.

**Peter STONE:** I was just going to say actually we do this all the time, so it happens more or less daily. Whether there is a severe weather event or not, it is for verification, so if you go, 'Well, we said this was going to happen at this place' and then we get the observations and we compare, so we just constantly do that. That is just a part of what we do.

**The CHAIR:** Thank you, Dr Ratnam. Ms Lovell.

**Wendy LOVELL:** Thank you. Most of my questions have already been asked. That is always the trouble with coming last, but I see Ms Broad has some more. I just want to go right back to the start. Mr Batchelor asked you about the average time for reporting. You committed to giving us an average time. I am just wondering, though, it has got to be vastly different catchment by catchment, and also the impact of that timing will be different catchment by catchment, given that some catchments are very fast rising, like the Campaspe, and others are slower. So I wondered if you could perhaps give us an average time for the eight rivers that are actually listed in our terms of reference rather than an average time for the state?

**Chantal DONNELLY:** I guess we are talking about observations here, so my understanding of the question that was asked was how long it takes for the automatic reading that a gauge does – it is a measurement instrument – for that to travel to reach a software system where you would look at that information, so that is not dependent on the catchment or the river –

**Wendy LOVELL:** Okay, so you are saying that that would be the same for every catchment. Then what is the impact of that on whether it is a fast-rising catchment and one of the catchments that has a lot more flood land to spread out into, like the Goulburn or something?

**Peter STONE:** How can I put it? By and large the interval at which we pick up information is enough to pick up changes in the stream with more than enough accuracy and currency.

**Wendy LOVELL:** What about for people in upper catchments, like the people in the upper catchment of the Goulburn who went to bed with Goulburn–Murray Water releasing 12,000 megalitres, and suddenly they start releasing 38,000 at 11 o'clock at night and no-one is notified?

**Peter STONE:** That is a different matter. I mean, if you are asleep, you are not looking at the observations, if you know what I mean, so that is not a –

**Wendy LOVELL:** Well, they would not get any notifications whether they were asleep or not. They did not get a text or anything.

**Peter STONE:** As I was saying, there are several steps. There is the observation and the publishing of those observations, and that is usually pretty near real-time. A significant change in the volumes flooding down the river because of a major water release, I classify that as a communication and warning matter rather than a rapidity of observations matter, if that makes sense.

**Wendy LOVELL:** Okay. That does lead me to my other question, which was: reflecting on the whole scenario and all of the briefings and warnings that you gave to government and to other authorities, do you feel that those warnings and briefings were adequately reflected in the warnings and advice that were relayed to residents in flood regions?

**Peter STONE:** We are not really in a position to comment on the –

**Wendy LOVELL:** Well, you are the only ones that know what information you gave to the authorities that had to issue the warnings and briefings, so we just would be interested to know.

**Peter STONE:** Yes. Several things. The information that we provide to emergency services is tailoring of information that we make publicly available in any case via the website, the app, radio et cetera, so that is clearly visible. We are just not in a position to comment on what another agency communicates once we have given them the information.

**Wendy LOVELL:** All right. I will cede my time to Ms Broad, please.

**The CHAIR:** Do you want to use the remainder? We have got 4½ minutes.

**Gaelle BROAD:** Thank you. I just want to clarify the earlier point, because just hearing more of the conversation, you said earlier, Dr Stone, the Bureau of Meteorology is the only legislated provider of warnings, and you said BOM is where you go to find out 'Here's what's happening'. I guess we just saw the impact of the huge water releases from Lake Eppalock, and Goulburn–Murray Water have indicated that they are now communicating that information to the bureau. How does that information for water releases get to the SES for them to inform people of what to do? Because there seemed to be a real gap in people getting that information, and there were properties with devastating flooding, and it is a very quick-moving catchment. What is the bureau's role in water releases?

**Peter STONE:** We have no role in water releases; they are done by the relevant authority. My understanding is that we are made aware of when they are planning a release, and that gets factored into our modelling.

**Gaelle BROAD:** Right.

**Peter STONE:** So we take that information, just as we take upstream information and rainfall information. That is okay. Well, there is going to be more water in the river channel – that goes into the model and becomes part of the forecast.



**Gaëlle BROAD:** Okay.

**Peter STONE:** I guess the difference is that the gap between when water actually starts being released and when it ends up in the river is pretty quick, whereas when it is rainfall derived it is slower. So there is, by definition, more time.

**Gaëlle BROAD:** And in that communication that you send off to the SES are you limited by what information you give in that? Is it simply 'moderate' or 'minor', or are there figures? Is there that volume?

**Chantal DONNELLY:** No. So that decision support, that embedded role that we have in the operations centre – I mean, even in the public information it is not just the 'minor', 'moderate' and 'major'. At the quantitative sites we will have, 'We expect it to reach so-and-so metres by so-and-so time.' But then our embedded people will sit with the emergency services and say, 'There are a range of scenarios that might occur,' because we are depending on the low range of the rainfall forecasts and the high range of the rainfall forecasts. As I said, they can monitor as those forecasts change between warning periods. They are also looking at any observations that are occurring in that time and helping interpret that. So while those observations are available to the public, it is that interpretation that our decision support person can provide in between that really helps the SES have that situational awareness and helps them improve their decision-making.

**Gaëlle BROAD:** Okay. We have heard a number of people talk about time – the time it takes for information to get through and from you guys to them. And in some catchments 2 hours is the difference between waking up and having water at your ankles. In those service delivery arrangements you have got, in those peak times how quickly are you reviewing the data? You kind of said that the hour delay is not with you, but how quickly are you actually doing that to process?

**Peter STONE:** Sorry, there are two parts to that. One is how rapidly we are able to publish the observations, and as we have said, by and large it is pretty near real time.

**Gaëlle BROAD:** Okay.

**Peter STONE:** Then there is the updating of the flood model data and publishing that – 'We expect the river level to be this' and whether it is minor, moderate or major. As Chantal was saying earlier, that gets updated more rapidly if we are expecting changes in the forecast. But if we issue a forecast for a river height and it looks like it is going to hold for three days, over that three-day period then we do not change it.

**Gaëlle BROAD:** So it is kind of a subjective or an informed judgement from the people at the time as far as what you are seeing.

**Peter STONE:** Well, I will make up the numbers. If you are issuing a forecast saying that the peak is likely to be 4 metres in two days and you are watching the observations and they are rising quite rapidly, you would say, 'Well, we will run the model for that river, and we will update the forecast more frequently.'

**Gaëlle BROAD:** So there are not set triggers; it is a people making a judgement call. Or are there set figures?

**Peter STONE:** If the situation is changing, they are more likely to update more rapidly.

**Gaëlle BROAD:** Just one last question. Melbourne Water said in a recent hearing:

We are in the process of transferring the modelling and forecasting function to the Bureau of Meteorology.  
Can you just give a bit more information on what this involves?

**Chantal DONNELLY:** So the reason is to be nationally consistent with how we do flood forecasting in the rest of Australia. There is an intergovernmental agreement between the Bureau of Meteorology and the jurisdictions, the states. Basically, what we are doing at the moment is scoping out what the transition means – to make sure it is as seamless as possible and done as well as possible for the community. We want that to work the day it moves to the bureau. What we are doing is working together very closely with Melbourne Water and also the SES and to some extent DEECA to plan that out: so which catchments are riverine catchments, and will transition to the bureau; which ones are flash-flood catchments and will remain with the SES and Melbourne Water for consistency with intergovernmental agreement arrangements; and then doing a very

detailed project plan that allows us to understand exactly how we will transition the flow of data to make sure that the models transition and that we have our people trained and the processes in place for us to deliver those warnings at the same level we do our warnings across the rest of the country. But while that planning is going on we are working really closely with Melbourne Water to do a bit of uplift in each other's training. So they have been coming and sitting in the Bureau of Meteorology and learning a lot more about the rainfall forecast information, and vice versa: we are bringing our people into Melbourne Water to learn as much about those catchments so that, in the interim, we are helping uplift Melbourne Water's work and also making sure we are starting to uplift our people to take on those catchments.

**The CHAIR:** All right. Thank you, Ms Broad. Mr Ettershank, the bell for your time.

**David ETTERS HANK:** Yes, thank you. We have got one of those alternate reality, parallel truth-type things happening. I am going to ask you to come back to us, so take this on notice. Justice Pagone did an inquiry for Melbourne Water on the floods, and at paragraph 73 he starts a history of this. What he basically concludes from this chronology is that on the morning of the 13th you had issued a major flood warning for the Maribyrnong. At 3:24 in the afternoon you downgraded that.

**Chantal DONNELLY:** The bureau had?

**David ETTERS HANK:** The bureau had.

**Peter STONE:** Sorry, we do not issue, we publish.

**David ETTERS HANK:** This says:

... major flood warning for the Maribyrnong River ...

from the Bureau of Meteorology.

**Chantal DONNELLY:** Yes. The arrangements are that Melbourne Water analyses, judges and makes a decision to issue a warning and then the bureau's role is to disseminate. So purely our role is to take a warning and publish it on our website.

**David ETTERS HANK:** Okay. So it was downgraded to a moderate at 3:24, and it says here: the forecast was based on revised forecast rainfall data. So that would have been your data.

**Chantal DONNELLY:** The rainfall data would have come from us but the decision to change the warnings – that sits with Melbourne Water in the current arrangements.

**Samantha RATNAM:** That is not how this report reads, is it?

**David ETTERS HANK:** Okay. That is what I am saying – there is a disconnect. So then basically in the afternoon and as they are heading to bed, they are basically going, 'Okay, the flood's going down.' Then at just after 2 am –

**Peter STONE:** Sorry, it is not necessarily going down, it is just not going to be as high.

**David ETTERS HANK:** Yes, okay. You are quite right. Yes, it is gone from a major flood to a moderate flood. That is what people are being told. I am not actually attributing any blame. I am a big fan of the BOM. You are on my home page. But clearly there is this disconnect, and we are interested to make sure this does not happen again, okay? I will just finish this, and then by all means – I am conscious of time as well. And then at 2:25 am, again, based on updated data, it went back to a major flood. But of course by 2:25 am most people are well and truly tucked into bed. And then the next thing they know of course is it is at the door. So we would be very interested to have the bureau's response to this analysis provided to us in writing.

The second one is that the report also makes a very specific criticism of the bureau when it talks about, in paragraph 124, the need for more timely forecast data from the bureau, okay? We would really like your response to that chronology at 73 to 74. We would really like your response to paragraph 124 – the need for more timely updates.

**Chantal DONNELLY:** What was the first paragraph?

**David ETTERS HANK:** You will get all this in writing. Then we would also like any other response that you would care to make to the Pagone report in writing by 4 December, if you could, before we have our next lot of witnesses come in, if that is all right. I do not know if there is anything in particular you wanted to –

**Peter STONE:** Yes, just a couple of things. Look, we are unlikely to provide detailed commentary on paragraphs 73 and 74, was it?

**David ETTERS HANK:** Seventy-two and 73, yes.

**Peter STONE:** Seventy-two and 73. I mean, they are just statements of fact, and they are actually questions for Melbourne Water. We publish – so we do not issue, we publish; there is a difference – the information that they decide to provide as a warning, so we really do not have anything to comment on on those paragraphs.

**David ETTERS HANK:** Well, that may be the form of your reply.

**Peter STONE:** Yes. No problem.

**David ETTERS HANK:** Well, we would like you to do that in the context of what has been said in the report.

**Peter STONE:** Yes. No worries. And look, it goes without saying that everyone wants a longer lead time on a forecast.

**David ETTERS HANK:** Of course. Yes.

**Peter STONE:** It is the name of the game – lead time and accuracy. And there is a trade-off.

**David ETTERS HANK:** This is not about scoring points or whatever. It is just trying to learn. Clearly there were some major problems, so we are keen to understand that.

**Peter STONE:** Yes. No problem.

**David ETTERS HANK:** Could we also get a copy of the transition document you talked about in terms of the changing roles and responsibilities between the bureau and Melbourne Water? That would be terrific – happy for you to take that on notice.

**Chantal DONNELLY:** Yes. I would have to work out what there actually is in writing that we can provide, but yes.

**Peter STONE:** Well, I think it is safe to say it is a live document. We are actually doing a scoping study to work out what the transition actually looks like.

**The CHAIR:** What is in the agreement?

**Peter STONE:** The agreement is what currently stands.

**The CHAIR:** You mentioned there was an intergovernmental agreement.

**Chantal DONNELLY:** Within the intergovernmental agreement it mentions some service schedule for flood and that there is the need to consider the transition of the Melbourne Water catchments, or the catchments flowing into Port Phillip Bay, to the Bureau of Meteorology. And then the other agreement that currently stands is an MOU between the bureau and Melbourne Water. And then we have set up an implementation group that consists of senior members of Melbourne Water, the Bureau of Meteorology, the state emergency services and also a representative from DEECA in Victoria.

**The CHAIR:** So does the MOU govern the existing arrangements or the proposed new arrangements?

**Chantal DONNELLY:** Existing arrangements. Yes.

**The CHAIR:** If I may, why are they different for Melbourne Water compared to other catchments? Do you know?

**Chantal DONNELLY:** Legacy.

**Peter STONE:** Yes. It is legacy. We had a somewhat similar situation where –

**The CHAIR:** I have another question. Is it like that anywhere else in the country?

**Peter STONE:** Yes. I was just about to say the two anomalies of which I am aware were Victoria for Port Phillip and Western Port catchments and South Australia – Murray-based catchments. We actually recently, I will call it, nationalised that, so the bureau took on accountability for that a month or two ago. It was quite a process to go from it being that the flood forecasts and warnings were the responsibility of a number of South Australian organisations. There was quite a process to move them across into the bureau.

**The CHAIR:** How long did it take in South Australia?

**Peter STONE:** A couple of years.

**The CHAIR:** So we could expect a similar –

**Chantal DONNELLY:** Yes.

**Peter STONE:** Yes.

**The CHAIR:** Just for our purposes – it is important for us to know.

**Chantal DONNELLY:** It goes all the way through from, as I mentioned, the careful transition from a system process of people place but also from a community information place, because as you have unpacked with your questions here, having our community understand who does what in the space is really important. So that transition project will also include us helping the community understand where to find what information.

**The CHAIR:** So in the course of the next couple of years the status quo will effectively continue, which is that Melbourne Water will make the warnings and you will publish them. And then at some point Melbourne Water will cease to make the warnings, and you will make the warnings and publish them.

**Chantal DONNELLY:** Correct, yes. But through this implementation group we have formed much closer connections with Melbourne Water. And as I mentioned, there is training going on to help uplift Melbourne Water's understanding of the forecast rainfall information, just a general uplift so that they are up with the latest that we can offer them, and also just improving the communication lines between our agencies.

**The CHAIR:** You mentioned that you had a person embedded with the State Control Centre. Did you have any similar arrangements with Melbourne Water?

**Chantal DONNELLY:** No.

**The CHAIR:** Unless anyone else has got any further questions – Ms Lovell.

**Wendy LOVELL:** Just one last one. Have we got a good forecast for Christmas Day?

**Chantal DONNELLY:** Hot.

**David ETTERS HANK:** Just one very quick question: are you involved in the flood modelling exercise for the mid-Maribyrnong that is currently being undertaken by Melbourne Water?

**Chantal DONNELLY:** No, I imagine that is inundation flood modelling. There is flood modelling for the purposes of operational flood forecasting. That is where you run a model in real time to understand what the river level will get to, and as Peter was mentioning before it is really difficult to understand what level will inundate. What they do is they run models and calculate scenarios – if the river level reaches this much, this is what we would expect to be inundated. I am guessing that is what that is.

**David ETTERS HANK:** There is a project to completely rework the mid and lower Maribyrnong that it is being conducted by Melbourne Water. I am just really interested know whether you are involved. Perhaps you could just take that on notice as well.

**Chantal DONNELLY:** Yes.

**The CHAIR:** Thank you very much for coming today. It has been exceptionally informative. We really appreciate your evidence. You will receive a copy of the transcript for review in about a week, before it is published on the website. That brings today's hearing to a close.

**Committee adjourned.**