

REPORT ON PROCEEDINGS BEFORE

SELECT COMMITTEE ON THE PROPOSAL TO RAISE THE
WARRAGAMBA DAM WALL

PROPOSAL TO RAISE THE WARRAGAMBA DAM WALL

CORRECTED

At Windsor Function Centre, Windsor, on Monday 25 November 2019

The Committee met at 13:00

PRESENT

Mr Justin Field (Chair)

The Hon. Wes Fang

The Hon. Rod Roberts (Deputy Chair)

The Hon. Adam Searle

The Hon. Penny Sharpe

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The CHAIR: I welcome everybody to the first hearing of the Select Committee inquiry into the proposal to raise the Warragamba Dam wall. Today's inquiry will examine a number of aspects relating to the proposal to raise the dam wall. Today we will be focusing on the flood risk assessment and proposed flood management of the Hawkesbury-Nepean Valley and the extent of the examination of alternative options for flood management. I acknowledge the Darug people, who are the traditional custodians of this land. I would like to pay respects to the Elders past and present of the Darug nation and extend that respect to any Indigenous people present today. Today is the first hearing for this inquiry. We will hear from representatives of the New South Wales Government, flood risk experts and local councils affected by the proposal.

Before we commence I need to make a few brief comments about the procedures for today's hearing. Today's hearing is open to the public and a transcript will be placed on the Committee's website when it becomes available. In accordance with the broadcasting guidelines, while members of the media may film or record Committee members and witnesses, people in the public gallery should not be the primary focus of any filming or photography. I would also remind media representatives that you must take responsibility for what you publish about the Committee's proceedings. It is important to remember that parliamentary privilege does not apply to what witnesses may say outside of their evidence at the hearing.

I urge witnesses to be careful about any comments you make to the media or to others after you complete your evidence as such comments would not be protected by parliamentary privilege if another person decided to take an action for defamation. The guidelines for the broadcast of proceedings are available from the secretariat. All witnesses have a right to procedural fairness according to the procedural fairness resolution adopted by the House in 2018. There may be some questions that a witness could only answer if they have more time or with certain documents to hand. In these circumstances, witnesses are advised that they can take a question on notice and provide an answer within 21 days.

Committee hearings are not intended to provide a forum for people to make adverse reflections about others under the protection of parliamentary privilege. I therefore request that witnesses focus on the issues raised by the inquiry's terms of reference and avoid naming individuals unnecessarily. Witnesses are advised that any messages should be delivered to Committee members through Committee staff. To aid the audibility of this hearing may I remind both Committee members and witnesses to speak into the microphones. Finally, could everybody please turn their mobile phones to silent for the duration of the hearings.

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BRETT WHITWORTH, Deputy Secretary, Greater Sydney, Place & Infrastructure, Department of Planning, Industry and Environment, affirmed and examined

COLIN LANGFORD, Director, North-West Precinct–Greater Sydney Division Roads and Maritime Services, Transport for NSW, sworn and examined

MAREE ABOOD, Head, Hawkesbury-Nepean Valley Flood Risk Management Directorate, Infrastructure NSW, affirmed and examined

SIMON DRAPER, Chief Executive Officer, Infrastructure NSW, affirmed and examined

ANDREW GEORGE, Executive Manager, Water Solutions and Market Strategy, WaterNSW, affirmed and examined

PETER CINQUE, Principal Adviser, Hawkesbury-Nepean, NSW State Emergency Service, sworn and examined

PAUL BAILEY, Assistant Commissioner, NSW State Emergency Service, sworn and examined

The CHAIR: I would like to welcome our first witnesses for today's hearings. Mr Draper, would you like to begin with a short opening statement?

Mr DRAPER: Firstly, I and my colleagues are pleased to appear before the Committee today so thank you for inviting us. Infrastructure NSW is overseeing a whole of government implementation of phase one of the Flood Strategy for the Hawkesbury-Nepean Valley. At the outset, I would like to note that the Environmental Impact Statement for the proposal to raise the Warragamba Dam wall for flood mitigation is not yet complete. As such our responses to this inquiry cannot reasonably draw upon assessments that are ongoing and not yet reviewed by the Department of Planning, Industry and Environment for their adequacy.

It is also important to consider the Warragamba Dam raising proposal in context of the broader Flood Strategy for the Hawkesbury-Nepean Valley. Flooding is a very significant and ever-present risk to the safety, homes and livelihoods of tens of thousands of people living and working in the valley. The Insurance Council of Australia considers the Hawkesbury-Nepean to have the highest single flood exposure in New South Wales if not Australia. This is a diverse region covering 425 square kilometres from Bents Basin near Wallacia to the Brooklyn Bridge. It has flooded in this valley for millennia and it will flood again.

There have been 130 moderate and major floods since records began in the 1790s. The worst flood on record happened in 1867 and is described as having a one in five hundred chance of happening in any given year. It was similar in scale to the Townsville flood earlier this year. The largely rural flood plain communities were devastated by that massive flood in which thirteen people died. Development, both rural and urban, has been ongoing across the flood plain in the intervening 150 years. Today, if a similar flood occurred, around 90,000 people would need to be evacuated to safety and due to the unique nature of flooding in this valley—which can be rapid, deep and widespread—many hundreds of lives would be at risk.

More than 12,000 homes would be directly impacted by floodwaters and the damages bill would exceed \$5 billion. The social costs of such a disaster would impact on the health and wellbeing of thousands of people and their communities for many years. Research by Deloitte Access Economics has shown the lifetime mental health costs of the Queensland floods in 2010-11 is about \$5.9 billion. This is in addition to the direct physical damages of around \$6.7 billion. Given the last major flood in the Hawkesbury-Nepean was in 1990, local communities have little or no experience of regional flooding.

Our 2018 social research confirmed that only 18 per cent of people were aware of the high flood risk. This is clearly a serious and complex disaster risk management problem that needs to be addressed. There is no "off the shelf" blueprint or simple solution that can be applied to this unique flood risk but there are principles and frameworks that have guided our response. The development of the Flood Strategy over four years was underpinned by international, national and State best practice approaches to disaster resilience. In line with best practice, it adopts an integrated approach across the risk management spectrum of prevention, preparedness, response and recovery.

The strategy's suite of non-infrastructure and infrastructure measures is designed to reduce the significant risk and help build a more resilient community that is better prepared to respond to, and recover from, floods. A detailed options assessment was undertaken to arrive at the Flood Strategy outcomes. It is publicly available on our website and I encourage everybody to have a look at it. Along with new approaches to land use and emergency planning and programs to build community resilience, the proposal to raise the Warragamba Dam wall for flood mitigation is a key element of the strategy.

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There has been recent speculation that the proposed dam raising would not reduce the risk of major floods in the Hawkesbury-Nepean. I confirm here today that is simply not the case. While flooding cannot be prevented in this valley, raising Warragamba Dam for flood mitigation was shown to significantly reduce the significant existing risk. This is because the Warragamba catchment is the major contributor to inflows for the most dangerous and damaging floods. The proposed dam raising would mitigate floods by creating a dedicated flood mitigation zone above the current full water supply level of the dam. This would delay and lower the peak of floodwaters downstream, substantially reducing the number of people and homes affected, and increasing evacuation time for those still impacted.

Importantly, the water supply storage level of the dam would not change. The proposed raised dam would only be used and operated during a flood. While the proposal would have very significant community benefits, it is important to fully understand the potential environmental and heritage impacts and to mitigate those wherever possible. To fully assess the proposal on its merits, the Government is committed to completing the assessments currently underway. WaterNSW, as the dam owner and operator, is completing an environmental impact statement [EIS] that responds to the detailed set of requirements set down by the Secretary of the NSW Department of Planning, Industry and Environment. Further analysis of feasible alternatives to the proposed dam raising is being undertaken as part of this assessment. Ahead of public exhibition, the Department of Planning will assess the EIS for its adequacy in responding to the secretary's requirements.

Subject to feedback from the exhibition, the EIS will be considered under New South Wales legislation, as well as under Federal environmental legislation, in relation to world heritage, national heritage and threatened species. The completed EIS will also be provided to the UNESCO World Heritage Committee through the Australian Government. Importantly, the final decision on the proposal will only be made after all environmental, cultural and economic assessments are complete. Again, I encourage everybody to assess the dam raising proposal on its merits when the full environmental impact statement is exhibited for public review and comment in the first half of 2020.

The CHAIR: Thank you, Mr Draper. For the benefit of witnesses, the Committee is going to take a free-flying approach to asking questions, so it might bounce between different members. I will start with members from the Opposition.

The Hon. ADAM SEARLE: Mr Draper, I do not know if you are the right person to direct this question to—maybe it is Mr Whitworth—but what is the current estimated cost of the dam raising proposal? I know you do not have a final cost due to the EIS process, but you must have some sense of the financial impact.

Mr DRAPER: The cost that we published some years ago was the 2015 estimate of \$690 million. That is being updated as work progresses and we better understand the requirements. Any subsequent assessments that have been developed have been developed for advice to Cabinet and, therefore, I am not in a position to provide any further details on those.

The Hon. ADAM SEARLE: All right, but if it was \$690 million four years ago, it is reasonable to assume that that same work would now cost a fair bit more, given increases in construction costs and recent experiences of Government infrastructure projects, for example?

Mr DRAPER: I agree, yes. I think you would expect any estimate that was done in 2015 to be updated for escalation, as you point out, but also as the design develops and the standards that are applied to these types of dams have been updated over that period, as well.

The Hon. ADAM SEARLE: What sort of cost escalation should we think is reasonable? Is it the sort of light rail doubling of costs or is it more like the WestConnex 40 per cent to 45 per cent increase in costs?

Mr DRAPER: I could not really speculate, especially using those comparators. I think we will be able to provide more information when the EIS is released next year.

The Hon. ADAM SEARLE: All right, but that \$690 million estimate was based on certain assumptions. Using those same assumptions, what would be that cost today? You must have some sense of that.

Mr DRAPER: It is not really possible to provide an update on those same assumptions without making further assumptions about escalation and design developments. It is really quite difficult to work off that one.

The Hon. ADAM SEARLE: Okay.

Mr DRAPER: I think we are better off waiting. There is quite a substantial amount of work underway to understand the requirements for the dam raising and that is being undertaken by colleagues at WaterNSW. That design development is underway using an early contractor involvement process. That will allow us to develop a much more confident estimate of the costs next year.

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The Hon. ADAM SEARLE: Looking at page 8 of the Government submission to this inquiry, there is a handy ready reckoner about the potential impact on the Hawkesbury-Nepean Valley of different floods—one using the Brisbane 2011 one in 100 flood experience and then using the 1867 flood comparator. You were talking about up to 12,000 residents potentially impacted, \$5 billion in damages and 90,000 people needing to be evacuated. Can you or Mr Whitworth that tell us what the projected population increase is in the flood plain area over the next 10 to 20 years?

Mr DRAPER: I will defer to Mr Whitworth on that one.

Mr WHITWORTH: That is a very difficult question to answer at this point in time because we do not tend to do those populations projections—we tend to do them on a local government area basis. We do not tend to isolate and pull them out in terms of a particular area. We know that we are planning for the potential that there could be additional development in the flood plain. It is not a target that we are setting in terms of an additional amount of development. I am happy to try to take on notice what the potential additional population would be, but I am not sure that I can provide that because it would be making rather large assumptions and pulling apart smaller areas and combining them. It would probably not help you very much on that basis.

The Hon. PENNY SHARPE: I just want to follow up on that population projection issue. Are you able to provide the Committee with the numbers of housing that has currently been approved within the three different levels—the probable maximum flood, or the one in 500 or one in 1,000? You may not be able to give that to us now but it seems quite material given that the decision about whether this project goes ahead or not has not been made.

Mr WHITWORTH: Can I just clarify that? You are seeking over what time frame? From the beginning of settlement, in terms of how many houses we have in each of those different categories?

The Hon. PENNY SHARPE: Since the beginning of settlement is obviously quite challenging—we went for a good drive around today looking at that. I am more interested in the fact that there are increasing numbers of houses about to be built that have already been approved to be built on the flood plain—I want to know that. If you want to go from 2011, I am happy to use that as a guide.

Mr WHITWORTH: From 2011 to now, the number—

The Hon. PENNY SHARPE: The number that have been approved and the number of lots.

The CHAIR: If I could ask one question that relates to that. The submission from the Government makes clear that the raising of the dam wall would reduce flood damages by 75 per cent on an annual average basis. That is what you say. Given that we know that there are approved developments in the flood plain and that there is an expectation of Government that some elements of the north-west corridor will be developed, is it 75 per cent of infrastructure and properties that are on the flood plain now, or is it 75 per cent of what we—how is that 75 per cent arrived at?

Ms ABOOD: The average annual damages is a methodology that is applied by flood plain industry practitioners and the insurance industry. It is calculated by, for example, there may be a 1 per cent chance of flood and it might have an associated, let us just say \$5 billion. That would be 1 per cent multiplied by \$5 billion. For each of the different floods, you multiply it by the cost—the probability of that flood occurring times the cost of those damages and you add them up and that gives you an average annual damage. You would expect that, particularly for those larger events, because it is a weighted average, it is a much smaller percentage, so it does not provide as much for the smaller events because it is a higher percentage of that number when you add them up. In terms of future damages you would expect a similar number. We would expect that it would be around 75 per cent.

The CHAIR: But if it is 75 per cent on an annual average basis, what is the period across which—

The Hon. ADAM SEARLE: What is the benchmark? What is it 75 per cent of?

Ms ABOOD: So for the probability of any flood occurring in any given year, you could have anything from a one-in five to a one in one thousand or a probable maximum flood [PMF], so it is a weighted average of all those probabilities given as an annual average. It is done on an annual basis; it is on a weighted annual basis.

The CHAIR: Given there is significant uncertainty, depending on where the waters fall in the catchment, about how much the dam wall raising will change the flood heights at different locations, how can you arrive at any meaningful average figure of reduced costs?

Ms ABOOD: We certainly have an understanding of the flood levels and their probability. We have applied the latest methodology from the *Australian Rainfall and Runoff* for 2016-2019, so we have the latest methodology. We certainly have confidence in what those levels will be. We also have mapped out individual

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properties, infrastructure and commercial business so we know where the location of those properties or the assets are so we are able to assess how that changes and with new development we can also estimate those changes as well.

The CHAIR: I do not want to labour on this because I want to get back to some of those other assumptions about height decrease as a result, but this reads as if the costs of floods are going to be reduced by three-quarters. That is sort of the way this reads but that is not how you should read that figure, right? That is not a reasonable thing for people living on the flood plain to assume, based on how you have described that figure of 75 per cent that you arrived at.

Ms ABOOD: As I said, it is an average annual weighted, so it is a weighted average. For example, for the very, very infrequent floods the cost would be higher. Because it is probabilistic, it averages it out. For smaller events the mitigation or the damages, the number would be much higher because the benefits are going to be much higher.

Mr DRAPER: I think maybe to clarify and just to check with Ms Abood, it seems those two variables in calculating that figure, one is probability and the other is the estimation of damages under that scenario. It seems like it is the estimation of damages under that flood scenario which reduces by 75 per cent, is that correct?

Ms ABOOD: Yes.

Mr DRAPER: Sorry to be asking the questions here. I am just making sure my colleague has clarified that one.

The CHAIR: I am not sure anyone has quite got their head around how that is arrived at yet.

Ms ABOOD: So, for example, if there was a flood now, say similar to a Brisbane flood, it would be estimated to be around \$5 billion. For that particular flood—I do not have the exact number of the reduction but it is probably more than 75 per cent because it is a wide-end average but it is a standard practice that is used by industry practitioners and the Insurance Council. What the flood mitigation does—I guess the dam—it reduces the frequency of those particular events occurring, so what it is saying is that if you compared the average annual damages now, the dam would provide a 75 per cent reduction and that is consistent. We had independently got the Insurance Council of Australia—giving them a dummy (scenario); we didn't tell them what they were looking at—to do an assessment and they came up with the same numbers.

The CHAIR: Perhaps if I could ask on notice if you are able to provide the working background around how that figure is arrived at—

Ms ABOOD: Yes.

The CHAIR: —and we can have a look at that outside of the hearing context. We can get the calculators out and work out how that is arrived at and if possible understand how much of that is made up of private infrastructure, public infrastructure and I assume life and limb is also included in those cost figures. That would be worth understanding.

Ms ABOOD: In the options report it has some of those details of how that has been calculated and what was included. In what we assume as risk to life, most of those damages are residential, and we are certainly happy to provide that information but most of it is documented in the flood assessments report, which is available on our website. The details are there.

The Hon. PENNY SHARPE: I want to come back to the cost issue. Mr Draper, you talked about \$690 million, and we are obviously going to re-evaluate that and it is going to be more because they are 2015 numbers. Assuming it is \$690 million, plus whatever it escalates to, not assuming blowouts in terms of increased scope, where did the associated roadworks that will need to be dealt with in terms of flood mitigation fit into that costing? Is the \$690 million just for the dam wall raising?

Mr DRAPER: Yes, that is for the dam wall raising itself.

The Hon. PENNY SHARPE: In that case I have a question for Mr Langford. My understanding is that there are around 46 projects for local roads currently being looked at and scoped as part of this project, is that right?

Mr LANGFORD: That is correct.

The Hon. PENNY SHARPE: Do you have a rough idea of how much that is going to cost—46 projects are a lot of projects?

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Mr LANGFORD: Just to explain what those packages were; as part of phase one from the flood strategy, we have been tasked with investigating upgrades to roads that lead to the main evacuation routes or specific locations along the main evacuation routes. These areas of low-level roads are getting inundated with the flash flood that comes through first.

The Hon. PENNY SHARPE: Yes, essentially people cannot get to the evacuation route even if they tried because they are flooded?

Mr LANGFORD: That is correct.

The Hon. PENNY SHARPE: So significant work is needed?

Mr LANGFORD: It is. So we are looking across that and it is across the four council areas that are impacted in the flood plain.

The Hon. PENNY SHARPE: Just remind me of those four council areas—Hawkesbury?

Mr LANGFORD: Penrith, The Hills, Blacktown. We are currently developing up a strategic business case for government. Current investigations have included detailed survey information of all the actual levels of all those low spots along the road. A lot of it comes down to capacity. These are generally two-lane roads, one lane each way, so can we look to improve to getting two lanes outbound in an evacuation sense and one lane inbound for emergency services, potentially running on shoulders or extra shoulder work. A lot of the work involves culverts underneath the road. These small culverts flood and cut off the road so we are looking to do amplification and stormwater works to be able to keep the road open for longer.

The Hon. PENNY SHARPE: But you do not at this point have a sense of what basic—

Mr LANGFORD: No.

The Hon. PENNY SHARPE: Is it \$200 million, is it \$500 million, is it \$1 billion?

Mr LANGFORD: The current estimate is above \$100 million.

The Hon. PENNY SHARPE: Above \$100 million extra. My understanding is that previously 200 spots had been identified that needed work done in the past but only 50 were ever funded out of the 200. How many of those are double-ups? Are some of those the same projects?

Mr LANGFORD: None of those projects are currently funded at the moment. We were provided funding to develop a business case, which we are currently doing.

The Hon. PENNY SHARPE: But there is no source of funding and nothing is funded?

Mr LANGFORD: There is currently no identified source of funding for those works.

The Hon. PENNY SHARPE: Just to go back, my understanding is that some of this work has been done previously, quite a few years ago, and there were 200 spots that were identified?

Mr LANGFORD: We did some early investigations as part of the original flood task force back in 2014-2015 but since that time we have done a significant amount of investigations across more than those 200 locations that were originally identified. They were shortlisted to those 43 but with additional information and learnings along the way we have gone back and actually picked up all of those locations and packaged them up into potential future infrastructure streams.

The Hon. PENNY SHARPE: But not one dollar has been allocated to them?

Mr LANGFORD: At the moment we have had funding allocated to develop a business case.

The Hon. WES FANG: Thank you very much and thank you for appearing today. I want to take you to page 22 of the Government's submission. Part of what we have heard in moving around and looking at sites is that not all the other options were being investigated but the graph at the bottom of page 22 clearly shows the cost benefit analysis of the other options. Mr Draper, would you mind expanding on what the other options were and why the raising of Warragamba Dam is the most suitable option?

Mr DRAPER: Certainly. There is a suite of measures that have been examined. Some of them are infrastructure measures and some are non-infrastructure measures. On that page that you are referring to we refer to all of those as infrastructure measures. There were more than those actually. As well as those I think we considered dredging of parts of the river and widening of gorges, localised levees and a number of other things. Quite a wide range of options were considered but these are the primary ones. The 14-metre Warragamba Dam wall raising, which we are discussing here today, lowering the full supply level by the five metres or 20 metres, dredging, which I mentioned a moment ago, permanently lowering the supply level by 12 metres—sorry, I have

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misrepresented that, the other one was a 20-metre wall raising rather than 20-metre lowering—12-metre lowering of the full supply level, currency creek diversion and the regional road upgrades, which Ms Sharpe was asking about a moment ago.

The reason why the 14-metre dam wall raising performs best is because it has very high benefits. It has significant cost but it also has very high benefits, as you can see from the chart that you referred to. The 20-metre dam wall raising has quite significant benefits, slightly higher benefits, but you get most of the benefits just from the 14-metre wall raising. The costs of a 20-metre wall raising are higher and obviously would have more significant impacts upstream so lower net benefits. The other one that sort of stands out that has quite significant high benefits is lowering the full supply level by 12 metres, but as you can see from that chart it also has very high costs.

You can consider those costs in two ways because lowering the dam supply level by 12 metres lowers the capacity of Warragamba Dam by around 40 per cent. Because of the shape of the dam, being conical in nature, you lose a lot of the supply capacity at the top of the dam. There are two ways that cost can be characterised: either you have to spend the money to replace that water supply and water security and spend that money elsewhere on other measures or you incur a quite significant reduction in the economic capacity and population capacity of Sydney.

The CHAIR: Just on that point, if I could: Mr Draper, were the economic benefits of improving the regional road network even during dry times, considered in that cost-benefit analysis? I would imagine that it would have had significant benefits for the local community to do that work anyway.

Ms ABOOD: I am sorry, could you repeat the question?

Mr DRAPER: I think I understand the question you are asking: Are these benefits measured only in terms of the flood mitigation benefits rather than the benefits across the full period? I do not know if Ms Abood can provide any clarity on that.

Ms ABOOD: All our examination of all the road packages was from a risk-to-life perspective. None of the road packages were looking at growth. The assessment criteria were really around: How does that package, whether it is the roads or the other infrastructure options, actually achieve in terms of reducing the risk to life and damages? In the case of roads, they are really important for providing capacity for evacuation but they were all assessed in terms of what we needed to do was for building resilience, not for increasing road capacity for growth.

The CHAIR: But if the costs of water supply was factored in, why was the benefit to the community of improving the road network not factored in? Why were the costs that were not related to risk—

Mr DRAPER: Because those costs would be a direct cost to lowering the full supply level of the dam. They would be a direct cost to that whereas the benefits you are describing would be a complementary or supplementary benefit that did not relate to the purpose of the investment. What you can see from the chart there—

The CHAIR: It sounds like a convenient cost-benefit analysis.

Mr DRAPER: I am sorry, what you can see from the chart there is that the major regional evacuation road upgrades provide very, very little benefit in relation to preservation of life. It does not actually serve the primary purpose of this investment, which is to mitigate the impacts of flood events by inundation downstream.

The Hon. WES FANG: Mr Draper, if I could just take you back to my original line of questioning, we have heard from you that in lieu of increasing the dam wall by 14 metres one of the options is to reduce the capacity of the Warragamba Dam by 12 metres, or about 40 per cent. Would you be able to provide some insights into what that economic detriment would be to the Sydney Basin by reducing our storage by that level? What options would we need to look at to make up the lost water storage that we would have if we were to use that empty space for flood mitigation instead of building a temporary inundation level on top of the wall?

Mr DRAPER: I am happy to have my colleague Mr George to contribute to this as well but, as I said, there are really two ways you can think about it. One is the reduction in the economic and social capacity, if you like, of Sydney to sustain a population. That would be the first way of thinking about the costs. The second would be that you would have to invest in other forms of water supply for Sydney and there are a number of possibilities there, such as major investment in desalination plants, which is obviously not cheap in its own right, and a number of other measures. I do not know if Mr George wants to add to that.

Mr GEORGE: Perhaps the only thing to add would be to point out that, obviously, the dam is not full all of the time so lowering the supply level to minus 12 would mean that we would be in drought more often. The Metropolitan Water Plan has the Government's policy criteria in place around the levels of service you provide

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for the city—how frequently we should go into drought and how long we should stay in the drought—so dropping full supply level and keeping all other things equal, we would obviously breach that policy criteria.

The Hon. WES FANG: Would another dam be a possibility for supply? What environmental impacts would that have?

Mr GEORGE: Sure, but probably greater environmental impact because this dam is not talking about permanent inundation.

The Hon. WES FANG: Just temporary inundation.

Mr GEORGE: A new dam would be talking about additional new inundation of, presumably, valued land—either national park or otherwise

The Hon. ADAM SEARLE: Just to be very clear about that: The raising of the dam wall proposal will not lead to any permanent increased water storage capacity for the Sydney Basin, will it?

Mr GEORGE: That is correct. It is only for flood mitigation.

The Hon. ADAM SEARLE: That is right.

The Hon. PENNY SHARPE: Could you give some Ministers in the Government that advice, please? Thanks.

The Hon. ADAM SEARLE: No, this is a serious point. I think the Premier herself has made the point that raising the dam wall proposal made by her Government will lead to increased water storage for the Sydney Basin. Now, that is just—what advice are you giving to Executive Government on this matter? Is it the same advice as package 16 your submission?

Mr DRAPER: In fact, I am willing to confirm that the submission is absolutely correct and the comments of Mr George also are correct: That the raising of the dam wall is not designed or intended to provide additional storage and the dam is purely for flood mitigation.

The Hon. ADAM SEARLE: Just getting back to the issue of the roads and the issue of population growth, depending on whether it is a Queensland 2011 sort of flood or an 1867-style flood, the evacuation figures were somewhere between 70,000 to 90,000 people based on the current population. That is correct, is it not?

Ms ABOOD: That is correct.

The Hon. ADAM SEARLE: This morning we had a very beneficial tour of about a third of the flood plain area and had a look at the roads. This is not a reflection on the professionalism of the work being done by the emergency services but it struck me that the roads I was seeing are not fit for evacuation purposes based on current population. If we factor in hundreds of thousands of extra residents in the flood plain area over the next decades how could Government even be considering raising the dam wall in advance of significant upgrade of roads? Is the Executive Government not looking at this the wrong way round?

Mr DRAPER: No. I think perhaps I will let Mr Langford address the roads issue but I think it is important to say—and I was trying to get to this point in the opening statement—that the raising of the Warragamba Dam wall is one of the portfolio of measures designed to reduce flood risk for the Hawkesbury to the Nepean Valley. In fact, there are nine outcomes we are targeting. The Warragamba Dam wall is only one of those nine.

Mr LANGFORD: In addition to the roads question, there are actually four initiatives under phase one of the strategy that we are currently progressing. We have already implemented improved flood evacuation signage following extensive community consultation surveys. That was implemented late last year. We have the one you have already mentioned with the local resilience package and we are also updating our flood evacuation model, which is world's best practice in helping to, I guess, assess risk to life in changes to the development on the flood plain and the infrastructure supporting evacuation. We have also got, I guess, the follow-on from those three packages, which is a north-west roads master plan, and that strategy will guide future transport planning in the flood plain to consider evacuation needs, et cetera, as part of the broader planning for the network.

The CHAIR: If we can, we might now move across to questions from Mr Roberts.

The Hon. ROD ROBERTS: I draw your attention to page 15 of your submission. I do not know who is the appropriate person to answer this, but you will figure that out among yourselves. We are looking at page 15, which talks about the benefits from the mitigation capability of raising the dam wall. You say in there that this would delay and reduce the flood peak and flood extent for downstream communities and allow more time for

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evacuation, reducing the risk to lives, flood damage and social disruption. How much time are we actually talking about?

Ms ABOOD: I will answer that first and then I might hand over to Mr Cinque. It just depends on the actual flood. For example, for a 14-metre raising, if there is a one in 100 chance per year flood then 100 per cent of the time you would expect that to reach 17.3 metres at Windsor. With a 14-metre raising, what that would do would mean that maybe 83 per cent of those events would not reach that level and of the remaining events that would you would have 10 hours or more delay in the peak.

The Hon. ROD ROBERTS: I will just rudely interrupt you, Ms Abood. Ten hours or more delaying the peak, whereabouts in the river system are we talking about? Are we talking at Wallacia or are we talking further downstream?

Ms ABOOD: That is at Windsor.

The Hon. ROD ROBERTS: What about at Wallacia? What is the time benefit there? Penrith? Here? What are the time benefits for all these stages along the river system?

Ms ABOOD: It varies according to the flood.

The Hon. ROD ROBERTS: Of course it does. What is your best- and worst-case scenarios then? Surely you have modelled this and worked it out.

Ms ABOOD: We have got a whole lot of modelling information, but I do not have exact numbers for those here. But I can certainly provide the different benefits of the different locations.

The Hon. ROD ROBERTS: I think that would be most prudent, don't you, if we are going to be talking about spending \$690 million plus? You cannot tell me how much time we are going to save at Wallacia, at Penrith, Windsor, Richmond, down the stream. I think that would be quite important. We look forward to your answer to that.

Mr DRAPER: I just want to correct that. We can tell you that according to Ms Abood's evidence and we will do so.

The CHAIR: Could I just add to that? I think the submission at one point says up to four metres reduction in height, and I assume that that also relates to the time saved. But that seems to be the best case, and I know you have around about 20,000 flood models. It would be more useful, I think, for the Committee to understand what the mean of all the different models were potentially as a distribution graph that can show us across the different models how many are within that best case and how many are closer to the mean, and you must also have an idea about the most likely flood pattern based on historical rainfall events. It seems that you offer up the best-case scenario in nearly all of the options in the submission, but I think the Committee would like to see where we are in terms of the average. It would give the Committee a better understanding.

Ms ABOOD: There is certainly an envelope, that is correct, because of Monte Carlo, and that is what we are trying to understand is the variability. My understanding is—Mr Cinque might be able to help in explaining—I think that is the median or the mean that we have actually presented.

The CHAIR: I am happy to put those on notice, Mr Cinque, unless you have got a specific answer now, otherwise we will go back to Mr Roberts.

Mr CINQUE: The things you were talking about is what we are currently undertaking, that analysis because of the flood evacuation modelling that fits into the evaluation of the options representative of floods. We are now undertaking a deeper analysis across the 20,000.

The CHAIR: We have been given a submission that provides specific numbers but you are suggesting that that modelling work is being conducted now. What is the basis of the information in your submission?

Mr CINQUE: Statistically relevant data sample of the floods, on advice from external consultants.

The CHAIR: So how much confidence can we have in these best-case figures that you have provided in your submission?

The Hon. WES FANG: Point of order: I think you are drawing a conclusion about best-case scenarios. The numbers are presented as the numbers are presented.

The CHAIR: It says "unproved" and it says "as much as", so we know it is best case. I think Ms Abood just agreed to that and Mr Cinque has just suggested there is more modelling being done, so I think it is a reasonable question: how much confidence can we have those figures?

CORRECTED

Ms ABOOD: Can I correct that? I did not say it was best case. I think when we are saying "up to", it varies for each of the different floods. It is around 4 metres the average for the one in 100, then it would be high—it varies for each flood. The "up to" could be the maximum for that particular flood range.

The CHAIR: That is right. Your answer in the submission is "up to four metres for high-risk flood islands depending on the location and size of the event". I am not sure how valuable that is in determining how much the dam wall raising can mitigate a flood at a particular location. It seems to give us not just the best case at a particular site but the best case across the whole flood plain. I am forewarning that I am going to put on notice some questions that try to get to the bottom of the mean and ideally the most likely scenarios at different locations.

Ms ABOOD: Certainly that information is available in the options report but also the flood strategy. So you will be able to look at some of that information. There are lots of graphs and information tables in there that will provide a lot of that information for you. But we are more than happy to take that on notice and give you further detail.

Mr DRAPER: Perhaps it is also worth reiterating what we said at the beginning. We have said at the very beginning there is a lot of work continuing because we are producing an EIS and all of that information needs to be exhibited and made available to the public at that time, and that is the process we are working towards at the moment. We have never claimed that all of the work required is complete.

The Hon. ROD ROBERTS: Again, continuing your work off your submission, at page 25—this might be directed at you, Mr Whitworth—I will just read from part of it, "However, to ensure the benefits of the dam raising would be maintained over time, the current flood planning area defined in the current one to 100 chance per year flood level would continue to apply. This would prevent land below the current one in 100 chance per year flood level of being opened up for new residential development areas." What guarantees can you give in relation to that?

Mr WHITWORTH: The way in which that would need to be given effect, and we are still looking at the different planning options—we are doing work under one of the outcomes in the strategy to do a regional land use planning framework, but there would effectively be a planning control established; whether it is established in each and every local environment plan that the council have or whether there is a need for a State environmental planning policy that could potentially do that. But the critical element here is to ensure that the shift in the flood planning level as a result of the dam, the reason we are doing that is not because we want to enable additional development; it is because we want to protect the existing residents and the existing development that is there now. We do not want to lose that benefit, so we can use the planning controls to establish that.

The Hon. ADAM SEARLE: What would be the nature of that planning control?

Mr WHITWORTH: There is a standard clause in most local environmental plans called a flood planning clause, and that flood planning clause either uses a map that shows the flood planning level, typically set at the one in 100 chance per year flood, it also sometimes refers to a development control plan.

The Hon. ADAM SEARLE: Would that result in essentially areas that would not be developable?

Mr WHITWORTH: Yes, it provides additional considerations and it identifies certain types of development that are not considered suitable in those areas for development, typically residential. It also provides extra heads of consideration for whoever is doing the assessment of any development application.

The Hon. ADAM SEARLE: But just on that, you are talking about considerations and restrictions but you are not talking about just preventing development in those areas.

Mr WHITWORTH: You have to understand, I suppose, that the planning system works on what is allowable under a zoning and what is suitable to identify and ascribe to a particular zone. At the moment the one in 100 chance per year line is typically used to designate the difference between, in this area in particular, a rural zone, where you do not have that level of density of development—you would allow dwelling houses associated with the rural activity—and residential development. We do use the flood planning controls to identify different levels of consideration. Typically we use the flood planning controls to try and limit childcare centres, hospitals, schools in the area between the one in 100 chance per year flood and the probably maximum flood. In the recently exhibited plans for Marsden Park North and West Schofields we have set a limit on the number of dwellings that could be allowed between the one in 100 chance per year flood line and the probably maximum flood line as a way of protecting and ensuring that we have sufficient evacuation capacity.

The Hon. ADAM SEARLE: Well, Mr Whitworth, that sounds like you are trying to mitigate against future damage but not prevent.

CORRECTED

Mr WHITWORTH: No, respectfully, I disagree. We are preventing those sorts of activities that are inappropriate from a risk-to-life element, remembering that a risk-based approach to planning needs to look at what is the likelihood of something happening and what is the consequence of something happening. If we were to take a very blunt and arbitrary approach and say that anything up to the one in 500 chance per year flood event should not have any additional development potential, we would be saying that there would be 10,000 homes that would not have any additional potential to put extra rooms, granny flats or whatever. We would also be saying that more than half of the Penrith central business district should not have any ability to have any additional development, shops should not be able to be renewed and so on.

We need to take a risk-based approach that is balanced and reflects what the risk to life and safety are and to try and prevent the damages that would occur. We also need to take an approach that says if there are areas that already have a degree of development potential or an expectation of development potential but they would create too much risk to life, we should not allow those developments to go ahead. That is the decision that we took with the Penrith Lakes area as an example.

The Hon. ADAM SEARLE: Let us come at this another way. I do not know who the right person is to answer this but are you all satisfied that the existing road system is absolutely fit for purpose when it comes to evacuation today? If there was one of these serious flood events, are you satisfied that the current road system in the flood plain is fit for purpose for evacuations?

Mr DRAPER: I think perhaps the way to respond to that is to observe that one of the areas of outcomes or programs that we have is to improve local roads for evacuation. That is clearly part of the strategy.

The Hon. ADAM SEARLE: Okay, I will assume that is a no.

The Hon. PENNY SHARPE: There is no money for it.

The Hon. ADAM SEARLE: You do not have to be a genius to look around at the different flood plain councils and see that development is continuing apace. The road system cannot cope today if there was the need to do so, development is increasing. You are looking at business cases for operating those roads but there is not one dollar allocated.

Mr WHITWORTH: If we are looking at additional development potential in the Penrith central business district, and we are looking at that on a staged approach on the basis of how much evacuation capacity exists, we are also identifying that there are certain thresholds that would need to be met in order to allow additional development to occur. Those thresholds would require development in making a contribution to the upgraded roads. A very good example is: To improve the evacuation capacity out of the Penrith central business district requires an upgrade to the intersection of the Northern Road and the Great Western Highway. It also requires increases in capacity to the Northern Road—which is being provided now—and an increase in capacity on the Northern Road to the M4.

These are things that are happening as a result of the growth in the area and are being funded by development contributions. Where we believe that we are unable to provide that evacuation capacity through an upgrade to road networks and by taking development contributions, we have simply so that we are not going to support development. We have done that Penrith Lakes. We have done that with the Emu Plains Correctional Centre. We have made a number of refusals to allow additional development rezonings in Windsor. We are taking a precautionary approach here.

The Hon. ROD ROBERTS: Following on from that, Mr Whitworth—and please accept that this is my first visit to this area so my geographical knowledge is not the best—we have just been taken on a guided trip and we came down what I believe was Richmond Road?

Mr WHITWORTH: Yes.

The Hon. ROD ROBERTS: We went past a brand-new estate called Clydesdale Estate?

Mr WHITWORTH: That would probably be Marsden Park, the Elara development by Stocklands.

The Hon. ROD ROBERTS: Yes. That appears to me to be down in the lower level, very close to the proximity of South Creek?

Mr WHITWORTH: Yes.

The Hon. ROD ROBERTS: Hearing from what you have just said, how many homes are in that area?

Mr WHITWORTH: I do not have that off the top of my head. I do not tend to walk around with—

The Hon. ROD ROBERTS: That is fine. There is a few though?

CORRECTED

Mr WHITWORTH: I can tell you it is about 3,000 to 4,000 from memory.

The Hon. ROD ROBERTS: So the Government is comfortable putting another 3,000 to 4,000 homes in what is clearly a low-lying area?

Mr WHITWORTH: That area is above the one in 100 chance per year flood—

The Hon. ROD ROBERTS: Above it?

Mr WHITWORTH: It is above the one in 100 chance per year flood. In New South Wales planning processes, we would not allow rezoning to occur for any property for that sort of development unless it was above the one in 100 chance per year flood.

The Hon. PENNY SHARPE: Are you sure there are no properties within that that are below the one in 100?

Mr WHITWORTH: Am I sure that there are no properties in the valley below the one in 100? No, there are properties below the valley that are below the one 100. Have we approved rezonings for residential development below the one in 100? No, I do not believe that we have because the ministerial directions require that development is above the one in 100. To Mr Roberts' question, in that area we are also looking at planning for additional development on the eastern side of the road there at Marsden Park North and at West Schofields. As part of the assessment of what was appropriate for that area, we undertook an evacuation capacity study to understand how long it would take us to evacuate those areas including Marsden Park onto Richmond Road in a safe way. That number has been used to effectively set a cap on the number of additional dwellings that we are allowing at Marsden Park North and West Schofields.

The Hon. ROD ROBERTS: I just want to clarify this: You are definitely convinced that that development is above the one in 100?

Mr WHITWORTH: As part of the approval process, it needed to be above the one in 100. What it entailed was a degree of filling. The New South Wales Floodplain Development Manual enables filling of the flood plain. It is a very difficult process. It requires people to demonstrate that if you are going to fill an area of the flood plain, that you are going to cut somewhere else so that there is no net impact on other people and other properties. That is an area where there was filling of the flood plain; it is an older approval. The north-west growth area is an area that had been identified formally as far back as 2006 through the growth centres State environmental planning policy and the structure plan for that area. It had always been contemplated that there would be a degree of filling in that area. We have tried to limit the degree of filling in other areas such as Marsden Park North and West Schofields. We have also recently taken decisions to not encourage filling in other places, at Riverstone West for example.

The CHAIR: Just to be clear, if there was a flood at the height of the 1860s flood, those houses would be inundated to a degree?

Mr WHITWORTH: Those houses would be inundated to a degree and this is where I come back to the likelihood and risk element. What we have also identified as part of the West Schofields and Marsden Park North planning controls is what we call increased and more resilient building design. So instead of having wooden floors, you would have concrete floors; instead of having gyprock in the lower levels, you would have villaboard; you would design the water and the electrical services in such a way that they could withstand a flood. In that way, we are trying to enable communities to be more resilient if there is a flood event. That would be tragic, but we are trying to minimise the amount of damages that would occur and enable people to get back on with their lives as quickly as possible afterwards rather than having homes having to be demolished.

The CHAIR: Thank you, Mr Whitworth. That concludes the time that we have for this hearing this afternoon. I would like to thank all the witnesses. The Committee has resolved that answers to questions taken on notice be returned within 21 days. There may be other questions on notice that the secretariat will contact you in relation to after today's hearing.

(The witnesses withdrew.)

CORRECTED

JAMIE PITTOCK, Fenner School of Environment and Society, Australian National University, affirmed and examined

CHAS KEYS, Former Deputy Director-General, State Emergency Service, affirmed and examined

BARRY CROKE, Senior Lecturer, Mathematical Sciences Institute, Australian National University, before the Committee via teleconference, affirmed and examined

The CHAIR: I welcome the next set of witnesses to the hearing today. Would any of you like to make a short opening statement? We have your submissions. If you would like to make an opening statement, please keep it short so we have more time for questions.

Dr KEYS: Thank you for the invitation. The first point I would like to make is that I am in favour of flood mitigation. New South Wales has led Australia in this field for decades. Since the mid 1960s we have spent something in the order of \$1.3 billion in today's terms on flood mitigation, and many communities have benefitted from that. More than 40 towns have got levee protection. We built mitigation dams; we built flood retention basins; we brought houses out of floodways; and we raised other houses to make them sit securely in very big floods. It has been something of a triumph. A very dangerous and costly natural hazard—flooding—has been reigned in to a significant degree. It is worth saying that we have done much better in New South Wales than the Queenslanders have done. The two States each have about 40 per cent of the national flood threat, measured in terms of flood losses on an average annual basis. Each State has about 40 per cent of that threat, and we have done much better in mitigating it.

Having said that, we need to be careful about how we go about flood mitigation. We need to especially make sure that we do not inadvertently worsen the problem, as we will if we encourage more development on flood plains. I will give you an example from Queensland from 2011—which everyone will remember—when a big flood drowned a very large part of Brisbane. In 1974 Brisbane had a very big flood, after which the State Government built Wivenhoe Dam. The result in psychology from building that dam was that Brisbane people, including the councillors of Brisbane City Council, came to believe that the flood problem had been overcome and a very significant measure—perhaps a total measure—of flood immunity had been achieved in Brisbane. That led to the development industry lobbying council to allow for much more development and there was development on the flood plain down stream of Wivenhoe Dam within the Brisbane City Council area.

In 2011—and this is a bit controversial, so I will not go into the details—a flood that was smaller than the 1974 flood in Brisbane got into more houses and more businesses. A smaller flood did more damage. That is because of the extra development that went in, based on the assumption that the flood problem had been substantially tamed. That is a real risk for the Hawkesbury. We are on the edge of a major and growing metropolitan area called Sydney. We are in an area on the urban fringe that is set up for subdivision and development. This development will be on the flood plain that has Australia's greatest potential for truly disastrous flooding. We have a combination of a large existing population and a certainty of an increase—which is Government policy—in an environment with a very high flood rate.

Most of the people in this room would have heard of the bathtub effect, which is a term given to a valley in which there are many tributary streams coming in—the Grose River, the Upper Nepean, the Warragamba and South Creek, which come in at various places, both through the dam and below it—that can only go out via the river downstream. And that river is severely constricted topographically and geomorphologically by a choke and restriction. That means that if those rivers are active and bringing in flood waters and there is a very inefficient bathplug downstream, the water will continue to rise. The consequence of that is an enormously high flood range. Today on the gauge in Windsor next to the river—I have not been down there, but this would have to be true because there is no flood going on that we know of—the height would be about one metre. In 1867 it got to more than 19 metres, which is 18 metres deeper than normal low flow.

All floors of a six-storey building, if you like, would be inundated if it was built down by the bridge at the start of Putty Road. Also, flooding higher than that is possible. The flood in 1867, while terrible, was by no means the highest flood you could see at Windsor and, indeed, in the valley. I acknowledge the work of Infrastructure NSW and I note that the raising of the dam wall will provide some significant mitigative effects. But very big floods or floods coming in from the Upper Nepean or the Grose River—both of which come into the main stem of the river below the dam—will be little effected or effected not at all by the raising of the dam. Yet the expectation is—and the figures of Infrastructure NSW bear this out—that the flood plain population below the dam will double over the next 30 years. It is clearly Government policy to increase the population of this valley.

CORRECTED

In 30 years' times, if the figures are remotely right, in genuinely big floods we could be required to evacuate up to a quarter of a million people. We should not underestimate how challenging that would be. It would be a huge job. There would be massive congestion on the roads and some people would not evacuate, which is always the case. I used to be the Deputy Director-Director General of the State Emergency Service and I came to respect the difficulty of evacuating people ahead of floods. Evacuation is nobody's hobby; it is never welcomed; and it is usually resisted. In this valley when that happens, which I think is inevitable, the results could be disastrous. The orthodox position in all of this is probably to take all the mitigation benefits that are on offer by raising the dam—and they are not insubstantial for small- and medium-sized floods, and perhaps even the smaller end of big floods. But I am extremely reluctant to take that position, given the inevitability of very big floods, albeit infrequent.

We have heard about the reduced probability of big floods in this valley, and I am not denying that. But a reduced probability nevertheless means an inevitability of big floods. They will just be less frequent than in the past. My mitigation would be to reign back development in the valley, build more evacuation routes higher and redouble our efforts to make sure that people understand the potential for big floods and will evacuate. That might even mean—and I just throw this out there, and I am not suggesting that it could be made into policy—enforcing people to evacuate and making sure that they know when they buy a house in the valley that they will be legally required to evacuate when told. That might be very difficult politically, but it might be the sort of thing you need to consider. I fear that the Government's preference for a bigger dam and more people in the valley is the essence of bad policy. It overstates the benefits; it understates the costs; and it is expensive to boot. With that, I am open to your questions. Please fire at will.

The CHAIR: Thank you, Dr Keys. Professor Pittock, do you wish to make an opening statement?

Professor PITTOCK: Thank you, Chair. I have worked for the restoration of flood plains by supervising projects around the world since 1994. Since 2007 I have been undertaking research on flood plain management and restoration at the Australian National University. There is no doubt that the Hawkesbury Nepean Valley has a grave flood risk and more public investment is required to reduce that risk to people. In terms of my ability to help you, I can best address the Committee's terms of reference (e) on alternative options of flood risk management and (f) on international standards, which, in many cases, are much higher than those applied here in Australia and New South Wales. I believe that the Infrastructure NSW strategy is seriously flawed in a number of respects. The first is that it assumes that more people will be enabled to move into and live in harm's way. No action is proposed to seriously manage that.

The second major flaw in the strategy is that the cost benefit analysis is very narrowly defined to only count the costs of flood infrastructure and flood benefits, it does not consider other costs to society of some of those measures, for example, the costs of flooding part of the Blue Mountains National Park and World Heritage area, nor does it assess any of the additional benefits. This must be the only State Government report I have ever read where proposals for major investment in roads do not count all the additional benefits of building roads, such as faster travel times and safer transport and so forth.

There are alternatives and those alternatives are not well considered in the current strategy. The first alternative must be to stop putting people in harm's way. In that respect New South Wales' use of the one in 100 year flood return interval, plus the half metre floor level as a standard, is below that adopted in other countries. Secondly, as Dr Keys argues, there is great potential to improve evacuation routes. Thirdly, I would say from international experience many other countries are investing in relocating the most flood prone residents. For example, in the United States of America where 15 per cent of flood disaster response money has to be spent on reducing the risk of future flooding, including by buying out those people in harm's way. There are 5,000 houses on this flood plain, below the one in 100 year flood return interval. Raising Warragamba Dam wall will not necessarily prevent them being regularly flooded by floods coming from tributary rivers below the dam wall.

Lastly, there is credible modelling from 2016—not my research but research from the University of Technology, Sydney—which suggests that an equal investment in lowering the current full storage level of Warragamba Dam to provide some flood mitigation and advancing the planned development of further desalination plants would provide both flood mitigation and a cost effective source of water for Sydney.

The CHAIR: Do you want to make an opening statement, Professor Croke?

Associate Professor CROKE: Okay, thank you. To start off with myself, my background is in hydrological science. I have worked in that area for over 20 years. Of course, I also have over 30 years' experience in the State Emergency Service, including flooding in the Sydney area of Georges River when I was on the Bankstown unit. Since 2000 I have been with the Queanbeyan unit and involved in the 2010 and 2012 floods there. Generally speaking in terms of the proposal, I am not really in favour of raising the dam wall in this because while it would in principal address like issues there is an impact of increase in the population in the flood plain

CORRECTED

after this that would lead to an increase in the overall risk, and an increased burden on the SES. As well, it does not really address the question of what the impact of dam failure would be adequately, in my view. I should have also mentioned that while I am in the SES my comments cannot be construed as being a response from the SES, these are only my personal views from my professional standpoint as a hydrologist.

The CHAIR: The Government has provided a range of scenarios in its submission about how much it thinks raising the dam will reduce flood risks at different flood likelihoods and at different locations and at different times. The Government seems to provide for the best case scenario. I am not sure whether either of you have read the Government's submission in detail. How much confidence can we have in it when there are so many factors that go into flood heights within this particular catchment?

Dr KEYS: Good question. I cast no aspersions against Infrastructure NSW and the research that has gone into this and I will refer to what the Professor Pittock and I both said that there are tributaries that come in below the dam which will be unaffected by whatever happens to the dam. We are making the point here that the 1867 flood which is the benchmark, really, the Hawkesbury flood, was in very rough terms a one-in-100 year flood at Penrith and one-in-250 years flood at Windsor. That tells you that something happened between those two places. Some tributary between Penrith and Windsor must have been in very big flood. It was probably the Grose. It could be South Creek but a little bit of it, we believe that South Creek could not produce that much flooding.

The Government's reports have done standard work, using standard and well-tried technologies, to produce a bunch of credible answers but they are not the only answers. Again Professor Pittock made the point about the limitations of things like cost benefit analysis. Cost benefit analysis are virtually always partial and therefore incomplete. They deal in dollars—lots of values are not related to—dollars cannot be counted in monetary terms. That is my general answer to the question. I do not dispute the modelling, the simulations and the results that we have been given by Infrastructure NSW. I merely say that they must be incomplete by definition, and they cannot tell the whole story.

If I had my way here, the whole story would be told in terms not of dollar values or in terms of probabilities—I hate the fact that we use the 1 per cent flood as a standard for New South Wales. It says nothing about risk. I would deal—since we are dealing here with a public safety risk—with community safety as the predominant variable. I take as the measures that count things like the numbers of people who have to be evacuated; the numbers of people who will be drowned if we do not evacuate them. I am very strongly of the view that in extreme events which by definition are rare we will drown heroic numbers of people in this valley, probably with or without the raising of this dam wall. We could have our own Hurricane Katrina in New Orleans which killed 1,600 people in 2005, or in the fire context, we could have a black Saturday type thing where 173 people died. Those deaths have not occurred yet on the Hawkesbury but it seems to me that they are inevitable given we know that extreme floods occur and will continue to occur—Townsville earlier this year was just a recent example.

The CHAIR: Do you have a comment Professor Pittock?

Professor PITTOCK: I think Dr Keys was most eloquent. A couple of points I would make: The hydrological modelling and forecasting system could be improved. I am astonished that apparently there is no hydrological monitoring station on the Grose River, is my understanding, for example, given that this is a major tributary that contributes to flood risk. Another point I would make is that flood risk changes and it is changing now with climate change. It is likely that the frequency of extreme floods is increasing and it also increases as land use changes in the catchment. As more and more of this valley is developed, and there are more hard surfaces, the ability of rainwater to run off more quickly and cause peak flash flooding is increasing and so all of those elements need to be considered. Those changes will not be managed by investing only in the Warragamba Dam wall. Many other flood risk management investments are required, for example, tougher planning standards, relocating the most flood prone houses or businesses and flood secure evacuation routes.

The Hon. WES FANG: Professor Pittock, in your submission you identify four options that the Government you said should consider. The Committee heard earlier from the Government, and the majority of them were identified. The first referred to the reduction of storage in Warragamba Dam by 12 metres. While that would have, in effect, the same flood waters as raising the dam wall, what do you consider are options for the reduction in storage for the Sydney area? Have you thought about what effect that would have on the economic and population values of Sydney? I want to take you to the first one of yours, which is the reduction of storage in Warragamba Dam by 12 metres. While that would have, in effect, the same ability to absorb flood waters, as would raising Warragamba Dam wall, what do you consider would be options for the reduction in storage for Sydney area? Have you thought about what effect that would have on the economic and population values of Sydney?

CORRECTED

Professor PITTOCK: Thank you. That is a very important question, and an obvious question, if I may say so. If you lower the water storage in Warragamba Dam, how do you secure Sydney's water supply in a cost-effective manner? I would point to the research by my University of Technology Sydney colleagues Andrea Turner and others, who have published peer review research in the *Journal of Cleaner Production*. They did a systems dynamic model where they looked at the current settings in Sydney's Metropolitan Water Plan and assessed the history of water inflows and storage in Warragamba Dam and what that would mean if, for example, Warragamba Dam was lowered by 12 metres. How would that then trigger the response measures that the Government has already adopted in the Metropolitan Water Plan in terms of bringing on extra desalination capacity.

Their findings are somewhat counterintuitive. One thing they point to is that with the existing desalination plant the Government has been paying the owners handsomely to keep it in a mothballed state, and the cost of operating it is not that much higher. The second point they make is that in the Metropolitan Water Plan there are already triggers for the development of new desalination plants. They would be brought forward into the twenties, thirties and forties by lowering Warragamba Dam. It would require up to two new desalination plants by 2040. The point that they make is that this has many socio-economic benefits for Sydney because it secures the water supply in a way that relying on surface water storage and dams does not. So it reduces the sorts of water restrictions that we are seeing being introduced now. So their conclusion—this is not my research—is that that option is equally cost effective as the proposal to raise the dam wall.

The Hon. WES FANG: I was going to ask that. Did that factor in the capital cost of not only two new desalination plants and the dramatic increase in water bills for Sydneysiders but also—we all know that desalination is very energy intensive—where the supply of energy was going to come from to power both of those, and the increase in emissions and the effect on the environment of having two desalination plants?

Professor PITTOCK: Yes. My understanding of their research is that they costed into that the capital cost of both options, the operating cost of both options and the need to run the desal plants off renewable energy. What they point out in terms of water bills is that Sydneysiders are already paying extra for desalination plants, and that spread over the several decades they have modelled, it would not greatly increase the water bills. That is their conclusion.

The Hon. PENNY SHARPE: Thank you for coming in today. I want to ask a question about concerns about the modelling given climate change. Dr Keys, you mentioned in your opening statement that there is no doubt that the raising of the wall will help with smaller to medium flood events but that it will not deal with more severe ones. I am just wondering whether Associate Professor Croke, Dr Keys or Professor Pittock could comment on the modelling of the likelihood of more extreme weather events rather than lots of smaller events. We are heading into less water but when we get it we are going to get it in a very large way. I wonder if you could talk through your views about that and why you think that that is important in terms of consideration of the wall.

Dr KEYS: I am not a climate scientist but I am an enthusiastic user of the product of climate scientists. I think the standard answer of those who have looked at this with more expertise than me is that we will see, creepingly over a very long period of time—well beyond the lifetimes of those of us in the room, but perhaps already beginning—more severe, extreme floods, and we will see fewer non-extreme floods. That means fewer small floods and more big floods. That might mean—to put it in very simple and slightly misleading terms; I do not have a better way of doing this—that the 100-year flood of now might become the 50-year flood in a century or so, beyond our lifetimes. These things are very slow to occur.

For the moment, you can see a fair bit of evidence for climate change in the context of droughts and fires. I do not say that merely because of what we have going on around us right now. It is harder to see that in the empirical record of the last couple of hundred years for floods and, for that matter, cyclones and other forms of severe storms, like thunderstorms. So I think the standard answer is that the big floods—that means 1867 and bigger in the context of this valley—will slowly and steadily become more frequent, whereas small floods will become less so, which will make difficulties for water supply, for example, to take the case that Professor Pittock was referring to.

The Hon. PENNY SHARPE: Does Professor Pittock want to comment about that?

Professor PITTOCK: Associate Professor Croke is probably better qualified than me.

The Hon. PENNY SHARPE: We cannot see him. Associate Professor Croke?

The Hon. ADAM SEARLE: Talk to us about climate change.

The CHAIR: Professor Croke, can you hear us?

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Associate Professor CROKE: Only slightly. That question was about the probability of flood events in the future. I caught the sense of what Dr Keys said, which was that the probabilities would change, which is correct. It is location specific, so you would have to look into the particular scenarios for the Sydney area, but generally speaking probabilities will increase.

The CHAIR: I will just repeat the question. It specifically called out climate, and how climate may be changing the severity and timing of flood events.

Associate Professor CROKE: Yes. Certainly the probability of severe events will increase. I am not sure what you mean by the timing of—

The CHAIR: I meant the regularity, I guess.

The Hon. ADAM SEARLE: The frequency.

Associate Professor CROKE: Yes. The more severe events are predicted to become more regular, which basically means that the one-in-100-year flood becomes the one-in-90 or 80-year flood, depending on the magnitude of the effect, which means that the one-in-100-year flood would increase in volume.

Professor PITTOCK: If I could just add, Ms Sharpe, it is wonderful to see so many members of the public here in the audience. I did observe a t-shirt which said, "Dam it. Raise the dam and save us all." I would hate to disabuse members of the public, but no dam will save us in this valley. Any dam you build is likely to be insufficient at some point with a major flood. Any dam will eventually fill and spill. So relying solely on a dam to manage flood risk is a very flawed strategy.

The Hon. WES FANG: To that point, we heard earlier again from the Government that this is one of many steps. Roads and Maritime Services [RMS], for example, is already analysing and building a case for upgraded roads. The business cases have been funded.

The Hon. ADAM SEARLE: Nothing else is.

The Hon. PENNY SHARPE: It is a plan for a plan.

The Hon. WES FANG: There is a lot of work going on around this. This is not the only factor that the government is looking at. Would you agree that it is, of itself, amongst a suite of measures, quite an advantageous resource for the Government to use in mitigating flood?

Professor PITTOCK: I certainly agree with you that a suite of measures is required to reduce the risk, and I was pleased to hear the government officials talking about their commitment to a suite of measures. What I did not see in Infrastructure NSW's strategy was a commitment to fund those major flood evacuation routes. I guess what I heard from the evidence this morning was that some of the planning for minor road upgrades was being proposed. I do not see in the government documents plans for the major evacuation routes to be upgraded at this point in time.

The Hon. ADAM SEARLE: I want to pick up on something that Dr Keys said earlier in his opening address, and that is about the terminology that we use—the one in 100-year flood, the one in 500-year flood. Some of the submissions picked up this point. It gives a misleading perception, does it not, that these things are likely to only occur once a century or multiple centuries but, in fact, that is not a meaningful measurement of probability? Do we need to change the language and change the measure of probability that we use in this space?

Dr KEYS: Yes, but it is not that simple. People can understand the concept of 100 years or 1,000 years or two years or whatever. Once you start talking in terms of probabilities—and I have trouble with this myself—and you talk about a flood that has, say, a 0.3 per cent chance each year of occurring, that is not all that easy to get around. So, yes, the language is misleading. More accurate language is often quite difficult for people to come to grips with. But you are entirely right in saying that the so-called one in 100-year flood does not happen once every 100 years and it certainly does not mean that it is going to happen only in 100 years from now. If that were the case, none of us would be worried about it personally.

The one in 100-year flood has a 1 per cent chance each and every year of occurring at a particular location—call it Windsor, and that is where we are today. It could happen next week. It probably will not. The ground is extremely dry and would absorb an awful lot of rain. It could happen any time in that hundred years and more than once in 100 years and then not for 1,000 years. Everyone has heard the term, I expect, "nature does not like straight lines". It does not like evenness either. You can get three or four really bad floods in five or 10 years and then nothing for hundreds of years. The Hunter Valley is pretty well such a case—very bad flooding several times between 1949 and 1955. The 1955 flood was one of the great floods of Australian history. We have had nothing like that period for frequency of big floods or anything remotely approaching 1955 in the 60-odd

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years since then. It is very uneven. That is one of the reasons why terminology like the one in 100 is misleading, particularly out in the public domain.

The Hon. ADAM SEARLE: Particularly getting to what you call the levee paradox—the idea that you build a dam, you reduce the risk and politicians and maybe some developers start peddling the idea that the risk has been addressed. The use of "one in 100 years" feeds into that, does it not?

Dr KEYS: Sorry, I missed the last part.

The Hon. ADAM SEARLE: The use of the terminology "one in 100 years" or "one in 500 years" certainly feeds into the perpetration of that paradox.

Dr KEYS: It does a bit. Take the case of levees in New South Wales. You build a levee around Maitland or Lismore or Wee Waa or Wagga: It is almost impossible to avoid the conclusion in the community—I am talking about Joe and Joan Citizen—that the flood problem has been fixed. Some of these levees look quite big and yet five levees—I have been interested in this business for pretty well 30 years; I joined the SES in 1990—five towns in that 30-year period that have levees have had those levees overtopped with substantial damage resulting and, in some cases, deaths, because of that. Once you build a levee you create a psychology of immunity. That leads to all sorts of political pressures. I referred to them in the context of Brisbane and we will have the same thing here below Warragamba. It is almost impossible to see how you could avoid it. There will be intensified development—fine until the mitigation measure is exceeded. Professor Pittock made the point that, however big the dam, sooner or later it will get overtopped.

By the way, someone mentioned dam failure. I think it was Associate Professor Croke. That has, I think, largely been put to rest in New South Wales. We do have a dams safety committee. Thirty years ago that was a considerable fear in this valley. That is why the dam was built up five metres in the early 1990s and then an auxiliary spillway was put on in the late 1990s, maybe into the early part of this century. So I think dam failure is not something we should worry about. We should worry about natural events produced by extreme rainfalls which will be rare but which will happen. The fact that they are rare will be of no help when they happen. People will not be worrying about whether this was a 100-year flood or a 500-year flood. They will be worrying why hundreds of their friends and relatives got washed away.

The CHAIR: The Government has been adamant that the dam will change the mitigating effects of floods in the valley—it will change the one in 100-year planning level—and it will introduce some sort of planning control to prevent any building in that area of reduced flood risk, as they see it. In your submission you have given some examples where that has gone wrong. What confidence do you think the community can have in those sorts of planning controls?

Dr KEYS: Not a great deal. We are here for a long time. We are not talking about what is going to happen over the next year or two. We are talking about things that might happen over decades. I will give you another example from Queensland. It had to do with Wivenhoe. There have been two droughts in this century—the millennium drought, which was different in different areas but broadly lasted from just before 2000 to about 2009, and then the current drought that started in 2013. So in the last more or less 20 years we have had two big droughts and a period in the middle with a lot of flooding in New South Wales, Victoria and particularly in Queensland. During the millennium drought Jeff Seeney, who was, at the time, the leader of the newly merged Liberal and National parties in Queensland, argued—because of concerns about water supply from Wivenhoe dam for Brisbane—that the flood buffer should be used to store more water for water supply. In other words what you had in Wivenhoe's case: There is the full supply level for water supply for Brisbane and there is—that extra—the flood buffer, which is for mitigation. He was arguing that we should push that up, because we were worried about water supply, and compromise, in effect, the mitigation capacity of the dam.

Now how would that have looked in 2011 when they had a big flood and the mitigation capacity was not only used but exceeded? There are some questions about how effective the operation of the dam was, but I think that is a relatively small part of the picture. The dam did have some mitigation capacity and reduced the flood level below what would have occurred had there been no dam. Mr Seeney's proposal would have looked ludicrous because he would have compromised the mitigation capacity and worsened the flood. That is part of the psychology of it and that could happen here. We could have the same situation in Warragamba during a drought, and there are forecasts of more, longer and more intense droughts in the future than we have seen in the past. This is the nature of politics. That mitigation capacity that would be built in by the raising of the dam would sooner or later be used for water supply and then—this is Sod's law, is it not—you will get a big flood like 2011.

The CHAIR: I have one other question. Obviously by holding the water back in that airspace that the raising of the wall is designed to do to mitigate the floods, it must create a more prolonged flood downstream

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as that water is slowly released. It is something we have not talked too much about. Can you explain how that might impact on the nature of flooding in the Hawksbury Nepean?

Dr KEYS: I do not know that it is a serious problem. You would let the water out very slowly below the minor flood level to the extent you can as soon as the levels have gone down downstream. Yes, you would have a long period of a high river but you would be letting it out deliberately to keep the levels as low as possible. You would prolong a very small flood, possibly for weeks or months. I do not think that is a particularly important concern.

The CHAIR: In its submission the Government has made clear that it would only be for up to two weeks, I think. Is that feasible to release that amount of water in a two-week period? If you had water coming in from other catchment areas, that could—

Dr KEYS: I would not be the best person to answer that but I do not find that impossible to believe that that is the case they make. If it is right, two weeks of a high river is pretty inconsequential by comparison with the horrendous consequences we are talking about from big floods.

The Hon. WES FANG: We are almost out of time. This question is to all three members who are giving testimony today. For transparency, could you outline any membership of think tanks or political affiliations et cetera that you have?

Professor PITTOCK: Certainly. I am not a member of any political organisation. I am a member of the Wentworth Group of Concerned Scientists, a scientific NGO. I am also on the advisory board of a number of non-government environmental organisations, mainly WWF Australia and The Nature Conservancy Australia.

Dr KEYS: I am in the blessed position of retirement. I am intensely interested in politics and current affairs but I have never belonged to a political party. I have no pecuniary or any other interests in being in this process. I am in it because I am concerned at what I regard as a self-defeating policy which, in due course, possibly including the current or soon-to-be-current residents of this valley, will have horrendous consequences.

The CHAIR: Professor Croke, did you hear that question?

Associate Professor CROKE: Yes, concerning the likelihood of being able to release that much water in two weeks.

The CHAIR: I am happy for you to answer that, but the subsequent question was just if you could provide any information about any organisations, political organisations or associations you have that might have a bearing on your answer.

Associate Professor CROKE: No, no real association. My only one is with the SES.

The CHAIR: Okay, thank you. But if you did have an answer to that previous question about prolonging the flood, we are happy to receive that.

Associate Professor CROKE: Certainly the dam can be engineered to release that water in a one-week to two-week time frame. The question is what the impact will be on the downstream communities at that rate of release. Basically, the operation of the dam would be to delay the onset of the peak and reduce the magnitude, hopefully, of that. But it would increase the duration of the flood. That is the effect of pretty well all dams. It is just going to be a question of how much longer the flood will exist and that is a question of how the dam is designed to release that water.

The CHAIR: So it has more to do with the operational rules and probably has more of an upstream impact than a downstream impact, potentially?

Associate Professor CROKE: It will not really have an upstream impact, because it only affects the lake itself upstream. The impact will be on the flow of water down from the dam.

The CHAIR: Okay, thank you.

The Hon. ADAM SEARLE: We had representatives of the Government here talking about how they propose to control development in the flood area by putting additional considerations and various restrictions on decision-makers. Is that going to be adequate to mitigate the risk to property and lives? What are the appropriate development controls?

Dr KEYS: Are you asking me?

The Hon. ADAM SEARLE: Either of you, because I think you both touched on it in your opening submissions and your written submissions as well.

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Dr KEYS: In the end, nothing is adequate. All we can do would be to palliate the effects of extreme floods. That is worth doing, but it will not solve the problem, particularly if we persist in increasing the problem by putting more people, more business and more industry into the flood plain. That appears to have been the policy of governments on both sides of the political spectrum in this State for the last several decades. We have been building the problem on this flood plain way worse than any other flood plain in New South Wales. Some of the other flood plains have basically been depopulated in the more rural areas, or they have put levees around towns—like Maitland, for example, on the Hunter.

In this valley, because it is on the edge of Sydney—our biggest city and very rapidly growing, and I saw over the weekend a suggestion that Sydney's population in I think 17 years could be 6.5 million, as distinct from the 5 million it is now. I find it difficult to see how that is a better Sydney. That goes back, of course, to immigration, which I know is not a State Government responsibility. If I were the immigration Minister in Canberra I would be thinking of a much lower level of immigration than we have now and that would take pressure off areas like the one we are talking about.

Professor PITTOCK: There will always be a residual risk. What I find disappointing is the New South Wales Government's reliance on the one in 100-year flood return interval as the basis of a planning standard. Any planning standard like that to some degree is a value judgement about what level of risk you are willing to wear. It is worth understanding where that number came from. It was an actuarial standard adopted by the United States for its national flood insurance program. It has no particular basis in physical science. The United States has moved to a one in 500-year interval for trying to manage floods.

The Netherlands, in somewhat similar circumstances for its riverside areas, has a one in 1,250-year flood return planning interval. It has invested considerably in returning the flood plain to some of the better, more appropriate land uses like agriculture and nature conservation and refocused its development in higher lands. While there remain 5,000 houses in this valley below the one in 100-year flood return interval and 13,000 houses below the one in 500-year return interval, there will always be a very high risk in this valley.

The Hon. WES FANG: Dr Keys, I asked you earlier if you were a member of any organisations, groups or think tanks et cetera. On the Give A Dam website there is a Dr Chas Keys listed in the media contacts. Is that you?

Dr KEYS: I imagine it is. I did not put that there. I know an individual who belongs to that organisation, as I know individuals, at least—

The Hon. WES FANG: It lists your mobile phone number.

Dr KEYS: —one of whom is in this room, who belong to "Dam It".

The Hon. WES FANG: It lists your mobile phone number.

Dr KEYS: Does it? I was not aware of that.

The CHAIR: Is that on a media release, Mr Fang?

Dr KEYS: It does not make me a member.

The Hon. ADAM SEARLE: Just while we are waiting for that—

The CHAIR: Just for the benefit of members, we are having a working afternoon tea, so this is scheduled to go until 3.00 p.m.

The Hon. ADAM SEARLE: Just in relation to further development on the plain, I live in the Blue Mountains where there is an ever-present risk of bushfire. We have got a situation now where mapping by the Rural Fire Service has essentially determined areas where you simply cannot undertake future development. Obviously that was not always the case. There are now some dwellings in places where you would not build today. Is that the kind of approach that you see should be taken to development on the flood plain: Setting an appropriate benchmark and only allowing development to that benchmark?

Professor PITTOCK: Yes, exactly.

Dr KEYS: I would agree with that. It used to be that the 1 per cent, so-called one in 100-year flood line relative to the Windsor gauge was 16 metres. It is possibly why McGraths Hill was built the way it is: very low. That was raised to 17.3 metres, I think in the early 1990s, which meant that you could not build as low as had been permissible before. I have already said that I am not particularly keen on the statistical measures in some strange way trying to define risk. I would use the 1867 flood—for one thing, it happened. For a flood that was that long ago we have got pretty good records of it. In using that to set floor levels, that would stop a lot of the developments currently planned.

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Now, that would be politically difficult for the Government. There are a lot of people who have been banking land—development interests, banks, construction interests, insurance interests—who want to see more development on the flood plain. My concern is that is adding risk and adding vulnerability, where we should be going the other way. For floor levels, I would be using the 19 metres-plus of 1867, recognising that even that is not enough to satisfy a purist's position, which would be no development on the flood plain—but I think that is just politically impossible and I would not argue for it. But I would make it harder for floods to get to than the rules we currently have.

The CHAIR: Professor Pittock, it is interesting that you mention the one in 100-year planning level is related to an actuarial—the insurance industry has come up with a way of mitigating its financial risk, primarily. I asked the Government before about its statement in its submission that raising the dam would reduce flood damages by 75 per cent on an annual average basis. We asked some questions to try to get to the bottom of how that figure was arrived at; I am not sure anyone quite understood exactly what that meant. However, it seems that is an insurance approach as well, the annual average basis. Are you able to comment on that claim and how that might stack up in terms of flood planning and understanding the mitigative effect of the dam raising?

Professor PITTOCK: I think, as Dr Keys mentioned, raising the dam would reduce the flood return interval for some kinds of floods in some years. I did not fully understand Infrastructure NSW's calculations. I would have thought that given the high flood risk from some of the key tributaries like South Creek, a more fine-scale approach and a more sensible approach to managing flood risk would have looked at calculating that tributary river by tributary river, as well as overall, to better understand the residual risk after any raising of the dam wall or any lowering of the full supply level to provide airspace for flood capture for the upper catchment.

Dr KEYS: I agree with that. I think what Infrastructure NSW is talking about with that 75 per cent is that is the mitigation benefit against the smaller medium-sized and, let us say, smaller big floods. The difficulty is the really big ones—the 1867s and worse—which, while rare—and we could all play Russian roulette with this and say, "It is unlikely that I will be affected by it in the next three years", and it is, and a government might say, given we are a four-year Parliament in New South Wales, "My decisions over the next four years—I am not going to be found out." Sooner or later, a generation will be caught by a very big flood and those figures like the 75 per cent reduction in average annual damage, while probably perfectly reasonable assessments based on reasonable methodologies tested internationally, will look ridiculously inadequate when there is a big flood and a whole lot of people are washed away.

The CHAIR: Do you think it gives a false sense of security to suggest to the community that flood costs will be reduced by 75 per cent?

Dr KEYS: Yes, all of this does. It looks very good. There is a sense in which it is entirely true, and yet every now and again it will be made to look ridiculous by nature.

The CHAIR: Are there any further questions? Thank you very much for the evidence that you have given to us today. I appreciate your time here. The Committee has agreed for answers for any questions taken on notice to be provided within 21 days. If there are any questions from Committee members, the secretariat will provide them to you. Thank you very much for your time.

(The witnesses withdrew.)

(Short adjournment)

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NICK RIGBY, Environment Manager, City of Blue Mountains, affirmed and examined

ANDREW KEARNS, Manager Strategic Planning, Hawkesbury City Council, affirmed and examined

BARRY CALVERT, Mayor, Hawkesbury City Council, affirmed and examined

WAYNE MITCHELL, Director—Development and Regulatory Services, Penrith City Council, affirmed and examined

ALEXANDRA STENGL, Manager Environment Outcomes, Wollondilly Shire Council, affirmed and examined

MATT GOULD, Councillor, Wollondilly Shire Council, affirmed and examined

MARK GREENHILL, Mayor, City of Blue Mountains, before the Committee via teleconference, sworn and examined

The CHAIR: We have more than one representative from the same council. If one person from each council could make a short opening statement to start the hearing it would be appreciated.

Mr RIGBY: I understand the mayor, Councillor Greenhill, will be making the opening statement.

The CHAIR: We will start with Councillor Greenhill then.

Mr GREENHILL: Thank you for allowing us this opportunity. Obviously our interest in this area very much relates to the fact that Blue Mountains City Council is located within the Greater Blue Mountains World Heritage Area. We are also a party to an Indigenous land use agreement with the Gundungurra peoples. Those two things are obviously paramount in my thinking and in our council's thinking behind its submission. Very briefly, and I will break my submission to you down into a couple of parts, one relates to Aboriginal cultural values and native title, then I will deal quickly with World Heritage, economic and ecological values.

Obviously Gundungurra traditional owners have advised us and we have consulted with them that the area for them is one that is incredibly important. It is culturally deeply significant. Inundation of areas, including the Coxs and Wollondilly rivers around the Burragorang, would mean inundation of highly significant parts of their country. For them—and we have made this point in the submission—country is the living embodiment of significant creation stories around the formation of the landscape and this is of great cultural significance. As I say, we have consulted with traditional owners and this is the strong message that they have given us. Our view, and we accept their view, is that raising the dam wall and any resultant predicted floods that may occur, would pose a serious risk and indeed an irreparable threat to very important, both tangible and intangible, Aboriginal cultural values in Gundungurra country.

Our initial consultation with traditional owners was not encouraging. Traditional owners have been clear with us that they were concerned about the resources afforded to them as part of the Aboriginal cultural values consultation that occurred. The draft document—which I believe was entitled the *Aboriginal Cultural Heritage Assessment Report*—was described by traditional owners in the conversations we had with them as hard for them to follow and inadequate in some places. We would say on their submission that the survey—this is on their submission to us—attached to a small proportion, about 26 per cent, of the total area impacted. Traditional owners have also given us the view that they are concerned about being given only 40 days to respond to a large and complex report that I am advised numbered about 2,000 pages. Our strong view is that the Government would be well served to restart that process and undertake a far more complete cultural assessment of the views of traditional owners.

In relation to native title, both the Blue Mountains City Council and the New South Wales Government are party to the Gundungurra Indigenous Land Use Agreement [ILUA], which was established under the Native Title Act 1993. The area proposed to be inundated is touched upon by this agreement. It is our respectful submission that any action by the Government in this matter would need to be cognisant of the terms of the ILUA. It is our further submission that what is proposed would have the significant potential of meeting the definition of what is known as a "future act" under the Native Title Act and that it may pose a significant potential as an extinguishment event under the Act. Our strong submission in that space is that the matter should be dealt with as a class 1 post-registration act under the ILUA and this would require actions under the ILUA and in accordance with the Native Title Act. We also note that the Government is yet to commence or is in the very early stages of commencing negotiations under the Native Title Act and obviously in that space we would urge caution and draw the Government's attention to recent High Court findings in relation to Timber Creek in the Northern Territory. That is contained in our submission and I do not need to go into it in detail.

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To close out, in relation to the World Heritage area and the ecological values of the Greater Blue Mountains National Park, it is our further submission that we are somewhat constrained in that we are unable to provide detailed comment on the impact of the proposal and the ecological values of the Greater Blue Mountains National Park as this component of the environmental impact assessment [EIA] process is yet to be completed and on my advice released. However, taking that into account, just a couple of general comments. We have great concerns regarding the integrity of the environmental impact assessment process being conducted at this time. It is our understanding that the intent of that process is to assess environmental impacts of a project to determine whether it should proceed, or proceed in a modified way, or not proceed at all based on what comes of that assessment. It is my understanding that in a sense we are in a pre-empted circumstance, and that is that the outcomes of the EIA process are subject to pre-emption.

I guess this is most clear in the passing of the Water NSW Amendment (Warragamba Dam) Bill 2018, which has on our submission the effect of actually amending the relevant legislation to the National Parks and Wildlife Act 1974, in that that new piece of legislation could, by its operation, allow for the temporary flooding of parts of the World Heritage listed Greater Blue Mountains National Park. Our submission, based on that, is that the passing of such a significant piece of legislation should really have been informed by the EIA process. It should not be enacted before that EIA process is completed or, indeed, significantly commenced. This view was reflected in statements that emanated from the UNESCO World Heritage Committee and, as the Committee would know, it has requested that the Government submits its environmental impact statement for review by that committee before any final decision is reached. UNESCO's World Heritage Committee has clearly stated that the raising of the dam wall and its impact on 1,300 hectares of world heritage area, to quote the committee, is likely to have an impact on the outstanding universal value, which is a term contained in the declaration of the Blue Mountains. Obviously that is worrying to us.

In our experience with the World Heritage Committee and other proposals it is often quite guarded. Our respectful submission is that their language on this occasion is not guarded. They say that, "Inundation of areas within the property resulting from the raising of the dam wall are likely to have an impact on the outstanding universal value of the property, being a world heritage area." It is our respectful submission that there are significant administrative issues with proceeding any further. They relate to Aboriginal cultural values, which are not administrative, but native title matters are, and also those matters that relate to whether or not the legislation has come early, whether or not it should have been informed by the EIA and whether or not any actions from this point could impact the universal values, noting that the strong language that has emanated from the World Heritage Committee of UNESCO and its request to see the environmental impact statement should be of concern.

I will finish by saying this: I do not think any of us wants to be in our positions and be responsible for the delisting of the Greater Blue Mountains World Heritage Area. That would be something none of us would want to see having occur on our watch. I think that is something that could bring unwanted global attention to us and we should be incredibly concerned about that. I will finish there. I thank the Committee very deeply for the opportunity to present to you today. I apologise to the Committee for not being there in person.

Mr KEARNS: Thank you very much for the opportunity today. I want to highlight that the current Hawkesbury City Council position in terms of the views of the raising of the Warragamba Dam wall is that we wait until the environmental impact statement is completed before we adopt a final and informed position. The completion of the environmental impact statement is essential.

In this regard the environmental impact statement should consider: the height of the dam wall in the context of downstream flood mitigation and upstream environmental or cultural considerations; transparently balance flood mitigation against consideration of property development on flood prone land on the Hawkesbury-Nepean flood plain; consider all information provided by the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organisation in relation to the project; consider in appropriate detail world heritage considerations, Aboriginal cultural heritage, the ecological values of the Blue Mountains National Park, the views of all relevant stakeholders, including traditional owners, the Warragamba community and communities of the Hawkesbury-Nepean flood plain; examine alternative options for flood management; identify and consider international best practice standards; and avoid premature decisions prior to the availability of all relevant information and data.

Mr GOULD: Thank you for having us. There are a huge number of issues with the proposed raising of Warragamba Dam and Wollondilly will bear the brunt of them. The environmental impacts and destruction of Indigenous heritage in the Burratorang Valley are undoubtedly some of the most significant. Whilst I could speak on these issues at length, they have already been strongly addressed by my colleague from the Blue Mountains. I would like to bring to the attention of the Committee some of the other significant impacts this proposal will have, specifically on the towns and villages in Wollondilly. Warragamba is the village that secured Sydney's water

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supply and its rich and unique history is inextricably linked to that of Warragamba Dam. From its inception, Warragamba was purpose built as a workers' village by the Sydney Water Board for the construction of the dam.

It was intended that they would demolish it when the dam was completed. However, by the time the dam was finished such a strong community had formed that the workers and their families refused to leave and eventually the Water Board relented and sold the village to its residents. Warragamba village has remained essentially unchanged from its origins to this day and a significant portion of the community is still either dam builders or their descendants. Warragamba has always relied very heavily on tourism. Visitors to the dam are a key driver of the village's economy. I saw firsthand the devastation that was caused when the dam was closed for the construction of the auxiliary spillway. The tourists stopped coming and the village was brought to its knees, with almost three quarters of the shops being vacant at one point.

It is now 20 years later and it is only in the last couple of years that the tourists have come back and the village has started to fully recover. If the dam raising goes ahead not only will Warragamba's economy be brought to its knees again, but it might finally do what the Water Board intended all those years ago and fully destroy it. In addition to the economic impacts that the dam raising would have on Warragamba, the construction impacts on Wollondilly more widely would also be significant. It would include noise, dust, health and liveability impacts. There will certainly be major impacts on Warragamba, Silverdale and access to Yerranderie. Based on the available information there is potential for significant impacts on Wallacia, Werombi, Orangeville, The Oaks, Picton, Tahmoor and Thirlmere.

To highlight just one of these issues, road access to Warragamba Dam requires travel on Silverdale Road, which is a single-lane road that in various places is narrow, windy and steep. In its current state it is wholly unsuited to the type of high-volume heavy vehicle movements which would be necessitated by a project such as the dam raising. It already has a reputation for bad accidents, which would certainly not be improved by the addition of thousands of truck movements. As it is now, six people I went to school with have died on that road. I would also like to make very clear that I am acutely aware of the dangers posed by flood risks in the Hawkesbury-Nepean Valley. I worked in emergency services for over a decade and parts of Wollondilly at Wallacia can suffer from the deepest flooding in the entire Hawkesbury-Nepean system.

These risks undoubtedly need to be managed, but raising Warragamba Dam is not the solution given the impacts it would have, particularly when, by the Government's own admission, up to two-thirds of floodwaters in the Hawkesbury-Nepean can come from tributaries other than the Warragamba River. A number of alternative solutions to mitigating the flood risk have not been fully considered. From our dealings with the proposal to date it unfortunately appears that all too often the EIS process is being used as a tool to justify the project, rather than the EIS being used to objectively and thoroughly assess the benefits and impacts and impartially judge the project on its merits.

The CHAIR: For the benefit of the witnesses and members, so far today we have focused on downstream impacts, particularly flood risk, but I know that the various council areas have different issues with the proposal or questions about the proposal. I invite members to broaden their questions to both upstream and downstream in local community impacts as well.

The Hon. PENNY SHARPE: I think this is mainly a question for Hawkesbury council, though anyone else can jump in if they feel they need to. I am very interested in the council's involvement in design around local roads that would need to be dealt with to help with the evacuation risk. I do not know if you were here earlier this afternoon, but the Government essentially said that there are around 46 or 47 local roads projects that are needed immediately, regardless of whether the dam wall is raised or not, just to assist with the current evacuation plans. Are any of you able to comment on that?

Mr KEARNS: Yes, I can comment. Our officers have been working with Roads and Maritime Services in particular and Infrastructure NSW in what is one of the key elements of the Hawkesbury flood strategy in terms of the flood evacuation routes and the upgrading of those. We have been working with RMS in terms of the various projects and identifying the priorities in terms of that. That is an ongoing process.

The Hon. PENNY SHARPE: Are you doing some rough costings in relation to that as part of that process?

Mr KEARNS: RMS have been doing the costings, yes.

The Hon. PENNY SHARPE: Given that there is no money allocated to it, is there an expectation that council will have to fund some of this work, or will the State Government be doing it?

Mr KEARNS: Our understanding is that the State would be funding it.

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Mr CALVERT: Can I just add to the answer? Providing the roads is not necessarily the answer. We have done a survey which tells us that only about 18 per cent of people in the Hawkesbury area are aware that they are living in a flood danger zone. So even if you provide the roads, people are not necessarily going to be able to use them unless we have a comprehensive package of training and education so that people know when to evacuate and how to evacuate. So yes we need roads but we also need a comprehensive education system on how to use them and when to use them.

The Hon. PENNY SHARPE: Does anybody else wish to comment?

Mr MITCHELL: Yes, I would like to comment. I was going to raise it in my opening statement. Our submission from Penrith City Council—

The CHAIR: Apologies, Mr Mitchell. Feel free to make an opening statement.

The Hon. PENNY SHARPE: Use this time to make your opening statement and then you can address my question. How about that, Mr Mitchell?

Mr MITCHELL: Penrith is an important strategic centre and the closest major centre to the new Western Sydney Airport. We currently service a regional catchment of over one million people. Our population is currently around 210,000 and is expected to grow to 260,000 by 2031. Given our location as a river city in the Hawkesbury-Nepean Valley, we have long acknowledged and been mindful of the significant flood risk to our community. We understand the unique characteristics of the catchment that make it one of the most at risk in the State in the event of major floods.

For example, a probable maximum flood level in Penrith city centre is around six metres higher than the current 1 per cent plus half a metre freeboard that is used for planning purposes. The SES has estimated that potentially 90,000 people in the valley would need to be evacuated in the event of a flood equivalent to the 1867 flood. Many of those would be our residents in Penrith. We also know from the SES that there will be insufficient warning time to be able to evacuate that number of people. So many of our residents in Penrith could be at significant risk in an event of that nature. That is compounded by the fact that many people from the Hawkesbury and areas to the north of Penrith have to evacuate these areas through heavily congested roads through the Penrith area. If evacuation routes in Hawkesbury are cut very early, this would force everyone north along the Northern Road, the Castlereagh Road into Penrith to get to the M4 and evacuation centres.

Our submission does not provide any opinion on the potential merits or otherwise of Warragamba Dam. Our council has received several briefings from Infrastructure NSW throughout the development of the strategy and work on the Warragamba Dam and has formally resolved to wait until the Environmental Impact Statement is released and assessed before a position is made. Our council does, however, have an interest in the terms of reference 1 e and 1 f. Particularly concern into the investigations of alternate options that did not consider the benefits of new road infrastructure year-round on the road network but purely on the ability to minimise the costs of flood damage.

We have long been advocating for the delivery of the Castlereagh Freeway, a corridor for which has been earmarked since 1951. A first stage of that motorway project could provide a flood free connection from the Londonderry area to the M7 motorway. We believe that this would form an important flood evacuation route as well as a daily transport connection for our community and those in the Hawkesbury, providing access to the motorway infrastructure and other networks. We understand that even if the dam wall was raised, our residents will still need to be evacuated in major events and that delays could cost lives in the worst-case scenarios. We believe that if the Castlereagh Connection is built it could provide a safe, swift evacuation route for tens of thousands of residents in Penrith and the Hawkesbury, particularly those north of Penrith.

The CHAIR: Thank you Mr Mitchell and my apologies again for missing Penrith in opening remarks. Are there any other questions?

The Hon. PENNY SHARPE: The Castlereagh Corridor is obviously a much bigger regional project as opposed to local roads. Is there separate work going on around local hotspots in relation to flooding as well?

Mr MITCHELL: Yes, there are many local roads that need to be upgraded as well and, similar to Hawkesbury, we have participated in discussions and working groups with RMS to understand that. We have not been told the costs of those but they would have significant benefit to Penrith residents.

The Hon. PENNY SHARPE: It is my understanding that in the past—and I apologise as I do not know the time frame—there has been previously identified 200 local projects that would assist with evacuation. They are local road projects but only around 50 of them have been funded. Is that something that your council has participated in?

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Mr MITCHELL: We made submissions to the work from the Resilient Communities on Hawkesbury. There were around 200 projects. We made a number of suggestions. Some of those were considered, some were not, but it was based on a cost estimate and a cost benefit analysis that RMS were doing.

The Hon. PENNY SHARPE: I am interested in the ability of your councils—and I suspect you may have slightly different approaches—to limit development in areas you are concerned about on the flood plain. Obviously there are the usual planning instruments but would you like to have more power to stop some of that? How is that interaction between the State and local council going around managing risk on the flood plain, particularly development on the flood plain?

Mr KEARNS: Obviously we have a number of existing concerns in terms of regional flood evacuations, just in terms of the existing population. So obviously there are concerns in terms of increasing population within the flood plain. Our current planning provisions are essentially around the flood plain levels—the one in 100—we have essentially been indicating to people over the last three and a half to four years, that they are looking at development below the Probable Maximum Flood. If they are looking at increasing residential densities and rezonings above what is currently permitted then there are some serious issues to address and we would encourage those people not to apply for additional residential densities.

The Hon. PENNY SHARPE: Can I just clarify that? Your council is being approached to rezone land within the flood zone while all of this work is going on looking at managing risk to life and property into the future. But you have no ability to stop those applications for rezoning going ahead, do you?

Mr KEARNS: We do. There is the planning proposal process involving council's consideration of that. There is the local planning panel consideration of that and then obviously the Gateway determination part of that. So there is a process to manage that. Our advice to people looking at proposals is not to consider anything that increases residential densities within the flood plain.

The Hon. ADAM SEARLE: How many applications or approaches have you received? What is the scale of the density that is being sought to be increased to?

Mr KEARNS: In the last three or four years, we have probably had less than 10 approaches to be honest with you. Some of them are for relatively small increases. Some were for larger subdivisions of green field-type development of 1,000-type lots.

The Hon. ADAM SEARLE: That is quite big.

Mr KEARNS: For Hawkesbury that is.

The CHAIR: Mr Mitchell, are you having the same experiences in Penrith?

Mr MITCHELL: Yes, we regularly get approached about development in the flood plain. I would say that the Gateway process and the work through State agencies is quite strictly applied in flood planning policy. It would be very hard to rezone land in the flood plain. Having said that though I do believe the current flood plain manual, which is the guide for local government, is long overdue for review. It is written in a way that can be open to interpretation and certainly could be written in a much more formalised way, similar to bushfire planning guidelines. I understand that is a recommendation that has come out of the strategy, for that document to be rewritten.

The Hon. ADAM SEARLE: When was the last time that document was reviewed to your knowledge?

Mr MITCHELL: I believe it was the mid 2000s.

The Hon. WES FANG: Mr Mitchell, a lot of the Opposition and the opponents to this project have stated that part of the conspiracy theory behind increasing the size of the wall is that we will see relaxation of the development restrictions but your testimony just then was that you have not seen anything to that effect. Is that right?

Mr MITCHELL: That is right, yes.

The Hon. ROD ROBERTS: Just a question to Councillor Gould: You spoke earlier in your submission in relation to the damaging effects to Warragamba village that the spillway construction had. How long did that affect the village for?

Mr GOULD: It has really only been in the past two or three years that Warragamba has got back on its feet. If you look back five years ago, three-quarters of the shops in the village were unoccupied. As I said in my opening statement, Warragamba has always been dependent on tourism. When the auxiliary spillway was built there was no reason for the tourists to come so they stopped coming. That was certainly not helped by the bushfires that came through in 2001, which did a fair bit of damage to a lot of our infrastructure. When the dam precinct

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was reopened, it was much more restricted access and the tourists did not come. By that point, most of the shops had shut down because there was not enough business and for many years we were stuck in this chicken and egg arrangement where the tourists that did come to the dam would not come into town because there was nothing for them and the shop owners could not invest in and start a shop because the tourists did not come into town.

Over the past few years, council has put a lot of money into trying to rejuvenate the local economy. We have put in recreational vehicle campgrounds, we have just invested \$1.4 million in some playgrounds and we have been working quite closely with WaterNSW to try to increase the linkages between the dam precinct and Warragamba. Over the past couple of years that has started to show some benefits. Certainly, it is still nothing like it was when I was a child and what it was before the auxiliary spillway came in. If we were to go through that again, I really wonder whether Warragamba would get back on its feet because it has taken 20 years to fix what was broke last time.

The Hon. ROD ROBERTS: From your answer and just for clarity, it appears as though the bulk of the economy in Warragamba—if I can use that expression—revolves around tourism?

Mr GOULD: Correct.

The Hon. WES FANG: Councillor Gould, in that instance, have you done any modelling on the number of jobs that an investment in raising the wall would bring to the Warragamba township itself?

Mr GOULD: Not specifically. However, if we look at the auxiliary spillway work, there was a similar argument made that we would offset the tourism loss by construction workers and things coming into town. Our experience previously was that was not the case in any sizable quantity. Those that did come were after a different sort of product—construction workers are not particularly interested in gift shops, for instance. What we found last time was that it did not bide over until the dam precinct was reopened and what we are potentially looking at with the dam raising is a much longer closure than was required for the auxiliary spillway.

The Hon. WES FANG: In the previous answer you just gave, you cited a number of reasons why tourism might have dropped off—there was the bushfire issue, the greater restrictions around the wall itself and being able to visit the wall and obviously that was a result of the increased security, given the times we live in. Certainly, I would think that a large economic driver such as the construction of a 14 metre increase in the size of the dam wall should, if a responsive council would be able to gear a town to provide the needs of the people that were there—for example, not having gift shops but providing the services and accommodation facilities that those construction workers might want—be a huge economic driver for that town, could it not?

Mr GOULD: It could, potentially. But as I said, previous experience has shown that they did not come into the village in any large capacity. We would certainly be keen to leverage that if we could, but the broader impact is quite significant.

The Hon. WES FANG: Would it not be the responsibility of a strong council to seize the opportunity that presents itself—having a major construction project a stone's throw away from a township that was initially built off the back of the construction of the first project?

Mr GOULD: Look, we would certainly be advocating for that. Although, what this project is now, is quite different to when the dam was built. When the dam was built the whole town was built and everybody lived there—they lived on site. That is what made the village and made it be there. With the construction projects now, they come, they work and they go home. We may get some lunchtime business, we may get a little bit of the benefit but, as I said, our experiences of when this has happened previously strongly suggest that it is not going to offset the damage that would be done from the loss of tourism.

The CHAIR: Councillor Calvert or Mr Kearns, we took a tour around and saw some of the signage that is in place for the evacuation routes and we also saw one of the advertisement billboards that is currently up in your council area, warning people of flood risk. How much involvement have you had with Infrastructure NSW or the SES in designing the communication strategy around that advertising and ensuring that the community is aware of the evacuation routes and the signage and how all that works?

Mr KEARNS: I am certainly aware of the advertising campaign. I would not necessarily say that we actively participated in terms of the actual design of the material but we were certainly made aware of all the material that was prepared and all the collateral timings and so forth. Sorry, the other part was in terms of?

The CHAIR: It was about the signage, the evacuation routes and how all that is working.

Mr KEARNS: Yes. RMS consulted us in terms of the evacuation signage routes before they were installed to advise us that they were going into place. It advised us that they are in place now and we provided

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feedback on a number of signs that we feel may need a bit of attention in terms of the direction they are currently pointing. We are waiting for further feedback in terms of that.

The CHAIR: Councillor Calvert, you mentioned that there was a low level understanding about drought risk—

Mr CALVERT: Flood risk.

The CHAIR: —flood risk, sorry—in your area. Do you think that this advertising campaign will shift that? How often do you have these sorts of advertising campaigns?

Mr CALVERT: We have a flood risk management committee that addresses that issue and does it very well. Our problem is that there has not been a major flood for such a long time that people have moved here, grown up and had families and never experienced the big floods, so there is a lot of complacency. Hanging up signs might be one thing but if you talk to people you find that they do not believe that they live in a flood area, especially if they live in a place that is above the one in 100 limit. They think that living above one in 100 gives them protection. They think that the water will magically stop at the one in 100 but if you get a big flood that is not the way that it will be. There is a general sense of complacency amongst many of the population and so I think we need much more than just signage—we need to be able to get out there and have public meetings and inform the public with visual aids, if possible, of what the floods would look like. We had a series of town meetings earlier this year and we put up visual information about the previous floods we had in the 1980s. People were shocked to see how far the water came up. They were amazed at the areas where it went to because they did not think it was going to be that bad.

So, yes, there is a whole process we need to go through and we are working on that. In terms of complacency, the other thing is that there are many people who think that if the dam wall is raised then we will all be saved. There is a complacency built into that proposal as well. I am afraid that if it goes ahead, it will add to the current complacency, rather than detract from it. We need to look at the whole population, we need to look at the new people who have moved in in the past 20 years and address them and talk to them and give them the information. Public opinion in the Hawkesbury about the proposal to raise the dam wall is actually quite divided. There are old-timers who have been around for a long time and have seen floods and say that raising the dam wall is the answer. But there are many people like me who see raising the dam wall as a very simplistic answer to a very complicated question. This base in here gets flooded from numerous rivers, including the Macdonald, the Colo and the Grose rivers. Putting a dam on one of those rivers is not necessarily going to save people's lives. It may reduce flood to some extent and that is why we are waiting on the EIS to see exactly how it will function.

What this council has been saying over the years is that we want the people in the Hawkesbury to be protected against future floods. Raising the dam wall may do that but we would like to see a complex, integrated system that attacks flooding on all levels, including flood mitigation measures such as levy banks and finding ways for the water to escape at the other end of the basin that we live in—those sort of things. All of those sorts of things need to be addressed. I am personally concerned that raising the dam wall will mean it will shut debate down on the whole issue; people will be relaxed and say, "It's all over now. We've raised the dam wall. You can relax." That will be a very dangerous position for us to be in.

The CHAIR: Just in regards to that advertising and community awareness raising, do you think that has been a good use of money or would you have preferred it to go into those community meetings and a more intensive and direct form of community engagement on these issues?

Mr CALVERT: I think we need to do both and I think over the last 10 years when we discussed these solutions it is always the cost or the expense that comes up as the number one criterion and I do not think that should be the number one criterion. I think the number one factor should be how effective it is in saving people's lives and if it is expensive, it is expensive. We need to address this issue. We need to address it big time because there are many more people looking to move into this area and they will be very complacent and very relaxed and we need to make them aware as soon as we can.

The Hon. WES FANG: Councillor Calvert, we heard testimony from the Government today that in effect we can walk and chew gum at the same time so the raising of the dam wall would be one of a suite of measures. They are funding business cases at the moment for evacuation routes, et cetera. Would you agree that any measure that could buy time for evacuation would add value to your council?

Mr CALVERT: I would agree that that is true but I am yet to be convinced that raising the dam wall at Warragamba will actually do that and there are a couple of factors there because, as I said, there have been floods in this area where the water has not actually come over the top of Warragamba Dam.

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The Hon. WES FANG: I understand that but certainly you must recognise that when Warragamba Dam has an increased airspace to absorb inflows that would normally have spilled over the dam, that is going to buy your council in particular extra time to evacuate persons who live in the path of any floodwaters that may come down?

Mr CALVERT: As I said, it really depends. If the water is coming over the top of the dam that may translate to a big flood here or it may not. You really need to look at the whole basin in its entirety and look at the whole system working together. Our council at this moment does not have a position on raising the dam wall. Its position is to wait for the environmental impact statement so I cannot directly answer your question because our council's position is not stated at this point.

The Hon. PENNY SHARPE: I have two quick questions that are actually for Blue Mountains council and focus on native title holders and the Gundungurra people. Mr Rigby, obviously the World Heritage listing of Blue Mountains National Park is incredibly important for your council area in relation to economic activity. Has council done any work on the economic worth of the World Heritage status? I know some economic worth has been done around the impact of national parks and World Heritage listings. If you do not know now I am happy for you to take this question on notice.

Mr RIGBY: I will take it on notice but I would make the statement that the World Heritage listing is an immensely powerful brand for the Blue Mountains. You are probably aware that we have seen an enormous increase in visitation over the last couple of years. Anecdotally the World Heritage branding is a very strong element in that increase in visitation.

The Hon. PENNY SHARPE: This might be for you, Councillor Greenhill. We went out with the Gundungurra people earlier last week and they showed us some of the sites. What I am particularly interested in is whether you can speak to the Committee about the Indigenous Land Use Agreement and why it could have an impact on native title?

Mr GREENHILL: I think I heard the question and if my answer does not address it, perhaps whilst speaking this phone could be slid closer to the member and I thank you for the question. Just to preface it, we have consulted extensively with Gundungurra elders regarding the proposal to inundate the area in question and our understanding from them is that the area is of deeply significant cultural importance to them. In relation to the land use agreement, I guess in our submission we draw the inquiry's attention to the ILUA that we and the Government have signed. The Government is a party—in particular, to part 14, which is the alternative regime.

Our view, as a council, is that the State Government is obliged to consider and to demonstrate how it has considered—both to consider and demonstrate how it has considered whether the proposed inundation is in fact a class one post-registration act under clauses 14 (3), 14 (4) and 14 (5) of the ILUA. It is our view that there is a high likelihood that the proposed action would in fact result in the extinguishment of native title. That is our submission. Our submission is that it is our view that this is a highly likely thing and as such we say there is no leave to carry out the act other than through dealing with the native title interests through the relevant provisions of the Native Title Act. Council's view is that, as a minimum, the State Government should be open about this matter, including how it has or how it intends to come to terms with it.

The Hon. ADAM SEARLE: Councillor Greenhill, is it possible—I do not want you to do anything you cannot do legally—to provide a copy of the Indigenous Land Use Agreement to the Committee? It might be of value in terms of deliberations?

Mr GREENHILL: I couldn't hear the member's question, I am sorry.

The CHAIR: The question asked if the ILUA was available to the Committee to review, if you were able to provide a copy of it?

Mr GREENHILL: Yes, we are.

The Hon. ADAM SEARLE: Thank you. Mr Mitchell, I have just a couple of questions following on from Mayor Calvert's description about the awareness raising in Hawkesbury, ascertaining how many people were aware of the flood risk. Has Penrith council done any work with its community about what is the level of flood risk awareness in Penrith?

Mr MITCHELL: We have not done any direct research but we are certainly aware that anecdotally that awareness is very low. Similarly, it has been a long time since we have had a major flood event. We are aware that Infrastructure NSW has done some of that research and certainly it came through as a strong recommendation of the strategy to not only do awareness on an ad hoc basis, which has been done in the past but do it consistently, regularly and continually reinforce that message with our communities in multiple different ways to reinforce it.

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The Hon. ADAM SEARLE: You were saying that the gateway process, in your view, was weeding out some of these applications for greater density or for rezonings. I am happy for you to take this on notice if you do not have the information to hand but can you tell us how many approaches you have had over the last 10 years about rezonings and what sort of level of density is being proposed from these different approaches?

Mr MITCHELL: I would have to take that on notice to give you a number—

The Hon. ADAM SEARLE: I am happy for you to do so.

Mr MITCHELL: —but I could indicate that there are a significant number of proposals for greater height and greater density in Penrith city centre in particular and a number of those are going through complex investigation around evacuation capacity in the roads in the area and whether the road network can sustain that sort of increasing density, hence the reason why a major evacuation option like the Castlereagh Freeway would certainly provide significant benefit for the region.

The Hon. ADAM SEARLE: Would you anticipate an increase in those sorts of approaches to council if the State Government gave the green light to the dam wall raising proposal?

Mr MITCHELL: I would not see that the dam wall raising would make any difference to those types of proposals because it would not change the flood planning levels. It would not stop the major floods from occurring, so it would not change that flood planning regime. I think it is simply a symptom of the property market and development demands in the Sydney basin where we are seeing such demand, and with the airport coming to Western Sydney the growth in the region is demanding that greater density.

The CHAIR: Councillor Gould, I would like to direct a question to you. In your opening statement you briefly mentioned Yerranderie. As I understand it, the proposal would have impacts on access to rural communities out there and in Colong areas. Can you provide more information about how it will impact on access to those areas?

Mr GOULD: Yes, certainly. Yerranderie is an isolated rural community that sits in the middle of the catchment. It is quite a unique community. At the moment the public access route requires a quite long and winding journey via Oberon, which is roughly six-hour trip from the eastern side. There has been a longstanding arrangement where residents of the area are able to have escorted access from the eastern side through Sheehys Creek to get to and from Yerranderie on designated dates. That access goes very close to water at a number of points. It actually crosses supply at Murphys Crossing.

In the event that the dam raising was to proceed, that entire area would be inundated with any significant additional flooding and it would then cut off that crossing. That area around Murphys Crossing as it is now is subject to significant silting just from the normal flow of water. If we were to have a major flood there would be tonnes and tonnes of area and significant portions of the access trails that would be under a metre or more of silt and completely inaccessible, which would mean that that eastern access would be cut off for the residents there. Similarly, at the moment that eastern access is what is used for Rural Fire Service access when we have fires in there. There is actually a fire just south of Yerranderie at the moment. The loss of that access route would significantly restrict the ability for fire appliances to be able to get out there and knock down the incidents quickly because all of the ground-based stuff at the moment uses that Sheehys Creek access to be able to get out there.

The CHAIR: Has the Government made any suggestion of how it would deal with those access issues?

Mr GOULD: No.

The Hon. WES FANG: Have you asked the Government to respond to those issues?

Mr GOULD: Yes, we have. The project team has come and presented to the Yerranderie Management Committee twice, I believe, and they were issues that were raised. We were told that it would hopefully be addressed within the EIS.

The Hon. WES FANG: So the Government has promised to an answer but it is in the EIS.

Mr GOULD: They promised the EIS would look at the issue. They did not promise that there would be any resolution to that issue.

The Hon. WES FANG: And the EIS is not out yet, is it?

Mr GOULD: The EIS is not out yet.

The CHAIR: I have another question that is probably more for Hawkesbury although it concerns everyone. The Government has indicated changes it will make to the dam wall as part of the raising of the wall allow for a change in the environmental flow regime for the Hawkesbury downstream to be more like natural

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flows compared to the current arrangements. Has it been raised with any of the downstream communities how that might change environmental conditions for the river?

Mr KEARNS: Not that I am aware of, no.

Mr MITCHELL: I am aware that environmental flows has been a long-term issue for the Hawkesbury-Nepean, particularly, as I understand it, approximately 90 per cent of the water is taken out of the catchment for Sydney's water supply. There have been many projects over the years to try to return environmental flows: the upper Nepean dams were adjusted and we had the big recycled water projects to return flows back into the river. We suffer from aquatic weeds, particularly in sections of the Nepean and Hawkesbury, as a result of low environmental flows. It certainly has been a significant long-term issue.

The CHAIR: I know that in the Hawkesbury you get the salt coming further and further up. Has the Government spoken at all with the council about environmental flows and how you would like to see the environmental flow regime change, if the dam wall is raised?

Mr CALVERT: We have had a few visits from some of those groups that are helping to put this proposal together. I do not recall that issue ever being discussed, no.

The CHAIR: If there are no other questions, thank you all for your time today. The Committee has resolved that answers to questions taken on notice be returned within 21 days. I think there were a couple of questions that were taken on notice. The secretariat will contact you in relation to the questions you have taken on notice and, if there are anymore, will let you know. That concludes today's hearing. I thank all the witnesses and members of the public for making the time to attend today's hearings.

Mr GREENHILL: Thank you.

(The witnesses withdrew.)

The Committee adjourned at 15:59.