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INDEPENDENT PLANNING COMMISSION

MEETING WITH APPLICANT

RE: HUME COAL PROJECT AND BERRIMA RAIL PROJECT

PANEL:	**PROF CHRIS FELL** **GEORGE GATES** **ANNELISE TUOR** **GEOFF SHARROCK**
ASSISTING PANEL:	**DAVID KOPPERS** **BRAD JAMES**
APPLICANT:	**CREIG DUNCAN** **BEN ANDERSON** **MARK LEE** **NICOLE ARMIT** **LIZ WEBB** **BRETT McLENNAN** **PROF BRUCE HEBBLEWHITE** **RUSSEL FIRTH**
LOCATION:	**IPC OFFICE** **LEVEL 3, 201 ELIZABETH STREET** **SYDNEY, NEW SOUTH WALES**
DATE:	**1.04 PM, MONDAY, 11 FEBRUARY 2019**

PROF C. FELL: Well, thanks. I think we can get underway. I've got to give a formal little address first, and I will ask you to bear with me while I do that. So good afternoon and welcome. Before we being, I would like to acknowledge the traditional owners of the land on which we meet, the Gadigal people of the Eora Nation. I would like to pay my respect to their elders past and present, and to the elders and other communities who may be here today. Welcome to the meeting today. Hume Coal Proprietary Limited, the applicant – yourselves – is seeking to construct and operate a new underground coal mine in the Southern Highlands of New South Wales near Moss Vale until after the extraction of ..... 5 million tonnes of run-of-mine coal per year over a project life of 23 years, including construction and rehabilitation. My name is Professor Chris Fell. I'm the chair of this IPC panel. Joining me are my fellow commissions, Annelise Tuor, Geoff Sharrock, and George Gates. The other attendees of this meeting are – if you could just identify yourself as you go around – Creig Duncan.

MR C. DUNCAN: Creig, yes.

PROF FELL: Hi. Ben Anderson.

MR B. ANDERSON: Hello.

PROF FELL: Mark Lee.

MR M. LEE: Yes.

PROF FELL: Nicole Armit. Ms Webb.

MS L. WEBB: Yes.

PROF FELL: Brett McLennan.

MR B. McLENNAN: Yes.

PROF FELL: Bruce Hebblewhite, and Russel Firth. Great. Back we go. Before I continue, I should state all appointed commissioners must make an annual declaration of interest identifying potential conflicts with their appointed roll. For the record we're unaware of any conflicts in relation to our appointment to this panel. In the interested of openness and transparency to ensure the full capture of information, today's meeting is being recorded by Emily and a full transcript will be produced and made available on the Commission's website. This meeting is one part of the Commission's process. It's taking place at the preliminary stage of this process and will form one of the several sources of information which the Commission will use to complete the task referred to in an administrative request dated 4 December 2018.

It is important for Commissioners to ask questions of attendees and to clarify issues whenever we consider it appropriate. If you are asked a question and not in a position to answer it please feel free to take the question on notice and to find any additional information in writing, which we will then put up on our website. I request that all members here today introduce themselves before speaking first time, and for all members to ensure that they do not speak over the top of each other to ensure accuracy of the transcript. We will now begin.

So we're here to actually learn more about the project, to ask some questions, and to consider these in our role as a Commission looking at it. So I really hand over to yourselves first, if you would like, to give us a presentation, which I believe you are. We have two hours. We would particularly like to ask questions about the mine method, about groundwater, about surface water, possibly about the social-economic impacts of the proposal. So we will work through that over a period of time. We've given you some questions to actually define the broad areas that we're interested in. Certainly won't stick to those, but we will broadly encompass those topics. So over to you.

MR DUNCAN: Okay. I think the first thing is the introduction of the team that I have here with me. So having Liz on the left.

MS WEBB: So Liz Webb from EMM Water.

MR R. FIRTH: Russell Frith from Mine Advice.

PROF B. HEBBLEWHITE: Bruce Hebblewhite. I wear two hats; I'm Professor of Mining at UNSW part time, but in this capacity I'm as an independent mining consultant.

PROF FELL: Thank you.

MR ANDERSON: Ben Anderson. I'm the Approvals Manager for Hume Coal.

MS N. ARMIT: Nicole Armit from EMM. I was the primary auditor of the EIS.

MR McLENNAN: And Brett McLennan from EMM, as a project director for the preparation of the EIS and the response to submissions.

MR LEE: Mark Lee, senior coordinator for Hume Coal.

PROF FELL: Thank you very much.

MR DUNCAN: Thank you. Before we start the presentation, I would just like to say something first. We received, about a week ago, the list of questions from the IPC. We had already put together the presentation. We've tried to address as many of those questions as we could possibly do in the presentation. Those that haven't

been covered in the presentation will be addressed in the submission we put forward in detail. Okay.

PROF FELL: Thank you very much.

MR DUNCAN: With the presentation itself, we're covering broad areas of introduction on the project itself, the water – sorry, mine design issues, then the water issues and the economics, and it would be best if you could ask your questions as the presentation proceeds rather than wait to the end. That will help.

PROF FELL: Okay. That's a very good point. And please be aware that members of the Commission have actually read the documents that are available ..... EIS. Subsequent to that, the submissions have been put in response to that, and your response to the submissions and various other reviews have come round. So assume us as somewhat knowledgeable, but we're in your hands now.

MR DUNCAN: Thank you. Excuse me, we've just got a little problem with the .....

PROF FELL: I'm sorry?

MR DUNCAN: If I'm using a pointer – okay. You're all right. I didn't realise that. Right. The agenda we've got in the presentation is the project introduction and overview, the key issues, mine design and operation, water management impacts, and economics. And they're the broad areas we'll cover in the presentation. Looking first, POSCO in Australia - - -

PROF FELL: What's happening? Sorry about this.

MR DUNCAN: All right. POSCO in Australia, in Australia since '81, currently in a number of joint ventures: Mount Thorley, Roy Hill and other joint ventures over in the west. POSCO has invested more than 5 billion in Australia by the end of 2018, purchased around $7 billion worth of raw materials from Australia and purchased about 500 million in coal from New South Wales on an annualised basis. In terms of the Hume Coal project, it was acquired as part of a joint venture in 2010, acquired 100 per cent in its own right in 2013, and POSCO has invested approximately $200 million by the end of 2019 in the project.

Looking at the project description, it's a low-impact underground coal mine, approximately 50 million tonnes run-of-mine from the Wongawilli seam; 39 million tonnes of saleable coal over the 23-year mine life; 55 per cent met coal; 45 per cent thermal coal; normally 3 million tonnes per annum; 673 million in NPV of direct benefits to New South Wales; and approximately 300 full-time jobs during operation and 400 jobs during the construction.

The other project – the Berrima Rail project – it's a new one kilometre rail spur and loop connecting to the existing rail infrastructure near the Berrima cement works. The coal will be railed to Port Kembla. Up to four million tonnes of capacity is

available on the rail. Port capacity, approximately 18 million tonnes, and 13.3 million tonnes is currently unused. Five train movements per day, and covered coal wagons will be utilised.

Just a bit on the history of the area. The exploration leases were awarded back in '56. They were consolidated in '85 into their current form. Hume Coal acquires it in 2010. 2011, expiration environmental baseline studies commence. 2015, the PEA lodges with Department of Planning and Environment. And in 2017, development application lodged. And as of December '18, DP&E issues report, referral to the IPC.

Just the overview of the location. The project area is to the south-west of the township of Berrima and west of New Berrima. The Boral Cement Works is approximately here. The Hume Highway truncates the project area, and it's generally bound in the east by Golden Vale Road and the south by the Illawarra Highway, and then out into Belanglo State Forest. Moss Vale is approximately due east of the project area.

Looking at the project layout, to the north is the infrastructure area which contains all the above-ground infrastructure, including coal stockpile, CHPP, rail layout facility and associated infrastructure. The mining operation is to the south. Initially, it moves out into the west in the Belanglo State Forest area, and then to the south, down into Sutton Forest.

It's worth noting over in the east is the Berrima Cement Works and the existing rail line which the project will access with its one-kilometre rail spur. And the blue shaded area represents the Moss Vale economic zone, which has been set up as an industrial zone within the Moss Vale area. This just looks – this is a drone's view from a height of approximately 26 metres, which is the coal stockpile height, of the project's infrastructure area. That's not going to work. No, that's not going to work.

MS WEBB: That's video. There's a video .....

MR DUNCAN: Unfortunately, there's a video there - - -

PROF FELL: Can I ask a question about that.

MR DUNCAN: - - - which would have showed the - - -

PROF FELL: Yes. Sorry, can I ask a question about that. You say the only significant source of high-quality metallurgical coal, and yet the Rolling Downs that has just been refused, the project in the Hunter Region, claims it to be metallurgical coal. Is there something that differentiates this particular - - -

MR DUNCAN: Most of the Hunter Region met coal is a semisoft coking coal, whereas the - - -

PROF FELL: That's right.

MR DUNCAN: - - - coal down the south coast - - -

PROF FELL: Yours is hard coking coal.

MR DUNCAN: We're classed as a hard coking coal.

PROF FELL: And can you just fill me in on the differentiation between that in terms of markets?

MR DUNCAN: Generally, you find that the steel mills themselves don't use just one particular type of coal.

PROF FELL: Right.

MR DUNCAN: They use your mixture of coals, depending on the type of steel they want to manufacture, and they can be a mixture of what we call PCI-type coal - - -

PROF FELL: Right.

MR DUNCAN: - - - semisoft, hard, and also there's a semi-hard coking coal as well.

PROF FELL: Right. Got it.

MR DUNCAN: So quite often during the steel manufacturing process the type of the coal used is a mixture of different coal.

PROF FELL: I think I sort of remember this from Newcastle days, where Newcastle Blast Furnace had to blend both.

MR DUNCAN: Yes.

PROF FELL: Okay. Thank you.

MR DUNCAN: The coal that we propose to produce is identical to an existing mine on the south coast that currently supplies coal to the BlueScope Steel Works. Okay?

PROF FELL: Right.

MR DUNCAN: It's the same coal.

PROF FELL: And is it generally more valuable than soft coking coal?

MR DUNCAN: The hard coking coal has a higher value, correct - - -

PROF FELL: Right.

MR DUNCAN: - - - than the semisoft.

PROF FELL: Right.

MR DUNCAN: That's correct.

PROF FELL: Thank you. Sorry for that.

MR DUNCAN: Yes, unfortunately, the video that we had that shows the project area doesn't appear as though it's going to work.

PROF FELL: Right.

MR DUNCAN: So I will just continue to move on. Provision of the southern coalfield is the only significant source of quality hard met coal or coking coal in New South Wales. Within the project area the coal has all the necessary characteristics to produce a product that generally meets export coking coal specs and contains some highly attractive qualities, such as ultra-low .....

The project location. Rail links to the Port Kembla Coal Terminal, currently an under-utilised asset that is ready to accept coal from the Hume Coal Project. Close to the Moss Vale Enterprise Zone. The surface infrastructure area is situated on predominantly cleared land to avoid ..... environmental features and is an area with limited neighbouring sensitive receivers. Due to the underground non-caving nature of the mine, existing land use will continue across 98 per cent of the project area ..... impacts for mine-induced subsidence.

Land ownership. The main land use within the – and adjacent to the project area are agriculture, industrial, extracting, forestry, rural/residential and residential. Over half the area comprises cleared land. Only two per cent of the project area will be required for surface infrastructure. Land ownership. The government-owned land is approximately 13 – just under 1400 hectares. Freehold land owned by others, including Hume Coal subsidiaries, 1253 hectares. Freehold by others is 2400 hectares. Crown land, 12 hectares. Total of 5000 hectares.

The community. 31 per cent of the individual community submissions were in support of the project; 69 objected to the project. The majority of the individual community submissions from local government area opposed the two projects. The majority of the submissions from local government areas of Wollongong, Shell Harbour ..... and Goulburn, and Wollondilly supported the project. The vast majority of the objections were in the form letter format; approximately 92 per cent. 40 per cent of the form letters came from the Sydney area.

Community. This plan just represents where some of the objections came from and the support or objection to the project, with the green being supporting and the

browny/yellowy colour objecting. DPE stated the vast majority of the community in the local government area having expressed their opposition to the project and - - -

PROF FELL: We will get a copy of these slides. Thank you.

MR DUNCAN: Yes.

MS WEBB: Yes.

PROF FELL: Right.

MR DUNCAN: Only 1.5 per cent of the population of the local government area were in opposition to the project. Best practice impact mitigation. The project's design includes features that exceed the normal practice used in Australian coalmines and go beyond minimum ..... standards. A low-impact underground mine resulting in manageable subsidence which greatly reduces surface and groundwater impacts. Ceiling panels with bulkheads after extraction and reject backfilling which allows for the early recovery of the groundwater levels. Rejects will be placed underground, removing the need for the permanent surface emplacement. ..... empty coal wagons traveling to and from the mine will be covered.

DP&E assessment. The DP&E assessment focused on mine design, groundwater and economics. These will be addressed later in the presentation. DP&E assessed the potential impacts, including noise and vibration, air quality, traffic, biodiversity, heritage, agriculture rehab. The DP&E concluded these potential impacts would be similar to or less than other approved underground mining projects. The department accepts that these potential impacts are likely to be able to be managed, mitigated or offset to achieve an acceptable level of environmental performance.

Now looking specifically at the mine design and operations. Key DP&E issues for mining. The culmination of untested mining method, unconventional method of storing water underground is likely to result in serious operational safety risks. Unconventional mine design may result in unexpected sterilisation of coal, safety risks relating to the storage of water underground using bulkheads. Before I proceed with the presentation, I wish to clearly point out that we were instructed by the Department of Planning to restore reject underground. They would not consider surface emplacement.

As a result of an open requirement to do that, the mechanism for storing rejects underground is by use of water, and that means you resize the rejects, and then you turn to a medium that can be pumped underground with the use of water. That was the primary reason for putting the water back underground. The other benefits from doing that, quite obviously, is the early recovery of the water table, and once we put water underground for the rejects, then we will put the rest of the water underground as well; hence, we're a nil-discharge site.

PROF FELL: Sorry. What was the first point you made then? The second point was the rejects, but the water – you - - -

MR DUNCAN: The rejects – to put the rejects back underground - - -

PROF FELL: Yeah. To slurry.

MR DUNCAN: - - - you need a medium to do that - - -

PROF FELL: Yeah.

MR DUNCAN: - - - and that's water.

PROF FELL: Okay. That's fine.

MR DUNCAN: Okay.

PROF FELL: Yeah. Yep.

MR DUNCAN: There was some concern about apparent lack of exploration .....

PROF FELL: We would like to discuss the mine site. Is it best to do that now?

MR DUNCAN: Sorry? The mine - - -

PROF FELL: We would like to discuss the mining technology.

MR DUNCAN: Yes.

PROF FELL: Now, is it best to do that now or let you finish your presentation?

MR DUNCAN: As I go, you – we'll actually go - - -

PROF FELL: Okay.

MR DUNCAN: The presentation will - - -

PROF FELL: Go - - -

MR DUNCAN: Will get into that.

PROF FELL: Go for it.

MR DUNCAN: Okay, then.

PROF FELL: All right.

MR DUNCAN: And quite happy to discuss that.

PROF FELL: We're just raring to go.

MR DUNCAN: We probably are too. Exploration – in actual fact, there's a total of 345 holes in the project area. 167 are historical holes that have been drilled by others who've had the EL over the years, and 178 exploration and groundwater bores been constructed by Hume. Total area of 89 square kilometres. About four bores per kilometre and a total of 108 cored holes which have lab test results. This just shows you the overview of the structural geology, the major structures, and also where there is igneous intrusions within the project area. So the structure of the proposed project area is very well-defined.

Key design considerations ..... overburden caving. Overburden fracturing to be either prevented or, at worst, maintained at significant levels to minimise groundwater inflows. Complete mine workings must remain accessible by persons and be suitable, stable for CHPP rejection placement and disposal. The mine layout can be subdivided into discrete mining panels that can be permanently sealed soon after mining in a panel is completed so as to allow workings to be flooded as soon as possible. We evaluated a number of mining types during the course of the – forming the position we have on the current proposed mine design, and what we have here – this graph looks at total groundwater inflow over the life of the mine versus total production.

The mining systems that were evaluated was a version of – longwall was discounted very early in the piece because of the potential subsidence issues. We then looked at a miniwall system approximately ..... metres in width. We then evaluated the Clarence-type mining system, first workings only and our current mining system. What is evident is that the more coal you take out of the ground, the greater the impact on water. So consequently we looked at the lowest potential impact that also was economic to develop. Some similar mining designs – and these mines, while they might not have the design with the long runouts that we do, there are some similarities.

For instance, the Myuna Colliery, while they form normal pillars here, they then come back and they have plungers which recover additional coal. These plungers are generally at 70 degrees and are unsupported, similar to Cook Colliery in Queensland, South Bulga ..... longwall mining operation then continue to remove additional coal using a similar system. The US, Murray Energy in Ohio and Clarence use a – not a dissimilar system, looks at pillar reduction as well ..... all 70-degree breakaways and in all cases unsupported roof.

PROF FELL: Why the 70-degree breakaway?

MR DUNCAN: Sorry? The - - -

PROF FELL: Why the 70-degree breakaway?

MR DUNCAN: Because it's far easier than 90 degrees. In one of the expert reports the department ..... they reference – they challenge why it's using 70 degrees versus 90 degrees. A 90-degree breakoff is far harder to achieve accurately than a 70-degree breakoff with the size of equipment - - -

PROF FELL: It's just an equipment - - -

MR DUNCAN: Yep. That's just the - - -

PROF FELL: Yep. Right. Thank you.

MR DUNCAN: - - - type of equipment we have for mining. The New South Wales resource regulator recently introduced an innovation policy and basically supports the development, trial and adaption of new technology systems and products, and, again, it goes on to say "does not directly or indirectly inhibit investment in the development and adoption of improved technologies and products", and innovation mine design does not affect the ability of the project to be approved.

MS A. TUOR: So just in that previous slide, the one before where you showed the different options, do any of those have it where you come back afterwards and do the filling with waste or the - - -

MR DUNCAN: No.

MS TUOR: No ..... water.

MR DUNCAN: Not to my knowledge. Yep. No. Cook Colliery, the waste is all stored on the surface. It's in Central Queensland. Myuna sells their coal ..... mine to the power station. Clarence Colliery does have a washing plant. I think they have trialled putting some forms of waste underground, only on a trial basis. South Bulga, not to my knowledge, and I can't comment on that one at all in Ohio.

MS TUOR: So with what's proposed, as I understand it one of the concerns with unsupported roofs, etcetera, is the potential that when you use it for the waste storage and water that people may be going back into it the second time around, and therefore you've got an unsupported roof and it's – is that correct, or is that something - - -

MR DUNCAN: I will come to that in the – we actually address that in some detail a bit further in the – that's - - -

MS TUOR: Okay. Good. Thank you.

MR G. SHARROCK: If I may – Geoff Sharrock – do you mind – the Murray Energy one, you said you don't know much about it and it's hard to see – is that, in fact, mine filler or not?

MR DUNCAN: It's not exactly the same but it is similar. They do long runouts in a – okay. If you – looking at the mining system design process ..... appropriate design method, then we constructed preliminary design, presentation of concept in DP&E back in December 2014. Conceptual project of a plan review by GRE. Risk assessment workshops, updated, presented to DP&E back in May 2015, peer review by Dr Bruce Hebblewhite, adequacy review of EIS by DP&E in November 2016. Risk assessment reviews undertaken in 2018. Numerical model scoping and mine advice from Dr Bruce Hebblewhite. DP&E review by independent experts chaired by Mr Ted Brown. 3D and numerical modelling validating updated design, results of 3D modelling provided to DP&E experts, a peer review of numerical modelling undertaken by Dr Bruce Hebblewhite. DP&E has been consulted about the mining system since 2014. Looking - - -

PROF FELL: Have they expressed adverse views in each stage?

MR DUNCAN: Sorry?

PROF FELL: Have they expressed adverse views any stage?

MR DUNCAN: No. The first time we became having adverse reviews we had a meeting with the experts. It was shared by Professor Ted Brown. A number of issues were discussed and resolved at that meeting. At that same meeting we actually gave a presentation on the outputs from the 3D modelling. We had actually done a pre-emptive strike on the 3D modelling and commissioned it. What we didn't have at that point in time was the full report, so all we gave was the outputs from the 3D modelling which supported the original design of the project. We then made the report available when it became available; it was undertaken by a gentleman in the United States who was recommended by all parties.

PROF FELL: Heasley, yes. Professor Heasley, yes. Yes.

MR DUNCAN: Yes, that's correct. The mine design – there's a lot of ..... we've nominated Clarence Colliery, and the reason we nominated that because they do a – like a pillar reduction and they're limited by the amount of subsidence because the aquifer is above them, right. So there is some similarities in the way. Intrapanel barrier pillars were utilised in our design, which was also utilised in Clarence. Panel headings are not dissimilar; the number just is slightly different. Pillar systems are not dissimilar. We have the long runouts, they don't. They can do a pillar reduction.

Continuous haulage – Clarence currently use a – sorry, a Joy floor-mounted FCT for continuous haulage from the continuous mine ..... and the main headings – number of headings – in short if you take the time pine feather component out of the mine design it looks exactly like a longwall design that's used in New South Wales today. Every longwall mine has a similar sort of design. So the only thing that's actually different between us and existing – the majority of the existing underground mines is this system of first workings here, we call pine feather. The rest of the mine design looks like all the other longwall mines in New South Wales.

PROF FELL: Here we're a bit confused because resource regulator came back and said yours was like second workings, not first workings, and we need to get over that at some stage.

MR DUNCAN: Yes. That's a debate that we've had.

PROF FELL: Yes. If you can give us some feedback – maybe we can package these questions up in a moment if you go through the rest of the mining.

MR DUNCAN: I might point out that the final assessment report by the experts, the resource regulator, etcetera, that form part of the submission by Department of Planning were not made available to us until after their submission had been made, right. So we never saw the resource regulators report, and the final expert reports that were commissioned by the Department of Planning were not made available to us until after they submitted their – put their submission.

PROF FELL: To after they submitted their assessment. Yes.

MR DUNCAN: Yes. So we couldn't – we had no ability to understand what the issues were or ability to comment.

MR GATES: Before you move off, Creig, the Clarence Colliery – do you happen to know what the water inflows for that are?

MR DUNCAN: They're quite high.

MR GATES: It's almost known as a wet mine, so – yes.

MR DUNCAN: Yes. They're quite – I couldn't give the exact - - -

MS WEBB: We can take that one on notice.

MR DUNCAN: Yes, yes. They are substantially higher than what ours are. Just looking at the mining system itself, the issue – the proposed mining method relies upon narrow web pillars remaining stable in the long term. There's the chain pillar. Again, those roadways are not dissimilar from a stock standard longwall mine in New South Wales. It utilises barrier pillars in-between the pine feather and the web pillar between each of the plungers. The plungers are approximately 120 meters in length. Those who do not – are not aware of, these plungers – or drives 120 metres – are very similar to a Wongawilli system of mining that was – used to be used in a lot of mines in New South Wales.

PROF FELL: Yes ..... yes.

MR DUNCAN: The only difference being is we leave the web pillar intact; we don't attempt to extract it. Okay. The response is – this is a fundamental mischaracterisation of the assessment, the outcomes of the expert meeting, the

numerical modelling and the supplementary expert report. The stability of the pillar system as a whole is the key consideration as whether the proposed layout sites are fit for purpose and not the strength and stability of individual web pillars.

PROF FELL: Well, our understanding of this is that once you take the overburden strength into account that transforms the situation as far as individual pillars go. But we want to just discuss a little later the impact of individual pillars and safety, which is an issue that has been raised with us. Do you want to do that now?

MR DUNCAN: Bruce, you want - - -

PROF HEBBLEWHITE: You do have a slide coming up, but happy to do that now if you like. Bruce Hebblewhite. I – as we said before, I did the review. Russel and his people did the initial design; I then did an independent review of it.

PROF FELL: Right.

PROF HEBBLEWHITE: And one of the key things that I identified was that this mine layout needs to be looked at as a three-dimensional layout, which is quite different to a lot of underground coalmines where you can do a simple two-dimensional section through it. Because of the geometric configuration of the chain pillars, of the barrier pillars and the web pillars themselves, you need to look in both directions, and - - -

PROF FELL: Look, I think they came through pretty clearly, I would say. We don't have a problem with that.

PROF HEBBLEWHITE: Yes. So therefore you need to look at the overall system and, yes, that overall system is carrying the weight of the overburden. We actually – in the modelling we got Keith Heasley to actually remove one and then a whole panel of web pillars to demonstrate or give us confidence that the system was independent of the integrity of individual web pillars or panels of pillars.

PROF FELL: No, I think we got that.

PROF HEBBLEWHITE: Yes.

PROF FELL: And, in fact, it was more a question that when you're working in this structure, if you like, there is a risk of roof falling because of minor compression of individual pillars.

PROF HEBBLEWHITE: Within a panel.

PROF FELL: Within the panel.

PROF HEBBLEWHITE: And, again, there is a slide later, but we will – just to comment on that is that you don't have people working in adjacent to those pillars.

This is all remote. So there's no people in that region. If there was a localised either roof fall – or the other issue is if there's a localised rib spall off a web pillar it would be a localised fall. But there's no people in there. People are outby of that area.

PROF FELL: Well, I think the issue was raised – if equipment got jammed for some reason and you had to send people in to retrieve it, then there's the risk.

PROF HEBBLEWHITE: Yes. And that's no different to any other extraction system: if equipment gets buried you have to adopt conventional – you may – and, Creig, you might like to go into this further – but you may need to go in and fully – well, you would support – if you needed to get in there to recover that equipment you wold fully support and ventilate to access that.

PROF FELL: The point – yes. The point was made you may not have room to do that in the quite narrow passages that you have.

PROF HEBBLEWHITE: I think – being narrow you actually have improved stability anyway. Yes, it's a confined area. It's not a – you don't have the luxury of a six metre-wide heading - - -

PROF FELL: I'm simply asking for a response, no more than that, from an experience mining people.

PROF HEBBLEWHITE: Yes. Yes.

MR DUNCAN: I – the comment I'd make there is that, for decades, in the mining industry, continuous miners have been buried in roof falls, either in pillar extraction or in first workings. Pillar extraction is very difficult to recover in some cases, and quite often they're just left. In terms of first workings, where continuous miners – there might be minor roof falls – they tend to be very minor, and – there's – it depends specifically on the circumstances. To my knowledge – and I've been managing mines since 1981 – they've always been recovered, right, without anyone being seriously injured or - - -

PROF FELL: I'm being very pedantic: resource regulator said you're second workings, all right?

MR DUNCAN: Yeah, well, that's an argument we will - - -

PROF FELL: Okay.

MR DUNCAN: - - - probably have.

PROF FELL: All right, okay.

MR DUNCAN: Because we don't believe we are; we're first workings. The resource regulator acts – and just recently, earlier this year, changed the definition of

what was secondary extraction. We weren't – clearly weren't – secondary extraction prior to that change. The change has now been made, and there is probably an argument to be had, or a debate to be had, to be more specific, over whether we are or we aren't.

PROF FELL: Okay. Thank you for that. I mean, the issue, I think, on the table is, is it unsafe if you have to recover stuff?

MR DUNCAN: The answer's no.

PROF FELL: Thank you know.

MR DUNCAN: Because I've recovered miners from first-workings roof falls myself, so the answer is no.

PROF FELL: Any comment on that?

MR SHARROCK: No, I take what Creig says – when we're talking in some detail about this, one of the views is that the – when you enter those particular webs there, the intersections themselves, the chambers aren't supported, and often you get ribs fall, and rib bursts at these intersections. So are you doing anything special for those intersections?

MR DUNCAN: The – I think it's – the modelling is shown that the level of deflection is obviously going to be slightly higher than in the roadway itself. But there has been – if you look at our situation, we're mining, in the majority of the cases, three and a half metres of an eight-metre seam. So if there's going to be a roof fall in a – in one of these drives, it's predominantly going to involve top coal, not stone, right? And that's a lot easier to recover a continuous miner from, as you'd appreciate, than what would be sandstone or something like that.

And then there has been cases, in highwall mining, where there has been falls of top coal in some – some ..... miners, and those have been recovered. And in some – in one case I'm aware of – because I was managing ..... Creek at the time – the highwall mining system there – we had to resupport the roadway, go in there, hook a big chain on the back of the continuous miner, and pull it out, right? So there was no – no exposure to any individual; it was – generally, you've got to resupport the roof as you go in there, and then you use a remote means to recover the continuous miner from that roadway.

MR SHARROCK: I understand some of the newer systems have got, really, quite robust conveyors: they're armoured and covered, if you know what I mean. And then the ones that you're going to use are conventional ones, are they not? They've got the rollers – they're flexible. But would you be able to pull one of these – I suppose it depends on the fall, doesn't it, Creig – but would you be able to pull one of those out via the conveyor without sending anybody in there?

MR DUNCAN: By the conveyor, that's a difficult one to answer. It's something you could consider in the design. It depends on which type of continuous haulage system you use. It'd have to be a floor-mounted one; it couldn't be a roof-mounted one, for a starter, for obvious reasons, if you got a roof fall. But I think the – the thing to remember is that when we're driving, the sequence we drive those roadways in, if you were to have a roof fall in one of those roadways, the reason it's highly unlikely is because on one side of the miner, you still got quite a large block of solid coal, right? You've only got - - -

MR SHARROCK: Beyond where you're going.

MR DUNCAN: Yeah, you're putting a punch up; you're moving back, putting another punch up. On this side, you've got solid coal. So the probability of a roof fall is – is pretty slim. It's not as - - -

MR SHARROCK: That's a barrier in itself.

MR DUNCAN: It's not as if you were doing punches all over the place, and going up the middle somewhere, and suddenly you've got a lot of – well, lower-strength pillars - - -

MR SHARROCK: Okay. I understand.

MR DUNCAN: - - - on either side of you. It's just a difference setup altogether, okay? But I have – I'm very confident that if you had something like a roof fall of coal on top of a continuous miner in a punch, it would be reasonably easy to recover, and you would not put people's safety at risk.

MR SHARROCK: Thank you.

PROF FELL: That's a helpful comment, thank you very much. Just one other question along - - -

MR DUNCAN: Yes.

PROF FELL: - - - that line, on the issues that were raised, I think, in the documentation. If you had a roof fall, you'd flush air out of the punch, because it's dead-ended, and this air might be – I think the word is "irrespirable", but – now, your comment on that – I mean, you've said that a level of methane – level of CO_2 actually in the air – in the coal is very, very low.

MR DUNCAN: There's no methane, and there's – less than half a cubic metre per tonne of CO_2.

PROF FELL: Well, can we look at that scenario for a moment. Roof fall; air being flushed out. Can you offer me comment on that?

MR DUNCAN: The velocity – the velocity would – number one, if the – if we're mining up a punch and you get a roof fall, the mining system's being operated remotely; it's not being operated from within that roadway at all.

PROF FELL: Understood.

MR DUNCAN: Okay? All right? So people are not going to be in there. When you get a roof fall in a small roadway like that, the volume and the velocity of the air is going to be quite small; it's not going to be high. And I would suggest to you that the quantity and the velocity of the general ventilation in the panel would offset anything that was to come out from there. There is – as I indicated to you, there's no methane in the coal; all that bled off back – centuries ago. The amount of CO_2 per tonne of coal in situ is quite small.

PROF FELL: It's quite low, from the figures we were presented.

MR DUNCAN: Very, very low, yeah. And we've actually – one of the reasons we're fairly aware of that is because one of the concerns that a lot of people had is, we were going to be a coal seam gas mine, from day one, and we were going to extract large volumes of gas. So we went to the trouble of doing enough analysis to ensure everyone that over – generally – the project area - - -

PROF FELL: Yes. Understood.

MR DUNCAN: - - - there was no methane - - -

PROF FELL: Yes.

MR DUNCAN: - - - and there were very low levels of CO_2.

MR SHARROCK: I have another question, if you don't mind. And that is that one of the reviewers from the department really takes issue about the web pillars being narrow. So could the web pillars be made wider, ie, you would get less coal out? But, I mean, there must be a – effect the economics in recovery, would it not?

MR DUNCAN: Correct. And that's one of the reasons – it became an optimisation process, of looking what was achievable. And again, you know, we have to look at the total system – 3D system, not just individual web pillars. By increasing the width of the pillar, you obviously reduce the amount of coal recovered, and that will have a negative impact on the economics, okay? So we – we're not a longwall mine; we don't have the ability to generate huge tonnes of coal, and hence a lot of revenue. If – in our case, right, we've got to try and balance and minimise the environmental impacts versus amount of coal we recover.

And I don't see why we should increase the web pillar when clearly the work that we've done, both the numerical and the modelling that's been undertaken by Heasley in the US, shows that what we've put forward is stable long-term. And that's the key

issue: it's long-term stability, minimal subsidence, minimal environmental impacts. And that none – no one's safety is at risk, because the mining system is – operates remotely.

PROF FELL: Thank you. So DPEs comments, of course, which you've seen, say that there's a worry about the – how the mine operates the – and, frankly, we've had that discussion. I guess, the other issue would be water being held in the mine. Are you going to do that later?

MR DUNCAN: I actually got quite – some detail on that so - - -

PROF FELL: Okay. Well, any more questions about the mining technique?

MR SHARROCK: There may be some more.

PROF FELL: Okay. Thank you.

MR DUNCAN: The – again, another assertion: the proposed mining method relies upon narrow web pillars remaining stable in the long term. During the meeting of experts back in March of '18, the experts, including DPE and experts, agreed the stability of the ..... as a whole is the key consideration as to whether the proposed layout design is fit for purpose, and not the strength and stability of individual web pillars. The numerical modelling undertaken by Professor Keith Keasley, on behalf of Hume - - -

PROF FELL: Well, we may have waited for that slide, and saved ourselves a lot of - - -

MR DUNCAN: Yes, as well. I've actually gone to some detail in – we have gone to some detail in this presentation.

PROF FELL: No, that was a very useful discussion, thank you.

MR DUNCAN: Again, down – I'll just go to the last point on this one, and then move on. There are no operational safety issues associated with the long-term instability of individual web pillars. The department considers the issue of pillar stability has not been adequately resolved by the 3D numerical modelling, and that there are significant residual risks to worker health and safety. A comment by our mining expert, Dr Bruce Hebblewhite:

> *DPE claim that such a web pillar failure may pose a direct risk to worker health and safety as a result of roof falls and ground falls. If such falls were to occur in roadways between web pillars, it is highly unlikely to impact on worker safety, since no personnel will be operating in such roadways at any time.*

PROF FELL: Just before we go on, do you want to comment on that, Bruce, because, you know, we have an experts' disagreement here.

PROF HEBBLEWHITE: Well, I think we have – we have the DPE disagreeing with us. The expert reports, and in fact the expert meeting back in March, actually was in general agreement that this was not a - - -

PROF FELL: Well, certainly with the top point.

PROF HEBBLEWHITE: Yes.

PROF FELL: But not the second one.

PROF HEBBLEWHITE: The second paragraph, you're referring to there? Yes, the second paragraph is the point about the effect of, say, geological structure on either local roof falls or the rib falls.

PROF FELL: Yes.

PROF HEBBLEWHITE: Yes, certainly, that might take place. So the first answer is again that people aren't working up against those ribs, and therefore not exposed directly. The other issue is that, as in any operational mine – and Geoff would know well from his past experience that you can modify methods, on an operational decision-making basis, to take account of local changes. So the comment about web pillar width, for example – yes, it really challenges the economy of the project to say all web pillars should be X metres wider. But if you're coming to a mining zone where you know that there's particular structural concentration of faulting or joining or whatever, it would be a simple operational management decision at the time to say, "In this panel, we're either going to put an extra metre on the width of our web pillars, or we're going to rotate them slightly, or we're going to stop them short." There's lots of operational decisions that can be made to deal with that scenario.

PROF FELL: Okay. Now, if this was encountered, all right - - -

PROF HEBBLEWHITE: Yes.

PROF FELL: And I'm flagging this for a question later on – is it likely to compromise your ability to store water?

PROF HEBBLEWHITE: That's back to - - -

PROF FELL: A question for later, when you tell us about the water - - -

MR DUNCAN: Yes. Well, okay.

PROF FELL: We can flag it.

MR DUNCAN: We'll address that with the bulkhead one, is probably - - -

MR SHARROCK: Okay.

MR DUNCAN: - - - the best way, if that's okay.

MR SHARROCK: Yes. I mean, I think we should review – I mean, I think we should let you go on.

PROF FELL: I think so, too.

MR SHARROCK: I know - - -

PROF FELL: I mean, you want me to be quiet.

MR SHARROCK: No, no. No, Creig said we should ask questions on the way through, but – some of these things are, in a way, interrelated, are they not?

PROF FELL: Yes, I've been instructed.

MR SHARROCK: You're the chairman. You're the chairman.

MR DUNCAN: Okay. The assertion – the department considers that the issue of – numerical modelling, and there are seen to be a residual risk to worker health and safety.

> *Risk to worker health and safety is no different from other forms of underground mining, such as partial pillar extraction, full extraction, bord and pillar mining. In fact, the proposed use of remotely controlled or semi-autonomous mining equipment significantly reduces worker exposure to face hazards as compared with these methods.*

This looks, now, at some of the systems available for remote mining, practiced routinely in highwall mining, and practiced under outburst conditions on South Coast Mine. Full underground automation is currently being implemented at the new Grosvenor mine, in central Queensland, four metre wide extraction headings for improved stability – the normal width roadway in an underground mine is a minimum of 5.5 metres. Continuous haulage system. That's a continuous miner with a continuous haulage, going back to the 1990s.

> *Integrated –*

sorry:

> *Inertial navigation technology has existed for decades in highwall mining for unsupported punch. Inertial navigation – gamma horizon control. Similar systems used underground in mines in Illinois and Ohio. CSIRO has recently*

developed a significant upgrade to this technology that will allow absolute positioning of CM rather than relative to the last punch. Measured deviation, during underground trials, of three centimetres over 120 metres.

Pretty accurate. It's similar – it's an offshoot from similar systems that are used in missiles. Looking at continuous haulage system, there's a number of systems available; there's not just one or two. You've got the flexi train, the FCT, which is currently used at Clarence. There's the Sanvex EBS, the crawler one, which is – and there's also a new one under trial, a Sanvic one. Probably the one that would be currently suitable would be the similar system of the Joy brand floor mount FCT that's currently in use at Clarence. This one is probably not suited. This one is a cascading belt system that's currently used at Cook Colliery. This one offers the most potential long-term, because it's not limited in length. This one is limited in length to about 160 metres, and that's because of tensions within the system. This system here is unlimited. You can have it as long as you like.

So if, for instance, you wanted to extend plungers out to 200 metres, you would need about 240 metres of conveyor, you can actually do that. Other systems are available also, including bridge conveyors. Right. We're getting to a real interesting one. This one will go on to answer quite a few of the questions you may have. Right. The fact that the project needs to, like, your high-risk activity, you know, means that the project carries more risk than any other mining project. Clearly, wrong. The response – high-risk activity notifications required for all mining activities undertaken regularly in underground coal mines, including longwall mining, pillar extraction, shaft sinking, drift development and pillar reduction, and there's others.

I'm not going to go – this is from the resource regulator, what's required. What we have, we've done an audit and I'm – it will be a very busy slide, but what we've looked at is the current underground mines. We've looked at all the high-risk activities that are undertaken at the mines on either a day-to-day basis or a regular basis, and the green represents those risk activities that fall into category high-risk activities for notification. The DP&E appears to have misrepresented the nature of high-risk activities and the potential of high risk to impact on ability of the project.

MR SHARROCK: Well, if I may - - -

MR DUNCAN: And there's just one other - - -

MR SHARROCK: Yes, Creig.

MR DUNCAN: This also includes mines that have got water empowerment underground. Okay. And we've identified those as well.

MR SHARROCK: I understand the onus is now on the operator. If you've got a high-risk activity coming up, the onus on the operator is to have plans, if you like, and show those to the regulator, and I suppose the regulator can say yes or no. Is that the way it works now?

MR DUNCAN: No. It doesn't.

MR SHARROCK: It's not prescribed like it used to be, is what I'm saying.

MR DUNCAN: It doesn't. The way you do it, you have to supply, as your – all the Gtech information, the risk assessments, the management plans, all that sort of thing, to the regulator. You have a certain – the regulator has a certain period of time to evaluate it. If they don't ask for additional information within that timeframe, you can allocate the work. They no longer approve or reject formally, because they're guilty by association if they do. Right. So it's a case of notification with all the appropriate information. If they think it's deficient they will request you to provide more information. You have a certain period of time. If they don't come back to you within that period of time, they're to undertake the work.

PROF FELL: Now, the view was expressed that you need to have high-level staff that have experience of high-risk operations on your team to actually do it properly.

MR DUNCAN: Well, to do it properly, you have the – the people who have the experience to undertake the design work, but you also have to, when you're doing the risk assessments, you need a cross-section of the work force, including the people, the operators, the frontline supervisors, the middle management and the tech people, and an independent expert to assist in that risk assessment.

PROF FELL: You've given a list of the people associated with the operation in the information you've provided. Would they meet that requirement?

MR DUNCAN: We can do that. I mean, we – we've already undertaken risk assessments, and I will get to that on the project. There was a – there's an inference in the report by the planner that we have not undertaken what they would consider risk – taken risk - - -

PROF FELL: Yes. That's right.

MR DUNCAN: We have. And we did that - - -

PROF FELL: And there was some suggestion you might make that available.

MR DUNCAN: Well, I'm prepared to make certain parts of it, who was involved, the areas I've covered, that sort of thing, but the risk assessment covers pre-construction, like, the design phase, the construction. The operation can only be done by the operation. With a risk assessment you will also get it colour-coded into certain areas. The risk assessment, if I transmit it, will – in the wrong hands will eventually be misconstrued, and I have a problem with that. Okay. I'm quite happy to show it to you. Right. But as for giving you a copy that could finish up being disseminated in the public arena, probably not.

MR SHARROCK: Why? And I'm not - - -

MR DUNCAN: Sorry?

MR SHARROCK: I asked the question. It's not – and therefore might be misinterpreted by such people.

MR DUNCAN: That's correct.

MR SHARROCK: I must say one of the worries that I have is that there is some controversy about the mining method. The experts don't all agree on everything. So you've done quite a lot of risk assessment work and I wondered why you didn't bring that forward.

MR DUNCAN: Well, we know. At the meeting we had with the experts, we didn't inform them we had done the risk assessments.

MS TUOR: Yes.

MR SHARROCK: I'm not talking about informing them.

MS TUOR: But were they - - -

MR SHARROCK: I'm talking about showing them.

MS TUOR: - - - available at that meeting to the different experts?

MR DUNCAN: Again, it's for the same reason.

MR SHARROCK: Well - - -

MR DUNCAN: I didn't want – because anything we give to the Department of Planning, right, finishes up in the public arena.

MR SHARROCK: Well, you know, maybe I could ask that maybe, as you said, you can show them to us and, you know, we hand them back to you and we don't copy them, and that sort of thing. Because I think every piece of information we can get is helpful, because this is certainly not straightforward.

MR DUNCAN: We've got - - -

MS TUOR: Yes. But also I think the thing is if safety was becoming a key issue and if there are a number of experts, including experts employed as independent experts by the Department of Planning, and you've done this safety audit work, I don't see why it wouldn't have been made available with a confidentiality agreement, etcetera, etcetera, to the independent expert on behalf of the Department of Planning for them to review. Just so that there would be someone that could review it and then say, "Yes, this safety audit is adequate." No further detail.

But by you just saying, "We've done it. Trust us." That's not how the system works. I think – that's my understanding of it. And there's plenty of information that's commercial-in-confidence that does get reviewed throughout government organisations, and I think there are mechanisms that can be dealt with to deal with that commercial-in-confidence type information.

MR DUNCAN: Certainly, I don't think the Department of Planning do have the people internally to be able to review that risk assessment.

MS TUOR: No. I understand that had a – they could have employed - - -

PROF FELL: What happens – what if it were made available to the Commission?

MR DUNCAN: Well, that's what I'm requesting.

PROF FELL: - - - on a confidential basis?

MR SHARROCK: Because, as Creig has implied, if you see a risk assessment colour-coded and it gets in the hands of someone who doesn't know, "Look at red. They shouldn't do any of that red stuff."

PROF FELL: Well, I appreciate that. I understand where you're coming from. But, on the other hand, there's a question, "Has it been done?" You know, "Do we trust you when you say it?" I know that's a terrible thing to say.

MR GATES: But Creig has made an offer - - -

MS TUOR: Well, I'm sure it has been done.

MR GATES: - - - that he could put it on the table - - -

MS TUOR: It's – no one has reviewed it.

MR DUNCAN: I'm quite happy to put it on the table - - -

MR GATES: - - - and we could read it and hand it back.

MR DUNCAN: - - - and let you have a look at it. That's fine. But as for transmitting it formally and it finish up in the public realm, that's – no.

PROF FELL: Well, I understand that.

MR DUNCAN: Yes. Yes. No, I'm quite happy to do that.

PROF FELL: Okay.

MR DUNCAN: Okay.

PROF FELL: We're past and through that, thank you.

MR DUNCAN: All right. I suppose, to get back to this little slide here, this addresses the issue of higher risk.

PROF FELL: So the little high-risk operations around.

MR DUNCAN: Yes. It also addresses who impounds water. Right. So in that - - -

PROF FELL: Right.

MR DUNCAN: Okay. And, moving on to the next slide, there are inherent risks associated with impoundment of ground water underground. The impounded water underground working is commonplace. Of the 29 mines listed in the slides, some 16 impound water in underground workings. The remainder may inadvertently impound water in mine groves and low-lying areas. Inrush associated with impoundment of water underground is classified as a principal mining hazard under New South Wales legislation, and Hume Coal would operate under the inrush principle hazard management plan. Right.
So the fact that we are going to store and impound water underground, we would have to come up an inrush management plan, and that would have to be acceptable to the regulator and we would have to operate to that plan.

PROF FELL: And that covers the - - -

MR DUNCAN: It would cover these sorts of risks - - -

PROF FELL: - - - down-dip situation. Yes.

MR DUNCAN: - - - that we're talking about. Yes. Yes. Right. Bulkheads. The risks associated with the impoundment of groundwater underground may be exaggerated by various other risks associated with the pillar stability. It is not clear how the two issues are related. The bulkheads will be installed at the start of the panel and is not near web pillars. This looks at a section in a heading. Most of the panels are down-dip or cross-dip. Only the very back end of the mine they are flat-laying, consequently the bulkhead doesn't have a lot of pressure against it. Most of the water is down-dip from it. Okay. Looking at the location. Response of DP to our bulkheads. That's where the bulkheads are. They are not opposite where the web pillars are. They are actually up here where there's quite large blocks of coal to maintain the stability around the actual bulkheads.

So they're not, like – they're not going to be subject to what happens in the vicinity of the pine feather and the web pillars. The timing of the proposed impoundment of water in flat lying parts of the mine represents a residual uncertainty. We responded to this and to DP&E mining expert reports on 11 July 2018. The timing of the proposed impoundment of water in areas of the mine that are flat flying is discussed

in the ..... response to the mining experts report. This is not a residual issue and it has been addressed. Just - - -

PROF FELL: I didn't notice that in the documentation on the mine experts meeting.

MR DUNCAN: Sorry.

PROF FELL: I didn't notice that comment that you've just made in the documentation that was produced from the mine experts meeting.

MR DUNCAN: Well - - -

PROF FELL: So that's new information before us.

MR DUNCAN: It's in our response.

PROF FELL: Yes, well, I accept it.

MS TUOR: Sorry. Couldn't you make a reference to it?

MR SHARROCK: That meeting was in March, though.

MS TUOR: Okay, but is the - - -

MR DUNCAN: Yes. Yes.

MR SHARROCK: Yes.

MR DUNCAN: And we put it a report together on the – yes. Okay.

MS TUOR: Page 41.

PROF FELL: Okay. Thank you.

MR DUNCAN: Bulkhead failure may lead to a need to discharge water directly into the creek, but panels are designed to be down ..... of bulkhead sites, meaning that if bulkhead were to begin to leak, the leakage rate would be limited to groundwater inflow to the single panel. Remedial pressure ..... would require partial or full ..... of the panel level to the level of the bulkhead but not the full pumping out of the panel. The void behind the bulkhead would remain full during the remedial work if such works were ever required. This looks at the – the bulkhead failure may lead to a need to discharge water directly into the creek. This looks at the direction of dip and the layout of the panels. These are cross dip, these panels here. These are full dip. And this area is the last part of the mining life is where it's flat, okay, so it's - - -

PROF FELL: So that comment is simply not true.

MR DUNCAN: Yes, it's – it should not be an issue. The other thing too, depending on the sequence of mining, whether your mine needs panels on the advance or on the retreat. If you mine them on the retreat, any way that was to leak in would be accumulated behind you.

MR SHARROCK: So ..... as any mine would down dip, you know, taking the shallow part first, if I can put it that way.

MR DUNCAN: These panels here are on full dip.

MR SHARROCK: Yes.

MR DUNCAN: Right. These parties here are going across dip. And this area of the mine is actually flat, this area in here.

MS .....: And that's the last bit ..... yes.

PROF FELL: Well, some of this answers our question to - - -

MR DUNCAN: The primary water dam would only provide approximately 10 to 11 days of mine water storage. False. The model scenario where the primary water dam reaches it speak storage of 625 megalitres versus a design capacity of 1720 occurs in only one of the 108 climate sequences modelled. This occurs very early in the mine life when the mining flows are comparatively low. Peak mining flows occur mid to late in the mine life when there is a lot of spare underground storage capacity. Furthermore, the mine infrastructure has multiple water retention basins. The water modelling was undertaken on the basis that these are pumped dry after every rainfall event and the water is transferred to the primary water dam. Under the worst case scenario, water could be left in these basins to provide additional storage capacity. This looks at the primary water provide approximately seven to 11 days of mining water storage.

This graph here, it shows that it's very early in the mine's life, and then later on, it's only in this period here, around years 15 and 16, where we reach peak water inflows. There's still plenty of capacity. Another key concern to the level of risk assessment undertaken, many of the matters raised in this report could originally be expected to have been evaluated by the mine owners in a risk assessment, mining ..... prior to deciding a lodgement of a development application. Hume Mining System Concept Risk Assessment, February 2015, reviewed and updated in March '18, include two subset risks assessments. Mining system risk is included, mine layout, Gtech, mining sequence, working section, mining equipment, productivity, ventilation, gas ..... and rejecting placement. Inundation inrush risks included, failure of bulkheads, intersection of already flooded panel, failure of the web during hydrostatic pressure, geological structure ..... failures, major roof fault and under-ventilated plunges.

PROF FELL: This was previously discussed - - -

MR DUNCAN: That's right. That's exactly right.

PROF FELL: - - - to indicate they might allow us to actually cite it.

MR DUNCAN: And we went into some detail without even attempting to read that. That's just to take out from one part of the risk assessment, and the risk assessment originally ..... in 15, development application lodged in 2017. And both Bruce and Russel were involved in that risk assessment that time. Okay.

MR SHARROCK: And that was supplied to the department, I presume, was it?

MR DUNCAN: It hasn't been provided to the department.

MS TUOR: No, that's the one that's confidential.

PROF HEBBLEWHITE: That's what could be put on the table.

MR DUNCAN: They were told about it, but that's all.

MR .....: But it did provide the roadmap for everything that happened subsequently.

PROF HEBBLEWHITE: Yes.

MR DUNCAN: Right. We're then on to the next one, water. Just keeping an eye on the time.

TECHNICAL ISSUES – RECORDING INTERRUPTED [2:11:14 – 2:11:44]

PROF FELL: Well, I think we can save ourselves ..... I think that broadly we're not unhappy about the concept of it being class 21. Is that a fair statement?

MR GATES: Yes.

PROF FELL: George?

MR GATES: Yeah. Yeah.

PROF FELL: All right. And we've discussed it at length with DPE, so that's not on the table. I think we're happy about that. The make good arrangements are one of the key issues, so it's important we discuss those fully.

MR GATES: Yeah.

PROF FELL: And groundwater licencing, well, you've got 90 per cent at the moment, and the issue is whether the volume associated with the groundwater licence will decrease and you'll have insufficient for your mining operations. You've indicated you can pull some water from the stored water, right, if that happens, but, George, you were the one who raised that issue, I think.

MR GATES: Look, there was a couple of issues that it would be good to get off the table today. One was environmental impacts. I mean, a lot of the drawdowns are sort of social and economic impacts, but are there separate environmental impacts that need to be discussed, because I don't think DPE understood the difference between those two.

I'm not 100 per cent sure they did. I was a little confused about what might be a water table decline and what might be a water pressure decline, and hence I was asking for some diagrams that might sort of show that style of difference, because it seemed to me when I was reading it, they were used interchangeably in the report, and that's why I was after that.

And, as Chris says, it's a class 2 model. It's been reviewed by independent experts. I accept their decision that there's some class 1, some class 2, some class 3, so we're happy to go with a class 2 model, and the model shows significant impacts anyway of class 2, so they're some of the things that I was sort of interested in. And we accept that models aren't perfect. Geology is not perfect. There's errors in there and they get carried across to the uncertainty analysis. But still, that's what we're working with, and you've improved the model greatly with the additional work.

PROF FELL: Only went up one bore being affected - - -

MR GATES: Yeah.

PROF FELL: - - - right through to 94. The interesting breakdown of bores and the extent of the effect of what the make good would encompass was obviously quite important to us, and then the issue of how you go about – maybe that's the angle we need to discuss and sort out.

MR GATES: However – and I certainly was – and the others were probably the same – the water quality issues and things, you know, I thought they were dealt with satisfactorily in terms of putting it underground and stuff.

PROF FELL: Well, I have one very small one, that is, that some of the water you put back down the hole is water that has been on the surface, probably runoff from your storage of waste material before you put it back down the – sorry – the mine, and could it have higher contaminant levels than straight mine water, largely because of oxidation at the surface and possible mobilisation of some component ..... if you like, that could be picked up? Do you get what I'm asking?

MR DUNCAN: The way we've tried to set up the – do you want to comment on this?

MS WEBB: Yeah, I can comment on it. And that was looked at in detail by Lang, who did – Geosyntec did a - - -

PROF FELL: Yes.

MS WEBB: - - - detailed study of that quality.

PROF FELL: But for they did a test, and they used the still water for their leaching test.

MS WEBB: For the leachate.

PROF FELL: And I would say, look, you've got a system exposed to the atmosphere. You could have something in there, a few bugs as well, so you could be leaching a bit of stuff out, and that could end up concentrating.

MS WEBB: Yeah. I can – I know - - -

PROF FELL: I think it's fairly unlikely but, you know, I'm just interested in your response.

MS WEBB: Yeah. That was looked at specifically. I'll have to – I can come back to you on that.

PROF FELL: Please.

MS WEBB: I can't recall the details, but I know that we looked at the difference of the surface water mixing with the groundwater and then being put back in underground.

PROF FELL: Indeed, but on the questions, I – you know, a hypothetical.

MS WEBB: Yeah.

PROF FELL: If you did have a slightly higher concentration in your stored water, basically, would that leech out into the groundwater system.

MS WEBB: I think the dilution was so great that it made no difference, but let me come back to you on that.

PROF FELL: Well, there's an osmotic effect, as well. Whenever I mention osmosis to groundwater people, they freak out, but it's there. Right.

MS WEBB: There was – yeah. If we can come back on that, but my – from memory, the changes away from the mine workings themselves extended to about one or two metres from the mine, and after that, everything was undetectable, every contaminant.

PROF FELL: Okay. Thank you.

MS WEBB: That probably addresses it, but we did look at that in detail.

PROF FELL: Ostensibly, taking mine water out, putting it back is a perfectly acceptable thing to do, logically.

MS WEBB: Yeah. It's efficient. Yeah.

MR GATES: Do – Liz, do we know where the groundwater is going to discharge to eventually, you know, once recovery occurs and - - -

MS WEBB: I guess you're looking at the groundwater flow directions as they sit now. Is that what you mean, once it's recovered? So there's a – we're at the top of a – of the groundwater recharge zone where we are, where you've got some water flowing into the incised rivers to the west and then you've got the dip of the coal going to the east. So it's right at the top of the catchment, so you have – if you look at the – I guess, the groundwater contours, it's away from the mine.

MR GATES: And there was some community concern that eventually any change in water quality will discharge, you know, where the groundwater discharges, you know, and - - -

MS WEBB: But that's what we – and we took that on board and looked at that quite closely in terms of modelling the particle trackings from the mine, and that was where that comment about the change in chemistry didn't extend more than two metres because of the high quality water generally that's going back in there that you – there was no detectable changes beyond that, but we can find that reference and those stats and make that - - -

PROF FELL: You can help me.

MS WEBB: Yeah.

PROF FELL: I mean, basically, you have to have a – you've got licenses that add up to almost two gig.

MS WEBB: Yeah.

PROF FELL: One gig of that is actual water you pull out. You seem to have to buy a licence to put it back.

MS WEBB: Yeah.

PROF FELL: Is that the truth?

MS WEBB: There's – there's a lot of other examples of mines just licensing their net take. I haven't ..... off the top of my head, but that is common, whereas Hume is licensing the full take and by – if you look at a lawyer's definition of the Aquifer Interference Policy, that's where we ended up being on a very conservative place in licensing all of it.

PROF FELL: Well, that's what struck me.

MS WEBB: Yes.

PROF FELL: I couldn't see why.

MR GATES: And are you also conservative because you haven't modelled the emplacement of the water underground?

MS WEBB: We have modelled that.

MR GATES: You have?

MS WEBB: Yeah.

MR GATES: And that reduces your drawdowns as a result of your emplacement?

MS WEBB: Yeah. It does – it does make – make some differences in terms of putting it back in, but because a lot of them are down dip, it's, you know, it helps speed the recovery up.

PROF FELL: Yes. I - - -

MS WEBB: But not a significant .....

PROF FELL: I sense that the model was somewhat imperfect in the way it actually handled that, you know, the ..... full or half full. All that sort of – there's some issues raised about that.

MS WEBB: There was a – yeah, there was, and there was a lot of fine-tuning that went on throughout the response to submissions on - - -

PROF FELL: Okay. But we've said the model is good enough for what we're about.

MS WEBB: Yeah. Yeah. And - - -

PROF FELL: And we've got a rough idea of what the water – it's unlikely to be substantially more - - -

MS WEBB: No. And - - -

PROF FELL: - - - than what we've got.

MS WEBB: And if you look at – I mean, I'm jumping right through, but if you look at the uncertainty analysis that was done, the uncertainty bands are very narrow around the difference between 50, 60, 70, 90 percentile.

PROF FELL: Yeah.

MS WEBB: So what – I guess what that means is the base case model is quite tight. Like, we actually have quite a lot of certainty in the uncertainty, if that makes sense. You know, you haven't got – you haven't got the uncertainty saying, "Look, it could be this or this." You've got it saying, "Look, it could be this or this." It's very – it's a very tight band.

PROF FELL: Well, George made the point you have a look at what other mines are getting. And my quick sum as to how much you take out, got to put that back and there's a bit of leakage, as well, and it sort of all checks out reasonably, so I don't think it's too far out of whack.

MR GATES: And that was the reason for my question on the Clarence Colliery, you know, because Dendrobiums get 7.5 megalitres a day and Berrima had three and a half megalitres a day inflow and you're predicting 5.8 or something or other, so it was just a sanity check to see where it was in terms of, you know, other mines.

MS WEBB: We've got a couple of slides on that exact point - - -

MR DUNCAN: We've got some slides that could probably address that.

MS WEBB: - - - George, that we've put together, so - - -

PROF FELL: Yeah. Well, let's delve into this make good question, then, because that's one that seems to hang around. Now, you've broken the 94 down into, you know, what you might have to do, and 15 are left with, well, we mightn't be able to do anything, and one of the questions on that list was, is it worth tipping out some of the water and simply piping it up to them?

MS WEBB: That's one of your questions. Yeah.

PROF FELL: I mean, does that render the project impossible - - -

MS WEBB: I guess - - -

PROF FELL: - - - if you were to – I'm very conscious, say, that Santos at Narrabri are running a relatively small water treatment plant quite successfully, and the cost isn't all that high. That's for their current discovery stuff. All right. It's about a two megalitre a day or something, whatever.

MS WEBB: Yeah.

MR ANDERSON: If I may – sorry, Liz. Maybe if we job to slide 67, where we had the breakdown of make good.

PROF FELL: Okay. That will be useful.

MR ANDERSON: That may be – may enliven - - -

PROF FELL: Yeah. Sorry. I've done it again.

MR ANDERSON: No, no.

MS WEBB: Do you want to flick through these slides?

MS TUOR: I think – could we just quickly flick through them?

MS WEBB: And then we can come that - - -

MS TUOR: Go onto that.

PROF FELL: Yeah.

MR GATES: - - - when we get there to 67.

MR DUNCAN: What I will attempt to do is the – some parts I'll just move through very quickly because - - -

MS TUOR: Yeah, yeah.

MR DUNCAN: - - - you've already discussed them. DP&E have relied on this DoI Water to provide feedback in coal. Page 2 of attachment A of the DoI Water response to submission document, DoI Water state DoI Water is aware that DP&E has engaged an independent groundwater expert to review the latest work. DoI Water has not had access to this document in preparation of this advice.

PROF FELL: Ever so useful.

MR DUNCAN: Just moving on, in terms of the data collection, DP&E have sufficient data. We've got eight years of data, 24 surface water quality monitoring sites, 11 stream gauges, 54 bores and so on. Got 11 vibrating wire through private land owner bores. Comparison, number of pumping tests where we sit with some

other projects. Number of slug tests and where we sit with other projects. Number of packer tests, number of core samples analysed, and this just looks at the conceptual model, and the government expert conceptual models are in accordance with Australian modelling guidelines and fit for purpose.

Software design, extend grid boundaries, parameters form a good example for best practice in design and execution. That just looks at the process for refining model post-RtS, and basically DS models fit for mining impact prediction purposes, refinement through RtS required very robust uncertainty analysis in collaboration with DoI Water. The RtS model is fundamentally a good example of best practice in design and execution.

There's comment that the modelling end burden is a question in terms of thickness, extent and assigned permeability in the model. The Hume coal model has been set up with the appropriate thickness. No low flow permeability parameters to limit the potential connection between the coal seam and ..... sandstone, does not unduly restrict the ground flow – groundwater flow into the workings. And again, the model class, we've talked about that. We're happy it's a class 2. I'll just duck over it.

MS WEBB: Yeah. We'll just skip through it.

MR DUNCAN: Yeah. This just looks at the uncertainty analysis. Again it's the uncertainty analysis. This - - -

PROF FELL: Could we just go back to that one for a moment. The – we'll be meeting with Drs Pell and Anderson later, so I'm quite interested in your take on that.

MR DUNCAN: Okay. Okay.

PROF FELL: If not now, in a few moments. All right.

MR DUNCAN: Yeah. Okay. The – well, I'll start with this one. Recognise the efforts of strength, uncertainty and sensitivity analysis in the RtS model. They raise that critics Pell and Anderson still have residual concerns on the uncertainty analysis. DP&E state ..... model provide a range of predictions that can be used to make a reasonable assessment of the impacts. They cite residual uncertainty as a reason for adopting a precautionary approach, and that model conservative results should be adopted.

The uncertainty analysis modelling – uncertainty analysis for Hume was scoped with DoI Water and the method agreed upon. As agreed, the uncertainty analysis focused on the most sensitive model parameters, hydraulic conductivity. Hume model uncertainty analysis tested a large range of hydraulic conductivity values from data within the area but produced a relatively tight range of inflow volumes drawdown. This equates to high confidence in the model results.

DPI comment 90 percentile uncertainty adopted for licencing and make good. The standard modelling adopts the most likely parameters, 50 percentile. Sensitivity analysis used multiple model runs, accesses the importance of particular parameters, values on model prediction. Uncertainty analysis tests range of known measurements allows for more robust qualification of uncertainty, 50 percentile median used in most approvals. All standard models are 50 percentile. Pilbara uncertainty analysis recommended a 20 percentile to 80 percentile range. Bulga did an uncertainty analysis and confirmed the standard base case model was equal to 50 percentile.

Hume adopted a 67 percentile conservative due to the community and social concern. The 90 per centile, extremely conservative, not likely to occur even in extreme conditions. This looks at the table, 90 percentile uncertainty adopted for licencing and make good. 67 percentile and then 90 percentile, about as likely as not for the 67 percentile, and very unlikely 90 percentile, and unlikely is the 67 to 90. Uncertainty communicate – consistent with methods outlined in the IESC draft ..... of uncertainty analysis in groundwater modelling. Descriptors on the likelihood of key impacts directly linked with probability classes and uncertainty. Liz, you can do this one.

MS WEBB: Sure. I guess this is just a quick – one of the questions we picked up was the difference between the 67th and the 90th in terms of – from George, was it? So I guess just showing you what those – those are, so it's an increase of 196 megalitres. So when you're talking about the difference between 2059 and 225, it's not a huge increase in volume for that change in percentage, so that's what – we're talking about the tight band in terms of the uncertainty, and that's pretty much it for that slide.

MR DUNCAN: Okay.

MS WEBB: You can see the curves are very similar.

MR DUNCAN: Right. Level of impact – the project is predicted to have significant impacts on highly productive groundwater aquifer. The drawdown impacts on the aquifer would be most significant for any mining project that has ever been assessed in New South Wales. Depressurisation and drawdown extend from Hume is modest in compared to many other assessed mining projects in New South Wales. Aquifer interference policy defines highly productive aquifers are those that have yields in excess of five litres a second. New South Wales Government database reports that average yield of bores within nine kilometres of Hume project having yield of two litres a second.

MS TUOR: So – sorry. Just on that, my understanding of your stating that is that you would dispute that this is a - - -

MR DUNCAN: Yes.

MS TUOR: - - - highly productive aquifer.

MS WEBB: We've still - - -

MR DUNCAN: ..... statement.

MS WEBB: We've done the assessment under a highly – under the aquifer interference policy, we've assumed they're highly productive, but I guess this is just a point to say although we've done that anyway, it is not as – it's not a highly productive system if you look at that average, but because it's a fractured rock environment, you have some high and some low, but on average, we're talking about something that's less, although we did assess it based on a high. That was just to make that point.

MR GATES: Just while we're talking about this pumping, you didn't have good pumping usage data, so you've had to assume some percentage of entitlement was being used.

MS WEBB: That's right.

MR GATES: And you've assumed quite a large – quite a high percentage of entitlement has been used.

MS WEBB: Yes.

MR GATES: Something – just under 90 per cent or something. That's unusually high to assume that that – all that water is being used. Individually it might be 90 per cent, but across board, I thought that was a high value.

MS WEBB: Yeah. I guess – I guess that was looked at in the modelling and as part of the calibration of the model, George, so when the original model was doing in the EIS, that was looked at. That was looked at again when it was reviewed through the RtS about the level of pumping in that area. I think that seemed to align with what the model was – was saying and – yeah. It's less – less than 100, but I guess you've got that – that's where – where the model came out at in terms of looking at that usage, so - - -

MR GATES: And I certainly - - -

MS WEBB: We did question that and we - - -

MR GATES: Yes.

MS WEBB: - - - went back through it a couple of times.

MR GATES: And had a look. Yes.

MS WEBB: Yes.

MR GATES: Yes. Okay.

MR DUNCAN: This looks at the comparison to other mines of the distance to two metre drawdown from the ..... workings so this looks at a number of other projects that have been approved and ..... two kilometres, so we're not quite significantly impacted.

MS WEBB: I think this is getting to your point, George, about the difference in ..... environmental impact and the impact on bores. So if you look at drawdown, it's not as great as a lot of other mines, but .....

MR GATES: So I haven't seen this diagram before, but it says that ..... mine – the two metre drawdown contour is 10 kilometres ..... and your two metre - - -

MS WEBB: Yes.

MR GATES: - - - contour is much less.

MS WEBB: Yes.

MR DUNCAN: This looks at the comparison of the mine's groundwater inflow to ..... underground mines and looks at the water ..... as you can see, 5.9 ..... that answers the issue about Clarence, 18.

MR GATES: Yes, it does. Yes.

MR DUNCAN: Comparison to mines ..... groundwater recover used from commencement of mining, again, were generally fairly low by comparison to other mines.

MR GATES: These are all model prediction results. We're comparing like with like.

MS WEBB: That's it. They're model – they're published data based on either approved mines or mines being – are under approval on – off the major project's website. So you know what it's like trying to compare. Sometimes it's not exactly the same, but we have had a pretty good lit review of all of that data to try and give – we wanted to give some context to the statements about it being a ..... mine to compare it to some other mines, just to show that point.

MR DUNCAN: Let's just look at the boreholes – the number of bores through experience right around is 94 bores. For the 60, 70 per cent ..... compared to 118 for the 90 per cent. High number of bores is ..... the high density bores in the area and most bores .....

MS WEBB: That's a location of bores, not a volume. A location.

MR DUNCAN: This looks at the make good – make good arrangements for ..... suitable or practical. DP – DoI did not raise many major concerns with technical feasibility of ..... options. DP&E then stated that the department generally accept the applicant's ..... make good options are technically feasible. Their expert states make good arrangements are reasonable in principle and consistent with make good arrangements, guidelines in Queensland ..... dewatering of one horizon, the middle coal seam – mine's coal seam – sorry – does not preclude the occurrence of saturated aquifer conditions above, and this – you get a depressurisation immediately above the coal seam, but you still have access to water further up in the strata ..... does not ..... simply lowers the groundwater pressure level. Huma Coal, DPE ..... all agree that the ..... arrangements are technically feasible and suitable and practical to physically ..... question why. Despite the above arrangement the DPI ..... is not suitable or practical.

MR SHARROCK: So may I ask – and so you're saying DP are saying two things. Second last paragraph. DPE feasible, then DPE not suitable; is that right?

MS WEBB: They're saying that it is technically feasible.

MR SHARROCK: Technically feasible.

MS WEBB: Yes.

MR DUNCAN: Yes.

MR GATES: But not suitable for - - -

MS WEBB: But not suitable for .....

MR GATES: - - - for social reasons.

MS WEBB: I guess ..... - - -

MR DUNCAN: Because of the administrators. We will get to that.

MR GATES: Okay.

MR DUNCAN: I'm mindful of the time. This is the make-good strategy ..... make good arrangements for ..... not suitable or practical. Hume proposed the detail make good assessment ..... that is ..... five-year lots. Strategy is flexible and suitable arrangements made for each individual landholder. Make-good arrangements will be suitable and practical where all parties are ..... only 16 bores in the first five years and 64 bore, or 68 per cent of the bores, make good with mining strategies such as increased pumping costs and lowering pumps. So if you look at the table here we got ..... five to 10, 15, 20 and out to 25 to plus 25 years. Increasing ..... approximately one third ..... pump in the bore approximately a third again, and then replaced stock

and domestics as probably 15 bores ..... approximately 15. Hume ..... comments not suitable ..... are inaccurate.

DP&E comments undermine the ability to hold fair assessment of the project. Administration. DP&E substantial levels of disruption to the community, considerable disagreement between actual ..... impacts and proposed make good option. Process will rely heavily on dispute resolution. Extensive time delays and lengthy dispute resolution. And these DP&E comments ..... administrative in nature ..... is only six metres, 68 per cent of the bores, make good with ..... measures. Step 1 of make good is site visit and excess arrangements already exist with 20 landholders. Only 16 negotiations needed in the first five years. Make good is a landholder entitlement. If they don't choose to exercise the right, then there is no dispute. It is an opt-in arrangement which is similar to most make-good arrangements - - -

MR .....: .....

MR DUNCAN: - - - existing development approvals. This just looks at the total volume in storage versus what the take is and basically you're looking at just ..... need 2.059 ..... licensing. We ..... have 1.9 which is 93 per cent. It's worthwhile pointing out when we first started this project both planning and water said that we would never get the licenses we needed, and that was – been the theme and even now opposition said the same thing, but it came as quite a shock when suddenly we walked through the door and we've got 93 per cent of the licences. And a lot of that has been achieved in the last 12 months, and we already had offers of other licences from within the Highlands. So - - -

MR GATES: Would I be right in assuming that people are selling a component of their entitlement that they haven't historically used?

MR DUNCAN: Either selling it or all of it, that they haven't historically used, that's correct. And we're not the only ones buying or licences. There's other companies and organisations buying licences in the Highlands.

PROF FELL: So I don't think that's seen as a problem.

MS WEBB: That's not – you don't see it as a problem. Yes.

MR DUNCAN: We don't see licences as an issue.

PROF FELL: Very well. But I think .....

MR DUNCAN: Well, we already have 93 per cent.

MS WEBB: .....

MR DUNCAN: Well, we don't need the full amount ..... project.

MS WEBB: Yes.

MR DUNCAN: So we've already got more than enough.

MS WEBB: Just get the next slide if you don't – if you don't see it as an issue then.

MR DUNCAN: Yes.

MS WEBB: Just skip that one. If you're comfortable with that, then that's fine. That just says the same thing again. That's - - -

MR DUNCAN: Okay.

MS WEBB: Yes.

MR DUNCAN: Economics. Basically, this was for an original EIS by BAEconomics and the ..... NPV7. New South Wales direct was 295 million. New South Wales indirect is 73 to 76 mill. Local area direct was 84; local area indirect, 44. Total externals was estimated at 21 million, direct benefit cost ratio 14 to 1. This was revised – here we go. This was revised in October '18 and the NPV based on changes to both pricing, and this was based on the chief economist's forecast, updated 2018. New South Wales direct was now 373 million; indirect, 119 to 149; local area, 107; local area indirect, 54; total externals was 2 million; and it was reduced by approximately 19 million of greenhouse gas cost following guidance from DP&E on ..... of this externality and another project's assessment. So you're seeing the benefit-to-cost ratio has changed significantly.

DP&E issues. The applicant's net estimate economic benefits are 373 – is very – relatively low in comparison to many other coal mining projects in the southern coal ..... across New South Wales. Applicant's intention to export coal is likely to reduce economic benefits to the State. The department does not consider that there is any ..... of thermal coal that needs to be filled. The State of – the State of New South Wales produces up to 170-odd million tonnes of thermal coal per year.

Treasury guidelines make it clear that labour should be considered as a cost rather than a benefit. New South Wales Treasury guidelines state that the cost of labour is its opportunity cost, and that's straight out of the guidelines. This is not the same as saying that labour should be treated as a cost rather than as a benefit. This means the net benefit should be counted by subtracting the opportunity cost, consistent with the general approach, to present only net benefits, this completely consistent with the approach taken by BAEconomics.

Applicant's intention to export coal is likely to reduce economic benefit to the State. It is false to suggest that exporting coal could reduce the economic benefit to New South Wales compared to net benefits associated within coal – EIS and RtS. The economic analysis has been undertaken under the assumption that the coal is exported. The State benefits are, therefore, entirely consistent with the intention to

export coal. Residual uncertainty could substantially reduce the economic case ..... DP&E failed to consider several areas of potential considerable upshot, particularly price and volume. There are likely to be more than offset any potential residual uncertainties.

Furthermore, sterilisation of coal due to geological structure has already been allowed for in the mine's production schedule and economic model. Coal sterilisation due to geological structure acts to shorten the mine life, not reduce the annual production volume as assumed by DP&E, thereby limiting the NPV. There are no residual uncertainties that could act, individually or in combination, to materially reduce the net economic benefits. The mine plan when it was deigned was – looked at the structural geology of the area. Okay. That was taken into consideration in terms of the layout and also the production schedule.

MS TUOR: So just back on that slide. So if we were hypothetically to accept that there could be additional safety requirements required in terms of supporting the roof, etcetera, etcetera, so changes to the mine layout, and the requirement for a water treatment work, so those sorts of issues – if they were to be things that ended up being things that you needed to look at, how does that potentially impact your NPV?

MR DUNCAN: I don't see any of those as showstoppers in terms of what are treatment works. The cost of water treatment, if it became necessary, wouldn't necessarily become – make the project uneconomic. Yes, you are looking – changes in geology and structure may require additional support from time to time, but with the number of developing units in operation, that would potentially only be one in five. So that's only 20 per cent. So the impact, while it may exist, would be minor, unlike a long wall. With the longwall operation, you render a significant geology ..... that's 80 to 85 per cent of your production would be adversely impacted and would have a substantial impact on the revenue and the cost.

MR SHARROCK: I have some geological questions. Maybe you've got some appropriate slides to come or maybe it's appropriate to ask them now. Time is of the essence, isn't it?

MR ANDERSON: We've got three more economic slides and then we're finished.

MR DUNCAN: Yeah.

MR SHARROCK: I have a question on economics, too, but anyway.

MR DUNCAN: Department does not consider there is any existing shortage in coking coal or thermal coal that needs to be filled. The State of New South Wales produces 175 million tonnes of thermal coal per year. The State of New South Wales does not produce any thermal coal. Private enterprise does. That's on the free market.

PROF FELL: Well, we won't discuss .....

MR DUNCAN: I won't even go there.

PROF FELL: You've made your point.

MR DUNCAN: But this is the most important slide. Even the applicants estimate a net economic benefit of 373 million is relatively low in comparison to many other coal mining projects in Southern Coalfields and across New South Wales. False. Analysis of a range of other projects recently assessed by DP&E shows the estimate is not – estimated net economic benefits of 373 are quite high compared to other coal mining projects. If you look at Hume and you look at Springvale and all – they're listed there. 373, relatively low economic benefit. 200, major economic benefit. And it goes on. Moolarben, 311, extensive benefits. Airly, 125, significant economic benefit. Russell Vale, Wongawilli, significant, significant, quite small by comparison. Metropolitan, 436 million. The department is satisfied. Okay.

MR SHARROCK: Interesting table.

MR DUNCAN: That really sums it up. Looking at the local economic benefits, there's 400 full-time equivalent jobs during construction over the three years. 300 full-time equivalent jobs during operation. There's 60 flow-on jobs during the life of the mine to the local area. Over 600 businesses and individuals have registered an expression of interest in working with Hume Coal and in a discounted basis, there's $9000 net direct benefit and indirect benefits per household in the Southern Highlands.

Looking at the statistical – the median total employee income, Southern Highlands is 44,000. Wollondilly, which is adjacent, is 52. And Goulburn, again, is slightly higher, which is adjacent. Both those areas form part of our employment catchment area, okay. We've stipulated 45 minutes from the mine. Because of the Hume Expressway, areas outside the immediate Highlands do fall into the employment catchment area. That's - - -

MS TUOR: The table before which showed the comparison in terms of NPV with other mines, presumably, that table was made – or something similar would have been in the economic assessment that was independently reviewed by - - -

MR DUNCAN: That wasn't put in the economic. That was something that we've done ourselves by researching what projects have been approved recently.

MS TUOR: So in terms of someone independently reviewing it and checking that you're comparing like with like, that hasn't - - -

MR DUNCAN: We haven't had anyone go and check that, but, as I said, it comes straight out of the reports associated with those projects.

MR ANDERSON: So it's all open-source data that we've retrieved this from, so it's all publicly available.

PROF FELL: Now, I'm assuming you have no problem about us sharing this information with DPE. Right.

MS TUOR: Well, presumably, all of this slide presentation would be something that will go on our department's web – the Commission's website.

MR D. KOPPERS: Ben and I have had a chat - - -

MR ANDERSON: So we've had a discussion and – yeah, sorry, with David, and the intent is we'll go through and provide a version and if there is anything – because it's going to be public – that is deemed sensitive, we will remove it and inform the Commission of what slides we removed. But, you know, for instance, this one has DP&E's comments on it for – against those assessments, so planning is aware and they're public documents to start off with, so there's nothing - - -

MR SHARROCK: So many of these slides, we've not seen. I saw on the way through there's some that look familiar from the report, so – so you will send us a version of that?

MR ANDERSON: Correct.

MR SHARROCK: And if there's some omitted, you will say why.

MS TUOR: Well, presumably the Commission will get this version, but the question is what version will go on the web to be publicly available.

MR ANDERSON: Correct. Correct. So we've had that discussion.

MS TUOR: Yeah.

MR McLENNAN: And this will – sorry, this will form part of our response to the matters raised by DP in their assessment report that will provide - - -

PROF FELL: So you're putting forward a responsive - - -

MR McLENNAN: We'll put a submission in. That's our intent.

PROF FELL: Have you been asked or are you just doing that?

MR ANDERSON: That's our intention. We haven't been asked, so it is our intention to put a submission in.

MR .....: .....

MR SHARROCK: Could I ask about one of the earlier economics slides. It's the one that's got the benefit-costs ratio and it went a bit quick for me. Do you mind - - -

MR DUNCAN: Which, sorry?

MR SHARROCK: - - - going back there – benefit-cost ratio. It's got some – I think it might be the one before - - -

MR DUNCAN: That one?

MR SHARROCK: See that, well, if a – it's direct benefit-cost ratio so that direct benefit to New South Wales 373, so I assume the denominator must be 20. The project's going to cost more than 20, isn't it? I mean, it's – to go from 373 to 187, it's about half, isn't it?

MR DUNCAN: 187 is - - -

MR SHARROCK: I mean, if the direct benefit to New South Wales is - - -

MR DUNCAN: Yes.

MR SHARROCK: - - - 373 million - - -

MR DUNCAN: Yes.

MR SHARROCK: And a benefit to cost ratio, so to get that number, what do I divide by? I divide by two, don't I?

MR .....: The external costs - - -

MR DUNCAN: I can't ..... it on that. It's - - -

MR SHARROCK: It seems – I mean, it seems - - -

MR DUNCAN: I understand what you're saying.

MR SHARROCK: I'm not querying your 373 - - -

MR DUNCAN: Yes.

MR SHARROCK: - - - 119, that just seems to be a very odd unbelievably high ratio, does it not?

MR DUNCAN: Well, I think with the New South Government if the ratio is going one to one, it should proceed.

MR SHARROCK: Indeed. That's – I mean, that in itself - - -

MR DUNCAN: Yes.

MR SHARROCK: - - - indicates - - -

MR DUNCAN: I will take that – and - - -

MR .....: Yes.

MR DUNCAN: We will come back the explanation - - -

MR SHARROCK: I have some - - -

MR DUNCAN: - - - on that.

MR SHARROCK: - - - questions about geology because geology – geological data finds its way through many parts of the reports and the point is made by a number of people in reports that while you've got a large number of boreholes over the area, it's a very big area and there are areas where you don't have much geological data. Now, I'm assuming that the reason why you don't might be that there are landowners that won't allow you onto their land to do drilling.

MR DUNCAN: That's true. There is landowners who won't allow us on our land – on the land that we're drilling. We have drilled on landowners' – other landowners in the past and we drill predominantly. If you go back - - -

MR SHARROCK: It is a long way back, isn't it?

MR ANDERSON: Yes.

MS WEBB That's right.

MR SHARROCK: Sorry about that.

MR ANDERSON: It's - - -

MS WEBB: That's right.

MR ANDERSON: It's the second slide from the start so - - -

MS WEBB: Gosh.

MR ANDERSON: There we are .....

MR DUNCAN: Next – I got there. We – apart from the land up here, right, that we own, Mereworth and Evandale, we own quite a large track of land just above to the north of the Illawong highway as well. We were able to drill on that. We were able to drill on the property that was adjacent to it on the eastern side. There was other

land along Golden Vale Road we were able to drill on and also out the Belanglo State Forest. Forestry had no trouble with us drilling out there and there was private properties we've drilled on out in that area as well. So while we've been able to drill on a lot of land, right, there is some and, to be fair, some of the people you will be talking to on the other side of the fence their land was land built. We weren't allowed to drill on and they wouldn't give us permission to drill on. So we haven't been able to drill over the whole project area.

MR SHARROCK: Well, as I understand it, then, you've got to try and negotiate an agreement with the landowner and if the other party won't come to the party, there's not much you can do, but if you need those boreholes, because there's been several questions about there's not enough geological data, there's not enough detail and your response has been, "Well, we're not designing a mine today. We're at the very early stage", so I presume from that you will get them later, but what are you going to do with those landowners that won't let you on them. I mean, you go to the mining warden if they still exist.

MR DUNCAN: We've been, in some cases, we have been through a series of conciliation and there's just no outcome. Some of them went for two years. We accept that there is certain properties that we won't be able to drill on. That said, we have a lot of information and the mining system we're using, it's not a longwall mining system which is really depending on a high level of borehole and geological information and interpretation - - -

MR SHARROCK: Is depended on, did you say?

MR DUNCAN: Depended on. Yes. We have five development units. Right. And if one development unit ..... adverse ..... we have the ability to change direction and it only affects 20 per cent of the production. It doesn't affect 80 per cent. Right. The type of mining system we have is more flexible than a longwall or anything of a similar nature so, therefore, not being able to drill on some properties and have geological information doesn't present a major concern to us.

MR SHARROCK: When you have to do the more detailed mine plan - - -

MR DUNCAN: Yes.

MR SHARROCK: - - - won't the regular insist, "We need more detail than that"?

MR DUNCAN: No.

MR SHARROCK: And what if you hit a 10-metre fault in one of these - - -

MR DUNCAN: It depends on where the 10-metre fault is and how it impacts on the mine plan.

MR SHARROCK: Yes.

MR DUNCAN: A 10-metre fault – if it's in the mains, you would probably go through it, but if it's in the one of the panels, that's a different story.

MR SHARROCK: Yes. Yes. Yes.

MR DUNCAN: You'd probably look at just stopping at that point and turning it off.

MR SHARROCK: I mean - - -

MR DUNCAN: And you can do that with the type of mining system we have.

MR SHARROCK: Yes. Yes. I mean, I would – I guess where my question is coming from it'd be better to have more geological data, but even if I ask you that question, if you can't get ..... people's properties, you can't do it, but, I mean, it seems to me – even though, as you say, it's a bigger number, but some of them are a pretty long way part. I mean, you don't even have – at this stage, you don't really have measured reserves, so you can't do a mine plan.

MR DUNCAN: You know, that's true, but we don't believe there's insufficient information that we have currently that would prohibit us from designing and developing a mine plan.

MR FIRTH: Can I talk to that, Creig?

MR DUNCAN: Yes .....

MR FIRTH: If you – this has all got a little bit convoluted over time. If you go back to the original intent of the layout, it was based on using geometry, not geology. And the original design was done to try and make it geology independent because I was aware of the issues with, say, Mandalong where the mine design was highly reliant on geology, and I'm a mining engineer, but I understand that you can never be fully, you know, confident with the nature of the geology. So we limited the spans between barriers so that the geology of the overburden was really a secondary question. It's come into the vernacular - - -

MR SHARROCK: Yes.

MR FIRTH: - - - as part of the DP&Es independent experts. And when we did the numerical model, we had to bring geology in, but those results show that the outcomes are insensitive to geology. The only geology that personally I'm concerned about is the major faults which will actually truncate the bits of the mine - - -

MR SHARROCK: Yes.

MR FIRTH: - - - but in terms of the robustness of the mine design, from day 1, we've never been reliant on the nature of the overburden to ensure the integrity of

that mine design. And I think that has been lost a little bit in all the 3-D numerical modelling and all the comments that have come later on. If you go back to the very early – the initial design reports, it was a case of limited geometry and we're relying on geometry, not geology.

PROF FELL: Gentlemen, ladies, it's getting close to time. I am going to ask the Commissioners if they have any last questions and then ask ..... so Annelise.

MS TUOR: You always go to me first. I think I know the answer, but just in terms of the department's assessment on groundwater, they – my understanding of it is they say whatever model you use, whatever the – it's – there would be a significant ground impacts on the aquifer. I think it's in the questions that we sent to you, the quote. And then they – so they say it's not a matter of avoidance and minimisation. It becomes a matter of the make good strategy, the mitigation, and then there seems to be general agreement that there's technical – the technical aspects of the make good can be achieved, but it's then the sort of feasibility in terms of getting access to people's land.

So I just wanted to get your opinion as to whether you agree to that first premise that whatever range that you use in the model, there will be – I can't see the words here, but – yeah. Given the various residual uncertainty, the department – now, where is it? Just basically say there will be significant impacts, so I suppose that's point 1, do you actually agree with that as – that there are significant impacts, and then it becomes a question of how you mitigate those impacts through a make good strategy.

MS WEBB: Well, I think if I can answer that. The impact from an environmental point of view I guess in comparison to other mines you can see is not that great, and that's to do with the mine design, so you've got drawdown extension – you know, the extension of drawdown and the depressurisation and the inflows are not that high, so that's – I guess significant impacts – if you're talking about those sort of impacts, we disagree that they're significant because they're smaller than a lot of other approved projects and we can manage it.

From a social, I guess, significance, or an administrative significance in the make good, I think that's where the comments are getting a bit muddied up in some of the DPE work, and I guess we counter that to say, no, because we've done that detailed make good assessment, we can – you know, we're not saying that there's not a lot of bores. We're very open about that. But we're saying there is a pathway we can follow to – and if everybody plays ball, we can work through this. Yeah. And a lot of those make good measures are relatively minor.

MR ANDERSON: I suppose to put it in perspective, for the majority of the bores, we're paying additional pumping costs. We're talking about cents to dollars a year in additional pumping costs of seven cents or something a year in addition, and we've had to calculate that. So - - -

MS ARMIT: And that's only 70 per cent of the bore spend, 68 per cent.

MR ANDERSON: Yeah.

MS ARMIT: In that category.

MR ANDERSON: So 68 per cent once the bores – and that's also working on some assumptions about where that bore is placed – where the pump is placed within the bore as well. They – a conservative approach. So in terms of the scale there, we're not talking huge amounts. Sorry. Yeah. I'm aware of time.

PROF FELL: You happy then?

MR SHARROCK: Look, I just have one very general question. Creig, you've presented us with a lot of data today. I've got to assimilate that. You've answered a lot of questions that the DPE put out there. But there's – would I – I just go back to one of my original questions. Do you still think there are outstanding questions or unresolved issues regarding reliability of the 3D model? I mean, your answer may well be no, and then it's our problem, is it not? We have your view and we have a DPE view. Is it – are there still things outstanding on the 3D model or is it all agreed?

PROF HEBBLEWHITE: In terms of the outcome of the 3D model, I – we believe there's no significant issues. There are undoubtedly detailed – I would call them academic differences of opinion in relation to failure criteria used and five, 10 per cent differences here and there. Those differences are there, but I would suggest that from what we've looked at, even if you took up those alternative suggestions, they would not make a material difference to the assessment of the model. The other comment I'd make that also backs that up is that when we modelled the hypothetical removal of a web pillar or panel, we removed it completely. In reality, even if they were to fail, they would actually still be contributing significantly to overburden support. So to remove them to zero load-carrying capacity is an absolutely extreme - - -

MR SHARROCK: Yes.

PROF HEBBLEWHITE: - - - end point. So, again, in short, we don't – the outcomes of the model, we don't believe there are fundamental differences.

MR FIRTH: And there'll be a written response. Unfortunately the independent expert's review of the modelling, we haven't had the opportunity to respond to that, so it's gone into DP&E's assessment, and we still haven't – so we'll be responding to that formally.

PROF FELL: Okay.

MR SHARROCK: Thank you.

MR FIRTH: I'm the peer review process isn't over yet.

PROF FELL: Sure.

MR GATES: Look, we've covered off on quite a few of the groundwater issues, but there are other smaller issues that we've asked some questions. Are we going to get a - - -

MR DUNCAN: Yes.

MR GATES: - - - a response to that?

MR DUNCAN: We are – when we put our submission in - - -

MR GATES: Yeah.

MR DUNCAN: - - - we will be responding to every question. Even though we've covered it here today - - -

MR GATES: Yeah.

MR DUNCAN: - - - we'll still give a written response to every question you've provided to us.

PROF FELL: I'd simply offer the comment - - -

MR DUNCAN: And that'll include all those ones as well.

PROF FELL: Some of the questions we sort of soft off into nothingness with information you've given us. Please, feel free to actually say that, if you follow me. And this is irrelevant, really. I've finished.

MS WEBB: Yeah. Some of the - - -

MR DUNCAN: We will.

MS WEBB: - - - questions, that's right, we found we'd already covered - - -

PROF FELL: Yeah.

MS WEBB: - - - and there's others there that we can put some points around that.

MR DUNCAN: Some were a straight out no and don't require no further - - -

PROF FELL: Well, that's right. But, I mean, fair enough. Now - - -

MR DUNCAN: Yes.

PROF FELL: - - - you were going to tell me about the other assessments which weren't DP&E, but I think we've run out of time for that.

MR DUNCAN: Yes.

PROF FELL: So it's over to you – your comments to us as a sort of closing if - - -

MR DUNCAN: Well, in terms of the process now, we – what we will be doing, putting forward a detailed assessment report. Right. Attached to that will be our expert reports that have had the chance now to review - - -

PROF FELL: Yes.

MR DUNCAN: - - - the department's ..... independent assessment reports and also in terms of the questions that have been put to us in writing. We will be responding to all those questions - - -

PROF FELL: Now, just on that - - -

MR DUNCAN: - - - and attaching the report - - -

MR GATES: Sorry. Forgive me. Your very helpful comments up there – the DP&E said this and these are the facts. Will that be coming in your formal responses?

MR DUNCAN: That will be included.

PROF FELL: Okay. Thank you.

MS TUOR: Can I just clarify the process, though, through you, David. How long ago were these independent reports done? Because – I mean, this has been going on a huge amount of time and I suppose the concern that I have is that you have, you know, independent reports which, presumably – I don't know what the dates were, but there's been, presumably, time to have had them addressed and then there's the department's report.

And then if we get more information, then who's going to go and assess that information and then when they assess that – it's just – at some point, we've got a project and we've got an assessment of that project and it's not our job to do further assessments and I'm just wondering who's going to be doing this assessment of all the extra information, and in terms of procedural fairness, obviously, if you put further information and then, you know, the community, etcetera, has to have the time to assess that. So I just don't want to get onto this - - -

PROF FELL: I mean, our job basically is commission ..... identify the issues and make some recommendations. It then goes back to DP&E for an updated assessment and then it comes back to the Commission - - -

MS TUOR: Yes, but if we get a lot - - -

PROF FELL: - - - for a decision.

MS TUOR: - - - of – I mean, even just some of those slides where it has got a lot of additional information that doesn't seem to have been assessed by anyone yet, then - - -

PROF FELL: My understanding - - -

MS TUOR: - - - then who - - -

PROF FELL: It's our job to actually assess that.

MR ANDERSON: So - - -

MS TUOR: I mean, I - - -

MR ANDERSON: I can – I'm going to make a comment here, is that this presentation was prepared using our EIS and RtS and also open source information so for one of the comparison or the tables the data that we're presenting is that – that is ours – is in the public domain. Some of the other comparison slides, obviously, that is in the public domain as well and I suppose from the mining report side of things that will be a review of an existing report using the information and modelling that we've already - - -

PROF HEBBLEWHITE: Yes.

MR ANDERSON: - - - got.

MS TUOR: But when was that independent report done, the last – like, how long has it been around?

MR ANDERSON: Galvin and Canbulet.

PROF HEBBLEWHITE: They came out at the same time as the - - -

MR .....: The assessment - - -

PROF HEBBLEWHITE: DPE assessment.

MR ANDERSON: So – yes.

MR .....: The assessment - - - .....

PROF HEBBLEWHITE: They came out twice. I don't know how long they've been with DPE.

PROF FELL: Right.

MS TUOR: So you haven't actually had a chance to respond to that?

MR DUNCAN: We hadn't seen the point – at the point in time it was issued to the IPC. We've only seen it since it was issued, right, and we've actually reviewed it.

PROF HEBBLEWHITE: Yes.

MR DUNCAN: Bruce and Russel have reviewed it - - -

PROF HEBBLEWHITE: In January, we reviewed it - - -

MR DUNCAN: And they've put together - - -

PROF HEBBLEWHITE: But we got it in - - -

MR DUNCAN: - - - reports - - -

PROF HEBBLEWHITE: - - - early December - - -

MR DUNCAN: - - - which will include as part of our overall assessment report that we put back to the IPC, it will include the reports of Bruce, Russel. It will also include the response to the questions and any other independent expert report that the Department of Planning may have used in putting together their final assessment report that they issued.

PROF HEBBLEWHITE: So it's not putting new material on the table. It's purely they're an assessment of those documents - - -

MR DUNCAN: Yes. That's right.

PROF HEBBLEWHITE: - - - which we saw for the first time in December.

PROF FELL: Are you satisfied with that - - -

MR .....: Yes. Yes.

MR DUNCAN: Those reports were dated October, I think.

PROF FELL: - - - response.

MR GATES: I'm still a little confused. If they're – if Hume Coal are doing a new assessment you're going it for us on the Independent Planning Commission or are you - - -

MR DUNCAN: Correct.

MR GATES: - - - or are you doing it for the Department of Planning and Environment?

MR DUNCAN: No. We're doing - - -

MR GATES: You're doing it for us?

MR DUNCAN: Doing it for the IPC - - -

MR GATES: Yes.

MR DUNCAN: - - - which will include the updated expert – our expert reports that been – have the opportunity now to review the department's expert reports. It is – it is not - - -

MS TUOR: But specifically which expert report are you - - -

MR DUNCAN: - - - for something we're putting together to get the planning.

MS TUOR: As I understand it, in your presentation, you said that you hadn't actually seen the - - -

MR DUNCAN: That's right.

MS TUOR: The comments about it being classified as high risk. You hadn't seen that before.

MR DUNCAN: We had not seen that before.

MS TUOR: But there are other independent reports that you haven't ever seen before.

MR DUNCAN: The final separate independent reports that were given to planning to finalise their assessment report we have not seen.

MR McLENNAN: And I think it's - - -

MR SHARROCK: Which were in October, I think.

MR McLENNAN: - - - fair to say that we - - -

PROF HEBBLEWHITE: It's October 2018.

MR McLENNAN: We're not providing - - -

PROF FELL: Yes.

MR McLENNAN: - - - an assessment or an updated assessment. We're just responding to the issues - - -

MS .....: Yes.

MR GATES: Okay.

MR McLENNAN: - - - and the matters - - -

PROF FELL: And you're responding to us.

MR ANDERSON: Yes. Just to clarify - - -

MR McLENNAN: That's right.

MR ANDERSON: It's a submission only.

PROF FELL: Yes.

MR ANDERSON: I suppose we're making a submissions to yourselves.

PROF FELL: Well - - -

MR ANDERSON: There's no - - -

MR McLENNAN: So the term - - -

PROF FELL: Perhaps then - - -

MR McLENNAN: - - - assessment is a misnomer. Yes.

PROF FELL: We can request you to respond to us and you're going to do that.

MR DUNCAN: Yes.

PROF FELL: Thank you very much. Now, at this stage, I will get into trouble if I let you run on anymore and just to procedural fairness, but I would like to say a very sincere thanks. I think it has been a very useful discussion. We've learnt a lot and thank you for the frank way you've presented it and let's see how it all goes. Right?

MR DUNCAN: Thank you very much - - -

MR ANDERSON: Thank you.

MR DUNCAN: - - - for you time.

MR McLENNAN: Thank you.

MS TUOR: Thank you. Thanks.

PROF FELL: Thank you.

RECORDING CONCLUDED **[3.09 pm]**