

# TRANSCRIPT

## LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

### Inquiry into the 2022 Flood Event in Victoria

Melbourne – Wednesday 11 October 2023

#### MEMBERS

Sonja Terpstra – Chair

David Ettershank – Deputy Chair

Ryan Batchelor

Melina Bath

Gaelle Broad

Wendy Lovell

Samantha Ratnam

Rikkie-Lee Tyrrell

Sheena Watt

#### PARTICIPATING MEMBERS

John Berger

Ann-Marie Hermans

Joe McCracken

Evan Mulholland

Rachel Payne

**WITNESSES**

Ron Sutherland, and

Geoff Crapper.

**The CHAIR:** I declare open the committee's public hearing for the Inquiry into the 2022 Flood Event in Victoria. This public hearing is for the Environment and Planning Committee, an all-party committee of the Parliament looking into the October flood event. We will be providing a report to Parliament, which will include recommendations to government. Please ensure that mobile phones have been switched to silent and that background noise is minimised.

I would like to begin this hearing by respectfully acknowledging the Aboriginal peoples, the traditional custodians of the various lands we are gathered on today, and paying my respects to their ancestors, elders and families. I particularly welcome any elders or community members who are here today to impart their knowledge of this issue to the committee. I welcome any members of the public in the gallery and remind those in the room to be respectful of proceedings and to remain silent at all times.

For those of you that are giving evidence today, all evidence taken is protected by parliamentary privilege as provided by the *Constitution Act 1975* and provisions of the Legislative Council standing orders. Therefore the information you provide during the hearing is protected by law. You are protected against any action for what you say during this hearing, but if you go elsewhere and repeat the same things, those comments may not be protected by this privilege. Any deliberately false evidence or misleading of the committee may be considered a contempt of Parliament.

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

So at this point I will take the opportunity to introduce myself to you, and then committee members will introduce themselves to you as well. My name is Sonja Terpstra. I am the Chair of the Environment and Planning Committee, and I am also a Member for the North-Eastern Metropolitan Region.

**David ETTERS HANK:** David Ettershank, Deputy Chair, and I am from Western Metropolitan Region.

**Samantha RATNAM:** Afternoon. Samantha Ratnam, Member for Northern Metropolitan.

**Melina BATH:** Hello. Melina Bath, Eastern Victoria.

**Rikkie-Lee TYRRELL:** Rikkie-Lee Tyrrell, Member for Northern Victoria.

**Gaelle BROAD:** Hello. Gaelle Broad, Member for Northern Victoria.

**Wendy LOVELL:** Wendy Lovell, Member for Northern Victoria.

**Ryan BATCHELOR:** Ryan Batchelor, Member for Southern Metropolitan Region.

**The CHAIR:** Thank you, everyone. So with that I will invite you to make your opening remarks of 5 minutes. I ask that you please keep to that time, and that way it ensures that we also have plenty of time to ask you questions. Could I just get you to begin with for the Hansard record please stating your name and any organisation that you may be appearing on behalf of. So over to you now for your opening remarks. Thank you.

**Geoff CRAPPER:** Great. Thanks, Chairperson. I am Geoff Crapper. I represent myself basically. I worked for Melbourne Water for 30-odd years, was for 15 years in charge of flood warning and have been retired from there for about 10, 15 years. I have been working since 9 pm on Thursday 13 October – for eight months, basically – preparing my 50-page submission. It is impossible to do 50 pages in 5 minutes. So what I have done is given you all, hopefully, a copy of the table of contents of my report, and I will just speak broadly to that if I may. So basically the areas that I have highlighted in yellow are the key parts of my 50-page submission.

The main initial things I came up with in terms of the causes and contributors of the flood were that basically Melbourne Water was the primary cause for the flooding of Rivervue retirement village through a sequence of

failures over many years in their role as a responsible drainage and flood plain management authority for Melbourne. So they were basically the cause of the flooding. They were not the contributor, they were the cause. Melbourne Water's failed flood modelling, flood predictions and flood warnings for the Maribyrnong community contributed to the flood event, and I have also mentioned that their underwater flood-retaining basin, which has been on the books for Melbourne Water for about 50 years, is the way to fix the flooding. So basically my submission has 10 pages on the Rivervue, which was, as I mentioned, caused by Melbourne Water; 33 pages on the adequacy and effectiveness of the early flood warning systems – and I apologise that I only just realised I needed a table of contents. It has been four months since I picked it up, and it just really is a lot of information to digest.

**The CHAIR:** That is okay. That is fine.

**Geoff CRAPPER:** Okay: 33 pages on the adequacy of the early flood warning systems, and I had three pages on the flood wall and the likes and flood mitigation and one page on the Flemington flood wall approval, which I had involvement with from the early stages in July 2003. I have actually got a copy of the original report in July 2003, when I was still working at Melbourne Water, with my critical assessment of the GHD modelling at the time. So I have now tabled that, and that will be coming to you. You would not have it now, but that is coming through the process and that will be appendix D to my submission. That also includes a lot of work that Ron did through working with the US Army corps of engineers, who are the owners of the model that GHD use. They said outright that it was used wrongly, had wrong assumptions and should not happen. Melbourne Water on 31 May 2005 said, 'No, it is all right; sweet, let's go with this,' and then they did. What we saw on 14 October 2022 is a direct consequence of that. How long have I got?

**The CHAIR:** You have got about 1 minute and 16 seconds for your opening remarks.

**Geoff CRAPPER:** One minute, fine, okay. Excellent. I am still going. So hopefully you have all read my submission. As I say, I have got about four or five lots of conclusions, findings and recommendations. So I implore you to look at those, and feel free to ask me about any questions or anything in my submission that you want more information on.

**The CHAIR:** Okay, great. Thanks very much. Ron, over to you – 5 minutes.

**Ron SUTHERLAND:** Thanks, Madam Chair. Well, I made a submission and this is a copy. Hopefully you have all got a copy. If you have not, find it, please, and read it thoroughly. I put a lot of work into it. I know what I am talking about. I am blowing my own trumpet, but it is worthwhile reading to get an overall picture of where we are at. If I can digress a little bit, I could tell from the questions you asked council that you have not got the full story. So hopefully I can fill in some of those gaps today.

Ron Sutherland: my big claim to fame is that I wrote this. So this is called *Maribyrnong River Flood Mitigation Study*, 1986. I was 37 years younger. It is a fair while, but I was at the time and still am considered the hydrology expert. So that is what this is all about. I am an ex-Monash University student, and when I started work the Monash University professors Eric Laurenson and Russell Mein kept contact with me because they could see that I was a bit of a goer in hydrology, which is what their background was. They wrote a program called RORB – run-off routing model. The 'B' is because they stuck it on a Burroughs computer, which took up the whole floor at Monash at that time. That was in the early 70s, and then in the late 70s, early 80s PCs became available. I got on to, I call it, the 'ground floor for PC' and I figured out how they work and what to do with it. Russell Mein in particular from Monash knew that I was in the water authority – I was with the State Rivers and Water Supply Commission before Melbourne Water – and I kept in a lot of contact with Russell, because academics love practitioners to approve their works, basically. So it worked both ways; it was good for me. So I learned how to run RORB, and I was one of the few people in Victoria who knew how to do it by the end of my time with them. So that is my trumpet.

I will just make you aware, because some of the questions you asked councillors means that you should give more attention to this plan. What is it? It is a catchment plan of the Maribyrnong River. So down the bottom is the Maribyrnong township that floods – the 500-odd houses that flood – and up at the top of the mountain obviously is Lancefield and over here is Gisborne. So that is 40 kilometres from there to there, and it is 50 kilometres there to there. It is huge and it is essentially rural. And the thing you have to understand from flood warning is that the houses that flood are where my thumb is going to make an imprint, there, and yet this

is all rural. These are the black dots; they are just quite wonderful automatic rainfall gauges and streamflow gauges that he has put on – automatic means they give off a beep to computers at head office and they can tell you how much rain has fallen and how much flow has resulted.

Now, if you look at the scale of this, you can understand that if – the famous ones are Darraweit Guim up here; Tullamarine Airport is over here. This is the key one, because if you can figure out what on earth is happening at Darraweit Guim – and there is a massive catchment flooding into it – if you can figure out that a flood is on the way, you can give a lot of warning, about 12 hours warning time before the people in Maribyrnong township have to worry about it, plenty of time for SES under their current resources. I heard comments that, you know, they have got limited resources – well, question mark. Ask them; they are on this afternoon I think. So if you can figure out the boffin work of Darraweit Guim – and computers have revolutionised flood warning – if you can figure out what is happening at Darraweit Guim, you have got up to 12 hours warning time to get residents out of the way.

Now, on my report – I am going to stand up, if I could. Cameraman, bear with me. This is a wonderful photograph – I know it is me.

**Ryan BATCHELOR:** You look better in colour.

**Ron SUTHERLAND:** It shows you – I am going to stretch my fingertips, so keep with me. My fingertips, they nearly hit the ceiling; in other houses they do hit the ceiling. I change light bulbs, you know –

**The CHAIR:** Ron, if I could just interrupt you there, your time for your introduction has finished. It is now over to us to ask questions. As the Chair, I get the first crack, but what I will do is I will ask if you can continue to explain what you have in your hand over the next 4 minutes. I was going to cede to Mr Ettershank, but I think that is probably more appropriate. If you could continue just explaining what you have got there, that would be very helpful. Thank you.

**Ron SUTHERLAND:** So my fingertips – and I am standing on the riverbank of the Maribyrnong River, just near Anglers Tavern, right? So those 500 houses are all over on this side, and my fingertips are to where the 22 October flood came, which is a 50-year flood, you know, worst in 50 years. But the worst in 100 years, which is what flood estimation is all about, is another half metre higher.

This is Geoff's pole. He has colour-coded the pole, thank goodness. So the 100-year is well above my fingers, but that is how much happened. And your questions to the councillors – 'Oh, was it significant?' and 'Let's blame SES' or whatever – are unfair, because that is how big it got and that is why we should be worried. 'What are we going to do about it?' is where we are going with this.

Now, Geoff, to his credit – give me one minute, and I will briefly talk about flood warnings; it is Geoff's bag. Remember where Darraweit Guim was? So on the night of the flood, Geoff actually demoned; he was working at home on it. And at 10 pm that night he rang me: 'Ron, Melbourne Water stuffed it up – log on and see what's happening.' Well, I did. Now, it is a bit hard from where you are, but it is in my report submission.

So this slide is a wonderful slide, it really is – it says a thousand words – because this is what Melbourne Water produced as their flood warning, which is why they did not panic and why they did not panic the SES or the police. Because that is minimal, you know. It is – oh, pick a number; what is it? – 280 cumec, cubic metres a second. So that is what Melbourne Water found out was going to happen at Darraweit Guim, but it is incorrect. Geoff knew within half an hour that it was wrong.

**Geoff CRAPPER:** That is it, here.

**Ron SUTHERLAND:** Yes.

**The CHAIR:** Would you like to pass that around to us? We could perhaps – oh, it is in your submission?

**Ron SUTHERLAND:** It is figure 14 in the submission, yes. That is a wonderful graph, and the top line is what actually happened. And Geoff knew that on the night. At 10 o'clock that night he knew that they – I will pick my language – messed up. The rating table at Darraweit Guim relates the amount of flow to the height of the flow. Geoff knew that Melbourne Water had used the wrong rating table. Why on earth they changed the rating table is beyond me. Like, it was accurate for 30 years, for goodness sake. Now they have changed it to

something that – you know, obviously looking at the graph it is clearly wrong. Righto. So that is what happened –

**The CHAIR:** Do you have any insight into why they perhaps used a different rating table?

**Geoff CRAPPER:** I can perhaps talk on that.

**Ron SUTHERLAND:** Give me 30 seconds – a quick one. This up here is rural land. It is where the cows graze. It is not ‘Oh, climate change is coming. Let’s worry about it. It’s all going to be residential.’ It is not that at all. It is rural land. Now, when the water breaks the banks of all the tributaries there it goes over to where the grass is, and the grass can be up to your waist. Righto. So when that floods – what happens when grass is flooded? Well, it bends over, for goodness sake. It bends over, hence you have got all this area available for the flow. And what –

**The CHAIR:** Ron, sorry to interrupt you. My time has expired. It is over to Mr Ettershank to ask questions, and he can also then decide how he would like you to answer within his 4 minutes.

**Ron SUTHERLAND:** I have stolen a lot of Geoff’s thunder.

**The CHAIR:** But yes – apologies.

**David ETTERS HANK:** Okay. All right. A few questions – and I am conscious of time, so please if we can keep it as brief as possible. You made a statement just recently – sorry, you provided some supplementary information in light of the report from Pagone, the Melbourne Water inquiry –

**Geoff CRAPPER:** Yes. Absolutely.

**David ETTERS HANK:** and part of that referred to the Rivervue retirement village and the modelling. I am wondering if you could just explain to the committee why you think that the Melbourne Water decision to reduce the LSIO on that retirement village site based on GHD modelling was so wrong or obviously wrong.

**Geoff CRAPPER:** I have referred to this in my submission. Basically it talks about the 1974 flood, and it has got a profile of the flood levels. The flood level at Rivervue back in May 1974 was 6.07 metres AHD. Back in the day when the planning permit was approved by VCAT – Moonee Valley council objected to it – the 100-year flood level was 6.6 metres. Somehow between 6 June 2006 and now, Melbourne Water lowered the flood level at Rivervue by 0.6 metres. I found this out from Rob Considine, former Melbourne waterways general manager, and I asked him, ‘Do you realise, Rob, your new 100-year flood level is lower by that much than the May 1974 50-year flood?’

**David ETTERS HANK:** That LSIO should be premised upon a one-in-100, and 1974 was only a one-in-50.

**Geoff CRAPPER:** Absolutely – 50, yes; 40 to 50.

**David ETTERS HANK:** So we are talking about a significant margin of difference in the face of all reality.

**Geoff CRAPPER:** Absolutely, yes. And what happened – when they lowered the flood level from 6.6 to 6 they were able to move the LSIO 80, 90 metres further away towards the river from Rivervue and build all the houses that flooded.

**David ETTERS HANK:** All right. Terrific. Thanks. You said in the *Age* the other day that Melbourne Water should not be allowed to review the decision around Flemington Racecourse flood wall.

**Geoff CRAPPER:** No. I do not recall saying that.

**David ETTERS HANK:** Oh, okay. That is what it said in the *Age*. I will ask you then –

**Geoff CRAPPER:** Oh, do you mean Melbourne Water were not qualified to review it?

**David ETTERS HANK:** Well, yes. You actually said they should not be allowed to.

**Geoff CRAPPER:** It should be done by independent experts, yes.

**David ETTERS**HANK: Do you think it should be at arms length from Melbourne Water?

**Geoff CRAPPER:** Absolutely, yes. They have already failed to acknowledge all the experts plus my report when I was working for them in 2003, when I told them it was all wrong. So they need to have experts look at it in the full light of what we now know.

**David ETTERS**HANK: Okay. Thank you. Can I ask a quick question again. You are both advocates for the Arundel basin. Obviously that has had a very vexed history. If the Arundel basin was proceeded with and was constructed, would it still require other remediation works to be undertaken in places like Maribyrnong township and the Rivervue retirement village?

**Geoff CRAPPER:** No, in a word. Ron wrote the report, so you can refer it to him.

**Ron SUTHERLAND:** Arundel is the solution – they are Ron’s words, all right? It is the big solution because, to answer your question, it does not require any other works to solve the problem. What a retarding basin does, if you are not familiar with what the name means – call it an empty bathtub. There is water coming in – rainfall – and then there is a plug there, so there is a low-flow outlet. If it is coming in quicker than it is going out, it will gradually fill up until it stops raining and then it will gradually empty. So over the next three days it will gradually empty. The design of this – and I did it – was that the important things are: how high is this wall, and what is going to flood the farmer’s property here?

**The CHAIR:** I am sorry. Your time has expired on that 4-minute slot, so I am going to have to go to Ms Bath now.

**Melina BATH:** All right. I am going to give you 1 minute of my 4 minutes to finish, Ron. Thank you for your passion and integrity on this, both of you. Go – retarding basin.

**Ron SUTHERLAND:** The Arundel retarding basin, honestly, is the solution.

**Melina BATH:** Cost? How much would it cost now?

**Geoff CRAPPER:** It was \$16 million in 1986.

**Ron SUTHERLAND:** Good question – \$16 million in 1986. I took a stab, and I said –

**Geoff CRAPPER:** We are hydrology, not accountants.

**Melina BATH:** That is okay. That is all right.

**Ron SUTHERLAND:** I said \$60 million off the top of my head, but it will be of that order. It is only earth – it is an earth embankment. It is nothing fancy.

**Melina BATH:** And there is still the space to do it?

**Ron SUTHERLAND:** Yes.

**Melina BATH:** Right. That is great.

**Ron SUTHERLAND:** You can move the cows out of the way, and –

**Melina BATH:** Thank you. You have articulated really technically – and we appreciate it – the issues. We are about, as well, solutions, and I know you have got solutions. That is one of them. Let me go back to the flood warnings probably, Geoff, and the BOM – its role and responsibility and what it should do, its information gathering. What about the dissemination of information, and also then Melbourne Water’s? I will leave it to you to say what the problems are – you have articulated that about this graph. What needs to happen so that we are better informed and there can be better distribution of information to council, to residents – period?

**Geoff CRAPPER:** Thanks, Melina. Basically, Melbourne Water have been responsible for flood warning since 1975, and the met bureau have been the postbox, if you like, for the information. That is going to change apparently next year somehow.

**Melina BATH:** The met bureau – just the BOM?

**Geoff CRAPPER:** Bureau of Meteorology – BOM.

**Melina BATH:** Yes, BOM, groovy.

**Geoff CRAPPER:** Melbourne Water's systems – I was in charge of the flood warning from 1989 to 2003 – so 15 years or so. We had a terrific relationship with councils and SES. Maribyrnong was just – what would you call it – a stand-out, an example of best practice, if you like, across Australia, back in my day. I have got absolutely no idea what has happened since then. But Theo Pykoulas, who was the municipal emergency resource officer back then – he was just fantastic. He was a leading light in emergency management.

**Melina BATH:** What do we need in terms of gauges or how you get that information about in-stream flows to the BOM – all of that – and then back out to us via an emergency app? What needs to happen there?

**Geoff CRAPPER:** Well, the gauges are one thing. It is the stage-to-discharge rating tables that really drive the whole process, and that is what went wrong with Melbourne Water's flood modelling and flood predictions and flood warnings. They just got it so horribly wrong with this new stage–discharge rating they had for Deep Creek at Darraweit, which is an order of magnitude of two to three out. They said it was 280 cumecs. It was actually 600 cumecs. The old 2003 rating we had back then said it was even higher. But it was about 600 – so it is at least double in reality what Melbourne Water said it was.

**Melina BATH:** So putting on the mic your recommendation in relation to rating tables, what do you want to see happen?

**Geoff CRAPPER:** I want to see the rating table that I gave Melbourne Water about four months ago implemented. As I say, I spent about eight months getting my submission together. I posted it on 5 June, and there was a flood alert issued for the Maribyrnong on about 7 June. I immediately got onto Melbourne Water and spoke to John Woodland, and we had an email exchange over a period of a week about the need – the absolutely urgent need – to update the rating table for Darraweit and to a lesser degree the rating table at Bulla. He said, 'Oh, we'll get back to you if we need to.' And then five weeks later he went to the Moonee Valley Clocktower and did not mention anything about my concerns and just said, 'Oh, it's all to do with the model, basically' or 'We'll improve the model.'

**The CHAIR:** I am sorry, your time has expired, so we will go to Mr Batchelor.

**Melina BATH:** Thank you. I have got more questions. I will put them on notice.

**Ryan BATCHELOR:** Thank you both for coming along today and for the enthusiasm, passion and detail. Geoff, if I can, one of the things I am interested in – and I raised this with the councils – is where the finished floor height of the Rivervue facility ended up. To give credit to the good photos in your presentation, and Mr Sutherland has shown us his, you took the dumpy out and tried to measure the height of your friend's – that is exactly right; that is exactly what I am looking at right now.

**Geoff CRAPPER:** There is a good reason for that too.

**Ron SUTHERLAND:** That is me holding the staff.

**Ryan BATCHELOR:** Yes, I was going to say, 'Is that you?' Anyway –

**Geoff CRAPPER:** He was a lot younger then; that was about six months ago.

**Ryan BATCHELOR:** So is the result of your survey that the actual finished floor height was below where the permit ended up or where it began?

**Geoff CRAPPER:** Where it should have been. It should have been the be-all and end-all when Melbourne Water placed the conditions in June 2006. The flood level then was 6.6. They needed to put another 0.6 metres on top of that to 7.2. Melbourne Water would not tell us what the floor level was. They knew it. They had surveyed it already about four months earlier – I know that for a fact. They would not tell us it. Ron, a few

months earlier – in November, I think – went out to try and survey it with a licensed surveyor. He was threatened by Rivervue management – to call the police and to get off the property.

**Ryan BATCHELOR:** And the results of your survey, do they show that the finished floor level aligns with where the planning permit ended up rather than where it began?

**Geoff CRAPPER:** Absolutely.

**Ryan BATCHELOR:** So it was built in line with the last iteration of the permit not the first.

**Geoff CRAPPER:** Yes, which as we now know, is totally wrong.

**Ryan BATCHELOR:** Exactly. I am trying to figure out whether your guerilla survey showed us that there was a bit of discrepancy between –

**Geoff CRAPPER:** We did not go on the property, so it was all good.

**Ryan BATCHELOR:** No, no, no, I know that. I would never suggest you did that. But I was trying to figure out whether what was actually built was where it should be or not.

**Geoff CRAPPER:** We discovered it was 6.4 AHD, which is about 0.8 metres lower than it should have been. The very next day Melbourne Water issued their six pages of flood levels with floor levels, after I mentioned on Facebook that Ron and I had solved the mystery. It was a really strange coincidence there. Melbourne Water's levels confirmed exactly what we found. This property in question, number 5 Evergreen Avenue, is –

**Ryan BATCHELOR:** In your experience, would that sort of change – from where it should have been in the original permit to where it ended up – have occurred back in your day?

**Geoff CRAPPER:** Absolutely not. Ron was the policeman there.

**Ryan BATCHELOR:** And why do you think it has changed? What has changed?

**Geoff CRAPPER:** This is Ron's area of expertise.

**Ryan BATCHELOR:** What has changed now? Why is this happening now?

**Ron SUTHERLAND:** Well, we would do our own levels for a start. From the planning point of view, I was in charge of the whole group, and all the tricky ones used to come across my desk. Things like a retirement village would have easily come across my desk, and I had a few misgivings about even what was approved in 2006. Melbourne Water never went to VCAT in 2006, and they should have. If I was there, I would have, and I would have argued strongly that it was inappropriate. I understand your question about the changing levels, but even before that, it is inappropriate to stick – we will call them people in wheelchairs – retirement people of that age in a situation where the road in front of their dwelling is that deep. Well, I would not be able to push a wheelchair through that deep. That was part of a Monash study. It is called a VD ratio – velocity times depth – and that is a requirement to say, 'Is this a bit dangerous or not?' That is in my report as well.

**The CHAIR:** I am sorry.

**Ryan BATCHELOR:** My time has expired.

**The CHAIR:** Your time has expired. Dr Ratnam with a question.

**Samantha RATNAM:** Thank you very much, both for your excellent submission and your evidence today. Just following up from Mr Batchelor's questions as well, I too have similar questions around the culture of decision-making, given your intimate knowledge of the organisations as well. And I understand that it will be your views, and I will not generalise beyond that, so I am happy for you just to share your views on that. Both with the Rivervue decision and the Flemington Racecourse flood wall decision, which required Melbourne Water modelling, talking about Melbourne Water relinquishing its opportunity to challenge some of the claims at VCAT in 2006 that were put forward in that hearing of that permit, why do you think that happened? Was it

a change of personnel? Was it a cultural decision? Do you have any insight into what happened in the decision-making culture that gave rise to more of these kinds of permissive decisions being made?

**Ron SUTHERLAND:** We were both gone by 2006, retired, so it is a little bit difficult to answer your question.

**Samantha RATNAM:** Of course, yes.

**Ron SUTHERLAND:** I am very proud of – I got flood plain management – what was achieved in the 20-odd years that I had a say in things. It is like any organisation: people under you learn from you. So I went to over 30 VCATs, and I would always take along a junior officer so they could learn the process as well and what the hell is flood plain management, what does it mean. So that is how you learn, right. So your question is: well, how come they do not do it now?

**Samantha RATNAM:** What has changed, yes.

**Ron SUTHERLAND:** How do I say this – you are pushing me, Samantha: the big change happened in 2015. We have got the 2006 report – which, yes, I would not agree 100 per cent with, but nevertheless it gave the correct floor levels and so on to build these 47 dwellings that now flood. So it set the standard for that. And then we find later in 2015 that the levels have changed, as Geoff has just indicated. Your question really should be, well, what caused that?

**Samantha RATNAM:** Yes.

**Ron SUTHERLAND:** Well, the cause: the internal expertise went out – well, I was going to –

**Geoff CRAPPER:** Out the window.

**Ron SUTHERLAND:** Can I get stuck into John Thwaites? The internal level of expertise that I certainly had and my colleague had then did not seem to exist in 2015. So the head of drainage – and we met that guy; he was quite a nice guy – what does he do about it? Well, he went and took the decision to hire GHD – this is Rivervue –

**Samantha RATNAM:** Yes, they outsourced it.

**Ron SUTHERLAND:** to do the calculations for them.

**Samantha RATNAM:** The modelling – right.

**Ron SUTHERLAND:** Now, gee, where have I heard that before? GHD were the consultants who did the Flemington flood wall. Ooh, that has got my interest.

**Samantha RATNAM:** Right. So both Rivervue and Flemington were done by GHD, and Melbourne Water is outsourcing its modelling at this stage.

**Ron SUTHERLAND:** With Rivervue, they were hired by Melbourne Water.

**Geoff CRAPPER:** We should say allegedly. We do not know for sure, but that is what we have been told from very reliable sources.

**Samantha RATNAM:** Allegedly, of course. Okay.

**Ron SUTHERLAND:** So the GHD report on Rivervue comes back, and as Geoff has indicated, they go, ‘Oh, we’ve recalculated the 100-year levels down here.’ The previous one was up here, so they set floor levels for the 47 dwellings down here even though that actually happened in May 1974 and again the following year. It does not make any sense.

**Geoff CRAPPER:** The question has to be asked: did GHD or whoever did the modelling subsequently know about the May 1974 flood level? And their 100-year flood levels were that much lower than that again.

**Ron SUTHERLAND:** They are questions to ask Melbourne Water.

**Samantha RATNAM:** Well, that is really insightful and useful. I am not sure how much time I have, but you can take this on notice as well –

**The CHAIR:** Sorry, your time has actually expired.

**Samantha RATNAM:** I will ask on notice what was wrong with the GHD modelling. All right.

**The CHAIR:** Ms Lovell with a question.

**Wendy LOVELL:** Thank you. Ron, is Arundel still the best option for flood mitigation on the Maribyrnong?

**Ron SUTHERLAND:** The quick answer is yes. This report, which took us, like, six months or something to write, a team of people, goes into all the logical answers. The overwhelming decision, to answer your question, is Arundel. It is a retarding basin. Build this dam rock wall, and it solves all the flooding downstream. The outflow from the retarding basin is no bigger than bank full, right? So that is the quick answer.

The rest of this report – it is pretty voluminous – looks at a lot of the other options. Well, you can buy up everything that floods. Some of the questions you asked council were around this topic. Buying up 500 houses – how much do you reckon that is going to cost? In today's values that would be \$500 million, to round it off. It is a lot more than building a retarding basin. So what else can you do? You can build a levee bank. Take note of my photograph here of where the October 2022 flood came, and the 100-year is half a metre higher than that – can you imagine walking up from the Anglers Tavern to have what I will call an ugly levee bank up to the ceiling level? That is just not on. It will not happen.

**Wendy LOVELL:** That only pushes it onto someone else, anyway.

**Ron SUTHERLAND:** No. And that will not solve Rivervue flooding, anyway, and that has been introduced, stupidly, by incorrect work by Melbourne Water.

**Wendy LOVELL:** Okay, so you mentioned Rivervue – yesterday we actually visited Rivervue, and in their report they refer to three ponds that they have at the front as 'constructed retarding bases'. Yesterday we learned that they are full of water anyway and that they actually just overflow into each other and then into the river, so there is no drainage off them. Can you comment on Rivervue's claim that these ponds are in fact a retarding basin?

**Ron SUTHERLAND:** I will try and do it without laughing, Wendy.

**Wendy LOVELL:** I was the same yesterday.

**Ron SUTHERLAND:** I have spoken to the guy who I went to university with who designed those works – I call them duck ponds. He is adamant – like, he is not a fool – that he designed them to trap run-off going down the hill from where the dwellings are built – so it is a bit dirty, it is an earth bank – to trap all the earth that is contained within that run-off that drains into those ponds. Because now the velocity in the ponds is zero or close to it, the silt will drop out. So they are silt trap areas. A retarding basin, that is what I proposed for Arundel – you know, the empty bathtub analogy. And then Neil, who designed these things, is ropeable; he wanted to come here today. He is ropeable that Arundel has put in their submission that they are retarding basins. They are clearly –

*Members interjecting.*

**Wendy LOVELL:** Get Neil to write to us, as a submission. Geoff, can you tell the committee why you believe that the major flood warnings for the Maribyrnong catchment were so inadequate, when you first realised that there was a serious problem with Melbourne Water's flood modelling and how long it was before Melbourne Water realised it?

**Geoff CRAPPER:** Well, they still do not realise it. I spoke to Melbourne Water four months ago and they still will not accept the reason that I came up with for the failure as the thing they need to fix the problem. It was simply the flows at Darraweit Guim. I will just cite – it is in my report – the flood intelligence card –

**The CHAIR:** I am sorry; your time has expired for that question. So perhaps we will move to Mrs Tyrrell. Maybe she might help you out here.

**Rikkie-Lee TYRRELL:** Yes, you may finish answering that question if you like.

**The CHAIR:** Do you want to continue with it?

**Rikkie-Lee TYRRELL:** Would you like to continue?

**Geoff CRAPPER:** Yes, bear with me and I will find it; it is in my report.

**Rikkie-Lee TYRRELL:** While you are looking for that I will ask a question. We will be sitting with Melbourne Water later today. Are there any questions you would like arm us with so we can get the answers we need to help us with this report?

**Geoff CRAPPER:** Well, basically all the questions that I was not able to get around to.

**Rikkie-Lee TYRRELL:** Now we have got them both fishing.

**Geoff CRAPPER:** The main thing is the rain table at Darraweit Guim and Bulla, okay? The crux of the whole issue is the fact that somehow between 2003 and 2022 they updated the stage–discharge table in their database to realise that 7.22 metres was 280 cumecs now, whereas back in the day it would have been about 800 – it is crazy.

**Ron SUTHERLAND:** They have messed it up.

**Geoff CRAPPER:** They completely messed that up.

**Rikkie-Lee TYRRELL:** That was the rain table at where, sorry?

**Geoff CRAPPER:** At Darraweit Guim.

**Rikkie-Lee TYRRELL:** I am trying to write this down, but you guys are just flying ahead with it. I will catch up.

**Geoff CRAPPER:** Here is the email trail, okay?

**Rikkie-Lee TYRRELL:** Okay.

**Geoff CRAPPER:** This is from four months ago. I corresponded with John Woodland from Melbourne Water from 7 June to 14 June with my list of concerns, telling him exactly what he needed to fix it, and I have not had any response. He went five weeks later to his internal review panel and did not even mention any of this. If a flood comes tomorrow, it is going to be just as bad as it was back then.

**Rikkie-Lee TYRRELL:** Okay. Do you have anything to add to that?

**Ron SUTHERLAND:** Can I change the topic?

**Rikkie-Lee TYRRELL:** Yes, you are more than welcome. I am lost for words.

**Ron SUTHERLAND:** It is pretty hard to stop now. I am pre-empting the question you are going to ask about the Flemington flood wall. I am armed with a couple of papers here – call it evidence if you like. What was the date, Geoff?

**Geoff CRAPPER:** December 2004, when you were just back from the USA.

**Ron SUTHERLAND:** Yes, in 2004 – I was retired by then; Geoff was, I think, still there – this idea of the flood wall at Flemington came up. ‘Well, why?’ ‘Oh, well, it’s so you can have a Melbourne Cup without the horses getting their feet wet.’ That was how it was presented. I know that is not accurate, but that is how they presented it, and they still romance on that that is the reason why it was built. If time permits, I can go into what my view is.

**Rikkie-Lee TYRRELL:** Go for it.

**Ron SUTHERLAND:** So we will go back to 2004. Geoff was employed there.

**Geoff CRAPPER:** No. I had gone by 2004.

**Ron SUTHERLAND:** Oh, okay. So there was good old GHD – their name was raised. They were hired by Victoria Racing Club, VRC, who own Flemington. They hired GHD to have a look at how they could stop water getting into Flemington Racecourse. So GHD – the same people who did Rivervue – were hired to do some calculations. The computer model you use is world renowned. It is called HEC-RAS, and it is written by the US army corps. If you are going to pick a fight with someone, do not pick a fight with the US army corps. There is my hint. Geoff had a look at what GHD did, and GHD, to their credit, said, ‘Oh, there’s something wrong with our model, so we’ve hired Professor Bob Keller from Monash University.’ He is well known around the traps. He actually taught me how to use HEC-RAS. They hired Professor Keller to check their model, and Keller came back within a very short time and said, ‘No. There’s nothing wrong with it; it’s wonderful.’ Well, I have got this on my computer at home. I ran it, and within 20 minutes I quickly knew that it was faulty.

**The CHAIR:** I am sorry, but your time has expired. Apologies for that. Ms Broad might help you. It is up to Ms Broad how she uses her 4 minutes.

**Gaelle BROAD:** That is fine. Would you like to finish?

**Ron SUTHERLAND:** Can you give me 20 seconds?

**Gaelle BROAD:** Yes. Go for it.

**Ron SUTHERLAND:** Thank you.

**Geoff CRAPPER:** Three metres a second, Ron.

**Ron SUTHERLAND:** Right, so I was talking about the writers of this program, the US army corps. It is a world-renowned program. There is nothing wrong with the program; you have just got to use it properly. So I wrote to them – here are my emails. I wrote to the US army corps because I could see that there were – with all computer models you have calibration data on the way through. That is a matter of choice, and I could see that the wrong choices were made by Professor Keller. It was the reason why GHD, quite correctly, said, ‘Well, we can’t make sense of this, so we’ll give it to Keller to check it out.’ Righto, so Ron does it at home, and within a very short time I realised it was just wrong. It was given incorrect results for the levels. So I wrote to the US army corps. This is what I wrote and their reply. I had two goes at it. They came back, and the big conclusion here is do not use, well, fiddle factors, or calibration factors, the way Keller had used them, because they were wrong. Do not do it. You cannot get any more emphatic than that. You know, if you want to take them on, good luck to you. That was the outcome. Geoff and I were annoyed, so we rang the head of Melbourne Water – it was Rob Skinner at the time – and said we had great misgivings about the Flemington flood wall that was being built or had been proposed.

**Geoff CRAPPER:** I continue to have great misgivings about it.

**Ron SUTHERLAND:** Yes, and we still do to this day. We go to Skinner’s office – I have known Rob for years – and there was Bob Keller there and there were about three people from GHD and a couple of lawyers. That was fine. I am nearly finished; give me a go.

**The CHAIR:** Well, it is up to Ms Broad, but yes.

**Ron SUTHERLAND:** So we sit down with them – and this is where I only have some respect for GHD. I said, ‘What did you do with your modelling?’ And they said, ‘Oh, we ran the model’ – they had done it many times – ‘and we think it’s wrong. We couldn’t make head nor tail of it.’ So yes, we agreed.

**Gaelle BROAD:** I am happy to ask a question on notice if I am running out of time.

**The CHAIR:** Go for it.

**Gaëlle BROAD:** I am interested in your perspectives on Melbourne Water's response to the Maribyrnong River flood review. Could you make any comment on that?

**Geoff CRAPPER:** The fact that we only got it last Friday – I have not even had a chance to look at it. I have looked at the little summary. I looked at the 15 recommendations, and virtually 10 of those recommendations were things that Melbourne Water would do on a daily basis without having to be asked back in our day.

**Wendy LOVELL:** Or should do.

**Geoff CRAPPER:** Or should have done, yes. There are about 10 of those to do with flood modelling I think and flood warning. We did all that back in the day. And there is some sort of reference to climate change there about, 'Melbourne Water should somehow factor climate change into their real-time flood forecasting.' How would you do that? Can someone tell me how you factor climate change into real-time flood forecasting? Fair enough, add climate change into planning – long-term planning – but not real-time flood forecasting. And this is what Melbourne Water are on about.

**Ron SUTHERLAND:** Can I just add a little bit to that?

**Gaëlle BROAD:** By any means.

**Ron SUTHERLAND:** I will be brief. It is that to do something that happened in October 2022 on the computer and fiddling around – I do not know where my plan is – all those are actual rain gauges; it is what is actually falling. It is not what someone says will fall in 10 years time; it is actually happening. So it does not make any sense to say, 'Oh, we've got to factor in climate change for flood warning.' It is what is actually bloody happening. Come on.

**Gaëlle BROAD:** So if Melbourne Water had accurate information – you are saying that the flow tables are out of whack – if they updated that and something like the retarding basin was implemented, I guess would that give a lot more time? With the emergency warnings, what difference would that make to people on the ground?

**Geoff CRAPPER:** On that, Gaëlle, basically if they had the correct stage–discharge and the right flood flows, the modelling – and it was a RORB model in our days; I believe they use the URBS model these days. The URBS model was developed up in Brisbane – whatever. It is still fine. The met bureau use it; it is fine. But it needs the right data. If it has got totally wrong data, it will give you a completely wrong answer.

**The CHAIR:** I am sorry, but our time for this session has expired. Thank you so much for coming in. You have provided a wealth of evidence to us today. Thank you again for providing your evidence.

**Witnesses withdrew.**