

**Board of Inquiry into the McCrae landslide**

**Before: The Chairperson,  
Ms Renée Enbom KC**

**Federal Court of Victoria,  
305 William Street, Melbourne, Victoria**

**Monday, 4 August 2025 at 10.00am**

**(Day 11)**

**Mr M. Costello KC with Mr A. Di Stefano appeared as Counsel  
Assisting.**

**Ms K. Evans KC with Ms E. Pepler appeared on behalf of the  
State of Victoria.**

**Ms K. Foley SC with Ms E. Bateman appeared on behalf of the  
Mornington Peninsula Shire Council.**

**Ms D. Siemensma appeared on behalf of South East Water  
Corporation.**

1 CHAIRPERSON: Mr Costello, I'll take appearances this  
2 morning.  
3  
4 MR COSTELLO: Thank you. I appear with Mr Di Stefano.  
5  
6 MS FOLEY: If the board pleases, I appear with Ms Bateman  
7 for the Mornington shire.  
8  
9 MS EVANS: May it please the board, I appear with  
10 Ms Peppler for State of Victoria.  
11  
12 MS SIEMENSMA: If the board pleases, I appear for South  
13 East Water.  
14  
15 CHAIRPERSON: Before we start with the witnesses I need to  
16 deal with the timetabling issue, and this concerns you,  
17 Ms Siemensma. Now, the deadline for expert evidence in  
18 relation to causation was 21 July. Mr Paul and his  
19 colleagues provided their material by that deadline. So  
20 did the shire. South East Water didn't. The inquiry  
21 received one expert report on behalf of South East Water on  
22 21 July. The inquiry then received a further report titled  
23 "Technical memorandum" on around 25 July. After the  
24 conclave on 28 and 29 July the inquiry then received a  
25 further version of the 21 July SMEC report dated 31 July  
26 but not provided until after 5 pm on 31 July, which  
27 contained new material. The new material wasn't marked up.  
28  
29 The inquiry was then told last week that a further  
30 report containing modelling is currently being provided by  
31 Mr Jewell - prepared, I should say, by Mr Jewell, which  
32 will be provided to the inquiry at the end of this week,  
33 after these hearings have finished. And then very late  
34 last night the inquiry received two bundles of test results  
35 from South East Water. The first bundle was received at  
36 8.46 pm and the second bundle was received at 10.19 pm.  
37  
38 Ms Siemensma, that is very unsatisfactory.  
39  
40 MS SIEMENSMA: Madam Chair, I do apologise. Perhaps if  
41 I explain. The first SMEC report that was filed on 21 July  
42 contained their evidence. As I understand it, they  
43 continued to do borehole testing and some other testing in  
44 order to update their results, and also there was - so that  
45 was exhibit B. Exhibit D at that stage contained a Douglas  
46 report, Douglas Partners report, which was in draft form or  
47 a draft watermark, and I'm instructed that the difference

1 between the two reports, the second of which was filed on  
2 the 28th, is that the second report contains updated  
3 information from those additional tests and the draft  
4 watermark on the Douglas Partners report has come off. It  
5 was for the purpose of ensuring that the board had  
6 up-to-date information and as much information as possible.  
7

8 In relation to the documents that arrived last night,  
9 I'm instructed that it was SMEC's understanding that all  
10 certificates and so on had been included and provided to  
11 the board, and my instructor in the course of yesterday and  
12 over the weekend had gone through to double-check that and  
13 discovered that some of them hadn't been provided and  
14 thought it was important to provide them as soon as  
15 possible. So we didn't have them, my instructors didn't  
16 have them until then and provided them as soon as possible  
17

18 In terms of Mr Jewell, there wasn't a report because  
19 he hadn't finished his modelling, and I think there's been  
20 an affidavit that has passed between my instructors and the  
21 board about that, and certainly we would have no problem  
22 with the other parties putting in a minute or a note or a  
23 report or some feedback in relation to Mr Jewell's  
24 modelling when it arrives. We don't seek to shut people  
25 out. But it's important that the board operates on as  
26 recent information as possible and as accurate information  
27 as possible. So it was better to provide something rather  
28 than nothing with a view to not shutting people out.  
29

30 CHAIRPERSON: Yes, but it should have all been provided by  
31 21 July.  
32

33 MS SIEMENSMA: I accept that. I do accept that. And  
34 I apologise. But that is the explanation for the delay.  
35

36 CHAIRPERSON: And it looks like from the second bundle of  
37 test results that were provided after 10 pm last night  
38 those tests were conducted after the conclave on Friday; is  
39 that right?  
40

41 MS SIEMENSMA: Yes. I'm instructed, yes, they were.  
42

43 CHAIRPERSON: Without any notice to the inquiry?  
44

45 MS SIEMENSMA: No.  
46

47 CHAIRPERSON: Well, it's all very unsatisfactory and it

1 means that changes are now going to need to be made to the  
2 timetabling of submissions and so on. And, subject to  
3 hearing any further submissions from you, what I propose to  
4 do is this: require Mr Jewell to provide his modelling  
5 report by 10 am this Friday. That report will be limited  
6 to five pages in length, unless Mr Jewell tells me when  
7 he's in the witness box that that's impossible.  
8

9 South East Water's written submissions on causation,  
10 which are limited to 10 pages, are to be provided by 4 pm  
11 this Friday, 8 August, instead of 4 pm on Monday. Then  
12 what I'll do is when we get submissions and the modelling  
13 on Friday I'll look at that material, send that material  
14 to - that is send the submissions and the modelling to  
15 Mr Paul, to counsel assisting and to the parties with  
16 leave. I'll leave for the moment the date for parties with  
17 leave to file their submissions. Their current date is  
18 4 pm Monday. But I'll revisit that date when I receive  
19 South East Water's material on Friday. And if parties with  
20 leave and counsel assisting need more time, which they  
21 might because Mr Pope and Mr Paul might need to respond to  
22 South East Water's new material, then I'll need to give the  
23 parties with leave more time to file their written  
24 submissions.  
25

26 But I need all of South East Water's material and  
27 submissions this week, noting that the material, the  
28 evidence, should have been filed weeks ago on 21 July.  
29

30 MS SIEMENSMA: Madam Chair, I don't take issue at all with  
31 the need for Mr Jewell's report to come in on Friday, but -  
32 and subject to what Mr Jewell says. In my submission,  
33 requiring South East Water to provide its entire  
34 submissions on causation --  
35

36 CHAIRPERSON: They're only 10 pages long.  
37

38 MS SIEMENSMA: They're 10 pages. If we finish tomorrow,  
39 that gives us two days in circumstances in which there's  
40 very little difference between the amended SMEC report and  
41 this report and the other parties have a great deal more  
42 time. In my submission, that does work an injustice to  
43 South East Water. We won't have even seen or have an  
44 opportunity to digest presumably the Jewell report that's  
45 also coming on Friday.  
46

47 CHAIRPERSON: Presumably you'll get it before the inquiry

1 gets it at 10 am on Friday morning. You'll have it before  
2 then. Or you'll at least have a draft.

3

4 MS SIEMENSMA: I don't know how long Mr Jewell requires,  
5 but to require us to put in submissions effectively in two  
6 days when the other parties get far more time --

7

8 CHAIRPERSON: They may not. At the moment the date for  
9 the shire's submissions and for counsel assisting  
10 submissions is 4 o'clock on Monday.

11

12 MS SIEMENSMA: They still have the weekend, with respect.  
13 They get double the time. They get --

14

15 CHAIRPERSON: They get the weekend, but if this hot tub  
16 finishes tomorrow you'll have all of Wednesday, all of  
17 Thursday and Friday. Ms Foley, did you have submissions?

18

19 MS FOLEY: Yes. Thank you, Chair. It is a little  
20 surprising to hear my learned friend complaining about  
21 fairness because, in our submission, really South East  
22 Water's conduct has placed a significant degree of  
23 unfairness on the other parties in this process. The board  
24 had set down a very clear timetable, which all of the  
25 parties except South East Water have worked very hard to  
26 meet. We are now in a position where further material is  
27 coming. It's coming late. I don't think I've seen all of  
28 the information that's been put forward by South East Water  
29 explaining that, but in our submission the process was very  
30 clear.

31

32 We have great concern about Mr Jewell's report  
33 because, although the chair is considering more time to  
34 respond in writing, we won't be able to cross-examine him  
35 on that material, and that of course creates procedural  
36 unfairness.

37

38 We are in the board's hands of course, but in our  
39 submission if South East Water is going to be granted an  
40 indulgence to put on material late, then whatever needs to  
41 be done to provide the other parties with time to properly  
42 digest it in all of the circumstances really can't be a  
43 source of complaint by South East Water.

44

45 CHAIRPERSON: Mr Costello?

46

47 MR COSTELLO: I adopt everything my learned friend

1 Ms Foley has just said. There is a real risk that this  
2 further material is going to create practical difficulties  
3 for this inquiry in circumstances where it is time limited  
4 in a way that is unusual to ordinary court proceedings but  
5 strict in this circumstance. Of course there is a further  
6 hearing directed to mitigation, and it might be that if  
7 further examination of Mr Jewell or others is necessary it  
8 can be compacted into that timeframe. But all of that of  
9 course places a very serious onus on you, Madam Chair, as  
10 the person responsible for producing a concluded report,  
11 and in those circumstances I think that the timetable that  
12 you have outlined to Ms Siemensma is appropriate, and no  
13 doubt if there are any difficulties in complying with it  
14 there will be a very prompt communication to the inquiry.

15  
16 CHAIRPERSON: Thanks, Mr Costello. The reason I proposed  
17 the timetable I did, Ms Siemensma, is to give - which is  
18 not ideal, but to give the shire and counsel assisting and  
19 the witnesses engaged the weekend to work, and they'll be  
20 working the weekend because of South East Water's conduct.  
21 Not only will they be working the weekend because of South  
22 East Water's conduct; they also have to turn to preparing  
23 reports for the - on mitigation, which are due shortly, and  
24 we have the hearing in relation to mitigation shortly,  
25 which I understand South East Water is not participating  
26 in.

27  
28 So in all the circumstances I'm going to timetable the  
29 late provision of South East Water's evidence in the way  
30 that I propose. So Mr Jewell's modelling is to be provided  
31 by 10 am this Friday. His report is to be limited to five  
32 pages, unless Mr Jewell tells me when he gives evidence  
33 that that's not possible. And I want South East Water's  
34 written submissions on causation, the final version of  
35 those submissions - I don't want to receive addendums on  
36 Saturday, Sunday, Monday - the final version of the written  
37 submissions on causation by 6 pm this Friday, 8 August, and  
38 they're limited to 10 pages.

39  
40 Mr Costello.

41  
42 MR COSTELLO: Thank you, Madam Chair. Madam Chair, before  
43 moving to the concurrent evidence of the experts, just as a  
44 matter of good housekeeping could I hand up a document.  
45 I'm just handing copies around. This is just, as a matter  
46 of form, the formal tender of witness statements that have  
47 been provided to the inquiry but have not yet been

1 tendered. They're numbered. Exhibit numbers have been  
2 given for each document which I'm told accord with where  
3 we're up to.

4  
5 CHAIRPERSON: Thank you.

6  
7 MR COSTELLO: If it's convenient to do it that way, I just  
8 seek to tender each of the documents in the list.

9  
10 CHAIRPERSON: Yes. Those documents numbered 1 through to  
11 24 are received into evidence and given the exhibit numbers  
12 identified in the schedule, which means that the last  
13 exhibit - last document tendered, I should say, by counsel  
14 assisting is exhibit CA66.

15  
16 MR COSTELLO: Thank you, Madam Chair. Madam Chair, of  
17 course the principal purpose of this hearing block is to  
18 hear concurrent evidence from experts on the issue of  
19 causation in respect of both the 2022 landslide, in respect  
20 of which only some of the experts give an opinion, and in  
21 respect of the two 2025 landslides. This morning will be  
22 occupied to some extent with some procedural matters that  
23 I think are important to do to set the base for the inquiry  
24 to be done properly.

25  
26 What I intend to do first is have each of  
27 the witnesses individually sworn. There are room enough  
28 for six witnesses at the witness table that's been placed  
29 unconventionally at the end of the Bar table. There are in  
30 fact eight witnesses. I've suggested to Dr Vu and to  
31 Mr Jewell that for now at least they remain seated where  
32 they are once they've been sworn in.

33  
34 So if that's a convenient way to proceed I'll proceed  
35 to have each of the witnesses sworn in, but I'll start with  
36 Dr Vu and then Mr Jewell, and they can return to their  
37 seats, and then we could have the other experts come in, be  
38 sworn and remain in their seats.

39  
40 Dr Vu, would you mind moving to the witness box,  
41 please.

42  
43 MS SIEMENSMA: Could I just at this juncture before people  
44 are sworn in --

45  
46 CHAIRPERSON: Yes.

1  
2 MS SIEMENSMA: -- ask a housekeeping matter, one I raised  
3 with Mr Costello earlier, in light of the updated SMEC  
4 report whether that also can be tendered?

5  
6 CHAIRPERSON: Yes, it will be.

7  
8 <HONG VU, AFFIRMED:  
9

10 MR COSTELLO: Mr Jewell, if you could step into the  
11 witness table, please.  
12

13 <CHRISTOPHER MARTIN JEWELL, AFFIRMED:  
14

15 MR COSTELLO: Thank you, Mr Jewell. Then we might perhaps  
16 start with Mr Bolton and do the two witnesses that are in  
17 the box, and then perhaps I'll come to the formal tender  
18 once everyone's been sworn, if that's convenient.  
19

20 <HUGO DOUGLAS BOLTON, AFFIRMED:  
21

22 <DAVID MATTHEW HARTLEY, SWORN:  
23

24 <DARREN ROSS PAUL, AFFIRMED:  
25

26 <STEPHEN LEONARD MAKIN, AFFIRMED:  
27

28 <DANE RICHARD POPE, AFFIRMED:  
29

30 <PHILLIP WILLIAM HITCHCOCK, AFFIRMED:  
31

32 CHAIRPERSON: Is that everyone, Mr Costello?  
33

34 MR COSTELLO: I hope that's everyone. If there's anyone  
35 else, I'm going to be in trouble.  
36

37 CHAIRPERSON: Now, thank you to all the experts for coming  
38 along today and tomorrow to assist the work of the inquiry.  
39 You are all here because you have expertise relevant to the  
40 work of this inquiry. Your duty here today is to provide  
41 your honest expert opinion in response to questions that  
42 are asked by counsel assisting, irrespective of what that  
43 might mean for the people who have engaged you. So you are  
44 not here to advance the interests of the organisations who  
45 have engaged you or to protect their interests. You're  
46 here with your expertise to assist this inquiry to  
47 understand why the landslides occurred.



1  
2 Now, counsel assisting, Mr Costello, will ask you some  
3 questions, and at some point during your evidence others  
4 will have some questions for you as well.  
5

6 **<EXAMINATION BY MR COSTELLO:**

7  
8 MR COSTELLO: Can you all hear me down there all right?  
9

10 EXPERT: Yes.  
11

12 MR COSTELLO: Right. Thank you. I want to proceed to the  
13 formal tender of each of your reports, acknowledging that a  
14 number of the reports are jointly prepared. If I could  
15 start perhaps with the report of WSP. Mr Paul, it's fair  
16 to describe you as the principal author of that report?  
17

18 MR PAUL: That's correct.  
19

20 MR COSTELLO: All right. Before I do the formal tender of  
21 each report, just for the sake of the record and to make it  
22 clear to everybody that's watching these proceedings I'm  
23 just going to ask you some formal questions so you can  
24 identify yourself and your role here. So could you state  
25 your full name, please?  
26

27 MR PAUL: Darren Ross Paul.  
28

29 MR COSTELLO: And your job description?  
30

31 MR PAUL: I'm the technical director in engineering  
32 geology at WSP and specialise in landslides.  
33

34 MR COSTELLO: Your business address?  
35

36 MR PAUL: Is 567 Collins Street, Melbourne.  
37

38 MR COSTELLO: Now, Mr Paul, you've been engaged by the  
39 board of inquiry?  
40

41 MR PAUL: Correct.  
42

43 MR COSTELLO: And you in the course of your report have  
44 called upon the expertise of some of your colleagues?  
45

46 MR PAUL: Correct.  
47

1 MR COSTELLO: Could you please identify who those  
2 colleagues are?  
3  
4 MR PAUL: Mr Stephen Makin, beside me, who is a  
5 hydrogeologist and advises on matters relating to  
6 hydrogeology; Dr Hong Vu, who is a geochemist and has  
7 advised on matters relating to geochemistry.  
8  
9 MR COSTELLO: Right. And could you just give a brief  
10 description, for those that didn't see your prior evidence,  
11 of the type of work you do and your experience in  
12 landslides?  
13  
14 MR PAUL: Yes. So most of my work in landslides - we  
15 don't get too many of them - is related to planning for,  
16 prevention of and managing landslide risk. But then of  
17 course when landslides do happen I get involved in  
18 landslide assessment and mitigation work, and that's sort  
19 of the bulk of what I do.  
20  
21 MR COSTELLO: And I'll put the report on the screen at the  
22 moment, but is it right that you have a copy of your report  
23 in front of you?  
24  
25 MR PAUL: I do, correct.  
26  
27 MR COSTELLO: And do you also have a copy of the reports  
28 of your colleagues that are also seated at the table?  
29  
30 MR PAUL: Yes, I've got a copy of the PSM and the SMEC  
31 reports here.  
32  
33 MR COSTELLO: Thank you. Before I bring the report up  
34 onto the screen, Mr Makin, could you just describe your  
35 area of expertise, please?  
36  
37 MR MAKIN: Yes. I'm a hydrogeologist, which deals with  
38 groundwater, both the movement of groundwater under the -  
39 the water under the ground, and I also work in  
40 contamination of groundwater assessment and remediation of  
41 that.  
42  
43 MR COSTELLO: Thank you. Could I have on the screen,  
44 please, DPA.0004.0001.0001 - that's very prompt - for the  
45 transcript. Mr Paul, this is the report that you and your  
46 colleagues have prepared on the question of causation?  
47

1 MR PAUL: Correct.

2

3 MR COSTELLO: All right. And if we turn to the fourth  
4 page, which is the start of the table of contents, if  
5 perhaps we could have the fourth and fifth pages on the  
6 screen at the same time, is it the case that you have been  
7 responsible for particular aspects of this report and your  
8 colleagues have been responsible for other aspects of the  
9 report?

10

11 MR PAUL: That is correct.

12

13 MR COSTELLO: All right. Now, it is probably easier to  
14 identify this by way of exception. What parts of the  
15 report have you not been responsible for in a primary  
16 sense?

17

18 MR PAUL: Okay. So the sections labelled "Hydrogeology",  
19 which is 7.3, page 39, that would be Mr Makin; and then  
20 8.7.3, "Hydrogeological assessment of flow paths", is  
21 Mr Makin; and 8.7.4, "Geochemical assessment of water",  
22 that would be Dr Vu.

23

24 MR COSTELLO: Right.

25

26 MR PAUL: (Indistinct) by exception.

27

28 MR COSTELLO: I'll just show you for the sake of  
29 completeness the next page, which is the last page of the  
30 table of contents.

31

32 MR PAUL: Aspects of the executive summary of course  
33 relating to hydrogeology and of the summary of opinion,  
34 parts of that element, the hydrogeology or geochemistry,  
35 would be inputted by Dr Vu.

36

37 MR COSTELLO: Of course. All right. But otherwise,  
38 insofar as you are concerned, the contents of that report  
39 are true and correct?

40

41 MR PAUL: Correct.

42

43 MR COSTELLO: And, Mr Makin, so far as you're concerned,  
44 the contents of the report insofar as you were primarily  
45 responsible for those parts are true and correct?

46

47 MR MAKIN: Correct.

1  
2 MR COSTELLO: Thank you. And I'll confirm that with Dr Vu  
3 later when he comes into the witness box. Thank you.  
4 I might move to SMEC.  
5  
6 CHAIRPERSON: Mr Costello --  
7  
8 MR COSTELLO: Sorry, I should tender it, yes.  
9  
10 CHAIRPERSON: -- I'll give the WSP report an exhibit  
11 number. WSP's causation report dated 21 July 2025 is  
12 exhibit CA67.  
13  
14 **EXHIBIT #CA67 WSP CAUSATION REPORT DATED 21 JULY 2025**  
15  
16 MR COSTELLO: Thank you. Mr Hartley, are you the  
17 principal author of the SMEC report?  
18  
19 MR HARTLEY: Yes.  
20  
21 MR COSTELLO: Yes, thank you. Now, could I ask, as  
22 Mr Paul did, for you to first begin by saying your full  
23 name for the record?  
24  
25 MR HARTLEY: Yes. My name's David Matthew Hartley.  
26  
27 MR COSTELLO: And your job description?  
28  
29 MR HARTLEY: I'm a senior associate at geotechnics working  
30 for SMEC.  
31  
32 MR COSTELLO: Thank you. And your business address?  
33  
34 MR HARTLEY: East 5 - Federal Mills, Mackey Street, North  
35 Geelong.  
36  
37 MR COSTELLO: Thank you. And could you just give a brief  
38 explanation of your area of expertise and your experience  
39 in that area?  
40  
41 MR HARTLEY: Geotechnical engineering. So 24 years  
42 experience primarily working in the infrastructure  
43 geotechnical sphere. So that's highways, rails and  
44 waterworks. Working in improvement but also maintenance  
45 and mitigation, remediation of landslides. Slope failures,  
46 cuts, embankments and natural slopes as well.  
47

1 MR COSTELLO: Thank you. You're the primary author of  
2 the report but it's been prepared with the assistance of  
3 colleagues?  
4  
5 MR HARTLEY: That's correct.  
6  
7 MR COSTELLO: Could you identify those colleagues, please?  
8  
9 MR HARTLEY: Mr Hugo Bolton, Mr Dan - I beg your pardon,  
10 I just refer to him as Dan, and --  
11  
12 MR COSTELLO: Is that Mr Gorman?  
13  
14 MR HARTLEY: That is correct, yes. And Minh, who will be  
15 Minh Tran.  
16  
17 MR COSTELLO: Mr Gorman and Mr Tran will not be giving  
18 evidence in the course of this hearing?  
19  
20 MR HARTLEY: Correct.  
21  
22 MR COSTELLO: Are Mr Gorman and Mr Tran both geotechnical  
23 engineers, or do they have a --  
24  
25 MR HARTLEY: Yes.  
26  
27 MR COSTELLO: -- different area of expertise?  
28  
29 MR HARTLEY: That is correct.  
30  
31 MR COSTELLO: Thank you. Mr Bolton, could you please  
32 state your full name for the record?  
33  
34 MR BOLTON: Hugo Douglas Bolton.  
35  
36 MR COSTELLO: And your job description?  
37  
38 MR BOLTON: Technical principal hydrogeology.  
39  
40 MR COSTELLO: Your business address is the same as --  
41  
42 MR BOLTON: Correct - no, no, I'm in Melbourne, so 727  
43 Collins Street, Melbourne.  
44  
45 MR COSTELLO: Thank you. Could you just give a brief  
46 description of your area of technical expertise and some of  
47 your work experience?

1  
2 MR BOLTON: Yes, of course. So I'm a hydrogeologist.  
3 I've got about - over 30 years of experience, quite broad  
4 range of experience. I've worked in mining contaminated  
5 land, been involved with - in the mining in particular, you  
6 know, slope stability, working a lot with geotechnical  
7 engineers to support them in that endeavour and also mine  
8 stability. I also have I think a very good handle on  
9 groundwater geochemistry, have used that a lot as a tool to  
10 identify signatures of groundwater. I've also got a lot of  
11 water supply experience, done quite large bores for various  
12 water authorities. You know, I could keep going on. I've  
13 got quite a bit of, you know, experience broadly in  
14 groundwater, to summarise.

15  
16 MR COSTELLO: Thank you. Now, there are I think at least  
17 two reports that I need to tender in relation to this work.  
18 Could I have up on screen first, please,  
19 SEW.0001.0001.0501. I think I might have said "SEW", but  
20 I think it might be "SME". It's not in the court book.  
21 That's the new one? All right. So that's the new report  
22 that's been mentioned. It's not yet in the hearing book.  
23 But I will get it put in there and I'll formally tender it  
24 once it comes in. For now we'll use the pre-existing.

25  
26 If perhaps instead I could have brought up on screen  
27 SEW.0001.0002.4187. Now, Mr Hartley, this is the report  
28 that you're the principal author of?

29  
30 MR HARTLEY: Correct.

31  
32 MR COSTELLO: As we've heard this morning, there's an  
33 updated version of this report, which I will separately  
34 seek to tender, but for now we will work from this version.

35  
36 MR HARTLEY: Yep.

37  
38 MR COSTELLO: Are you aware in general terms of what has  
39 changed in respect of this version and the newer version?

40  
41 MR HARTLEY: Very much so.

42  
43 MR COSTELLO: Could you just give a brief explanation of  
44 that just so we can be aware of where we might need to move  
45 to the newer version?

46  
47 MR HARTLEY: Yes. Appendix D of this report has been

1 modified with updated laboratory test results that came  
2 through as part of the Douglas Partners report, which  
3 itself is an appendix of that appendix D. And the other  
4 change is that appendix E has now got some updated  
5 laboratory test results, and that has been included. And  
6 I've added a paragraph in the introduction to explain that  
7 in the umbrella report. I've also taken the opportunity to  
8 do a spellcheck, which has tidied things up a bit.

9  
10 MR COSTELLO: If we could go to the table of contents.  
11 Yes, if we could have page 5 and 6 perhaps side by side.  
12 Putting aside the long list of figures which follows after  
13 this, Mr Hartley, are you able to describe, as Mr Paul was,  
14 those areas that you are not the principal author of?

15  
16 MR HARTLEY: The desktop study was written by Mr Gorman  
17 based on the earlier report. The ground model was written  
18 by others, Mr Gorman and Mr Bolton, section 8 was written  
19 by others, but, other than that, that's - everything else  
20 is mainly written by myself.

21  
22 MR COSTELLO: Thank you. And, Mr Bolton, are you able to  
23 identify any part of this report that you're the principal  
24 author of?

25  
26 MR BOLTON: Yes. As Mr Hartley was saying, the sections  
27 of the ground model, section 7, hydrogeology, and I guess  
28 in the executive summary it contains some hydrogeology  
29 words, so that I would have added my input. Plus I can see  
30 6.3 has hydrogeological investigations, so that would've  
31 also had --

32  
33 MR COSTELLO: 6.3 and 7 are principally - are the areas  
34 that you're principally concerned with?

35  
36 MR BOLTON: Yes.

37  
38 MR COSTELLO: Thank you. And, Mr Hartley, who prepared  
39 chapter 8, "Hydraulic assessment"?

40  
41 MR HARTLEY: I think it was yourself, wasn't it?

42  
43 MR BOLTON: Hydraulic, that's the sand fan thing.

44  
45 MR HARTLEY: Gosh, that would be Mr Rhodes, Tim Rhodes.

46  
47 MR COSTELLO: What's Mr Rhodes' area of expertise?

1  
2 MR HARTLEY: Flood modelling surface water assessment.  
3  
4 MR COSTELLO: Is Mr Rhodes an employee of SMEC?  
5  
6 MR HARTLEY: Correct. Technical principal.  
7  
8 MR COSTELLO: Thank you.  
9  
10 CHAIRPERSON: Mr Hartley, if we look at page - the second  
11 page of the report where it says, "Prepared by David  
12 Hartley, Hugo Bolton, Dan Gorman, Trung Tran" and reviewed  
13 by others --  
14  
15 MR HARTLEY: Yep, that's correct.  
16  
17 CHAIRPERSON: "Is prepared by", is that an error? Should  
18 Tim Rhodes be in the "prepared by" column if he wrote  
19 chapter 8?  
20  
21 MR HARTLEY: One moment. That is correct. I think it  
22 should include Tim Rhodes' text, raw text, and so he should  
23 be considered as an originator.  
24  
25 CHAIRPERSON: As an author?  
26  
27 MR HARTLEY: As an author, beg your pardon.  
28  
29 CHAIRPERSON: And what about Mr Jewell?  
30  
31 MR HARTLEY: Mr Jewell hasn't been included in this -  
32 hasn't had input into this report.  
33  
34 CHAIRPERSON: Was he consulted when you were preparing the  
35 report?  
36  
37 MR BOLTON: He was involved with the appendix E, which was  
38 the hydrogeology. He was a reviewer on that, in doing that  
39 report, amongst other people.  
40  
41 CHAIRPERSON: Right. So should he be listed in the  
42 "reviewed by" column?  
43  
44 MR BOLTON: The person that we put down as the reviewer  
45 was the final reviewer. There was a number of other  
46 reviewers along the way that I asked to look at it. So  
47 I didn't put those other people down. I just put the final



1 reviewer.

2

3 CHAIRPERSON: So Mr Jewell, did he review a draft of  
4 appendix E?

5

6 MR BOLTON: He didn't review it, but he did provide me  
7 with feedback and comment.

8

9 CHAIRPERSON: On a draft of appendix E?

10

11 MR BOLTON: Yes.

12

13 CHAIRPERSON: Thank you.

14

15 MR COSTELLO: Who was the final reviewer on questions of  
16 water chemistry?

17

18 MR BOLTON: Final reviewer on chemistry?

19

20 MR COSTELLO: Yes.

21

22 MR BOLTON: I had - well, final reviewer was Paran, but in  
23 terms of the chemistry, well, I had - Chris Jewell was  
24 reviewing that. So I relied on his input on that because  
25 he's a geochemist, yes.

26

27 MR COSTELLO: And on questions of hydrogeology who was the  
28 reviewer?

29

30 MR BOLTON: I had a number of people. I had Detlef.  
31 I had Detlef Bringemeier, who is the technical principal  
32 hydrogeologist at SMEC, look at it. I also had Jurgen  
33 Schaeffer, who is also employed by SMEC, look at it. Those  
34 are the two main people, yes.

35

36 MR COSTELLO: Perhaps it's a question for Mr Hartley.  
37 What's Dr Richard Kelly's area of expertise?

38

39 MR HARTLEY: Geotechnical engineering.

40

41 MR COSTELLO: But Paran Moyes is a hydrochemist?

42

43 MR BOLTON: No, no, Paran is a geotechnical engineer. He  
44 was reviewing both reports just to get a common, I guess,  
45 final review, really, yes.

46

47 MR COSTELLO: I see. But, while he's a geotechnical

1 engineer, he did review those parts that relate to  
2 hydrochemistry as well as other parts; is that a fair  
3 description of what he did?  
4

5 MR BOLTON: Yes, he was reviewing them not as a hydro - as  
6 a geochemist but as a - to make sure that the two reports  
7 made sense, I guess, together.  
8

9 MR COSTELLO: I understand.  
10

11 MR BOLTON: More of a high-level view. The people that  
12 I depended upon for geochemistry related things would have  
13 been Chris Jewell plus the other two - well, to a lesser  
14 degree was - would have been also Detlef Bringemeier and  
15 Jurgen Schaeffer. But really the geochemistry side of  
16 things would have been Chris Jewell.  
17

18 MR COSTELLO: Thank you. I just want to make sure that  
19 I understand the areas of expertise of the people  
20 identified as reviewers. So Mr Tim Rhodes, who was  
21 involved with appendix E, is he a hydrogeologist or a  
22 geochemist or --  
23

24 MR HARTLEY: Tim Rhodes was involved in appendix G.  
25

26 MR COSTELLO: G; pardon me.  
27

28 MR HARTLEY: Appendix G, and from there the text from  
29 appendix G goes into section 8.  
30

31 MR COSTELLO: Thank you. And his area of expertise?  
32

33 MR HARTLEY: Yes, flood management surface water.  
34

35 MR COSTELLO: Yes. Does that make him a hydrogeologist?  
36

37 MR HARTLEY: I don't think he would say that. Water  
38 resources is his signature.  
39

40 MR COSTELLO: Okay. Thank you. I won't ask more  
41 questions --  
42

43 MR BOLTON: Hydrology is surface water, and hydrogeology  
44 is groundwater.  
45

46 MR COSTELLO: I understand. Thank you. That's useful.  
47 And then Detlef Bringemeier is a hydrogeologist?

1  
2 MR BOLTON: He's a hydrogeologist.  
3

4 MR COSTELLO: And would confess to being one. And  
5 Dr Richard Kelly is a geotechnical engineer?  
6

7 MR HARTLEY: Correct.  
8

9 MR COSTELLO: Thank you. Before I leave the two of you,  
10 could I have on the screen - well, actually, before I do  
11 that, insofar as you're each principally responsible for  
12 sections of the report, is your understanding that the  
13 report is true and correct?  
14

15 MR HARTLEY: Yes.  
16

17 MR BOLTON: Yes.  
18

19 MR COSTELLO: I tender that report, thank you.  
20

21 CHAIRPERSON: The SMEC report dated 21 July 2025 is  
22 exhibit CA68.  
23

24 **EXHIBIT #CA68 SMEC REPORT DATED 21 JULY 2025**  
25

26 MR COSTELLO: Could I have on the screen, please,  
27 SEW.0001.0001.0142. This is a report that's previously  
28 been tendered. I just want to do two things, first just  
29 have it identified. Mr Hartley, is this a report that  
30 you're involved in?  
31

32 MR HARTLEY: Correct, yep.  
33

34 MR COSTELLO: Right. And, Mr Bolton, were you also  
35 involved in this report, do you recall?  
36

37 MR BOLTON: I was, yes.  
38

39 MR COSTELLO: This is 5 May. And, Mr Hartley, perhaps you  
40 in the first instance - and Mr Bolton, if there's anything  
41 you'd like to add you can do it after Mr Hartley - could  
42 you just describe, just so everybody understands what  
43 reports served which function, what this report was  
44 concerned with and how it differs in a general sense at  
45 least from the more recent report that I've just tendered?  
46

47 MR HARTLEY: Yes. So the 5 May report was effectively a

1 desktop study. It was there to analyse the potential -  
2 effectively the potential for SEW asset or water to impact  
3 on the landslides, the 2025 landslides, based on available  
4 data that was available to us. Following submission of  
5 that the request was to get out on site and do some  
6 significant site works as much as could be reasonably got  
7 and completed by 21 July, which is where the 21 July report  
8 comes into it.

9  
10 MR COSTELLO: I see. Mr Bolton, did you want to add  
11 anything to that or? You needn't feel obliged; it's just  
12 if there was something that you wanted to add.

13  
14 MR BOLTON: No, I don't think I wish to add --

15  
16 MR COSTELLO: Thank you. I'm hopeful that we've got the  
17 updated version of the report now in the hearing book. So  
18 could we have SME.0001.0001.0501. Mr Hartley, you can see  
19 that that report is dated 30 July 2025 on the front cover?

20  
21 MR HARTLEY: Correct.

22  
23 MR COSTELLO: And this is the updated version of the  
24 report that we've discussed already?

25  
26 MR HARTLEY: Yes, that's correct.

27  
28 MR COSTELLO: All right. And you've already identified  
29 the principal areas of divergence from the report that  
30 I just tendered. Is there anything else that you need to  
31 mention in connection with this report?

32  
33 MR HARTLEY: Only to say that conclusions made in the  
34 written area have not been changed. It's purely factual  
35 laboratory data that's been added to.

36  
37 MR COSTELLO: You're the principal author of this report,  
38 as you were with the prior version?

39  
40 MR HARTLEY: That's correct.

41  
42 MR COSTELLO: And the same co-authors have been involved  
43 in the report?

44  
45 MR HARTLEY: To be honest, it was Hugo and I working and  
46 getting everything collated. So the other authors have  
47 only been by matter of the fact that their text is in the

1 previous report have been involved.

2

3 MR COSTELLO: I'll tender that report too, thank you,  
4 Madam Chair.

5

6 CHAIRPERSON: SMEC's causation report dated 30 July 2025  
7 is exhibit CA69.

8

9 **EXHIBIT #CA69 SMEC'S CAUSATION REPORT DATED 30 JULY 2025**

10

11 MR COSTELLO: Mr Pope - sorry, Mr Pope, you're just going  
12 to have to wait for a bit more. I should also tender the  
13 technical memorandum that was discussed. Could I have on  
14 the screen, please, SEW.0001.0002.4197. Mr Bolton, you're  
15 described as the lead author of this memorandum?

16

17 MR BOLTON: Correct.

18

19 MR COSTELLO: It's been reviewed by - is it Mr Moyes,  
20 Paran Moyes?

21

22 MR BOLTON: Yes. Paran, yes, also had - he was the final  
23 reviewer, yeah.

24

25 MR COSTELLO: Thank you. And approved by Mr Hartley. Is  
26 there anyone else who is an author of this report with you?

27

28 MR BOLTON: No, I just had discussions with Chris Jewell  
29 along the way as I was developing the report.

30

31 MR COSTELLO: All right. And could you just describe in  
32 general terms the purpose of this report?

33

34 MR BOLTON: The purpose of this report was to provide a  
35 bit more geochemical analysis to explain the geochemical  
36 signature of the water.

37

38 MR COSTELLO: Thank you. Madam Chair, I tender that  
39 technical memorandum.

40

41 CHAIRPERSON: The SMEC technical memorandum dated 25 July  
42 2025 is exhibit CA70.

43

44 **EXHIBIT #CA70 SMEC TECHNICAL MEMORANDUM DATED 25 JULY 2025**

45

46 MR COSTELLO: Mr Pope, could you state your full name for  
47 the record, please?

1  
2 MR POPE: Dane Richard Pope.  
3  
4 MR COSTELLO: And your job description?  
5  
6 MR POPE: Principal geotechnical engineer at PSM.  
7  
8 MR COSTELLO: And your business address?  
9  
10 MR POPE: It's Level 4, 100 Brougham Street, Geelong, and  
11 that will be different to what you write your letters to.  
12 Yes. We've just moved.  
13  
14 MR COSTELLO: Now, Mr Pope, you've been engaged by the  
15 shire?  
16  
17 MR POPE: Yes.  
18  
19 MR COSTELLO: And you've given evidence at a previous  
20 hearing block of this inquiry?  
21  
22 MR POPE: Yes.  
23  
24 MR COSTELLO: At a previous hearing block of this inquiry  
25 various of your reports were tendered; do you recall that?  
26  
27 MR POPE: Yes.  
28  
29 MR COSTELLO: I don't intend to take you through each of  
30 them now. If any of them become relevant we'll have them  
31 on the screen. They've each been tendered already. But  
32 you're the principal author of a new report on causation;  
33 is that correct?  
34  
35 MR POPE: Correct, yes.  
36  
37 MR COSTELLO: All right. Well, before I tender that  
38 report could you just describe for those that were not  
39 present during your last - on the last occasion you gave  
40 evidence what your technical expertise is and your  
41 involvement in landslide investigation and mitigation?  
42  
43 MR POPE: So it's a mix - as I've said back in May, it's a  
44 mix of open-cut coal mining, which I - I worked in the coal  
45 mines for a fair few years. Moved to Victoria and then  
46 was - switched industry into the residential industry,  
47 which a lot of landslide work there was based in the

1 Otways. So that was with Wye River and Sep Creek burning  
2 down, a lot of homes been lost there. There was a lot of  
3 landslide work done in those two towns. Since then, coming  
4 back to PSM, a lot of my landslide work is for DTP and some  
5 councils across the state. So we do a lot of cut slope  
6 remediation and fill slope remediation for the State.  
7 That's essentially it.

8  
9 MR COSTELLO: Thank you. You are the principal author of  
10 the PSM causation report?

11  
12 MR POPE: Yes.

13  
14 MR COSTELLO: And have you collaborated with other  
15 colleagues in the preparation of that report?

16  
17 MR POPE: I've had - so in section 2 of my report  
18 I outline who's helped me with the report. The opinions  
19 are my own, but essentially Oliver Stirzaker ran the  
20 stormwater and sewer investigation on my behalf. So he  
21 gathered all the facts --

22  
23 MR COSTELLO: Sorry, who did you say did that?

24  
25 MR POPE: Oliver Stirzaker.

26  
27 MR COSTELLO: Thank you.

28  
29 MR POPE: You might have to look that up to spell that  
30 one.

31  
32 MR COSTELLO: I'll put the table of contents up on the  
33 screen. It's MSC.5087.0001.0157, and if we could have  
34 pages 0158 and 0159 on the screen, please. Is it easy for  
35 you to identify by reference to the table of contents,  
36 Mr Pope, those sections that others have had significant  
37 input into?

38  
39 MR POPE: Section 8, Oliver assisted with the factual  
40 investigation. So that's been issued as a separate factual  
41 report. In terms of - that's pretty much it. In terms  
42 of - I do cross-reference in this report back to the  
43 landslide risk assessment. So that's where I've had help  
44 from two technical directors at PSM. Yes.

45  
46 MR COSTELLO: The technical directors that have assisted  
47 you, are they geotechnical engineers or have they got

1 different areas of expertise?

2

3 MR POPE: One's a principal engineering geologist, and  
4 he - that's Tim Nash, who helped with field mapping in  
5 January, and then the other is Garry Mostyn, who's  
6 literally the technical director of this project and our  
7 technical lead.

8

9 MR COSTELLO: And the contents of this report are true and  
10 correct?

11

12 MR POPE: Yes.

13

14 MR COSTELLO: Thank you. I'll tender that report, thank  
15 you, Madam Chair.

16

17 CHAIRPERSON: The PSM causation report dated 21 July 2025  
18 is exhibit CA71.

19

20 **EXHIBIT #CA71 PSM CAUSATION REPORT DATED 21 JULY 2025**

21

22 MR COSTELLO: Mr Pope, I think you just mentioned the  
23 evacuation order report. If I just bring up  
24 MSC.5047.0001.0001. This is 22 May of this year; is that  
25 the report you're referring to?

26

27 MR POPE: Yes.

28

29 MR COSTELLO: All right. And you're the principal author  
30 of that report as well?

31

32 MR POPE: Yes. That's where Tim Nash has helped, but yes.  
33 Yep.

34

35 MR COSTELLO: Yes. All right. And have there been any  
36 revisions to this report since it was issued?

37

38 MR POPE: That is - yeah, so you've got the original. We  
39 issued rev 1 on 28 May 2025. As would you know, it's been  
40 peer reviewed and --

41

42 MR COSTELLO: That was following peer review?

43

44 MR POPE: Yeah - no, this 28th is not. It was pre peer  
45 review. So it's been peer reviewed and we have not  
46 reissued yet.

47



1 MR COSTELLO: Have not reissued?  
2  
3 MR POPE: No.  
4  
5 MR COSTELLO: No. Okay. All right. But the content of  
6 this report will change to some degree by reason of the  
7 peer review; is that right?  
8  
9 MR POPE: Yes, yep. So the engineering - the geological  
10 model's probably not going to - I don't think it's going to  
11 change significantly at all. The calcs that we do at the  
12 back is where the --  
13  
14 MR COSTELLO: Where there will be change?  
15  
16 MR POPE: Yeah.  
17  
18 MR COSTELLO: The reason I'm asking is I don't want to ask  
19 you bluntly whether the content of this report are true and  
20 correct in circumstances where you know things are going to  
21 change. So subject to those matters that you have  
22 identified that will cause amendments by reason of the peer  
23 review process --  
24  
25 MR POPE: Yeah.  
26  
27 MR COSTELLO: -- the content of this report is true and  
28 correct so far as you're concerned?  
29  
30 MR POPE: Yes. So there's sections of that report that  
31 I've actually updated in my cause report, so there's - and  
32 they're minor details, but, yes, that is correct.  
33  
34 MR COSTELLO: Thank you. I'll tender that report.  
35  
36 CHAIRPERSON: The PSM landslide risk assessment dated  
37 22 May 2025 is exhibit CA72.  
38  
39 **EXHIBIT #CA72 PSM LANDSLIDE RISK ASSESSMENT DATED 22 MAY**  
40 **2025**  
41  
42 MR COSTELLO: Mr Hitchcock, I might just ask you if you  
43 can move that microphone a little closer to you, otherwise  
44 I don't think anyone will - sorry for the tight confines.  
45 Mr Hitchcock, could you state your full name, please?  
46  
47 MR HITCHCOCK: Phillip William Hitchcock.

1  
2 MR COSTELLO: And your job description?  
3

4 MR HITCHCOCK: Principal hydrogeologist, Australian  
5 Environmental Auditors.  
6

7 MR COSTELLO: Business address?  
8

9 MR HITCHCOCK: 321, number 1, Ricketts Road, Mount  
10 Waverley.  
11

12 MR COSTELLO: And, Mr Hitchcock, could you explain your  
13 area of particular expertise?  
14

15 MR HITCHCOCK: I started off life as geotech engineer for  
16 a few years, and then did a masters in hydrogeology and  
17 contamination management, and the last 30 years been  
18 working in groundwater related hydrogeology and  
19 contaminated site matters. I believe my expertise is  
20 mainly around how water moves through soil and how it  
21 changes as it does.  
22

23 MR COSTELLO: Thank you. You've been engaged by the  
24 shire?  
25

26 MR HITCHCOCK: That's correct.  
27

28 MR COSTELLO: For the purpose of today; thank you. And  
29 you've prepared a report. I'll have it put on the screen.  
30 It's MSC.5087.0001.0001.  
31

32 MR HITCHCOCK: Yes, that's correct.  
33

34 MR COSTELLO: All right. And, Mr Hitchcock, could you  
35 just explain in general terms what the subject matter of  
36 this report is?  
37

38 MR HITCHCOCK: It was a fairly broad review of  
39 the hydrogeological information contained in previous  
40 reports. So, importantly, it doesn't include some of the  
41 information in the causation reports because significant  
42 amount of extra groundwater and chemistry information was  
43 available after this report, and at the end of the report  
44 I identify where I think further information could be  
45 useful. A lot of that information now has been collected.  
46 But this report hasn't been updated to reflect that.  
47

1 MR COSTELLO: When you say a lot of that information has  
2 now been collected, collected by whom?

3  
4 MR HITCHCOCK: By SMEC, PSM and WSP.

5  
6 MR COSTELLO: Have you been provided with additional  
7 information in the time since you finalised this report?

8  
9 MR HITCHCOCK: Yeah, in the form of the causation reports  
10 and memos.

11  
12 MR COSTELLO: And we'll get to the detail of your  
13 conclusions later. You've reflected upon the further  
14 information that you've seen since you provided this  
15 report?

16  
17 MR HITCHCOCK: Yes, yeah, and I've tried to put comments  
18 into the expert conclave joint reports to perhaps draw that  
19 out --

20  
21 MR COSTELLO: Thank you very much. I tender that - before  
22 I do, the content of that report is true and correct?

23  
24 MR HITCHCOCK: Yes.

25  
26 CHAIRPERSON: Mr Hitchcock's expert report dated 21 July  
27 2025 is exhibit CA73.

28  
29 **EXHIBIT #CA73 MR HITCHCOCK'S EXPERT REPORT DATED 21 JULY**  
30 **2025**

31  
32 MR COSTELLO: Mr Hitchcock has just referred, Madam Chair,  
33 to the joint report. There are in fact two. Could I have  
34 on the screen, please, INQ.0009.0001.0001. This is the  
35 report of the conclave held between those identified in the  
36 table on the front page whereby each of those experts was  
37 engaged in dialogue with each other, having had the benefit  
38 of the written reports, with a view to identifying those  
39 questions upon which there was agreement, those questions  
40 upon which there was disagreement and the scope of  
41 the disagreement. If we could just cycle through that  
42 report, please.

43  
44 Yes, just stop there for a moment. This is the form  
45 that the document has taken in large part. This concerns  
46 the November 2022 landslide, and the form that has been  
47 taken is to identify preparatory or trigger factors - those

1 are terms upon which there is some debate, a matter that  
2 I will come to soon - for each of the three landslides.  
3 Each expert has then given an opinion to the extent they're  
4 able to on the magnitude of the contribution of each  
5 potential factor and their degree of confidence. Insofar  
6 as November 2022 is concerned, the debate, to the extent  
7 there is any, is between Mr Paul and Mr Pope.

8  
9 If we could then cycle over to the next page. This  
10 concerns the 5 January 2025 landslide. The same method  
11 adopted, although Mr Paul and Mr Pope are joined here by  
12 Mr Hartley, and Mr Hitchcock has also made a contribution  
13 to this part of the report in respect of matters within his  
14 expertise, which are opinions that are identified in red.

15  
16 Then if we go to the next page, please. This is the  
17 14 January 2025 landslide, which takes the same form as the  
18 earlier 2025 landslide.

19  
20 Then if we could just move through to the next page.  
21 There are then comments made where appropriate in respect  
22 of each relevant factor where an expert has felt the need  
23 to give further detail or to express more fully the basis  
24 of their opinion and the extent of the disagreement.  
25 That's most acute in respect of 2025, if we go over the  
26 page. And it's by reference to this document, Madam Chair,  
27 that I intend to conduct a large part of the questioning  
28 because it's the most central repository for the various  
29 opinions, and it simply will not be possible in the time  
30 available to canvass every line of every report. That  
31 would be a two-week hot tub. Could I tender this report,  
32 please.

33  
34 CHAIRPERSON: Yes. The joint report prepared at the  
35 conclusion of the conclave held on 28 and 29 July 2025 is  
36 exhibit CA74.

37  
38 **EXHIBIT #CA74 JOINT REPORT PREPARED AT THE CONCLUSION OF**  
39 **THE CONCLAVE HELD ON 28 AND 29 JULY 2025**

40  
41 MR COSTELLO: A further joint report, INQ.0010.0001.0001.  
42 This is a more recent joint report that derives from a  
43 conclave held between a variety of experts but concerning  
44 only questions essentially of geochemistry and perhaps  
45 touching on hydrogeology. It takes a different form in  
46 that it is really a minute of the discussion between the  
47 various experts.

1  
2 While Mr Paul and Mr Hartley were present in the  
3 conclave, it's evident from the discussion that it was  
4 principally a discussion between Dr Vu, Mr Jewell and  
5 Mr Hitchcock. If we just cycle through that document,  
6 please. It's quite short. This, Madam Chair, was the  
7 opportunity for those with expertise in hydrochemistry to  
8 address the particular issues, some of which had become  
9 more narrowed or acute by reason of the filing of the joint  
10 reports and the conclave process. I'd seek to tender that  
11 report.

12  
13 CHAIRPERSON: The joint report arising from the  
14 supplementary expert conclave held on 1 August 2025 is  
15 exhibit CA75.

16  
17 **EXHIBIT #CA75 JOINT REPORT ARISING FROM THE SUPPLEMENTARY**  
18 **EXPERT CONCLAVE HELD ON 1 AUGUST 2025**  
19

20 MR COSTELLO: I think for now there's only one other  
21 report that I should tender as a matter of good order.  
22 It's by an expert who is not attending the conclave but it  
23 has been provided by South East Water. It's the report of  
24 Professor van Zyl - that's v-a-n Z-y-l - professor at the  
25 University of Auckland, and it is SEW.0001.0002.4191. This  
26 is dated 17 July 2025 and described as flow rate from a  
27 longitudinal split in a PVC pipe at McCrae. It is a report  
28 that is principally concerned with a flow rate analysis in  
29 respect of the split and the - in basic terms, the amount  
30 of water likely to have travelled from the burst pipe to  
31 the stormwater grate nearby. It's more complicated than  
32 that, but that's at least a general description, and  
33 I think as a matter of form I should tender that report.

34  
35 CHAIRPERSON: The report of Dr van Zyl dated 17 July 2025  
36 is exhibit CA76.

37  
38 **EXHIBIT #CA76 REPORT OF DR VAN ZYL DATED 17 JULY 2025**  
39

40 MR COSTELLO: Madam Chair, those are the reports that  
41 I wish to tender at this point. It may be that there are  
42 additional documents that will need to be tendered in the  
43 running, and it may be, for example, that some of the  
44 additional material that's been provided by South East  
45 Water will need to be tendered, but I haven't had an  
46 opportunity to review that material. So I'll seek to do  
47 that either over lunch or overnight, and to the extent

1 there's further tender needed I'll attend to that at the  
2 appropriate time.

3  
4 In terms of the approach to joint evidence, now, what  
5 I thought I would seek to do if it's convenient to you,  
6 Madam Chair, is first to identify areas of agreement and  
7 the major areas of disagreement between the various  
8 experts. I think it will be best done if I concentrate  
9 first on the 2020 landslide and then move - sorry, 2022  
10 landslide and then move to the 2025 landslides. The scope  
11 of disputation in respect of 2022 is narrower, and the  
12 number of experts involved are also narrower. And then,  
13 having done that, I'll move to 2025.

14  
15 I'm on notice from counsel for the shire and counsel  
16 for South East Water that there are particular topics that  
17 they would wish to address on and, to the extent I can,  
18 I'll seek to stop at an appropriate point so that things  
19 can be dealt with topically rather than leaving  
20 cross-examination on diverse topics till the end, although  
21 I suspect there might need to be a mop-up at the end.

22  
23 CHAIRPERSON: Yes.

24  
25 MR COSTELLO: All right. We'd normally take the morning  
26 break in five minutes, but perhaps it's more convenient to  
27 do it now and then come back to start on 2022.

28  
29 CHAIRPERSON: Yes, let's do that. Let's have a break now.  
30 We'll return at 20 to 12.

31  
32 **SHORT ADJOURNMENT**

33  
34 MS SIEMENSMA: ... by Friday.

35  
36 CHAIRPERSON: By 10 am Friday?

37  
38 MS SIEMENSMA: Yes. So --

39  
40 CHAIRPERSON: By 10 am on Friday?

41  
42 MS SIEMENSMA: 10 am on Friday.

43  
44 CHAIRPERSON: Thank you.

45  
46 MS SIEMENSMA: The difficulty is of course the page limit.  
47 You said if he could limit the text to five pages, but of

1 course to provide the supporting material he wishes to have  
2 an appendix. He says you can't do both within five pages,  
3 having five pages of just text unsupported by data. He's  
4 not going to --

5  
6 CHAIRPERSON: Yes. So the appendix would have the data in  
7 it. That's fine.

8  
9 MS SIEMENSMA: And the five pages if --

10  
11 CHAIRPERSON: That's fine. Thank you.

12  
13 MR COSTELLO: Thank you, Madam Chair. Before I turn to  
14 2022 I just wanted to give each of the experts currently in  
15 the box the opportunity to explain whether and, if so, the  
16 extent to which they have been engaged to do work for the  
17 party for whom they appear today on matters separate to the  
18 matters of concern of the board of inquiry. Perhaps could  
19 I start with you, Mr Bolton. Have you been engaged by  
20 South East Water on prior occasions?

21  
22 MR BOLTON: No.

23  
24 MR COSTELLO: Thank you. Mr Hartley?

25  
26 MR HARTLEY: Similar, no.

27  
28 MR COSTELLO: No. Mr Paul, you've clearly not been  
29 engaged by the board of inquiry before, and nor have you,  
30 Mr Makin. Mr Pope, I think in fairness I might have asked  
31 you this question prior hearing. It 's well understood  
32 that you have done work for the shire in connection with  
33 the 2022 landslide and probably almost continuously since  
34 then. Am I right to recall that your evidence at a prior  
35 hearing was the 2022 landslide was the first substantive  
36 work that you had done for the shire?

37  
38 MR POPE: Correct, and then there was another separate  
39 legal matter that came later.

40  
41 MR COSTELLO: Yes. Yes, thank you. And, Mr Hitchcock,  
42 have you previously been engaged by the shire?

43  
44 MR HITCHCOCK: No, I haven't.

45  
46 MR COSTELLO: Thank you. I want to turn then to the  
47 November 2022 landslide, and perhaps the easiest way to do

1 this in the first instance is to have the joint report on  
2 the screen, please. That is INQ.0009.0001.0001. And could  
3 we go to the third page, please. Can that be made just  
4 slightly larger, try and eliminate the white area. It's a  
5 little hard to see. Thank you. Perhaps just leave it.  
6 Thank you.

7  
8 Now, Mr Paul and Mr Pope, this table sets out the -  
9 thanks. Very useful. Thank you. This table sets out the  
10 results of the conclave that you each participated in  
11 insofar as it concerned the November 2022 landslide; is  
12 that correct?

13  
14 MR POPE: Correct.

15  
16 MR PAUL: Yes.

17  
18 MR COSTELLO: Thank you. Now, as I understand it, there  
19 is perhaps one area of major disagreement and other areas  
20 of minor disagreement. But before we come to the areas of  
21 disagreement in a causal sense I want to identify a  
22 difference, which on one view might be semantic but on  
23 another view might be more substantial than that,  
24 concerning the words used to describe the various factors.  
25 The terminology in the second row is "preparatory" or  
26 "triggering" factors. Mr Pope, in your report you don't  
27 I think use the phrase "preparatory", although it is  
28 adopted in this table, but you have in a comment made had  
29 something to say about the use of the phrase and the use of  
30 "trigger" verse "causal". I just want to give you an  
31 opportunity first to explain your view about those words  
32 and their appropriateness.

33  
34 MR POPE: Sure. I mean, I'm happy with the term  
35 "preparatory" read on its own. The objection was to how -  
36 to my reading, it was linked to cause as in who was to  
37 blame. So I don't - the term in itself on its own, no  
38 problem. I use "cause", and I limit - I think in all the  
39 cases the trigger is generally singular. Like, it's a  
40 single event. There can be more than one trigger, but  
41 that's the distinction. What were the factors that led to  
42 the landslide, like, there's a bunch of causes, and then  
43 what was the trigger on the day. Yes.

44  
45 MR COSTELLO: And when you say there were a bunch of  
46 causes but only one trigger would you describe the bunch of  
47 causes as being preparatory factors or do you think that



1       that language --

2

3       MR POPE:    Yeah, that's what I was trying to say, if read  
4       that way, yes, like it - yep.

5

6       MR COSTELLO: All right. Mr Paul, you I think do more  
7       comfortably use "preparatory" and "triggering". Could you  
8       explain the significance of those terms?

9

10      MR PAUL:    So the term "preparatory factors" refers to all  
11      the aspects of the landscape that make it susceptible to  
12      landslide and includes things like the thickness of the  
13      slope, the type of geology, pathways for water to get in.  
14      So these are all things that kind of already exist and  
15      exist continuously if you like. The triggering factor is  
16      what actually causes the landslide on the day. So the way  
17      I distinguish it, the where and what might happen are  
18      preparatory factors. The when it happens is the triggering  
19      factor, and that's the distinction.

20

21      MR COSTELLO: Thank you. Mr Pope has just given evidence  
22      to the effect that ordinarily there will be a single  
23      triggering factor on the day. Is that consistent with your  
24      view>.

25

26      MR PAUL:    In most cases. You could - you know, you come  
27      up with a scenario where there are multiple triggers at the  
28      same time. That wouldn't be impossible. But usually, yes,  
29      there would be a main single trigger, although I would  
30      comment that that triggering mechanism doesn't have to  
31      occur on the day. It can unfold over a longer time.

32

33      MR COSTELLO: Mr Pope, are you content with what Mr Paul  
34      has just said?

35

36      MR POPE:    Yes.

37

38      MR COSTELLO: Is there anything that he's just said that  
39      you disagree with --

40

41      MR POPE:    No, no.

42

43      MR COSTELLO: -- or that you'd like to clarify?

44

45      MR POPE:    No, that's fine.

46

47      MR COSTELLO: Thank you. I will use the term

1 "preparatory", but if at any point you, Mr Pope, think  
2 there needs to be some qualification made then you should  
3 feel free to make it.

4  
5 MR POPE: Sure.

6  
7 MR COSTELLO: But it seems to me at least at the moment  
8 that the extent of any difference is not one that's likely  
9 to have any significant bearing on findings that might be  
10 made.

11  
12 Turning then to another question of terminology,  
13 Mr Paul, you in this table identify certain factors as  
14 being of an insignificant contribution, others as being  
15 significant, and one being minor and two being medium, and  
16 is that the terminology that's been agreed as between all  
17 of the experts in the conclave?

18  
19 MR PAUL: Yes. I've put definitions of that terminology  
20 in the first two or three pages --

21  
22 MR COSTELLO: Yes.

23  
24 MR PAUL: -- the first page, I think, to make clear what  
25 we mean by that. The terminologies for magnitude of  
26 contribution come out of a publication, and the confidence  
27 ones are just, you know, split 0 per cent to 100 per cent  
28 into five integers.

29  
30 MR COSTELLO: Thank you. If we could go back a page,  
31 please, and if that table could be blown up. This is the  
32 table that identifies the language employed by each of the  
33 experts in producing this joint report, and it concerns,  
34 first, magnitude of contribution - significant, major,  
35 medium, minor or insignificant - the percentage that each  
36 factor would need to meet in order to come within each  
37 grade, and then the language for the level of certainty.  
38 And so each expert has identified for each factor the  
39 magnitude of that factor and the level of certainty that  
40 they have arrived at that finding; is that a fair way of  
41 describing what's been done?

42  
43 MR PAUL: That is. But I need to make sure we convey that  
44 this is giving a relative indication. So if we say  
45 something's major, a contribution of 30 per cent to  
46 80 per cent, that shouldn't be seen as having a  
47 quantitative indicator of the level of contribution. These

1 are relative between the experts and relative between the  
2 different factors, and that's how it should be considered.

3  
4 MR COSTELLO: So a major contribution isn't necessarily at  
5 least 30 per cent responsible for the particular landslide?

6  
7 MR PAUL: That level of certainty on it.

8  
9 MR COSTELLO: Thank you. How do you arrive at a rating of  
10 a level of certainty in relation to each factor?

11  
12 MR PAUL: Yeah, that's more tricky and it's qualitative  
13 and it is subjective, and I think the - if I say how do we  
14 really get to that, it's a relative assessment, "I feel  
15 that I'm more certain about this than this", and again  
16 I've conveyed it, look at it as a relative assessment, not  
17 as, you know, I know this to be 80 per cent certain, I know  
18 this to be 100 per cent certain, but I know very high is  
19 more certain than high.

20  
21 MR COSTELLO: Yes. So the certainty rating is each expert  
22 bringing their skill and experience to bear to form a  
23 qualitative judgment about the - how certain they are about  
24 the contribution of that factor; is that right?

25  
26 MR PAUL: The key - qualitative judgment is the key word  
27 there.

28  
29 MR COSTELLO: Thank you. Mr Pope, do you agree with that  
30 or is there anything you would wish to add to that?

31  
32 MR POPE: No, no, I agree with that. It's how do we  
33 proportion contribution. I guess a lot of our - the  
34 individual's experience in past landslides is used to  
35 calibrate those terms, really.

36  
37 MR COSTELLO: Thank you. If we could move back to the  
38 next page, table 3. Although, Mr Hartley, you're not  
39 involved in the 2022 landslide, just on these preliminary  
40 matters of the relative contribution of each factor and the  
41 degree of certainty at which you've assessed it, do you  
42 agree with what has just been said by Mr Paul and Mr Pope  
43 and, if not or if so, is there anything you'd wish to add?

44  
45 MR HARTLEY: Yes, in general I agree. I would say that  
46 with a two-day conclave the approach that Mr Paul chaired  
47 is absolutely all right. Given longer, maybe, you know, us

1       arguing over significant, major and doing the qualitative  
2       side of things may have assisted. But, two days, it was  
3       the way forward.

4  
5       MR COSTELLO: I see. Thank you. Can we turn then to the  
6       2022 landslide and the particular factors that have been  
7       identified as at least potentially preparatory or  
8       triggering. I just want to orientate everybody to the  
9       particular landslide here. Perhaps I might do that by  
10      reference to a diagram. Could I have on the screen,  
11      please, DPA.0004.0001.0001, and could we go to 0042,  
12      please. Mr Paul, this is your report, and there's a  
13      diagram here which looks like a heat map?

14  
15      MR PAUL: Correct.

16  
17      MR COSTELLO: Now, this landslide originated within a  
18      gully on the west side of the slope; is that right,  
19      Mr Paul?

20  
21      MR PAUL: That's correct.

22  
23      MR COSTELLO: And can you just explain this diagram,  
24      please?

25  
26      MR PAUL: This diagram is produced by comparing digital  
27      elevation models, so a digital model of the ground surface.  
28      That's a comparison between the surface as it was in 2017  
29      and the surface measured after the January 2025 landslides.  
30      So you see the difference between the ground surfaces over  
31      what's an eight-year period. So red is described as "cut".  
32      The red colours, that is where the ground surface has  
33      reduced over that period; green, the fill is where the  
34      ground surface has increased over that period. So we can  
35      see areas where landslides have occurred because of that -  
36      due to that comparison, where material has come out from  
37      and gone and been deposited to.

38  
39      MR COSTELLO: So it shows the relative volume of  
40      the losses, in effect?

41  
42      MR PAUL: Yes, you can. You can calculate the volume of  
43      material that's mobilised and migrated.

44  
45      MR COSTELLO: Right. And I think I'm right to say that  
46      it's your opinion that this involved an initial  
47      translational slide which was then followed by a debris

1 flow; is that correct?

2

3 MR PAUL: I can't comment too much on that because, you  
4 know, that requires observation at the time --

5

6 MR COSTELLO: Yes.

7

8 MR PAUL: -- and of course I wasn't on site to observe it  
9 at the time. So all we can really say from this is  
10 material moved one place to another. We can look at the  
11 form of the slope and see that the shape of the landslide  
12 scar is somewhat translational and draw the conclusion that  
13 that's translation - it's shape to that slide.

14

15 MR COSTELLO: Thank you. Mr Pope, you've been involved  
16 with this landslide for longer. Is it your understanding  
17 that it was an initial translational slide followed by a  
18 debris flow?

19

20 MR POPE: Yes, correct.

21

22 MR COSTELLO: That's how you'd characterise it?

23

24 MR POPE: Yes.

25

26 MR COSTELLO: Thank you. I think I'm right to say that  
27 you, Mr Pope, estimated that the amount of material  
28 displaced was between 20 and 30 cubic metres?

29

30 MR POPE: Yes.

31

32 MR COSTELLO: Thank you. Now, Mr Pope, perhaps just  
33 sticking with you for the moment, you're aware that several  
34 other experts have given opinions about matters connected  
35 with the cause of this landslide?

36

37 MR POPE: Yes.

38

39 MR COSTELLO: And perhaps I'll call another document onto  
40 the screen, DPA.0004.0001.0001.0279. It might be within  
41 that same document, yes, 0279. Thank you. Could I have on  
42 the screen that page and the next page, please. Now,  
43 Mr Pope, there has been an enormous amount of reports  
44 produced in connection with this matter, but in particular  
45 item 4 there, which is after the 2022 landslide, is a  
46 geotechnical assessment by CivilTest; do you see that?

47

1 MR POPE: Yes.  
2  
3 MR COSTELLO: You've had regard to that report in the  
4 course of doing your work?  
5  
6 MR POPE: Yes.  
7  
8 MR COSTELLO: Thank you. And then item 7, this is a land  
9 stability assessment also prepared by CivilTest; you're  
10 familiar with that report?  
11  
12 MR POPE: Yes.  
13  
14 MR COSTELLO: And you've had regard to it?  
15  
16 MR POPE: Yes.  
17  
18 MR COSTELLO: Thank you. The structural computation for  
19 proposed land stability designs, that's a Rexicon document;  
20 are you familiar with that report?  
21  
22 MR POPE: Yes.  
23  
24 MR COSTELLO: Thank you. And you've had regard to it?  
25  
26 MR POPE: Yes.  
27  
28 MR COSTELLO: Thank you. And then 9, 10 and 11, two  
29 CivilTest reports and a report by AS James, who were  
30 engaged by the Willigenburgs; you're familiar with each of  
31 those reports?  
32  
33 MR POPE: Yes, but 9 I don't think I've read for a while.  
34 But, yeah, I have seen them all.  
35  
36 MR COSTELLO: Did you say 9 you haven't read --  
37  
38 MR POPE: Number 9, yes.  
39  
40 MR COSTELLO: Thank you. Now --  
41  
42 MR POPE: I've certainly seen it, sorry, but I can't  
43 remember details of it, yes.  
44  
45 MR COSTELLO: Thank you. If that could be taken off,  
46 thanks. And then finally 13. That's another CivilTest  
47 report, a technical memorandum, 21 December 2023. Do you

1 have a recollection in general terms of having looked at  
2 that report?

3  
4 MR POPE: There was a few - I can't remember specifics --

5  
6 MR COSTELLO: Would you like me to have it brought up on  
7 the screen?

8  
9 MR POPE: If you can bring it up that will help, yeah.

10  
11 MR COSTELLO: MSC.5000.0001.0246. Do you see it's  
12 21 December 2023 and --

13  
14 MR POPE: If you just scroll through a few pages. I've  
15 seen the front page. Yes. Yeah, yeah.

16  
17 MR COSTELLO: Do you recall that one?

18  
19 MR POPE: Yes.

20  
21 MR COSTELLO: All right. Thank you. And in the course of  
22 preparing your work you've had regard to that report?

23  
24 MR POPE: Yes.

25  
26 MR COSTELLO: All right. Mr Paul, have you also had  
27 regard to each of the reports that I've just mentioned with  
28 Mr Pope?

29  
30 MR PAUL: I have.

31  
32 MR COSTELLO: All right. Now, neither CivilTest or  
33 AS James or their representatives are giving evidence in  
34 the course of this hearing block, but I just wanted to  
35 establish that their reports have been given proper  
36 consideration by those who are giving evidence, and so let  
37 me ask you squarely, Mr Paul, have you carefully read each  
38 of those reports in the course of coming to the conclusions  
39 that you've come to?

40  
41 MR PAUL: I have read each of those reports, about two  
42 months ago, so I'm not going to say I know in detail every  
43 word in them. But I have read them.

44  
45 MR COSTELLO: No. I don't intend to examine you closely  
46 in regard to them. I just want to establish whether or not  
47 you've in fact had regard to them. And the same is fair

1 for you, Mr Pope?

2

3 MR POPE: Yes. Yes.

4

5 MR COSTELLO: Thank you. Mr Pope, have you had direct  
6 engagement with CivilTest or AS James over the course of  
7 your work, or have you only received reports and considered  
8 the reports?

9

10 MR POPE: Do you mean on this project or ever?

11

12 MR COSTELLO: No, in this project.

13

14 MR POPE: No. No, I've never worked with them. I've  
15 talked to them. I've had meetings with them, like - and we  
16 had without prejudice meetings 2024, a couple of them.

17

18 MR COSTELLO: Was that in connection with a legal matter  
19 that's not for this board of inquiry?

20

21 MR POPE: Yeah.

22

23 MR COSTELLO: Thank you. I don't intend to ask you about  
24 that. If we could go back to the joint report, please.  
25 That's INQ.0009.0001.0001. And if we could go to the third  
26 page. Mr Paul, as one might expect in respect of the first  
27 two potential factors, earthquake and erosion, there is  
28 absolutely no divergence between your opinion and the  
29 opinion of Mr Pope; is that your understanding?

30

31 MR PAUL: Yes, that's correct.

32

33 MR COSTELLO: All right. There is a difference in respect  
34 of number 3, erosion of escarpment, whether it was a  
35 preparatory factor, although it seems a relatively minor  
36 difference?

37

38 MR PAUL: It is a minor difference and it refers simply to  
39 that geomorphic processes, including erosion, formed the  
40 slope --

41

42 MR COSTELLO: Thank you. I'll come back to those where  
43 there's disagreement later, but first I just want to  
44 identify the scope of the agreement. The largest area of  
45 disagreement is the fourth item, piping through soils  
46 upslope, whether that was a preparatory factor. You view  
47 that as a significant factor, albeit with a low degree of



1 confidence, whereas Mr Pope considers it to be a minor  
2 factor, also with a low area of confidence. Is that what  
3 you would describe as the largest area of disagreement  
4 between you and Mr Pope in respect of 2022?

5  
6 MR PAUL: I'd say so.

7  
8 CHAIRPERSON: Do you agree with that, Mr Pope?

9  
10 MR POPE: Yes. And number 10 I - yeah, I just didn't  
11 comment on 10. But, yeah, that would be the --

12  
13 MR COSTELLO: Yes, thank you. No disagreement in respect  
14 of 5, which is whether or not anthropogenic changes were  
15 triggering. Some disagreement in respect of 6, whether  
16 anthropogenic changes were a preparatory factor. And,  
17 Mr Paul, as you sit there now do you recall what the  
18 particular anthropogenic changes being referred to there?

19  
20 MR PAUL: What we would be looking at for there was there  
21 modifications to the landscape that could have made a  
22 landslide there more likely, and you'd be looking  
23 particularly at the fill-in or perhaps drains that direct  
24 water there; that sort of thing.

25  
26 MR COSTELLO: Thank you. Is that correct, Mr Pope? Is  
27 there anything you would wish to add in respect of that?

28  
29 MR POPE: Yeah, and just local retaining walls and  
30 structures and the likes; yes.

31  
32 MR COSTELLO: Yes, thank you. I'll come to all of that.  
33 That was 6. 7 is agreed I think by both of you to be the  
34 most significant factor, that is the very high rainfall at  
35 that point in time, although, Mr Pope, you have got a much  
36 higher degree of confidence about that than Mr Paul has; is  
37 that a fair description?

38  
39 MR POPE: Yes.

40  
41 MR COSTELLO: No disagreement on 8, which is groundwater  
42 from a shallow aquifer triggering the slide. 9, there's  
43 not so much disagreement but a divergence. This is  
44 groundwater from shallow aquifer as a preparatory factor.  
45 Mr Pope, you've identified this as a medium contributor  
46 with a moderate degree of confidence and, Mr Paul, you've  
47 not commented on this particular factor. Why have you not

1 commented on this particular factor?

2

3 MR PAUL: What we're talking about there is a natural  
4 aquifer being - water that's conveyed through the ground  
5 naturally and there might be a spring in that area where  
6 that water comes out, and I've just not seen evidence for a  
7 spring or natural conveyance of water to the location of  
8 the 2022 landslides. At the same time, I wasn't able to  
9 make the observations at the time to be able to comment.  
10 So I left it as no comment.

11

12 MR COSTELLO: Thank you. Reversal of the situation in 10,  
13 water from 23 Coburn Avenue being a triggering factor. On  
14 this one you, Mr Paul, have assessed this as a medium  
15 contributing factor; but you, Mr Pope, have felt unable to  
16 comment on that.

17

18 MR POPE: I do discuss it in my report. I couldn't draw  
19 any meaningful conclusions on volume of water from the  
20 main. I do talk to it being a credible flow path. But  
21 I have uncertainties there as to how long that could have  
22 leaked without houses losing pressure, and that has  
23 happened on View Point Road where the main was hit and  
24 someone reported a pressure loss to their house pretty  
25 quickly. So I'm not sure how much water could have been  
26 lost there.

27

28 MR COSTELLO: All right. I might come back to that. No  
29 disagreement on domestic water usage as a trigger. And  
30 relative agreement on loss of vegetation as a preparatory  
31 factor, although stark differences in the degrees of  
32 confidence with which you've arrived at that conclusion.  
33 Mr Paul, you have very low confidence in the conclusion  
34 you've arrived at there. Perhaps I'll let you first  
35 explain why you have very low confidence, and then I'll let  
36 Mr Pope explain why he has high degree of confidence.

37

38 MR PAUL: Not on site at the time to make observations of  
39 what vegetation was removed. I've got to rely on images  
40 and photos. It was quite hard to understand how much  
41 vegetation would have been and roots would have been in the  
42 ground to influence it.

43

44 MR COSTELLO: You have had regard to aerial images,  
45 though?

46

47 MR PAUL: There's aerial imageries and there's

1 photographs. But again that (indistinct) much to see the  
2 green on the photo. It's really about the roots and how  
3 far they penetrate, not so much what you can see in the  
4 green on the photo.

5

6 MR COSTELLO: Mr Pope, you've got a high degree of  
7 confidence in your conclusion this is a medium to major  
8 preparatory factor. Why are you so confident in that  
9 conclusion?

10

11 MR POPE: I've probably had the joy of going through  
12 thousands of pages of planning documents with photos of  
13 properties in the '90s. Nearmap has oblique imaging  
14 capability, so you can look at the hill at different angles  
15 with different times. If you've got the right log-in it  
16 has a 3D representation in the land form as well, and so  
17 using aerial photograph but different angles and different  
18 models, and using the photos in the planning records,  
19 that's where my confidence comes from.

20

21 MR COSTELLO: Do you accept what Mr Paul has just said  
22 that the primary question is concerned more with roots  
23 structural than canopy?

24

25 MR POPE: No. No. Like, a tree's capability to pull  
26 water is directly linked to the canopy size. So you don't  
27 need to know the root system to know if they're pulling  
28 water out of the hill.

29

30 MR COSTELLO: Do you feel then that you're able to draw  
31 firm conclusions based on historical aerial images that  
32 would show principally at least the canopy; is that right?

33

34 MR POPE: I wouldn't rely on just top-down imagery,  
35 though.

36

37 MR COSTELLO: What other imagery would you rely on?

38

39 MR POPE: That's what was I'm saying; I've used oblique -  
40 so images that are taken - when they do the aerial imagery  
41 you get oblique photos so you can get, like, as if you're  
42 out on the bay looking back on the escarpment. Nearmap  
43 produces a three-dimensional model like the Pointerra model  
44 that everyone has had access to so you can actually look at  
45 it in 3D as well.

46

47 MR COSTELLO: All right. Thank you. That's the areas of

1 agreement and disagreement. I want to focus now on those  
2 areas where there is a significant disagreement, and the  
3 most significant is number 4. Mr Paul, what I might do is  
4 I might pull up paragraph 8.7.2 of your report just so that  
5 it's available.

6  
7 Could I have on the screen, please,  
8 DPA.0004.0001.0001, and could we go to internal page 68,  
9 please, which I think is 0082. This is the start of your  
10 discussion, Mr Paul, on this particular topic which is  
11 described in the table, as I said, as piping through soils  
12 upslope as a preparatory factor. Could you introduce this  
13 topic, please, explain what it is that you are considering  
14 in this portion of your report and that you and Mr Pope  
15 have discussed in conclave?

16  
17 MR PAUL: So when water infiltrates the ground it must  
18 migrate somewhere. It must move through the ground  
19 somewhere. And the ability of the water to - of the ground  
20 to absorb the water depends on its porosity, how permeable  
21 it is. So if we've got, say, a point source, a major leak  
22 or we've got water flowing into the ground, there's got to  
23 be enough voids, we'll say, in the ground to accommodate  
24 that water.

25  
26 These soils or some of the soils in these area are  
27 dispersive, meaning as water goes into that soil and as it  
28 can migrate through over time it's piping - and that's what  
29 we mean by the word piping - it's piping out, eroding soil  
30 out and creating pathways through the soils. What we're  
31 talking about here are there, you know, pathways that have  
32 formed in the soil upslope of these landslides that could  
33 act to convey water to the location of the landslide;  
34 water's introduced to the soil, you know, at a location  
35 different to where the landslide occurred.

36  
37 MR COSTELLO: So let me see if I properly understand it.  
38 What's being considered here is the presence of voids. The  
39 voids are created by water and, having been created, then  
40 provide an effective channel for water to flow.

41  
42 MR PAUL: Correct.

43  
44 MR COSTELLO: And the question here is whether or not  
45 there were voids of that kind that made in effect a  
46 preferred pathway for water into the escarpment; is that a  
47 fair description?

1  
2 MR PAUL: That (indistinct).  
3  
4 MR COSTELLO: Thank you. And in coming to the conclusion  
5 that you've come to about this matter you've had regard to  
6 CivilTest reports that identified voids and in some cases  
7 included photographs of voids that had been identified; is  
8 that right?  
9  
10 MR PAUL: Those, and also council maintenance records.  
11 Say, for example, up at 23 Coburn there's a record of voids  
12 forming around the stormwater pipe and of voids forming in  
13 private backyards.  
14  
15 MR COSTELLO: Yes.  
16  
17 MR PAUL: And images from the stormwater works that were  
18 done in 2023, I think it was, where the trenches exposed  
19 voids. So direct physical evidence of voids in the soils  
20 upslope (indistinct).  
21  
22 MR COSTELLO: Thank you. If we could just move to the  
23 next page of the report. Now, if we go over to the next  
24 page. And then one more to paragraph 163. Over again.  
25 Here you're identifying subsurface flow paths. This is in  
26 respect of January 2025. But in this part of your report  
27 I think you're considering flow paths in respect of both  
28 2022 and 2025 at various points; is that right?  
29  
30 MR PAUL: Yeah, that's correct.  
31  
32 MR COSTELLO: Okay. And if we go over two pages to  
33 subparagraph (c) of that report and just blow that up. You  
34 refer here in subparagraph (iii) to subsurface voids.  
35 Could you just read that paragraph to yourself for a  
36 moment, Mr Paul.  
37  
38 MR PAUL: Yes.  
39  
40 MR COSTELLO: Did you read (iii)?  
41  
42 MR PAUL: Yes, that's fine.  
43  
44 MR COSTELLO: Thank you. So this is the source of  
45 evidence, is it, for voids that have been physically  
46 identified?  
47

1 MR PAUL: Yes.

2

3 MR COSTELLO: Okay. And could you explain what you have  
4 drawn from that evidence in respect of the 2022 landslide?

5

6 MR PAUL: So there's probably three sources of water that  
7 we could identify that could lead to the 2022 landslides,  
8 those being the significant rainfall, the leak in the water  
9 pipe at 23 Coburn Road which there was evidence it's about  
10 0.9 of a megalitre over 12 hours or so, and irrigation  
11 pipes on the property itself. So they're our three sources  
12 of water.

13

14 Now, if it's the pipe, could that water issued from  
15 the pipe be conveyed through subsurface channels to the  
16 landslide? I've got a low certainty on it because I don't  
17 know exactly where those channels go. But we know there to  
18 be subsurface voids there, evidenced by the voids observed  
19 around the stormwater, the voids observed in the backyard,  
20 and the voids observed when they put the trenches in in the  
21 road there, and the ground-penetrating radar that's  
22 detected voids. So we know the voids to be there. What  
23 I don't know is could water have got from the pipe through  
24 those voids to that site, hence the low certainty I've  
25 assigned to that. But as a preparatory factor that's why  
26 I've got - saying it's significant because we know the  
27 voids to be there.

28

29 The other one is rainfall. We have rainfall  
30 concentrated through the gutters or concentrated by pipes.  
31 Could it get out of the pipes and into one of these flow  
32 paths? Well, it could. And if those flow paths are there  
33 it can convey it down towards the landslide. That's what  
34 I'm getting at with it's significant because we know the  
35 voids to be there. There is a means for water to  
36 infiltrate and be conveyed towards the landslide.

37

38 MR COSTELLO: Based on the evidence that you've seen were  
39 you able to draw conclusions about where the voids might be  
40 upslope?

41

42 MR PAUL: I know where they've been observed. We've got  
43 direct evidence where they've been observed. What we don't  
44 know is the connectivity. We've only got point  
45 observations.

46

47 MR COSTELLO: If we could go over three pages to 0091.

1 Thank you. This is a picture that you've put in your  
2 report. It's not a picture that you took. You've taken  
3 this from another report.  
4  
5 MR PAUL: Yes.  
6  
7 MR COSTELLO: But it's identifying what's described in the  
8 image there as a void, and that's at the front of or near  
9 to 10-12 View Point Road.  
10  
11 MR PAUL: That's right.  
12  
13 MR COSTELLO: All right. And so this is a void that's  
14 been revealed by reason of maintenance work that's been  
15 undertaken; is that right?  
16  
17 MR PAUL: That's right. I understand this to be the 2023  
18 works to upgrade the stormwater in View Point Road.  
19  
20 MR COSTELLO: I see. And that void, do you have a high  
21 degree of certainty that a void like that is formed by  
22 reason of water flow or are there other possible reasons  
23 for a void like that being underground?  
24  
25 MR PAUL: I have a high certainty it's caused by water  
26 flow through dispersive soils.  
27  
28 MR COSTELLO: What you don't know is to where that void  
29 leads?  
30  
31 MR PAUL: Correct.  
32  
33 MR COSTELLO: And you also don't know how many of those  
34 voids are around the area?  
35  
36 MR PAUL: That's right.  
37  
38 MR COSTELLO: If the voids are relatively short or shallow  
39 then are they of less significance?  
40  
41 MR PAUL: Well, to an extent, it depends on significance  
42 to what, I guess. Significance to causing a landslide, if  
43 they're short and shallow and they don't have connectivity  
44 towards the location of the landslide would occur then,  
45 yes, they're less significant.  
46  
47 MR COSTELLO: All right. Now, Mr Pope, you disagree

1 generally I think with the significance of these voids as  
2 preparatory factors for the 2022 landslide; is that fair?  
3

4 MR POPE: Specifically for the 2022 landslide, yes.  
5 I think I've talked in reports at length about why.  
6

7 MR COSTELLO: Is it fair to say - I'm giving you the  
8 opportunity to give full bottle on your explanation, but  
9 just to perhaps set the scene you are unconvinced that the  
10 voids in fact cause water to travel towards the escarpment;  
11 is that right?  
12

13 MR POPE: From that location, yes. The other mechanism to  
14 get voids like that - and we have South East Water in the  
15 room - is collapsed settlement in service trenches. It's  
16 quite common in deep trenches that this happens. When  
17 water enters the trench you get settlement immediately on  
18 wetting. So I routinely investigate collapsed settlement  
19 and routinely see voids like this near trenches, in  
20 trenches. So I didn't take the photo. I don't think  
21 anyone's picked it up as a coordinate. So to actually pin  
22 it on the sewer trench and differentiate it from it being  
23 from backfill or natural is difficult. It is very close to  
24 where the sewer comes across View Point Road and connects  
25 into the main that goes down the hill.  
26

27 These voids, like the natural form voids, are present  
28 across the escarpment. If you map the full length of the  
29 escarpment you'll see them in people's cuttings, behind  
30 their houses, like, in the old quarries up around  
31 Anthony's Nose, and they generally strike straight down the  
32 hill. So, for them to be running across contour,  
33 immediately I'm curious about whether that's natural or  
34 not.  
35

36 MR COSTELLO: When you say they're a common enough feature  
37 in the area --  
38

39 MR POPE: Yes.  
40

41 MR COSTELLO: -- they're a common enough feature and  
42 ordinarily caused by subterranean water flow?  
43

44 MR POPE: What I've seen is surficial erosion. There has  
45 been - and I've put it in the landslide risk assessment -  
46 there are properties with pipes in the cuts. So they do  
47 form surficial erosion and subsurface flow; yes.



1  
2 MR COSTELLO: And so I think you just said that it appears  
3 to you or at least there's evidence to the fact that the  
4 voids here strike perpendicular to contour; is that right?  
5  
6 MR POPE: This void is not - it's, like, literally on  
7 contour. So what I'm trying to say is, like, water flowing  
8 down that trench keeps going right to left. That's, like,  
9 down the slope. This void is going parallel to the slope.  
10  
11 MR COSTELLO: I see. Could I have on the screen  
12 PSM.5000.0004.4044. And could we go to 4096, please. Yes.  
13 The picture at the bottom, photo 13.  
14  
15 MR POPE: Yep.  
16  
17 MR COSTELLO: This identifies what are described as  
18 natural voids or pipes in "supper soil profile".  
19  
20 MR POPE: Typo there. In upper soil profile, yes.  
21  
22 MR COSTELLO: Glad that that's what it was. Perhaps could  
23 you just explain this photograph. This is from your  
24 report. I don't know where the photograph comes from, but  
25 the photograph was in your report.  
26  
27 MR POPE: It's a disused quarry around the corner, further  
28 towards Dromana.  
29  
30 MR COSTELLO: I see.  
31  
32 MR POPE: Around Anthony's Nose. Essentially what I was  
33 trying to say in words before is a lot of the piping exit  
34 holes are coming out from the face. If you go up the crest  
35 of a slope I wouldn't expect them running from right to  
36 left behind the slope. I'd expect these things to be  
37 coming straight out of the slope, if that makes sense; yep.  
38  
39 MR COSTELLO: Mr Paul, do you want to comment on anything  
40 that Mr Pope has said so far?  
41  
42 MR PAUL: No, I don't have any - the voids can migrate  
43 down towards the slope; that's fine.  
44  
45 MR COSTELLO: Now, I think I'm right to say that on this  
46 particular issue, although you, Mr Paul, view this as a  
47 significant preparatory factor and you, Mr Pope, view it as

1 a minor preparatory factor, both of you have got low  
2 confidence on this issue. Mr Pope, why do you have low  
3 confidence on this?  
4

5 MR POPE: Darren touched on it. We just don't know the  
6 length and direction of that void. We don't know how far  
7 it goes. As I said before, I don't think it was surveyed.  
8 So you can't literally put it over the sewer trench and  
9 have high confidence that's the sewer. Like, if the  
10 coordinate was high confidence then I would have more  
11 confidence that it was just settlement, if that makes  
12 sense.  
13

14 MR COSTELLO: Did the ground-penetrating radar testing  
15 that CivilTest do assist you in forming a view about this  
16 issue?  
17

18 MR POPE: Those works are pretty much where the two sewer  
19 lines connect to each other. So, no, it didn't. It just  
20 for me confirmed that there were voids in the area of sewer  
21 trenching. So I can't differentiate between voids in a  
22 sewer versus natural voids.  
23

24 MR COSTELLO: That's because you think those voids might  
25 be caused by collapsed settlement?  
26

27 MR POPE: Correct.  
28

29 MR COSTELLO: I see. Mr Paul, did you have regard to the  
30 ground-penetrating radar testing of CivilTest?  
31

32 MR PAUL: Yes. It's evidence there could be voids there.  
33 But the thing with any geophysics where you're sending a  
34 signal into the ground and looking for a response, you  
35 don't visually see; you have to interpret from  
36 the geophysics. So it's evidence, it's not conclusive  
37 evidence of voids.  
38

39 MR COSTELLO: I see. And that's one of the reasons why  
40 you have a low confidence on this is a preparatory factor?  
41

42 MR PAUL: That, and I don't know where those voids go.  
43

44 MR COSTELLO: I see. Do either of you have any idea based  
45 on experience or on the work you've done in the course of  
46 preparing your reports for this inquiry as to how long it  
47 would take for a void to be created in the type of soil

1 profile that the McCrae area has? Is that something that  
2 can be known or is known? Perhaps start with you, Mr Paul.

3

4 MR PAUL: Yeah, I've done work - it's called tunnel  
5 erosion, and I've done work on tunnel erosion in dispersive  
6 soils. In a landscape with dispersive soils these things  
7 can evolve over years and years and years. It's not a  
8 constant rate. It depends on - you know, you'll get storm  
9 events come through and it might take out a little bit,  
10 then it might break through to something more dispersive  
11 and break through. So it's not a constant rate. But these  
12 things can take years to form. It's not something I'd  
13 expect to form in days. It's something I'd expect to take  
14 years.

15

16 MR COSTELLO: Mr Pope?

17

18 MR POPE: Yeah, so there's a - I won't say what street  
19 address, but there's a cutting behind a house that is maybe  
20 about eight years old and it's already developed pipes in  
21 the cut behind the house. That quarry was - there was a  
22 publication regarding those quarries in the 30s. So  
23 that's, like, less than 10 years, but that's a 100-year-old  
24 cutting as well. It depends. I think it will depend on if  
25 you've got plenty of water coming it will be much quicker.  
26 If you don't have much run-on it can be much slower; yep.

27

28 MR COSTELLO: And is it the type of formation, these voids  
29 or pipes, that can be caused by or relate to natural  
30 springs or are natural springs unrelated to voids?

31

32 MR POPE: I don't think you would - if you have - like,  
33 some of those springs have been documented since the 1800s.  
34 I would expect that you could most likely have piping where  
35 those springs are; yeah.

36

37 MR COSTELLO: Do you agree with that, Mr Paul?

38

39 MR PAUL: Yeah, the soil is susceptible to the formation  
40 of these voids in the soil, it doesn't care where the water  
41 comes from, and one of the sources could be from natural  
42 springs.

43

44 MR COSTELLO: I see. I just want to close off on this  
45 topic. I just want to understand in terms of directional  
46 water flow here and whether or not the natural geography is  
47 other than conducive to voids and pipes being created in a

1 way that would lead water into the escarpment. Mr Pope  
2 suggests I think - Mr Pope, you'll correct me if I'm wrong  
3 about this - that that wouldn't be the natural path that  
4 would be taken and that would create a void; do you accept  
5 that, Mr Paul?

6  
7 MR PAUL: Yeah, the most likely is it will move what we  
8 call down gradient. So it's going to go downhill towards  
9 the escarpment. But what you've got to balance that with  
10 is you need to have the soil that's susceptible to the  
11 formation of the voids, and the soil is not uniform  
12 everywhere. So that can cause where this erodes to to  
13 vary.

14  
15 MR COSTELLO: That is a more dense soil, although in  
16 effect pointing downhill, might lead the water on a  
17 different path, a path of less resistance; is that what you  
18 mean?

19  
20 MR PAUL: That's right. Think of it like a river. A  
21 river carves its way through the soil that's the most  
22 susceptible for it to erode into. So we might find that  
23 there's some aeolian soil, which is windblown soil, really  
24 susceptible to the erosion. And then we might have some  
25 residual granite that comes up which is less susceptible  
26 perhaps and it goes that way.

27  
28 MR COSTELLO: Right. And in this area is there known  
29 evidence as to variation of soil types over distance that  
30 you're aware of?

31  
32 MR PAUL: Yes.

33  
34 MR COSTELLO: And can the soil types differ in a way that  
35 would be significant to the creation of voids over  
36 relatively short areas; that is, over metres rather than  
37 tens or hundreds of metres?

38  
39 MR PAUL: It can vary over metres, yeah.

40  
41 MR COSTELLO: Mr Pope, would you like to comment on  
42 anything Mr Paul has just said?

43  
44 MR POPE: Variability is real. Like, theirs is a  
45 significant variation in soil properties over short  
46 distances.

1 MR COSTELLO: Do you accept that that variation could at  
2 least potentially have the effect of creating voids that  
3 run in what would otherwise not be the natural direction?  
4

5 MR POPE: In the residual granites, sure; the colluvium,  
6 yes; but in the dune sands, no, I don't really accept it.  
7 That void's in the dune sands. Yeah.  
8

9 MR COSTELLO: Mr Pope, before I finish on this topic is  
10 there anything else that you wanted to say about it?  
11 I just want to make sure that you feel that you've said  
12 everything that you need to say.  
13

14 MR POPE: The only other works we've done this year on the  
15 matter is to try and measure the base flows in the  
16 stormwater of View Point Road as to contribution. So,  
17 like, the community said that the water's run down that  
18 road forever or for decades. So this year we measured base  
19 flow to get an idea of how much water that is. Certainly  
20 this year it's not an outrageous amount of water. I have  
21 given advice to council to fix some things on that line.  
22 Materially I don't think losses from that line is enough to  
23 trigger a landslide, and we actually went out and measured  
24 the flow rate to back that up.  
25

26 MR COSTELLO: Not sufficient to trigger a landslide, but  
27 could it be sufficient as a preparatory factor  
28 for example --  
29

30 MR POPE: Yeah, I think I've said that in my report, that  
31 it does contribute to the water in the near surface  
32 aquifer; yes.  
33

34 MR COSTELLO: Mr Paul, is there anything else that you  
35 wanted to say on this topic?  
36

37 MR PAUL: No, that's okay. I think we just say that we've  
38 got voids there. We know voids are there. We know water  
39 flows into those voids. We don't really know where that  
40 water goes.  
41

42 MR COSTELLO: Thank you. I'm not sure that anyone else  
43 has a question on this topic, Madam Chair, but perhaps  
44 I should just invite.  
45

46 CHAIRPERSON: Are there any questions on this topic?  
47

1 MR COSTELLO: Thank you. Could we return, please, to the  
2 inquiry joint report table, INQ - that's it. If we go to  
3 page 3. That was the fourth factor in respect of the 2022  
4 landslide. Can we try and touch perhaps briefly on the  
5 sixth, which is anthropogenic preparatory.  
6

7 Mr Pope, I might start with you. You consider this to  
8 have a medium magnitude and you express that conclusion  
9 with a moderate degree of certainty. Would it assist you  
10 if I brought up table 3 of your report which you refer to  
11 there?  
12

13 MR POPE: Yeah, probably section 9 of - like, table 3  
14 we've been through. Section 9 of this report, my causation  
15 report, would be more useful.  
16

17 MR COSTELLO: Let me bring that up for you. It's the 2022  
18 causation report that you're referring to?  
19

20 MR POPE: Sorry, no, my current '25 one.  
21

22 MR COSTELLO: The current report.  
23

24 MR POPE: So it's MSC.5087.0001.0230.  
25

26 MR COSTELLO: It's a very admirable attempt but, as you  
27 would learn if you were me, these numbers change all the  
28 time. I think what we need is MSC.5087.0001.0157. It's a  
29 large report, so it takes a little while to come up.  
30

31 MR POPE: No, that's okay.  
32

33 MR COSTELLO: And if we could go, please, to internal page  
34 74. This is the start of section 9 concerning the 2022  
35 landslide.  
36

37 MR POPE: Yes.  
38

39 MR COSTELLO: Have you got a hard copy in front of you?  
40

41 MR POPE: Yes.  
42

43 MR COSTELLO: Is there a particular paragraph that you --  
44

45 MR POPE: It's 185(a).  
46

47 MR COSTELLO: 185(a), which is at the bottom of the page

1 and over the page. Now, just to understand what's being  
2 spoken of here, Mr Pope, you had given an earlier causation  
3 report in respect of 2022?

4  
5 MR POPE: Yes.

6  
7 MR COSTELLO: You've given further consideration to the  
8 question of causation in respect of 2022 in the course of  
9 preparing this report; is that correct?

10  
11 MR POPE: Yes.

12  
13 MR COSTELLO: And would you say that your conclusions have  
14 differed in any material respect?

15  
16 MR POPE: Not really. I just found more facts to - like,  
17 in going through the work for '25 I just found more  
18 evidence of instability in the past which would have  
19 supported my contribution on the behaviour of steep slopes  
20 in general. So I've reported on what I thought to be a  
21 landslide in the '70s on the property.

22  
23 There's anthropogenic influence on most properties on  
24 the escarpment. The ReIn drains were - they're a relic of  
25 the pre-sewer days. And, while the septic tanks probably  
26 get removed or backfilled, the trenches are very much still  
27 in place. So they initially were scanned with GPR. That's  
28 how we found the anomaly, and then hand excavated to find  
29 the two arches. And those two trenches run back in behind  
30 the head of both the 1970s landslide and the '22 landslide.  
31 So that's an example of what I'm talking about when you  
32 need the void to go across contour. Well, this is a trench  
33 dug across contour.

34  
35 MR COSTELLO: I see.

36  
37 MR POPE: And then literally have plastic arches in them.  
38 The haunches are backfilled with gravel. So if you have a  
39 lot of - if you irrigate, if you've got a lot of rain, then  
40 you do have a flow path from those trenches out to the  
41 escarpment. That being said, I didn't change the  
42 contribution materially to anthropogenics. I still think  
43 it's just a steep slope and a lot of rain with past  
44 landsliding activity on it.

45  
46 MR COSTELLO: The type of anthropogenic change that you  
47 have identified in this paragraph, this is just a natural

1 and ordinary use of the land over time; is that a fair way  
2 of describing it?

3

4 MR POPE: It's an effluent field, so pre-sewer. Did you  
5 say natural?

6

7 MR COSTELLO: Yes.

8

9 MR POPE: I mean, natural way that humans use the  
10 property; yeah.

11

12 MR COSTELLO: So you have become aware of these facts  
13 since your initial report. You have included them in your  
14 updated report and it's caused you to have a moderate  
15 degree of confidence that these types of anthropogenic  
16 changes over time have been preparatory factors in the  
17 sense that they create a generally less stable slope; is  
18 that --

19

20 MR POPE: They just provide a - they literally - they  
21 provide a flow path for water, surficial water; yeah. Any  
22 water that infiltrates gets into that trench, once it's  
23 full, will want to go to the escarpment.

24

25 MR COSTELLO: Thank you, Mr Pope. Mr Paul, have you had  
26 regard to this aspect of Mr Pope's report?

27

28 MR PAUL: I wasn't aware of the ReIn drains until I had  
29 seen it in Mr Pope's report. But, yeah, now I'm aware of  
30 it; yes.

31

32 MR COSTELLO: All right. And do you have any recollection  
33 of whether this was a matter discussed in the course of  
34 your conclave.

35

36 MR PAUL: (Indistinct).

37

38 MR COSTELLO: Okay. Your conclusion in respect of  
39 anthropogenic changes was that it was of a minor nature,  
40 that is a minor contributing factor, although you had a low  
41 degree of confidence. Is anything that you've heard from  
42 Mr Pope or read from paragraph 185(a) on the screen cause  
43 you to reassess that?

44

45 MR PAUL: Yeah, I would. If we do have those drains there  
46 you can think of them in the same way as if you had natural  
47 piping in the soil. They are pipes underground that can



1 convey water, and if that water can be conveyed by those  
2 pipes to the location of the landslide then they would  
3 potentially be factors. And I'd put them in the similar  
4 category as I would to the natural subsurface voids. The  
5 only difference is these are human-made subsurface voids.  
6

7 MR COSTELLO: Thank you. I was going to move to a  
8 different topic. Would that be a convenient time?  
9

10 CHAIRPERSON: Yes.  
11

12 MR COSTELLO: Thank you. Madam Chair, it might just be  
13 worthwhile advising the witnesses as to their obligations  
14 over the lunch break as to what they can and can't talk  
15 about.  
16

17 CHAIRPERSON: Yes. We're going to break for lunch in a  
18 moment and we'll return at 2 o'clock. During the lunch  
19 break if I can ask - because you are being cross-examined  
20 by counsel assisting at the moment - if you not have any  
21 discussions with those who have engaged you or the lawyers  
22 for those parties that have engaged you, do not have  
23 discussions with them over lunch, nor discussions between  
24 you over lunch. We'll break now until 2 o'clock.  
25

## 26 LUNCHEON ADJOURNMENT

## 27 UPON RESUMING

28  
29 MR COSTELLO: Thank you, Madam Chair. I want to try and  
30 finish off 2022 relatively quickly and then move to 2025.  
31 Could I have the joint report back on the screen, please.  
32 Thank you. If we could go to the table at page 3. Mr Pope  
33 and Mr Paul, we've been through to the extent it's  
34 necessary most of these factors. I want to ask now about  
35 another preparatory factor, which is number 9 on the table,  
36 groundwater from shallow aquifer as a preparatory factor.  
37  
38

39 Mr Pope, you have attributed this a medium level of  
40 contribution and you've reached that conclusion with a  
41 moderate degree of confidence. Are you able to explain  
42 what this preparatory factor is?  
43

44 MR POPE: For me, there's been a history of observing  
45 seepage in that part of the escarpment, and I think I talk  
46 to it in the 22 report. Essentially there is from time to  
47 time seepage there. So it was reported by the first

1 responding geotechs in 22, and then CivilTest drilled some  
2 boreholes and they had wet soils in their boreholes, and  
3 that was later on in 23, and then Andrew Wilson, as we  
4 talked about in May, he went to site and had a look and  
5 observed seepage there November 23. So it's more just that  
6 there is water in that surficial aquifer from time to time.  
7 I think a few experts have commented on obviously there's  
8 water there, you need less water to cause the landslide.  
9 So it does make --

10  
11 MR COSTELLO: That's by reason of what's sometimes called  
12 presaturation; is that what you mean?

13  
14 MR POPE: Yeah, if the pores are already filled with water  
15 they're not taking more water, yeah.

16  
17 MR COSTELLO: And in terms of the shallow aquifer that you  
18 are speaking of here is anything specific known about it or  
19 is this just historical evidence about the fact of there  
20 being water in proximity to the area from time to time?

21  
22 MR POPE: There's been no groundwater monitoring that I'm  
23 aware of before 22, late 22. There's groundwater  
24 monitoring now, but obviously there hasn't been a lot of  
25 rainfall, so.

26  
27 MR COSTELLO: And as to the aquifer there's a well-noted  
28 history within this area of there being water about,  
29 natural springs have been documented at various locations,  
30 sometimes for quite extensive periods. Does this issue 9  
31 sit with that general geological, if you like, feature of  
32 the area that there are paths for water to travel and that  
33 one of the paths that water can travel along causes there  
34 to be water in the area around the 2022 landslide; is that  
35 what you mean?

36  
37 MR POPE: Yes, yep.

38  
39 MR COSTELLO: Right. Mr Paul, you weren't in a position  
40 to comment on this question at the time of the joint  
41 report. Is there anything that you wish to say about it  
42 now in the light of what you've just heard from Mr Pope?

43  
44 MR PAUL: I didn't comment because I've not seen the  
45 direct evidence for seepage at that location. But it's  
46 certainly a plausible scenario.  
47

1 MR COSTELLO: I just want to make sure that this notion of  
2 aquifers is clear enough because it's going to come up in  
3 2025 as well. Perhaps I'll just stick with you for the  
4 time being, Mr Paul. There are a range of concepts in  
5 respect of water here. In the reports we read of, for  
6 example, perched water, we read of aquifers, we read of  
7 springs, and that's by no means a comprehensive list of the  
8 types of water. Could you describe to the extent you're  
9 able what's meant by an aquifer?

10  
11 MR PAUL: So an aquifer would be soil or rock through  
12 which water is going to more preferentially flow.

13  
14 MR COSTELLO: And does that mean that an aquifer is a  
15 synonym for a spring?

16  
17 MR PAUL: A spring refers to what we call the exfiltration  
18 point. So the aquifer water is underground and, if that  
19 water can make it to the surface, the point at which it  
20 makes it to the surface is a spring.

21  
22 MR COSTELLO: There's a relationship between the two  
23 concepts?

24  
25 MR PAUL: Correct, an aquifer is linked to a spring.

26  
27 MR COSTELLO: A spring is the terminal point of an  
28 aquifer?

29  
30 MR PAUL: Yeah, that would make sense, yes.

31  
32 MR COSTELLO: And springs are commonly spoken of as being  
33 need to be recharged?

34  
35 MR PAUL: Correct.

36  
37 MR COSTELLO: That is in effect recharge of the aquifer;  
38 is it?

39  
40 MR PAUL: Correct. It's recharge of the aquifer, which  
41 then conveys the water to the spring.

42  
43 MR COSTELLO: And the aquifer can be recharged by any  
44 available water source?

45  
46 MR PAUL: Absolutely, yeah.  
47

1 MR COSTELLO: All right. Is the - perhaps I direct this  
2 to Mr Pope. Mr Pope, the aquifer here that you're speaking  
3 of in connection with item 9, is the concept that it would  
4 have been recharged by water - sorry, recharged by  
5 rainfall?  
6

7 MR POPE: Same recharge mechanisms as the gully,  
8 essentially.  
9

10 MR COSTELLO: Which are?  
11

12 MR POPE: Well, you've got, yes, rainfall, leaking  
13 services, irrigation, there are literally springs uphill as  
14 well, flowing through trench backfill. There's a big list,  
15 yeah.  
16

17 MR COSTELLO: So an aquifer can be recharged by any  
18 available source of water that can enter it. But you don't  
19 have any view about any particular contribution to the  
20 recharge of the aquifer here that you're describing in  
21 point 9 of the table as having had a medium contribution as  
22 a preparatory factor?  
23

24 MR POPE: I mean for that year and on the back of three  
25 years of La Nina and some significant rainfall I would say  
26 it would be rainfall dominant. But there are - like, we've  
27 listed out the other sources of recharge in this table.  
28

29 MR COSTELLO: That is potential sources?  
30

31 MR POPE: Correct, yeah.  
32

33 MR COSTELLO: Yes. And there's mention of a shallow  
34 aquifer. A shallow aquifer is nothing more than an aquifer  
35 that sits nearer the surface, is it?  
36

37 MR POPE: In this case, yes. Yep.  
38

39 MR COSTELLO: Mr Paul, nothing else from you on that  
40 topic?  
41

42 MR PAUL: (Indistinct).  
43

44 MR COSTELLO: Thank you. Can we move then to triggers.  
45 We don't need to spend much time on this, but it's clear  
46 enough, I think, from each of your reports that you  
47 consider rainfall to be the most significant, if not the

1 only trigger of any significance to the 2022 landslide;  
2 that's your position, Mr Paul?

3  
4 MR PAUL: That's right. There's three potential triggers,  
5 rainfall being the most likely.

6  
7 MR COSTELLO: I see. And you've assessed rainfall as a  
8 trigger as being a significant cause with a moderate degree  
9 of confidence. Mr Pope, you've assessed it as being a  
10 major contributor with a very high degree of confidence?

11  
12 MR POPE: Yes.

13  
14 MR COSTELLO: And that remains your opinion today?

15  
16 MR POPE: Yes.

17  
18 MR COSTELLO: Thank you. Does the fact that you have a  
19 very high degree of confidence that that was the major  
20 trigger mean that other triggers are insignificant, or can  
21 other triggers also be of a high degree of significance?  
22 I have in mind your earlier evidence that there will often  
23 be one trigger.

24  
25 MR POPE: Yeah, correct. I would need to see a similar  
26 sort of evidence trail to 2025 to have an opinion on number  
27 10. So number 10, if it was literally - if it was a  
28 megalitre of water, then there is an assessment to be made  
29 there.

30  
31 MR COSTELLO: Number 10 being the --

32  
33 MR POPE: 23 Coburn.

34  
35 MR COSTELLO: -- leak at 23 Coburn?

36  
37 MR POPE: Yeah.

38  
39 MR COSTELLO: So, to make sure that I understand the  
40 evidence you've just given, is the position that as you sit  
41 there today you don't have sufficient information to form a  
42 properly informed view about whether or not the leak at  
43 23 Coburn Avenue was capable of being a trigger of any  
44 significance?

45  
46 MR POPE: Yeah, I don't have enough information. So on  
47 that basis the very high for 7's probably not appropriate.

1  
2 MR COSTELLO: Sorry, what was the last bit you just said  
3 there?  
4  
5 MR POPE: Very high for 7 is probably not appropriate  
6 until we can run through --  
7  
8 MR COSTELLO: I want to make sure I understand this.  
9 Because you don't have sufficient information to rule out  
10 the leak at 23 Coburn Avenue as being of significance,  
11 you're concerned that your assessment of a very high degree  
12 of confidence in respect of rainfall might be misplaced?  
13  
14 MR POPE: It would still be high. Like, I respond - I get  
15 called out to landslides of that sort at one in 100, one in  
16 200 frequency.  
17  
18 MR COSTELLO: Is it fair to say this: based on the  
19 information that is available to you, you adhere to your  
20 opinion that the major contributing factor to the 2022  
21 landslide was rainfall --  
22  
23 MR POPE: Yes.  
24  
25 MR COSTELLO: -- and you hold that conclusion with a very  
26 high degree of confidence?  
27  
28 MR POPE: Yes.  
29  
30 MR COSTELLO: But that, if additional information came to  
31 light regarding the leak at 23 Coburn Avenue, that would  
32 cause you to reassess that opinion?  
33  
34 MR POPE: Yes. I know Mr Paul has talked of 0.9 of a  
35 megalitre, but I haven't been through that source of data.  
36  
37 MR COSTELLO: Mr Paul, it might be convenient at this  
38 point to turn to number 10, which is the Coburn Avenue  
39 leak. This was the - as you've just heard, this was a  
40 potential trigger that Mr Pope was not able to comment on  
41 by reason of an insufficiency of information. You have  
42 assessed it as having a medium contribution but you have a  
43 low level of confidence in it. Perhaps you could describe  
44 the information that you have looked at that's compelled  
45 you to the view that it was a medium factor.  
46  
47 MR PAUL: This is based on --

1  
2 MR COSTELLO: Would you like me to bring up paragraph 8.5  
3 of your report that you refer to, or are you happy just to  
4 speak to it?

5  
6 MR PAUL: You can, but I can speak to it. That's fine.  
7 The basis of this is a witness statement from Mornington  
8 shire council of Stephen Tully that - or have I got that  
9 wrong?

10  
11 MR COSTELLO: From South East Water I think.

12  
13 MR PAUL: From South East Water, sorry, yeah. It's a  
14 witness statement that describes the leak and mentions the  
15 0.9 of a megalitre leaking out over a period of about  
16 12 hours, and there's some photographs associated with that  
17 statement that show the leak coming out. You can see water  
18 coming out, going down the drain, but with a leak like  
19 that, you know, almost certainly some of that water is  
20 going into the ground.

21  
22 So I know water went into the ground, and we know that  
23 the timing of which that water went into the ground was at  
24 around the time on the day of the November 2022 landslide,  
25 or the day before the November 22 landslide. So I have a  
26 source of water going into the ground. We know we've had  
27 piping through the soil in that area. It could have been a  
28 triggering factor, but we don't know. We haven't been able  
29 to confirm a flow path from that leak location down to the  
30 landslide, only that water went in at the time of the  
31 landslide.

32  
33 MR COSTELLO: I might just put a diagram on the screen.  
34 Could I have DPA.0004.0001.0001, and I think it's page  
35 0090. If that map could just be exploded onto the screen,  
36 please. This is I think, Mr Paul, a map that identifies a  
37 number of locations, including the location of the 23  
38 Coburn Avenue leak; is that right?

39  
40 MR PAUL: That's right.

41  
42 MR COSTELLO: So you've had regard to this in the course  
43 of forming your conclusion as to its contribution or  
44 possible contribution?

45  
46 MR PAUL: (Indistinct).  
47

1 MR COSTELLO: And on the right-hand side we can see the  
2 location of the breach in the stormwater pipe. Could you  
3 just speak to the various lines, green and blue, as to what  
4 one is to take from those?

5  
6 MR PAUL: Yes. So the location of breach of the  
7 stormwater pipe is referring to a breach that was observed  
8 in March 25. So it's probably not - I wouldn't talk to  
9 that as part of the November 2022 event. But where the  
10 burst was, the - as I understand where the burst to be --

11  
12 MR COSTELLO: That's on the corner of Prospect Hill Road  
13 and Coburn Avenue?

14  
15 MR PAUL: Yeah, around that location, based on that  
16 witness statement, is where the leak occurred, and so the  
17 uncertainty is where that water went and whether it could  
18 have gone to the site of the 2022 landslide. We don't know  
19 where that water went, but we do know the timing is  
20 coincident with the 22 landslide.

21  
22 MR COSTELLO: You've got a low degree of confidence about  
23 this because the evidence that you've seen is not  
24 sufficient in your mind to convince you with any degree of  
25 certainty that this was a contributing factor?

26  
27 MR PAUL: Specifically where the water went.

28  
29 MR COSTELLO: Thank you.

30  
31 MR PAUL: Goes to the landslide, that's where the  
32 uncertainty lies.

33  
34 MR COSTELLO: The path of travel?

35  
36 MR PAUL: The path of travel, yes.

37  
38 MR COSTELLO: If that could be taken off the screen,  
39 please. That perhaps leads me back to the rainfall,  
40 80 mils. If - well, Mr Paul, with all you know about this  
41 site now, if there had been 80 mils of rain, as there was,  
42 within that period would it ultimately matter whether or  
43 not water had infiltrated the scarp from the Coburn Avenue  
44 leak, or would it be likely that there would have been a  
45 landslide in the event?

46  
47 MR PAUL: It's hard to know. All we can say, we've got



1 sources of water, the relevant contributions of each one  
2 we're not sure, and there's an element here of what I'll  
3 call positive feedback, which we see in landslides at  
4 times. So you might get a big rain event, and it could be  
5 that that rain infiltrated the trench into which that  
6 service was, caused it to wash out, caused the pipe to  
7 break, you know, perhaps influenced the irrigation. All  
8 these things can kind of feed back on each other and go  
9 together.

10

11 MR COSTELLO: Yes.

12

13 MR PAUL: But it probably is reasonable to say that that  
14 rainfall event, 80 millimetres in one day, that is an  
15 extreme level event. Leaks of that kind from the pipe  
16 happen with more regularity than a rainfall event of that  
17 size, and that's what leads me to put more emphasis on the  
18 rainfall as the main contributor.

19

20 MR COSTELLO: Mr Pope, would you like to comment on that?

21

22 MR POPE: No, I think Darren makes a reasonable point.  
23 There's - and we did talk to this in conclave. There's the  
24 higher frequency of water main defects in this immediate  
25 part of the community. So I think there's 40 of them in a  
26 small area, but we haven't had 40 landslides on record.  
27 What (indistinct) part for me I guess it's probably easy to  
28 see in plan, which if we can go to page 48 of my 25  
29 report --

30

31 MR COSTELLO: Sorry, what page number did you say?

32

33 MR POPE: My page is 48.

34

35 MR COSTELLO: Internal page number 48?

36

37 MR POPE: Yeah, correct.

38

39 MR COSTELLO: Could I have MSC.5087.0001.0157, I think at  
40 .0204, which should be internal page 68 - 48, pardon me.  
41 Is that the map you were after?

42

43 MR POPE: Yes, inset 41. The bottom --

44

45 MR COSTELLO: I'll just have it made larger, thank you,  
46 Operator.

47

1 MR POPE: So where it's difficult to comment is, like, if  
2 you look at the corner of Prospect Hill and Coburn, on the  
3 north-west side, I think it's 23 Coburn, so if the pointer  
4 goes up - keep going up and then off to the right a little  
5 bit. To the right. Keep going. If you come back to  
6 Prospect Hill Road, further to your right, that's it, in  
7 there. Perfect.

8  
9 MR COSTELLO: In there, yes.

10  
11 MR POPE: Near enough. So 23 Coburn's on the corner of  
12 Prospect Hill and Coburn Avenue. This is a 1957 contour  
13 which shows Margaret Street - what I call the Margaret  
14 Street gully. So it was an old - it was a gully that led  
15 to the bay and was backfilled I think late 70s, early 80s.  
16 The house - there's some soil testing reports on those  
17 corner properties, and there's significant amount of fill  
18 there, so, like, I think up to 8 metres, roughly 8 metres  
19 of clay fill under the house for 23 Coburn. So if you have  
20 a gully that's been backfilled with clays and then you have  
21 a water main failure upstream of that gully, it's quite  
22 difficult to know where that water's going to go, and in  
23 this situation whether the flow dominates down Coburn  
24 Avenue or if it is throttled and comes around Prospect  
25 Hill, that's quite difficult to work out with the  
26 information we have at the moment.

27  
28 Where the main's shown to fail on Darren's drawings  
29 and as I understand in South East Water's drawings, it's on  
30 the Coburn Avenue side of the gully. It's definitely still  
31 possible you get water coming around, but I just don't have  
32 any confidence in how much.

33  
34 MR COSTELLO: Yes. And this is not a matter of which you  
35 were aware when you wrote your initial 2022 causation  
36 report; is that correct?

37  
38 MR POPE: Yeah, correct. Yep.

39  
40 MR COSTELLO: This matter - that is, the fact of a water  
41 main burst at this location - is something you've become  
42 aware of during the course of this inquiry; is that right?

43  
44 MR POPE: Yeah, from the last hearing, yes. Yep.

45  
46 MR COSTELLO: And it's for that reason that in the  
47 relatively limited time since you became aware of it that

1 you don't have strongly formed views about it because you  
2 just don't have sufficient information to be able to form  
3 views of any strength; is that right?  
4

5 MR POPE: Yes. Yeah.  
6

7 MR COSTELLO: If you were to form --  
8

9 MR POPE: But with the stormwater that comes through there  
10 we can measure the flow - we haven't measured them yet, but  
11 we can go and measure the base flows that are coming  
12 through there. So kind of hard to retrospectively --  
13

14 MR COSTELLO: Would you need to drill boreholes to  
15 properly understand soil types around the location of the  
16 burst in order to have a better idea as to the likely flow  
17 of water?  
18

19 MR POPE: I spent a lot of this year drilling holes and  
20 not really finding much with them. So I think if you have  
21 a water main or an asset fail, with all the gear - with all  
22 the instruments that are in the ground now, you're going to  
23 inform opinions. But drilling a borehole without the water  
24 source there is not high on my priority list.  
25

26 MR COSTELLO: Just a straight assessment of soil types at  
27 different locations near to the burst wouldn't give you  
28 sufficient information to form a firm view as to the likely  
29 path of channel of water?  
30

31 MR POPE: Yeah, we - I mean, we could. We could apply the  
32 same lens that we did for the sewer and just greenfield  
33 drilling that we did.  
34

35 MR COSTELLO: Just so I can understand your thought  
36 process, Mr Pope, is that something that you considered  
37 doing and ruled out, or is that something you did not  
38 consider doing?  
39

40 MR POPE: There is a sewer line that comes into the back  
41 of - the bottom of these properties and it's been - it  
42 wasn't considered in my original scope. But, if we had to  
43 do further work, that would be a line of inquiry, yep. The  
44 awareness that Margaret Street drain was backfilled with  
45 clays, I didn't work that out until later on, certainly  
46 between the two hearings at least, well after I'd finished  
47 drilling holes, basically.

1  
2 MR COSTELLO: Is it a long investigation to undertake  
3 further consideration of this point? I'm not asking that  
4 you do it; I'm just trying to understand --

5  
6 MR POPE: No. I mean, you'd have to get permission from  
7 23 Coburn. If I was them I'd say, "Why don't you just use  
8 the eight boreholes that have already been drilled?" I  
9 might agree with them. And then we'd --

10  
11 MR COSTELLO: You'd try and convince them --

12  
13 MR POPE: You'd have to - it's all on private property, so  
14 I would have to convince them to let us on, yeah.

15  
16 MR COSTELLO: Mr Paul, is there anything else that you  
17 wanted to raise in connection with this? You don't need  
18 to; I was just giving you the opportunity.

19  
20 MR PAUL: It's quite difficult to try to work out where a  
21 subsurface flow path is like that. These things aren't  
22 huge. They're quite small and difficult to find, and  
23 there's various techniques. Just doing a point borehole at  
24 one point, you know, hit and miss. Maybe you hit it, maybe  
25 you don't. It's not really going to help you. I think  
26 I would be looking more at things like tracer tests and  
27 things and seeing where water went through the ground if  
28 I was to try to understand if there's a connection between  
29 that point and the escarpment.

30  
31 MR COSTELLO: All right. Tracer tests is going to come up  
32 in connection with 2025, but it might just be easier since  
33 we're on the topic for you to describe what a tracer test  
34 is now, if you don't mind?

35  
36 MR PAUL: Sure. So we put water in at a source and put a  
37 chemical in that water, which could be a dye, and then make  
38 observations as to where that dye emerges at the surface or  
39 in another borehole, for example. So we get a - it's not  
40 too similar to things that are used in medical imagery and  
41 things, you put the dye in and you see where it goes, and  
42 you've got a way then to trace where the water was flowing.

43  
44 MR COSTELLO: And based on what you know about the  
45 location of the Coburn Avenue leak could a tracer test be  
46 effectively deployed?  
47

1 MR PAUL: You could try. It's not going to be perfect,  
2 and one of the reasons it's not is because the water  
3 pressure behind it at the time might not be the water  
4 pressure you're able to put behind it when you put the dye  
5 in. So you're not replicating the conditions at the time  
6 exactly.  
7  
8 MR COSTELLO: I see.  
9  
10 MR PAUL: It's not a perfect test, but it gives you a test  
11 at a scale more relevant to what you're trying to be  
12 interested in than a borehole does.  
13  
14 MR COSTELLO: Excuse me for one moment. Madam Chair, they  
15 were the matters that I wished to address with the experts  
16 on the 2022 landslide. But there may be others that would  
17 wish to ask some questions.  
18  
19 CHAIRPERSON: Thank you. Ms Foley, do you have any  
20 questions.  
21  
22 MS FOLEY: I do not.  
23  
24 CHAIRPERSON: No. Ms Siemensma?  
25  
26 MS SIEMENSMA: I do.  
27  
28 CHAIRPERSON: Yes.  
29  
30 <EXAMINATION BY MS SIEMENSMA:  
31  
32 MS SIEMENSMA: Mr Paul, I would like to ask you some  
33 questions about the 23 Coburn leaking pipe, and, as you've  
34 said in your report, you have assessed it as having a  
35 medium contribution and your confidence in that is low. In  
36 your report you say that the leaking pipe near Coburn  
37 Avenue occurred on the day preceding the landslide, and  
38 I take it that statement is a reference to the landslide  
39 event on 15 November 2022; correct?  
40  
41 MR PAUL: Yes.  
42  
43 MS SIEMENSMA: And you'd agree there was a landslide event  
44 on 14 November, the day before?  
45  
46 MR PAUL: Yeah, so that's right, got a lot of - we've got  
47 to clarify, of course, the landslide event unfolds over

1 time.

2

3 MS SIEMENSMA: Yes. But there was a landslide event which  
4 Mr Pope has called a translational slide on the 14th of  
5 November?

6

7 MR PAUL: Yes.

8

9 MS SIEMENSMA: Mr Willigenburg, a resident, has given some  
10 evidence. He's the owner of unit 3, 613 Point Nepean Road.  
11 He gave evidence that on the 14th he heard a very loud  
12 cracking noise at the rear of his property in the direction  
13 of the escarpment, and that was at 6.30 am; and I take it  
14 you don't dispute that the landslide event on the 14th was  
15 around 6.30 am, thereabouts?

16

17 MR PAUL: Right, yep.

18

19 MS SIEMENSMA: And Mr Julian Tully, to whom I think you  
20 referred a moment ago, gave evidence that on his  
21 calculations the leak at 23 Coburn commenced at around 5.40  
22 am; so about an hour before the landslide. Do you recall  
23 that?

24

25 MR PAUL: That's fine, yep.

26

27 MS SIEMENSMA: Could I take you to some photographs which  
28 are exhibits to Mr Tully's witness statement. The Bates  
29 number is SEW.0001.0001.4933, and if we could start at  
30 0018. Now, Mr Paul, you may have seen this before. What  
31 we see here is the leak near 23 Coburn looking down Coburn  
32 towards Point Nepean Road. So just to orientate you,  
33 Prospect Hill Road is not in shot; it's actually behind the  
34 person taking the photo. And you'll see in the photograph  
35 the stormwater drain in the kerb on the left and a pit in  
36 the middle of the road, and I suggest that the photograph  
37 shows that the water emerging from the burst in the road is  
38 travelling towards that stormwater drain in the kerb; you  
39 agree with that?

40

41 MR PAUL: I see water travelling towards the drain, yes.

42

43 MS SIEMENSMA: And I'll show you a close-up, which is at  
44 two pages further on at page 20, and we see a volume of  
45 water which is primarily going down the stormwater drain;  
46 do you accept that?

47

1 MR PAUL: I accept that, yes.  
2  
3 MS SIEMENSMA: And if I could - sorry to muck the operator  
4 around, but if we could jump back to page 18, you'll see in  
5 the distance of that a white car, and do you accept that  
6 the road on Coburn is heading downhill, it's a downward  
7 slope?  
8  
9 MR PAUL: Yeah, it heads downhill towards the car, yes.  
10  
11 MS SIEMENSMA: And the water is moving in the direction of  
12 the downward slope?  
13  
14 MR PAUL: Yeah, it's flowing down the road that way, yes.  
15  
16 MS SIEMENSMA: And you would accept that if there are two  
17 paths of water - two paths that water can take, generally  
18 it will head down the steeper slope?  
19  
20 MR PAUL: What do you mean by two paths --  
21  
22 MS SIEMENSMA: So if it has the option of heading off on a  
23 level surface or going down a hill that has some gradient  
24 it will prefer to go downhill, all things being equal?  
25  
26 MR PAUL: If you mean water flows downhill, yes.  
27  
28 MS SIEMENSMA: Yes. And even if some water didn't go down  
29 the stormwater drain and some of it infiltrated the ground,  
30 I suggest that - there being only about an hour between the  
31 burst and the 14 November landslide event, I suggest that's  
32 insufficient time for the water to have made its way up to  
33 View Point Road; do you accept that?  
34  
35 MR PAUL: That's the main uncertainty I have. We don't  
36 know the connectivity between this point and the landslide.  
37 That's the main uncertainty, yeah.  
38  
39 MS SIEMENSMA: Well, connectivity is one thing, and I'll  
40 come back to that in a moment. But just in terms of time,  
41 if it was going to go subsurface there isn't enough time  
42 for it to get to View Point; do you accept that?  
43  
44 MR PAUL: Not necessarily, no. Let's say that was a pipe,  
45 then absolutely it would get there. So it all depends on  
46 the permeability of that subsurface flow path, and that's  
47 the unknown.

1  
2 MS SIEMENSMA: Well, let's touch on connectivity then.  
3 You agree there's an absence of evidence about where any  
4 subsurface water travelled?

5  
6 MR PAUL: That's right.

7  
8 MS SIEMENSMA: Could I take you to a map which is actually  
9 in Mr Pope's causation report. It's a different one to  
10 which he just went to. So this is MSC.5087.0001.0158, at  
11 page 0170. It's the causation report, Mr Pope's causation  
12 report. The report tendered this morning. 0157, yes,  
13 you're quite right. Thank you. And it's page 0170 of that  
14 document. Thank you. And if inset 2 can just be blown up  
15 a little bit I'd be grateful.

16  
17 Mr Paul, Mr Pope touched on this a moment ago. We  
18 see - and this is a map from about, it appears, 1957, and  
19 one sees in the middle of the page a black line going from  
20 the bottom of the page past the number S486 and ending in a  
21 T juncture just over Coburn and Prospect Hill Road; do you  
22 see that?

23  
24 MR PAUL: Yes.

25  
26 MS SIEMENSMA: And we see to the left of that by reference  
27 to the contours the historic gully which is to the left of  
28 the T. And historically that pipe ending in the T would  
29 release water into that historic gully; you accept that?

30  
31 MR PAUL: I don't know that to be the case.

32  
33 MS SIEMENSMA: Well, I suggest there was an historic  
34 established gully through which water flowed right down to  
35 Margaret Street at least up until the 1960s?

36  
37 MR PAUL: That's correct. I just don't know that that T  
38 represents the point at which stormwater is being directed  
39 into the gully.

40  
41 MS SIEMENSMA: Thank you. And to the extent that there  
42 was subsurface water from 23 Coburn, the leak, that didn't  
43 go down the stormwater drain, the preferential path for  
44 that water would have been to go into that major historical  
45 gully, it would have headed towards the major historical  
46 gully heading towards Margaret Street; do you agree?  
47



1 MR PAUL: It could have headed towards it, yes, it could  
2 have. But I don't know. Again, we don't know.  
3  
4 MS SIEMENSMA: And your statement in your report that  
5 water could have migrated to View Point Road depends,  
6 I suggest, on a number of assumptions and unknown factors,  
7 I suggest?  
8  
9 MR PAUL: Yeah, absolutely, there's unknowns, yeah.  
10  
11 MS SIEMENSMA: And one of them is knowing how much water  
12 went down the stormwater drain and how much infiltrated the  
13 ground; do you agree?  
14  
15 MR PAUL: Yes.  
16  
17 MS SIEMENSMA: And other than the photo there's no  
18 evidence of how much went down the stormwater?  
19  
20 MR PAUL: Correct.  
21  
22 MS SIEMENSMA: And, secondly, it depends on the existence  
23 of one or more subchannels, paleochannels; do you agree?  
24 And I'll come back to that in a moment. And, thirdly, if  
25 there was a subchannel the water would have to travel  
26 125 metres to the other side of that gully we see to get up  
27 to View Point; do you accept that?  
28  
29 MR PAUL: It's about 120 metres, that's right.  
30  
31 MS SIEMENSMA: And it would have to travel across that  
32 gully to get towards View Point?  
33  
34 MR PAUL: Yeah, it would - oh, close to the head of it.  
35 Yeah. It's not - almost describe it as across - yes, close  
36 to the head of that gully. You see it's not the deepest  
37 part of the gully it would have to go across.  
38  
39 MS SIEMENSMA: It would have to cross the gully?  
40  
41 MR PAUL: Not - it would have to go across the gully, but  
42 we're thinking in three dimensions here. So there's  
43 nothing to say it couldn't go below the gully. It has to -  
44 if we're looking at the gully as it is at the surface, it  
45 could have gone below, it could have gone through, but it  
46 would have to cross the line (indistinct).  
47

1 MS SIEMENSMA: And it would also depend on the ability of  
2 water to get to the escarpment in under an hour or in about  
3 an hour; true?  
4  
5 MR PAUL: If it caused that initial one on the initial  
6 date.  
7  
8 MS SIEMENSMA: Yes. Now, it's possible to undertake  
9 tests, I suggest, to identify paleochannels and subsurface  
10 channels through the geology, isn't it?  
11  
12 MR PAUL: Yeah, it's possible to undertake tests and  
13 investigate that.  
14  
15 MS SIEMENSMA: And they include a variety of geophysical  
16 methods such as electromagnetic surveys, ground penetrating  
17 radar, ERT tests and the like?  
18  
19 MR PAUL: There are a variety, a whole suite of tests we  
20 could do.  
21  
22 MS SIEMENSMA: And I take it that you haven't personally  
23 undertaken tests to identify the underground channels such  
24 as there are from Coburn up to View Point; correct?  
25  
26 MR PAUL: No.  
27  
28 MS SIEMENSMA: Now, SMEC has undertaken geophysical  
29 testing to try and find the existence of any such  
30 paleochannels, including from Coburn, and I suggest too  
31 they didn't find any paleochannels in the area that would  
32 make their way up to View Point, and I take it you don't  
33 dispute that outcome?  
34  
35 MR PAUL: That SMEC didn't find it? That the --  
36  
37 MS SIEMENSMA: Yes, SMEC did not find a channel that took  
38 it from A to B, a paleochannel?  
39  
40 MR PAUL: I covered on the - what can be inferred from the  
41 geophysics tests. I think I'm a little bit different  
42 opinion on that. But if the fact is SMEC inferred that  
43 from the geophysical test then that's a fact. I would not  
44 necessarily infer that from the geophysics tests.  
45  
46 MS SIEMENSMA: But you yourself haven't - there's the SMEC  
47 tests, and you've expressed some reservation about that,

1 but you don't have a test that --

2

3 MR PAUL: No, no, only --

4

5 MS SIEMENSMA: -- disproves what they say? To be able to  
6 prove the proposition that water from Coburn made its way  
7 to the landslide site via a paleochannel I suggest that you  
8 would need to undertake tests to evidence the existence of  
9 the channel and the dimensions and --

10

11 MR PAUL: Yep, yeah.

12

13 MS SIEMENSMA: -- where it went from A to B; correct?

14

15 MR PAUL: M'hmm.

16

17 MS SIEMENSMA: You would also, as I said, need to know how  
18 much water went subsurface?

19

20 MR PAUL: It would be good to have some idea, yes.

21

22 MS SIEMENSMA: And you would have to also be able to  
23 disentangle the Coburn leak from other sources of water;  
24 true?

25

26 MR PAUL: As I said before, there could be multiple  
27 sources that could have been feeding into it. In order to  
28 know the proportion of the Coburn leak compared to other  
29 sources I would say that would be almost impossible to  
30 know.

31

32 MS SIEMENSMA: So there's been some evidence about the  
33 burst pipe, the irrigation pipe, at the rear of 10-12 View  
34 Point Road, which on the evidence appears to have run from  
35 the 14th to the 15th of November and was shut off on the  
36 15th. And, on Mr Pope's calculation, he had said it  
37 released around one to two times the amount of water as the  
38 rainfall event; that was his evidence. Do you accept that  
39 in light of that, once the landslide on the 14th  
40 of November happened, with that extreme rainfall and with  
41 the burst irrigation pipe, the landslide event on the 15th  
42 of November was highly likely?

43

44 MR PAUL: I don't quite - you've mentioned the irrigation  
45 pipe at the start there --

46

47 MS SIEMENSMA: Yes.

1  
2 MR PAUL: -- and I'm not sure - you're saying that did the  
3 irrigation pipe make the subsequent sliding more likely?  
4

5 MS SIEMENSMA: Together with the rainfall, yes.  
6

7 MR PAUL: Together with the rainfall. Yeah. So the  
8 irrigation pipe, what I don't know and I've not seen  
9 evidence of is the exact timing of when that broke relative  
10 to, you know, all of the other movements. So I don't  
11 know - I've tried to look into that. I don't know what  
12 influence the irrigation pipe had because I don't know when  
13 it broke.  
14

15 MS SIEMENSMA: I see. So, as well as the inability to  
16 confirm the flow path, all of those unknown factors,  
17 including the one that you've just mentioned, is no doubt  
18 why you've expressed a low confidence about the Coburn  
19 leak?  
20

21 MR PAUL: Correct. Yes.  
22

23 MS SIEMENSMA: Yes. Now, Mr Hartley, you weren't asked to  
24 look at the 2022 landslide, but can I just ask you, having  
25 heard the exchange today, in your professional experience  
26 is there anything that you wish to add about the likely  
27 flow path of water from the Coburn leak in 2022?  
28

29 MR HARTLEY: Well, the pathway down Prospect Hill is  
30 limited to traversing through the fill across the gully, of  
31 which Mr Pope has kindly suggested is a clay fill, which  
32 I think we could understand is an impermeable or relatively  
33 impermeable material. There is a mains water line which  
34 goes parallel to contours, i.e. across a slope, which takes  
35 us to Prospect Hill Road, which would seem if material - if  
36 water would be going down there as opposed to going down  
37 the sewer/stormwater - well, stormwater drainage material,  
38 it would seem against what would be naturally to assume  
39 would be the case.  
40

41 I have a question because Mr Paul's map was  
42 fascinating. It was the one with the location of the burst  
43 in relation to the stormwater drain, and I was wondering if  
44 we knew about the offset between the centre line of the  
45 drain and the location of the burst.  
46

47 MS SIEMENSMA: Just one moment, Mr Hartley, we'll see if

1 we can bring that up. I'm indebted to my learned friend.  
2 I'm wondering whether the map you had in mind was at  
3 MSC.5087 --  
4  
5 MR HARTLEY: It was in Mr Paul's report, I think it was.  
6  
7 MS SIEMENSMA: The heat map?  
8  
9 MR HARTLEY: Yeah, 0004.0001.0001\_0090.  
10  
11 MS SIEMENSMA: I'll see if that can be brought up for you.  
12  
13 MR HARTLEY: Sorry about this. Figure 8.23.  
14  
15 MS SIEMENSMA: Thank you. So it's DPA.0004.0001.0001, and  
16 I think the page you were after was 0090, was it? Thank  
17 you. Yes.  
18  
19 MR HARTLEY: One of the things I - I haven't studied this  
20 one in any great detail, but one of the things which  
21 I hadn't understood totally was the fact that the - it  
22 would seem that there is evidence to suggest that the water  
23 main burst is on the Prospect Hill Road side of the  
24 stormwater drain. Now, obviously the stormwater drain  
25 trench would seem to be the main conduit of the upwelling  
26 because the upwelling is a few metres downhill, down Coburn  
27 Road, of the found leak. And, yeah, I was just wondering  
28 whether we happen to know an offset, whether it is  
29 noticeable or whether it's effectively over the top,  
30 because if the offset is beyond the trench of the  
31 stormwater pipe then there is a plausibility of water going  
32 away from the stormwater drain trench. However, if the  
33 water leak is effectively on top of the trench of  
34 the stormwater drain, the vast majority of it would suggest  
35 that it goes down the hill and it upwells where we found it  
36 had upwelled.  
37  
38 MS SIEMENSMA: We don't have that information at this  
39 point, but --  
40  
41 MR HARTLEY: That's fine. It was just an interesting map.  
42  
43 MS SIEMENSMA: Yes. Mr Paul or Mr Pope, do you have an  
44 answer to the question raised by Mr Hartley?  
45  
46 MR PAUL: No, not particularly. The evidence I've got is  
47 that the images you showed earlier of that's where the

1 water - we know water was there and coming out there, and  
2 going from 23 Coburn. Not much to add to that.

3  
4 MS SIEMENSMA: That wasn't right on the corner and I see  
5 on your map here the indication looks like it's right on  
6 the corner.

7  
8 MR PAUL: Yeah, the water main's on the other side of the  
9 street to what you showed in that image, too. So if that's  
10 correct then where it is coming up through the road there  
11 is not above the water main and it's coming - the leak is  
12 somewhere else and the water's migrating through the trench  
13 and coming up there. So I think that's what Mr Hartley is  
14 saying. And if that is correct then that would be the  
15 case.

16  
17 MS SIEMENSMA: The final question I have, and it's one for  
18 you, Mr Paul, is that you were asked some questions about  
19 things that might be done, some further investigations. Is  
20 it true to say that things may have changed from 2022 to  
21 2025, and one example, for instance, is the stormwater  
22 defect at Browne Street --

23  
24 MR PAUL: Yes.

25  
26 MS SIEMENSMA: -- such that it isn't possible to  
27 completely replicate the situation as it was in 2022.

28  
29 MR PAUL: Yeah, that's right. It's three years on. And  
30 I'd add, too, for example, the sinkhole in the property  
31 there, that's been backfilled and we don't know how that  
32 might have impeded a flow path that might be there. So,  
33 yeah, a test now would suffer from being that far after the  
34 original event.

35  
36 MS SIEMENSMA: Thank you. I have no further questions.

37  
38 CHAIRPERSON: Are there any further questions on this  
39 topic?

40  
41 <EXAMINATION BY MR COSTELLO:

42  
43 MR COSTELLO: Mr Paul, you touched on this a moment ago,  
44 but the photograph you were shown at the start of  
45 Ms Siemensma's examination that showed a burst in a street,  
46 are you aware of whether or not that is the location of the  
47 burst that I was asking you questions about?

1  
2 MR PAUL: I've got some uncertainty exactly where the pipe  
3 breach is. I know that's where there was clearly  
4 obviously - water was in the ground at that point and  
5 coming up from the ground at that point. But I don't know  
6 for sure if that's exactly over where the pipe broke.

7  
8 MR COSTELLO: You understood that the burst occurred on  
9 the corner?

10  
11 MR PAUL: Yeah, in that area.

12  
13 MR COSTELLO: Thank you. Could I have SEW.0001.0001.0142.  
14 And could we have page 0050, please. Could I have the map  
15 at the top expanded, please. This is a different map, but  
16 you can see there Prospect Hill Road and View Point Road.  
17 And then further up the map that is closer to the bottom is  
18 Prospect Hill Road and Coburn. And you can see there the  
19 location at least as identified on that map would appear to  
20 have the burst at Coburn, not at Prospect Hill, contrary to  
21 the map you've just been shown; do you agree with that?

22  
23 MR PAUL: Yeah, although it looks like the burst is in the  
24 main that runs along Prospect Hill, if that makes sense,  
25 and it's under Coburn.

26  
27 MR COSTELLO: When you say the main that runs along  
28 Prospect Hill do you mean the very thin blue line?

29  
30 MR PAUL: The blue line; correct.

31  
32 MR COSTELLO: Thank you. But as located there at least,  
33 for what it's worth, located on the Coburn Road side?

34  
35 MR PAUL: Correct.

36  
37 MR COSTELLO: But you don't know which - if either map's  
38 accurate?

39  
40 MR PAUL: No. No, I don't. We know there's a burst in  
41 there and we know where it was coming to the surface.

42  
43 MR COSTELLO: Can I show you another map. It's in a  
44 different document. It's SEW.0001.0002.4187. Could we go  
45 to page 0040, please. This is figure 18 from a SMEC  
46 report, plan showing water mains network in blue around the  
47 locality of View Point Road. Now, are you able as you sit

1 there to identify where Coburn Road is?  
2  
3 MR PAUL: Yes.  
4  
5 MR COSTELLO: And would it be fair to describe it as about  
6 the middle of the page?  
7  
8 MR PAUL: Yes.  
9  
10 MR COSTELLO: Slightly to the left?  
11  
12 MR PAUL: Correct.  
13  
14 MR COSTELLO: And can you see the blue line that runs  
15 along Coburn Road?  
16  
17 MR PAUL: Yes.  
18  
19 MR COSTELLO: And there is a blue line that intersects  
20 with it coming from Prospect Hill Road.  
21  
22 MR PAUL: Correct.  
23  
24 MR COSTELLO: And it looks as though at least on this map  
25 by South East Water that the intersection of those two  
26 mains pipes is on Coburn across the road from Prospect Hill  
27 Road.  
28  
29 MR PAUL: Yeah, on the south side of Coburn.  
30  
31 MR COSTELLO: South side of Coburn. And if that map's  
32 accurate do you understand that to be where the burst  
33 occurred, that is at the juncture?  
34  
35 MR PAUL: Not quite at the junction. I don't believe it's  
36 at the junction but, as the previous map you showed,  
37 slightly north of the junction. That maps the evidence we  
38 have of the location.  
39  
40 MR COSTELLO: Thank you. Mr Hartley, the views that you  
41 expressed a short time ago in the witness box, were they  
42 views that you formed while sitting there listening to  
43 what's been going on?  
44  
45 MR HARTLEY: Yes.  
46  
47 MR COSTELLO: All right. Have you had regard to or done



1 work in connection with the 2022 landslide in preparing for  
2 this hearing?

3  
4 MR HARTLEY: No.

5  
6 MR COSTELLO: All right. Thank you. No further questions  
7 on 2022, thank you, Madam Chair.

8  
9 CHAIRPERSON: Thanks, Mr Costello.

10  
11 MR COSTELLO: Could I have the joint report back on the  
12 screen, please. Could we move to the next page, please.  
13 Thank you. All right. This is the summary table of  
14 conclusions in respect of the 5 January 2020 landslide.  
15 I just want to identify the major areas of agreement and  
16 disagreement before descending into the areas of  
17 disagreement.

18  
19 No disagreement or no disagreement of any significance  
20 in respect of the first three items, earthquake, erosion  
21 triggering and erosion as a preparatory factor. Is there  
22 anybody in the witness box who disagrees with that  
23 characterisation? Thank you.

24  
25 If we move then to 16, anthropogenic retaining wall at  
26 10-12 View Point Road, Mr Paul, you view this as a minor  
27 preparatory factor with a medium degree of confidence; is  
28 that correct?

29  
30 MR PAUL: That's correct.

31  
32 MR COSTELLO: Mr Pope, you view it as a major preparatory  
33 factor with a high degree of confidence?

34  
35 MR POPE: Correct, yes.

36  
37 MR COSTELLO: And, Mr Hartley, you think it's a medium  
38 with a low degree of confidence?

39  
40 MR HARTLEY: Correct.

41  
42 MR COSTELLO: So we've got sort of the full spectrum there  
43 of degrees of confidence and magnitudes. All right. We'll  
44 come back to that.

45  
46 17, old fill preparatory. Mr Paul, again, you think  
47 this is a minor factor and you're moderately confident of

1 that. Mr Pope, you think it's a major factor and you've  
2 got a high degree of confidence?  
3  
4 MR POPE: Yes.  
5  
6 MR COSTELLO: And, Mr Hartley, you think it's medium and  
7 you have a moderate degree of confidence?  
8  
9 MR HARTLEY: Correct.  
10  
11 MR COSTELLO: Thank you. 21, water source Bayview Road  
12 leak. Mr Paul, you view this as being significant and with  
13 a high degree of confidence. Mr Pope, you view it as being  
14 major, with a high degree of confidence?  
15  
16 MR POPE: Yes.  
17  
18 MR COSTELLO: And is it right that, Mr Hitchcock, that's  
19 also your view?  
20  
21 MR HITCHCOCK: Yes.  
22  
23 MR COSTELLO: Thank you. And, Mr Hartley, on this one  
24 you're the outlier. You view it as insignificant to minor?  
25  
26 MR HARTLEY: Correct.  
27  
28 MR COSTELLO: And you've got a moderate degree of  
29 confidence about that; is that correct?  
30  
31 MR HARTLEY: Correct.  
32  
33 MR COSTELLO: And so, Mr Paul, you have attributed this a  
34 rating of significant, which is 80 to 100 per cent.  
35 Mr Pope, you've said major, which is within the range of 30  
36 to less than 80.  
37  
38 MR POPE: Yeah, I don't really - I prefer the terms than  
39 the numbers. But, yeah.  
40  
41 MR COSTELLO: You prefer the terms than the numbers, did  
42 you say?  
43  
44 MR POPE: Yeah.  
45  
46 MR COSTELLO: Yes. The problem with the numbers is the  
47 major category has got an enormous spread in it.

1  
2 MR POPE: Correct.  
3  
4 MR COSTELLO: I don't want you to do this if you can't,  
5 but within that spread, that is if 30 per cent is low major  
6 and 80 per cent is high major, where are you?  
7  
8 MR POPE: I'd be at 80. I consider it - in my report  
9 I consider it the trigger. So, yeah.  
10  
11 MR COSTELLO: And, Mr Hartley, you consider it  
12 insignificant, which is somewhere between zero and less  
13 than 1 per cent?  
14  
15 MR HARTLEY: Insignificant to minor, which --  
16  
17 MR COSTELLO: Yes, sorry, you're quite right. You're  
18 insignificant to minor. So you're somewhere between zero  
19 to less than 1 or 1 to less than 10. Thank you.  
20  
21 And, Mr Hitchcock, I don't mean to leave you out, but  
22 you, like Mr Pope, were major to high. And are you in a  
23 position to proffer an indication of where within the  
24 fairly broad spectrum of major you sit?  
25  
26 MR HITCHCOCK: At the higher end of the range.  
27  
28 MR COSTELLO: Thank you.  
29  
30 There are, Madam Chair, water chemistry issues that  
31 are related to issue 21, but I'll deal with them separately  
32 tomorrow for the two gentlemen that aren't currently  
33 sitting in the witness box, but I don't mean to ignore  
34 them.  
35  
36 Then another potential triggering factor is domestic  
37 water usage. That is number 22. Again there's a degree of  
38 disagreement here. Mr Paul, with a high degree of  
39 confidence you think this is a minor contributing factor;  
40 that's 1 per cent to less than 10 per cent?  
41  
42 MR PAUL: Correct.  
43  
44 MR COSTELLO: Mr Pope, you also are in the same position,  
45 minor with a high degree of confidence?  
46  
47 MR POPE: Sorry, I was on the wrong number. What number

1 are you on?

2

3 MR COSTELLO: 22.

4

5 MR POPE: Apologies. Yeah, correct, sorry.

6

7 MR COSTELLO: Thank you. Mr Hitchcock, you're minor but  
8 with a moderate degree of confidence?

9

10 MR HITCHCOCK: That's correct.

11

12 MR COSTELLO: Thank you. And, Mr Hartley, you view this  
13 as a medium contributing factor with a moderate degree of  
14 confidence; is that correct?

15

16 MR HARTLEY: Yes.

17

18 MR COSTELLO: Thank you. There is some disagreement but  
19 not substantial disagreement, at least as it seems to me,  
20 with respect to 23, 24 and 25; that is other proprietary  
21 domestic water usage as a preparatory factor, stormwater  
22 leakage as the preparatory factor, and loss of vegetation  
23 as a preparatory factor. The only one that it might be  
24 worth pointing out now and we'll come back to it is 25,  
25 loss of vegetation as a preparatory factor.

26

27 Mr Pope, this is not dissimilar, I think, to the  
28 disagreement in respect of 2022 that we've spoken about  
29 already. You view this as being a medium preparatory  
30 factor and you view that with a very high degree of  
31 confidence.

32

33 MR POPE: Yeah. In this case a registered surveyor has  
34 picked up the trees and the tree heights as well. So  
35 there's another layer of confidence.

36

37 MR COSTELLO: You've got evidence additional to the  
38 evidence you've previously pointed to.

39

40 MR POPE: Yep.

41

42 MR COSTELLO: All right. Thank you. We'll come back to  
43 that if there's time. Now, there's substantial overlap  
44 between 5 January and 14 January. So if we just go over  
45 the page I might just identify the areas of disagreement  
46 because most of them are consistent amongst the two tables.

47

1           If I could perhaps start at 27. This is erosion as a  
2 triggering factor. Mr Pope, you view this as significant  
3 with a high degree of confidence; is that correct?  
4

5 MR POPE:    Yeah, correct.  
6

7 MR COSTELLO:   And so do you, Mr Hartley?  
8

9 MR HARTLEY:    Correct.  
10

11 MR COSTELLO:   Whereas, Mr Paul, you view this as minor.  
12 All right. Well, we'll have to deal with that. The  
13 retaining wall, which is at 28, Mr Pope, you view this as a  
14 major contributing factor?  
15

16 MR POPE:    Yes.  
17

18 MR COSTELLO:   With a high degree of confidence.  
19

20 MR POPE:    Yes.  
21

22 MR COSTELLO:   And so do you, Mr Hartley?  
23

24 MR HARTLEY:    Yes.  
25

26 MR COSTELLO:   Mr Paul, you don't; you think it's a minor  
27 factor?  
28

29 MR PAUL:    Correct.  
30

31 MR COSTELLO:   Okay. And 29, old fill as a preparatory  
32 factor, again, Mr Pope, you think this is a major factor?  
33

34 MR POPE:    Correct.  
35

36 MR COSTELLO:   Mr Hartley and Mr Paul, you both think it's  
37 a minor factor and you hold that view with a moderate  
38 degree of confidence; is that correct?  
39

40 MR PAUL:    Correct.  
41

42 MR HARTLEY:    Correct.  
43

44 MR COSTELLO:   Thank you. Then the Bayview Road link at  
45 33. Mr Paul, significant to high; is that still your view?  
46

47 MR PAUL:    Correct.

1  
2 MR COSTELLO: And, Mr Pope, major with a high degree of  
3 confidence.  
4  
5 MR POPE: Yes.  
6  
7 MR COSTELLO: And is your confidence - sorry, within the  
8 major range are you at the same --  
9  
10 MR POPE: Literally same number as before; yep, upper  
11 limit.  
12  
13 MR COSTELLO: Thank you. Mr Hitchcock, are you in the  
14 same position as --  
15  
16 MR HITCHCOCK: Yes, same as the previously January  
17 landslide.  
18  
19 MR COSTELLO: Thank you. Mr Hartley, you're also in the  
20 same position, insignificant to minor, so something less  
21 than 10 per cent?  
22  
23 MR HARTLEY: Correct.  
24  
25 MR COSTELLO: And then there's, as there was in respect of  
26 5 January, some disagreement in respect of 35, 36 and 37  
27 which we'll come to. As I understand it, on the other  
28 factors that I haven't specifically addressed there's no  
29 significant disagreement. Does anybody have a view  
30 contrary to that?  
31  
32 MR POPE: No.  
33  
34 MR COSTELLO: Right. For the transcript, they all said  
35 no. All right. I just want to get a baseline of the work  
36 that was done to come to the views that you've each come  
37 to.  
38  
39 Mr Makin, I don't mean to leave you out of this but,  
40 don't worry, you're going to get your moment. Is it  
41 right - well, perhaps I'll put it to you each individually,  
42 and I'll start at the end. Mr Hartley, in coming to the  
43 views that you formed did you develop a geological model?  
44  
45 MR HARTLEY: Yes, we did.  
46  
47 MR COSTELLO: And, Mr Paul, did you?

1  
2 MR PAUL: Yes.  
3  
4 MR COSTELLO: And, Mr Pope, did you gentleman?  
5  
6 MR POPE: Yes.  
7  
8 MR COSTELLO: All right. Mr Paul, can you just explain  
9 the relevance of a geological model for the purpose of  
10 developing views on causation, please?  
11  
12 MR PAUL: An engineering geological model, it's intended  
13 to be a framework of everything we know about the ground.  
14 Part of that is what are the different geological units  
15 within the ground and what are the spatial relationships of  
16 those units to each other. But the model also includes  
17 what are the properties of those units. Things like the  
18 hydrogeological conductivity is important. So we're  
19 piecing together what ground do we have and what are its  
20 characteristics, and the word for that is a model.  
21  
22 MR COSTELLO: Right. Thank you. And, Mr Paul, I'll ask  
23 each of you this but I'll start with you. Are there any  
24 significant differences in the approaches to the geological  
25 models so far as you understand the models of Mr Hartley  
26 and Mr Pope and your own?  
27  
28 MR PAUL: Not so much the approaches. Every model is  
29 based on what factual information you've got. Where there  
30 might be differences is you've got discrete locations which  
31 you know information, which might be boreholes or  
32 observations. But, putting the model together, you've got  
33 to make an interpolation between those known points. So  
34 that's where there might be some differences.  
35  
36 MR COSTELLO: Mr Hartley, are you content that the  
37 approaches taken by each party, if you will, to geological  
38 modelling are appropriate?  
39  
40 MR HARTLEY: Certainly appropriate, yes.  
41  
42 MR COSTELLO: And do you see there as being any  
43 significant differences in those approaches?  
44  
45 MR HARTLEY: SMEC's approach, because of our lack of  
46 access to the landslide site per se, relied heavily on the  
47 investigation work which Mr Pope carried out. And it was a

1 desktop study approach as opposed to intrusive at the  
2 location of the landslide. But we're pretty comprehensive  
3 outside that area.

4  
5 MR COSTELLO: Mr Pope?

6  
7 MR POPE: How the models have been put together, not too  
8 different. The interpretation of the facts is obviously  
9 different but.

10  
11 MR COSTELLO: Now, it's right, is it not, Mr Hartley, that  
12 you have had access to the data that's been held in a joint  
13 dataroom?

14  
15 MR HARTLEY: That's correct.

16  
17 MR COSTELLO: You have drawn from that information in  
18 forming your views?

19  
20 MR HARTLEY: That's correct, yes.

21  
22 MR COSTELLO: And you understand that information to be  
23 the information that's also been relied on by Mr Paul and  
24 by Mr Pope?

25  
26 MR HARTLEY: That's what I assume and, yes.

27  
28 MR COSTELLO: Mr Paul, do you have the same understanding?

29  
30 MR PAUL: Yes, I'd agree with that. The differences might  
31 be that each of us has been on site and made our own  
32 observations of what can be seen on site, and that's  
33 separate to what's in the dataroom.

34  
35 MR COSTELLO: I see. And do you agree with those  
36 statements, Mr Pope?

37  
38 MR POPE: I was probably in the position to have the most  
39 time of anyone. So I had my own set of facts. I did  
40 consider SMEC's facts, but they - yeah. So broadly, yes,  
41 agree.

42  
43 MR COSTELLO: You say "I broadly disagree"?

44  
45 MR POPE: No, no, no, agree. I'm just struggling to say,  
46 yes, there was a dataroom. I didn't use a lot of their  
47 facts. I did consider them, but I didn't have to rely on



1       them.

2

3       MR COSTELLO:   Quite.  What I want to establish is that  
4       everybody's had in large part access to the same data.

5

6       MR POPE:     Yes, absolutely.

7

8       MR COSTELLO:   So that the opinions that have been formed  
9       have been formed from the same base of data.

10

11      MR POPE:     Yep.

12

13      MR COSTELLO:   And what you might be making plain, which is  
14      fair, is that to the extent anybody's had access to this  
15      site over time it's been you more than others.

16

17      MR POPE:     Yes.

18

19      MR COSTELLO:   And by reason of those investigations you  
20      may naturally have in your head at least or notes in your  
21      possession that are relevant to views that you formed; is  
22      that right?

23

24      MR POPE:     Can you rephrase that?  I'm not sure what you  
25      mean notes in my possession.

26

27      MR COSTELLO:   Well, ignore the notes for a moment.

28

29      MR POPE:     Yep.

30

31      MR COSTELLO:   I'll break it up into two different things.  
32      You've attended site a number of times?

33

34      MR POPE:     Yeah, yes.

35

36      MR COSTELLO:   And by reason of attending site you have  
37      information?

38

39      MR POPE:     Yes.

40

41      MR COSTELLO:   That might be in your mind?

42

43      MR POPE:     Yes.

44

45      MR COSTELLO:   Or you might have made a note of it; I don't  
46      know?

47

1 MR POPE: Yeah, yeah, yeah.

2

3 MR COSTELLO: But if you've made a note of it or if it's  
4 in your mind it's personal to you?

5

6 MR POPE: Yes.

7

8 MR COSTELLO: But, to the extent that you've relied upon  
9 anything, you've made it plain in your report?

10

11 MR POPE: Yes, correct; yep.

12

13 MR COSTELLO: And was the second point that you were  
14 seeking to make that, while there is a large amount of data  
15 in the dataroom that you've had access to, by reason of  
16 your long involvement in this matter you haven't had to -  
17 you haven't felt the need to have regard to some of the  
18 data that is in that dataroom?

19

20 MR POPE: Sorry, all I was trying to say was I've looked  
21 at it but it hasn't really been - it's been similar to my  
22 facts anyway. There's no big conflict on facts that are  
23 there; yep.

24

25 MR COSTELLO: And, Mr Pope, just staying with, you've  
26 conducted a range of tests?

27

28 MR POPE: Yes.

29

30 MR COSTELLO: And those tests have given you data from  
31 which you've drawn conclusions?

32

33 MR POPE: Yes.

34

35 MR COSTELLO: And, accepting that the conclusions are all  
36 adjusted for a confidence level, have you been able to  
37 conduct sufficient tests to draw firm conclusions?

38

39 MR POPE: I think I've done a lot of testing, yes.  
40 There's some testing in the water space that might be  
41 helpful to others, but I don't immediately feel the need to  
42 do more testing. So, yeah.

43

44 MR COSTELLO: All right. Thank you. Mr Hartley or  
45 Mr Paul, is there any other comment that either of you  
46 would wish to make about the dataset that you've had access  
47 to?

1  
2 MR PAUL: (Indistinct).  
3  
4 MR HARTLEY: Well, we tend to carry on investigating,  
5 given, you know, we're - following on from the hearing  
6 procedures, the view is from our client and from us is that  
7 further information is available to actually gain. And so  
8 we'll be continuing.  
9  
10 MR COSTELLO: Well, Mr Hartley, perhaps you could explain  
11 what it is that you mean by continuing the type of work  
12 that you intend to continue doing and the period over which  
13 you intend to do it?  
14  
15 MR HARTLEY: I think the scope would be delivered - it  
16 would be formed after the hearing is - you know, the  
17 inquiry process is completed. We're certainly not in a  
18 stage where we want to actually carry on and hinder  
19 anything else. But there is - there are - there will be -  
20 there is the opportunity when time allows to actually do  
21 further investigative information, particularly up Coburn  
22 Avenue, I would suggest, which, you know, when we were  
23 scoping the works for the investigations that occurred in  
24 late July - no, late June, I beg your pardon, that, you  
25 know, the logistics of actually getting things going were  
26 just not possible to complete and be of use to this  
27 proceeding.  
28  
29 MR COSTELLO: When roughly were you engaged - sorry, when  
30 I say "you" I mean your firm, SMEC, engaged by South East  
31 Water, Mr Hartley?  
32  
33 MR HARTLEY: Oh, gosh, I think 28 February rings a bell.  
34 I may be - yeah, 28 February, I think.  
35  
36 MR COSTELLO: And in terms of the further work that you  
37 intend to do what does that work comprise?  
38  
39 MR HARTLEY: As I said, the scope would be created, you  
40 know, at a later date. My suspicion is, you know, given -  
41 I want to give you an answer, I'd love to do some CCP tests  
42 around - cone penetration tests.  
43  
44 MR COSTELLO: So is it fair to describe it in this way:  
45 SMEC has an ongoing retainer with South East Water?  
46  
47 MR HARTLEY: I'm going to have to ask for an explanation.

1  
2 MR COSTELLO: That's all right. No, let me put it to you  
3 in a different way. SMEC's engagement with South East  
4 Water continues beyond today and indeed beyond the time  
5 period for this inquiry?

6  
7 MR HARTLEY: That's correct.

8  
9 MR COSTELLO: The scope of the further works that are to  
10 be done has not yet been agreed as between you and your  
11 client?

12  
13 MR HARTLEY: Correct.

14  
15 MR COSTELLO: But what has been agreed is that further  
16 work of some nature will take place?

17  
18 MR HARTLEY: Correct.

19  
20 MR COSTELLO: And how would you describe the rationale for  
21 that further work? To what end is it being done?

22  
23 MR HARTLEY: To what end is it being done? Increasing the  
24 level of confidence. We've been - come up with conclusions  
25 based on the information, the dates, the facts that we've  
26 got. I would say hand on heart that, you know, the  
27 breadth, geographic breadth, of our work, you know, was  
28 limited to site constraints and time constraints. That's  
29 not something I sit comfortably with. I want to get that  
30 level of satisfactory, you know, geological data at some  
31 point.

32  
33 MR COSTELLO: And have those limitations caused you to  
34 take any particular approach when you set the levels of  
35 confidence for each factor that you've assessed in  
36 connection with the 5 and 14 January landslides?

37  
38 MR HARTLEY: When I was scoping the site investigation  
39 works I had an idea about doing about eight or so  
40 investigations throughout the site. Following going out on  
41 site in early June I realised that the complications of  
42 actually getting approval and permits to do those  
43 investigations with various utilities and obviously the  
44 authority in charge of the roads would be too hazardous  
45 and, you know, put a time scale which would lead us to be  
46 out on site effectively at the moment, certainly to the  
47 extent where any information that we'd get not only would

1 hinder our ability to provide something here today but  
2 would have things in abeyance. So, yep.

3  
4 MR COSTELLO: All right. Accepting and acknowledging  
5 those limitations and your desire to do further work and  
6 further testing, and given your particular role here today  
7 is to assist the inquiry and not your client, are you  
8 concerned that the views that you have expressed in the  
9 joint report or in your SMEC report are premature?

10  
11 MR HARTLEY: Certainly not to the extent where we are, you  
12 know, expected to provide you with answers today for this  
13 hearing.

14  
15 MR COSTELLO: Did you say "where we are expected to  
16 provide you with answers"? I just wanted sure if you said  
17 "are" or "aren't".

18  
19 MR HARTLEY: Are. Beg your pardon.

20  
21 MR COSTELLO: Yes.

22  
23 MR HARTLEY: Yes. We scoped our work to get you answers  
24 to the best confidence that we can reasonably expect for  
25 today.

26  
27 MR COSTELLO: I see. And so where, for example, you have  
28 stated that you have a high degree of confidence in respect  
29 of a particular potential factor --

30  
31 MR HARTLEY: Yes.

32  
33 MR COSTELLO: -- you do in fact have a high degree of  
34 confidence?

35  
36 MR HARTLEY: Yes, because that - in those instances  
37 typically those are based on desktop study and, you know,  
38 standing on the shoulders of Mr Pope's work.

39  
40 MR COSTELLO: Mr Pope has said before that he's done a lot  
41 of tests and I think his evidence was something along the  
42 line of he wouldn't be rushing out to do further tests.  
43 You do wish to do further tests. Are you concerned that  
44 the further tests that you do may lead you to conclusions  
45 different to those that you've expressed in this report?  
46 Presumably that's why you wish to do them?

1 MR HARTLEY: Yeah, yes, there was a number of things that  
2 came out in conclave and this is not the only - and it's  
3 not the only source of queries we had ourselves to  
4 actually, you know, understand that, despite the site  
5 constraints, we're going to have to come up with it. But,  
6 yeah, I mean, as we - as was talked about with  
7 paleochannels and all that kind of stuff, if you hit  
8 something which is unforeseen which proves a theory which  
9 at this point in time has not yet been proven then that has  
10 an impact on everybody's conclusions.

11  
12 MR COSTELLO: Right. Do you have an idea of how much  
13 longer you expect your engagement to last?

14  
15 MR HARTLEY: I understand that it's in the region of a  
16 year maybe.

17  
18 MR COSTELLO: From where do you have that understanding?

19  
20 MR HARTLEY: Look, from correspondence in the meetings  
21 with the clients which we have had in the last - on a  
22 weekly basis since, you know - since February, I think it  
23 is. As the work has continued, the understanding and the -  
24 I don't know, the understanding of the scale of work from  
25 SEW has enhanced, I think, from what I understand and the  
26 expectation is that this is a long-term relationship.

27  
28 MR COSTELLO: You have personally met on a weekly basis  
29 with your client, have you?

30  
31 MR HARTLEY: Over line. On line.

32  
33 MR COSTELLO: On line. But you personally in these calls?

34  
35 MR HARTLEY: In this court?

36  
37 MR COSTELLO: Calls.

38  
39 MR HARTLEY: In the call?

40  
41 MR COSTELLO: On line? You are personally joining the  
42 calls with the client?

43  
44 MR HARTLEY: Yes.

45  
46 MR COSTELLO: And you discuss work on your report in the  
47 course of those calls?

1  
2 MR HARTLEY: Yes, yes.  
3  
4 MR COSTELLO: Give feedback to the client about the work  
5 you have done?  
6  
7 MR HARTLEY: Yes.  
8  
9 MR COSTELLO: The conclusions you've formed on a  
10 preliminary basis?  
11  
12 MR HARTLEY: Yeah, not on a weekly basis, but when they've  
13 actually been written, yes.  
14  
15 MR COSTELLO: Debate the views with the client?  
16  
17 MR HARTLEY: No, because that's our independent  
18 assessment.  
19  
20 MR COSTELLO: Does the client have technical experts on  
21 these calls or are they managerial people?  
22  
23 MR HARTLEY: The technical director is the current rep.  
24  
25 MR COSTELLO: And he'd have a view about some of these  
26 matters as you explain them to him, wouldn't he?  
27  
28 MR HARTLEY: The conclusion - yeah, he's kept himself to  
29 himself because the - our views are our views, and we just  
30 talk about progress.  
31  
32 MR COSTELLO: How long do these calls last?  
33  
34 MR HARTLEY: An hour, an hour and a half.  
35  
36 MR COSTELLO: A lot of discussion about progress.  
37  
38 MR HARTLEY: Yes.  
39  
40 MR COSTELLO: You must discuss more than just an update as  
41 to where you're at. What else do you discuss?  
42  
43 MR HARTLEY: Well, in recent times we've talked about, you  
44 know, well, for example, access - access to site, also raw  
45 data, desk study data and such like that which is available  
46 which has come through. There's been a lot of site work  
47 which both SEW has done independently that SMEC has been

1 invited to turn up to as well. So that kind of stuff has  
2 been - it takes a while.  
3  
4 MR COSTELLO: Have you on occasions, Mr Hartley, given  
5 evidence in courts?  
6  
7 MR HARTLEY: I haven't  
8  
9 MR COSTELLO: So this process of providing expert evidence  
10 to an independent forum like this is a new one for you?  
11  
12 MR HARTLEY: Correct.  
13  
14 MR COSTELLO: All right. So on that basis you don't have  
15 any prior experience on whether or not you ought be or the  
16 degree of contact you ought have with a client in  
17 connection with giving independent evidence?  
18  
19 MR HARTLEY: The advice has been from our immediate  
20 client, which are the solicitors.  
21  
22 MR COSTELLO: I see. And are they on these calls?  
23  
24 MR HARTLEY: Yes.  
25  
26 MR COSTELLO: All right. Is that a convenient time, Madam  
27 Chair?  
28  
29 CHAIRPERSON: Yes. We'll have a 15-minute break,  
30 returning at 20 to.  
31  
32 **SHORT ADJOURNMENT**  
33  
34 MR COSTELLO: Thank you, Madam Chair. What I would like  
35 to do now is just see if I can ascertain whether there's  
36 some degree of agreement about the composition of the slope  
37 and some of the characteristics of the slope. Perhaps it's  
38 easiest to do it by reference to some photographs and  
39 diagrams. Perhaps first could I have DPA.0004.0001.0001.  
40 That's Mr Paul's causation report. And could we go to  
41 0037, please. Mr Paul, I think it's right to describe  
42 these as 3D renders of the topography and that identify  
43 what might be described as colluvial gullies; is that  
44 correct?  
45  
46 MR PAUL: Yeah, that's correct. There's a lot more detail  
47 to it, but that's correct.



1  
2 MR COSTELLO: I don't mean to sort of diminish your work.  
3 I just wanted to understand if that's at least a fair  
4 description of part of what it's doing.

5  
6 MR PAUL: Yeah.

7  
8 MR COSTELLO: Could you explain the relationship between  
9 the two photographs and then perhaps just - they're not  
10 photographs, the two images and then perhaps explain them?

11  
12 MR PAUL: That's right. So the one on the top is looking  
13 towards Arthurs Seat, which is the mountain you see in the  
14 rear from Port Phillip Bay. The one on the bottom is  
15 looking down. The top one's an aerial imagery. The bottom  
16 one is not an aerial imagery. It's what's called a  
17 hillshade image just to show you the texture of the ground  
18 and the topography of the ground but not showing the  
19 photograph of it.

20  
21 And the one on the bottom, Arthurs Seat is in the  
22 bottom right. You can see that's the higher ground on the  
23 bottom right there. So the granites comprising Arthurs  
24 Seat over time erodes down. The reason Arthurs Seat is  
25 there is because it's made of harder rock and it sits up  
26 high and forms a mountain. Over time that granite erodes  
27 down. As it does it forms drainage courses that come off  
28 the side and gullies, and they fill up with this material  
29 we call colluvium. And colluvium is just a word for  
30 material that - the soils that are transported downslope  
31 under the action of gravity and then deposited in these  
32 channels. Over time some of the channels infill, and then  
33 new channels form and they infill, and new channels form,  
34 and this happens over thousands of years.

35  
36 So what we're looking at on the top one is just  
37 looking towards the gullies as they are now, and then the  
38 bottom one we've just sort of marked out some of the  
39 courses of the gullies there are now and shown also some of  
40 the now filled gullies that we know - some of we know are  
41 there; like the Margaret Street gully, it says present day  
42 gully, but other ones that have been naturally filled over  
43 geological time with colluvium.

44  
45 MR COSTELLO: One of the relevance of gullies is that they  
46 are a natural flow path for water?  
47

1 MR PAUL: That's right. So gullies that have been  
2 backfilled. And sometimes you hear the word paleochannel,  
3 which have been mentioned here today. It's a gully that's  
4 backfilled. The material that has backfilled that gully is  
5 coarser. It allows water to more readily flow through it,  
6 which we talked about as an aquifer. So these forms  
7 aquifers. The water can flow through those and then it  
8 emerges on the escarpment as a spring.

9  
10 MR COSTELLO: I see. And the reference that was made  
11 earlier in the day to shallow aquifers, that would include  
12 the sort of circumstance you've just been speaking of?

13  
14 MR PAUL: That does. That's what we mean by shallow  
15 aquifer.

16  
17 MR COSTELLO: Thank you. And so a gully, though, filled  
18 with colluvium is still a natural flow path for water; is  
19 that fair?

20  
21 MR PAUL: Yes.

22  
23 MR COSTELLO: Thank you. Is there any other aspect of  
24 either image that you wanted to draw out now or is that a  
25 sufficient explanation.

26  
27 MR PAUL: No, that's fine, other than the sketch I did  
28 perhaps explains it as well better; that's all.

29  
30 MR COSTELLO: I'll come to it. Mr Pope, do you have any  
31 dispute with anything in either of these images?

32  
33 MR POPE: I think we've used similar images in the  
34 landslide risk assessment. The only minor things and not  
35 nitpicking, I think it's important, is in the bottom image  
36 where the - just how it's drawn with the drainage lines  
37 choking out near where the water main failure was, like,  
38 they neck out really thin. If it helps, I've got a  
39 different view in LiDAR that shows how wide the gully is.  
40 Like, it's not just this isolated narrow gully through  
41 there. It's a wider channel.

42  
43 MR COSTELLO: Would you like me to have that brought up on  
44 the screen?

45  
46 MR POPE: It's page 34 of my '25 report.

1 MR COSTELLO: Your '25 report?

2

3 MR POPE: Yep. Internal page 34.

4

5 MR COSTELLO: That's MSC.5087.0001.0157. What was the  
6 internal page number you were after?

7

8 MR POPE: 34.

9

10 MR COSTELLO: 34, thank you. Is that this?

11

12 MR POPE: Yep. So Darren's hill showed much easier on the  
13 eyes, but the point of this figure is what is circled in  
14 red is a fill embankment on the Mornington Peninsula  
15 Freeway which gives you an idea of the width of the gully  
16 in full. So we've probably all been down, as Darren had  
17 drawn and is sort of where my leader is for inferred  
18 original gully location where the top arrow is. So there  
19 is a defined drainage path through there. So water does  
20 come down there and does go through the stormwater - like,  
21 that's where the stormwater line is and that sort of stuff.  
22 But the actual filling that was done for the motorway is  
23 much wider, which is telling me that the drainage path is  
24 much wider. And, to Darren's point about colluvium being  
25 infilled, there's a much wider zone of potential colluvial  
26 infill in that drainage path.

27

28 MR COSTELLO: Mr Paul, do you agree with what you've just  
29 heard?

30

31 MR PAUL: Yes. So the image I showed shows what we call a  
32 - it's a word we haven't heard - thalweg, which is if you  
33 imagine a channel, a line on the bottom of the channel.  
34 So, yes, these channels have a width to them.

35

36 MR COSTELLO: Did you say thalweg?

37

38 MR PAUL: Yeah, that's the word. It's T-H-A-L-W-E-G and  
39 it means the line at the bottom of a channel.

40

41 MR COSTELLO: Mr Hartley, do you broadly agree what's been  
42 said about the three images that have just been on the  
43 screen and, if you would be assisted by me putting the  
44 prior images up, just let me know.

45

46 MR HARTLEY: No, I think the interpretation and the  
47 general understanding of the geomorphology of the site is,

1       yeah, exactly what I understand, too.

2

3       MR COSTELLO:   Thank you.   Could we please go back to  
4       Mr Paul's report.   That's DPA.0004 - yes, that one.   Could  
5       we go to 0147, please.   Mr Paul, this is I think a  
6       conceptual model showing a cross-section of soil and rock  
7       types?

8

9       MR PAUL:    Correct.

10

11       MR COSTELLO:   In the broad area from just beyond the pipe  
12       burst at the top to the escarpment at the far right; is  
13       that correct?

14

15       MR PAUL:    That's correct.

16

17       MR COSTELLO:   All right.   I just want to see whether or  
18       not there's agreement that this is an accurate  
19       representation.   But, before I ask Mr Hartley and Mr Pope  
20       for any view that they have on it, could you just explain  
21       this diagram, please?

22

23       MR PAUL:    On the bottom right, the air photo, there's a  
24       green line which is showing the line along which this  
25       section has been drawn.   So it runs - yeah, so it shows  
26       that it runs from Bayview up here, Bayview Outlook  
27       intersection, close to, and down through the January  
28       landslide locations in a straight line.

29

30       MR COSTELLO:   It's a cross-section of the area of that  
31       green line.

32

33       MR PAUL:    A cross-section along the line.   If we go back  
34       to the cross-section.   So this has all been modelled in  
35       three dimensions, and we just took a two-dimensional  
36       cross-section through.   We know the profile at borehole  
37       location.   Also in that bottom right image you can see the  
38       dots with the little labels of where we have boreholes.   So  
39       we put all those boreholes into a 3D model and in each  
40       borehole identify what geological units are there and then  
41       tried to interpolate between them to form our model of the  
42       ground.

43

44               So what this model shows lower down the red is granite  
45       rock.   The pink is weathered granite or residual soil,  
46       which is soil that has derived from the granite itself  
47       through processes of chemical weathering in the soil.   And

1 then the green is colluvium, which we spoke about before,  
2 material that has come down from higher up on Arthurs Seat  
3 and under gravity been transported over the top of the  
4 residual granite.

5  
6 I should point out the question marks and why there  
7 are question marks, and that is because we only know the  
8 ground at the location of the boreholes because we've seen  
9 it and measured it. Those boreholes may or may not even be  
10 on the line of our section. They might be close to. In  
11 between the boreholes we have to interpolate. So there's  
12 lower certainty in the model between the boreholes the  
13 further you get from the borehole.

14  
15 MR COSTELLO: And, Mr Pope, are you in broad agreement  
16 with this model?

17  
18 MR POPE: I've got similar models. There's some minor  
19 things. You might have talked about before in the  
20 motorway's there's a series of - it's cut to fill. So  
21 there are fills with the motorway. And Bayview Road is  
22 built in fill. Broadly, yes, I have and have made my  
23 disagreements with the local model, put that in the  
24 conclave report, but this is roughly what you see across  
25 that part of the mountain, yeah.

26  
27 MR COSTELLO: When you say the local model you mean the  
28 cross-section closer to the headscarp?

29  
30 MR POPE: Correct, yes.

31  
32 MR COSTELLO: Thank you. Mr Hartley, are you in broad  
33 agreement with this model?

34  
35 MR HARTLEY: Yeah, sort of. We did our boreholes and we  
36 went on a transect slightly different, slightly on a  
37 nor-westerly direction down the eastern limb of Prospect  
38 Hill Road. And so we've got our boreholes which identify  
39 potential aeolian sand deposits, which I don't think are  
40 specifically included here. And I would suspect that the  
41 basement pumping annotation at chainage 360 at 8, 9 metres  
42 may be in different material than, you know, what is  
43 colluvial in general, no doubt. But, yeah, it's a little  
44 bit distant offset for this to be seen as a carte blanche  
45 of the area per se.

46  
47 MR COSTELLO: And one of the points that I think you're

1 seeking to make is that not all colluvium is consistently  
2 the same? So within what is coloured green there as  
3 colluvium will be soils that will be of different types?  
4  
5 MR HARTLEY: Yeah, different types, laminations and  
6 different lumps of stuff.  
7  
8 MR COSTELLO: Yes. And, Mr Paul, I imagine you'd agree  
9 with that?  
10  
11 MR PAUL: Yes, I agree with that. In fact you can see on  
12 this figure here we used the word "transported soils", and  
13 the reason for using that it was a term that encompasses  
14 more of what we find, so not just the material that's come  
15 down under gravity but Mr Hartley mentioned aeolian, which  
16 is windblown dune type material, that is in there as well.  
17 But we haven't got the borehole density to be able to  
18 delineate it with reasonable accuracy in the model; so just  
19 lump it together as a more broad group of transported  
20 soils.  
21  
22 MR COSTELLO: Now, the relevance of this cross-section and  
23 in particular the identification of that which is granite,  
24 that which is colluvium, and that which is aeolian is,  
25 first, those matters are capable of bearing on  
26 hydrogeological questions; do you agree with that, Mr Paul.  
27  
28 MR PAUL: (Indistinct).  
29  
30 MR COSTELLO: All right. Mr Makin, I promised I'd get to  
31 you. It's five to 4. We will deal in some detail tomorrow  
32 with questions of hydrogeology and flow paths. But,  
33 speaking generally for the purpose of explaining this  
34 conceptual model, are you able to give a generalised  
35 description of the relevance of, for example, aeolian,  
36 colluvium and granite to questions of hydrogeology?  
37 I assume - I presume, rather, that it bears on a number of  
38 questions including velocity?  
39  
40 MR MAKIN: That's right. As mentioned with transported  
41 soils, there's a variety of materials in there. But  
42 generally because of the nature that stuff has moved and a  
43 lot of the clay material might have been removed. So  
44 there's more gravels and sands in there. Gravels might be  
45 concentrated in channels, on the base of existing channels  
46 or buried channels. They could form higher permeability  
47 pathways. And the aeolian sands also might have a higher

1 permeability.

2

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1  
2 MR BOLTON: Yes. So the more you focus in on an area,  
3 I suppose, the more detail you're going to get. If you're  
4 having a helicopter view of something, it's going to be  
5 very granular, I suppose, and you're going to make very  
6 broad characteristics, I guess.

7  
8 MR COSTELLO: And was that your concern? Was it a concern  
9 born of scale or was it a different concern?

10  
11 MR BOLTON: Well, you look at this and you make an  
12 assumption that the colluvium is more permeable than  
13 something else, and you're sort of then fixed on this view  
14 of that, you know, which isn't necessarily the case because  
15 it is quite complex.

16  
17 MR COSTELLO: I see. So one needs to be careful the  
18 extent to which one draws conclusions from a model such as  
19 this.

20  
21 MR BOLTON: Because there's always exceptions.

22  
23 MR COSTELLO: Thank you. Mr Hitchcock, as the person who  
24 although a hydrogeologist has a significant experience in  
25 hydrochemistry as well in the witness box, do you accept  
26 that soil types such as aeolian verse colluvium verse  
27 granite can bear heavily on questions of water chemistry?

28  
29 MR HITCHCOCK: Yes, certainly can, and also flow, I think.  
30 I don't think anyone would dispute that perhaps the bottom  
31 of the colluvium at the contact with the granite would  
32 potentially be more permeable, just the way slope forms and  
33 the gullies fill with the bigger bits falling down the  
34 slope.

35  
36 MR COSTELLO: I see.

37  
38 MR HITCHCOCK: So just looking at this it doesn't show you  
39 that. And then colluvium varies by its nature. It's stuff  
40 that's rolled down a hill. So it starts off with a  
41 reasonable amount of clay, and it gets weathered out at  
42 some places and not others. So it's quite variable. Even  
43 when you think things are uniform, you can have things  
44 change by 2 or 3 per cent silt or clay content and change  
45 permeability by a factor of 100. So trying to assign  
46 things precisely in that environment or in nearly any  
47 environment is very hard.



1  
2 MR COSTELLO: Yes, thank you. And on questions of water  
3 chemistry as water passes through, for example, aeolian  
4 soils that can cause chemical reactions to occur that will  
5 alter the chemistry of the water?  
6

7 MR HITCHCOCK: Yeah, water passing through any soil, there  
8 will be some equilibrium of the water with the minerals in  
9 the soil. It's a matter that Chris will talk to about how  
10 fast that can occur.  
11

12 MR COSTELLO: Yes.  
13

14 MR HITCHCOCK: So the fact that the groundwater we know  
15 has 2,000 to 3,000 microsiemens in salinity and it's  
16 probably mostly started as rainwater, which is about 200,  
17 tells you that something dissolves into water and then it's  
18 an argument then about how quickly that can happen. With  
19 the colluvium it's probably old material from weathered  
20 granite versus the aeolian, which is windblown from near  
21 the bay with aerosols that are much more recent. So that's  
22 more likely to have a higher level of recent salinity and  
23 more soluble compounds.  
24

25 MR COSTELLO: Thank you. Could we go over the page,  
26 please, to 0148. Mr Paul, this is a cross-section but of a  
27 much smaller area.  
28

29 MR PAUL: Correct.  
30

31 MR COSTELLO: The area immediately leading up to the  
32 scarp.  
33

34 MR PAUL: Correct.  
35

36 MR COSTELLO: All right. And is there anything about this  
37 particular map that you need to identify that's different  
38 to the last?  
39

40 MR PAUL: It comes from the same model as the last one.  
41 We've got a greater density of boreholes that we've drilled  
42 in and around that area. So the level of certainty in this  
43 model would be higher than it would be across the regional  
44 model, and exactly the point you were saying about scale  
45 for those reasons.  
46

47 MR COSTELLO: Madam Chair, is it convenient to sit until

1 4.15?

2

3 CHAIRPERSON: Yes.

4

5 MR COSTELLO: Thank you. Now, there's clearly in this  
6 smaller cross-section fill identified, and fill is a word  
7 that most people will be familiar with and it gets quite a  
8 bit of airplay in the various reports. But to be clear  
9 what it is we're talking about what do you mean when you  
10 identify fill?

11

12 MR PAUL: Soils that have been placed by humans.

13

14 MR COSTELLO: All right. And does it mean placed by  
15 humans in recent times? Is there any particular timeframe?

16

17 MR PAUL: No, there's not. Any time.

18

19 MR COSTELLO: Okay. Any time. And so the fill that's  
20 been placed on that cross-section might have been there for  
21 50 years?

22

23 MR PAUL: Yeah, it could be. We've got an interpretation  
24 of it, and this fill is of different ages. There's  
25 different interpretation. Yes, could be.

26

27 MR COSTELLO: All right. So some of it might be very  
28 recent and other might have been there for a very long  
29 time?

30

31 MR PAUL: Correct.

32

33 MR COSTELLO: I might just pull up something from  
34 Mr Pope's report. That's MSC.5087.0001.0157. And this is  
35 the one that always takes a while to load but, when we get  
36 there, could I have 0442. Sorry, if that was the number  
37 I've given you I've given you the wrong number. It should  
38 end in 0157. 5087.0001.0157. Thank you. Could I have  
39 0442. That's it. And, if it's not to stretch the  
40 friendship, could I have the next page on the screen at the  
41 same time.

42

43 Now, Mr Pope, these are from your report. Did you or  
44 one of your colleagues produce these?

45

46 MR POPE: They're mine, yeah.

47

1 MR COSTELLO: They're yours, okay. Could you just explain  
2 each picture, please?

3  
4 MR POPE: Sure. So left-hand side - well, maybe not  
5 obvious, but I'm looking towards 10-12 View Point at the  
6 top. Essentially my interpretation is there's three key  
7 units there. So there's a near surface fill. We're  
8 looking to the west flank of the - this is the - as  
9 observed on 6 January. Essentially a little bit of fill on  
10 the western flank, and there's the timber terraces and the  
11 like there to - physically can see the fill underneath the  
12 timbers, but there's a little bit behind the timbers as  
13 well. The dominant layer there underneath that is the  
14 colluvium. So that may be not obvious but no-one has been  
15 in there to map this by hand. So these are all visual  
16 logs. But essentially what we found in there is a mix but  
17 quite sandy with cobbles and boulders and in that  
18 particular - sand dominant with cobbles and boulders in  
19 that part of the world.  
20

21 The interesting observation here is when you go to the  
22 right-hand side of that image and look back to the east the  
23 thicknesses of what I interpret to be fill are  
24 significantly thicker, and there is a colluvium at the  
25 base. So this is the image on the right-hand side.  
26

27 I guess the only other point - or two other points.  
28 On the 6th that landslide had evacuated to the contact with  
29 the extremely weathered granite, which is what's in centre  
30 of frame on the left-hand side. And at the time I just  
31 pulled a handful of clay out of the base of the slip, which  
32 is the bottom left-hand side of the left-hand image. So  
33 there was a clay seam there in the plunge of that gully at  
34 that time. So that's essentially it.  
35

36 MR COSTELLO: All right. And just so that I understand  
37 it, you might have said this but I couldn't quite hear,  
38 where you have marked the part of each picture as being  
39 fill and part of it as being colluvium is that based on a  
40 visual inspection where you can form a view or is it also  
41 based on in fact taking samples?  
42

43 MR POPE: No, that's visual only. No-one went near that  
44 face. So the only sample I could grab was the one that  
45 I've called CI to CH, medium to high plasticity clay seam.  
46 That was down the hill a bit. But, no, I didn't get other  
47 samples.

1  
2 MR COSTELLO: And because it won't be obvious to people  
3 who are not seated over there is being able to look at two  
4 types of dirt and identify one as colluvium and one as  
5 fill, is that the sort of skill that geotechnical engineers  
6 with experience in this type of work typically have?  
7

8 MR POPE: Certainly at my level I hope so, yep.  
9 I wouldn't back my graduates to do it, but I'd certainly  
10 back myself.  
11

12 MR COSTELLO: Okay. Well, that's on the record for them.  
13 Thank you.  
14

15 MR POPE: That's not the most upsetting thing I've said to  
16 them.  
17

18 MR COSTELLO: Mr Paul, have you looked at these  
19 photographs before?  
20

21 MR PAUL: Yes, I have.  
22

23 MR COSTELLO: Now, I suppose that by reason of the shading  
24 it's possibly hard for you to form a view as to the  
25 correctness of the diagnosis, if I can call it that; is  
26 that right?  
27

28 MR PAUL: It's difficult to, but there is an image similar  
29 in the PSM report without the shading. Perhaps we could  
30 look it up, if you want.  
31

32 MR COSTELLO: I see.  
33

34 MR PAUL: It is - here we go. So 5087.0001.0398,  
35 appendix D1.  
36

37 MR COSTELLO: Did you say 0398?  
38

39 MR PAUL: Yeah, 0398.  
40

41 MR COSTELLO: Yes. It's the same document.  
42

43 MR PAUL: It's the same document.  
44

45 MR COSTELLO: I think it's a small picture in the top  
46 left; is that right?  
47

1 MR PAUL: Yes, which I believe it to be the same - almost  
2 the same spot.  
3  
4 MR COSTELLO: Yes, I'll have that brought up. Thank you.  
5 That one in the top left could be --  
6  
7 MR PAUL: Top left, yeah.  
8  
9 MR COSTELLO: So perhaps not identical, I think, but you  
10 consider this to be the same area?  
11  
12 MR PAUL: Yes. I believe that could be the same.  
13 6 January is the date on there. So I believe it would  
14 be the same. It's looking in a slightly different  
15 direction. This is looking sort of back up towards the -  
16 it would be the east side of the retaining wall.  
17  
18 MR COSTELLO: And just so I can make sure there's no  
19 disagreement about this, Mr Pope, is this roughly a  
20 photograph of part of the area that you shaded --  
21  
22 MR POPE: Yeah, correct.  
23  
24 MR COSTELLO: -- that I took you to before?  
25  
26 MR POPE: So the first photo was taken from the left-hand  
27 side of this. There was a spot where you could walk  
28 across, obviously. The left-hand side was looking to the  
29 right-hand side - sorry, the first image we went through  
30 before is looking to the right hand, top right-hand corner  
31 of this. And then the second image we're looking at is  
32 from the right-hand side of this, taken from the right-hand  
33 side of this image, looking to the left towards the legs  
34 and the trees that you can see on the left-hand side. So,  
35 yes.  
36  
37 MR COSTELLO: Thank you. And, Mr Paul, I don't know if  
38 you can do this unless I bring the other picture up at the  
39 same time, but what did you want to make clear or, sorry,  
40 what point did you wish to make about this photograph?  
41  
42 MR PAUL: In terms of being able to use the visual set  
43 from the material types which you were taking about and  
44 what materials we can identify in this image.  
45  
46 MR COSTELLO: And is it broadly the case that the lighter  
47 coloured material to the right-hand side of the picture is

1 colluvium and the darker coloured material to the left-hand  
2 side is fill?  
3

4 MR PAUL: The material, the lighter coloured material sort  
5 of on the right-hand half are weathered granite or residual  
6 granite. You see the timber up the top right, and below  
7 that you can see is a brown coloured material with boulders  
8 in it; you see little boulders sticking out. That's  
9 colluvium. The material on the left-hand side, I think,  
10 where there's a disagreement on what that is, some of it is  
11 probably fill. My opinion is a little bit different.  
12 I believe a lot of that is natural.  
13

14 MR COSTELLO: I see.  
15

16 MR PAUL: That's the difference that we've got.  
17

18 MR COSTELLO: I see. So, Mr Pope, broadly speaking, your  
19 view is that the darker coloured material to the left,  
20 that's all fill?  
21

22 MR POPE: Yes.  
23

24 MR COSTELLO: Okay. Thank you. Mr Hartley, do you have  
25 any view about these images?  
26

27 MR HARTLEY: No, not from my point of view.  
28

29 MR COSTELLO: Thank you. Just to be clear about that,  
30 Mr Hartley, do you dispute that there is colluvium present  
31 in the picture that's in front of you now?  
32

33 MR HARTLEY: There is certainly colluvium in there.  
34

35 MR COSTELLO: Okay. And would you identify that colluvium  
36 as being towards the top of the right-hand side beneath the  
37 wooden plank?  
38

39 MR HARTLEY: Yes. Yeah. There may be a little bit in the  
40 foreground beneath the brownish stuff. But, yeah,  
41 typically - almost certainly, yes, the timber.  
42

43 MR COSTELLO: I see. Thank you. And then the lighter  
44 coloured material that takes up the bulk of the right-hand  
45 side of the picture is that granite or granite-like  
46 material, do you think, or do you not have a view?  
47

1 MR HARTLEY: Based on the visual, yes, that's likely to be  
2 XW granite.

3  
4 MR COSTELLO: Okay. Thank you. But you don't have any  
5 view about the extent to which the material to the left is  
6 entirely fill or partly fill partly colluvium?

7  
8 MR HARTLEY: Later on when we talk about it there may be a  
9 bit of interest. I'll just annoy everybody. The 5 January  
10 failure looking at a map seems to be off centre from the  
11 centre line of the gully. And my feeling from that point  
12 of view is that the explanation of fill shifting everything  
13 on the - you know, over may be an explanation as to why the  
14 5 January failure was off centre.

15  
16 MR COSTELLO: Yes, I understand. Thank you. All right.  
17 With that level of agreement or disagreement identified  
18 I might just go to one more document - sorry, one more page  
19 of this same document. It's 0252. It's a little hard to  
20 read. Yes, that's a bit better, thank you. Mr Pope, this  
21 is a document from your report.

22  
23 MR POPE: Yes.

24  
25 MR COSTELLO: And, as with the earlier cross-section  
26 I showed, this is a cross-section effectively of the scarp  
27 and a little bit behind it; is that right?

28  
29 MR POPE: Yeah, correct.

30  
31 MR COSTELLO: All right. And what are you seeking to  
32 demonstrate by this diagram?

33  
34 MR POPE: If we can zoom in further perhaps on the  
35 retaining wall, the orange bit. Yeah, there. Not quite  
36 that much but nearly that much. Mainly my interpretation  
37 of the fill is justified by there's a green layer that I've  
38 - so top down from where it says hand augur 01, if we go  
39 from top down we go into a zone of orange shaded material  
40 which are associated with retaining wall and backfill. But  
41 underneath that is two layers of fill. One is light blue  
42 and one is light green. They're what I've called old fill.  
43 So can't put a date on them, but other than I suspect they  
44 were put there well before the current property owners.

45  
46 The reason for that is those two layers in the  
47 headscarp are shared on both properties. So they're on

1 6 View Point and 10-12 View Point. Those properties were  
2 once one property. So, to me, I find it highly unlikely  
3 that anyone in the last 20 years has put those deeper fills  
4 there. There might be a few neighbours yelling at each  
5 other if they're tipping into each other's properties.  
6

7 But essentially I - the green layer, I can't resolve  
8 it being anything but a steep layer. I can't see how it  
9 can be placed flat and just tie in neatly with the slope.  
10 So, to me, it's a tip head that has been - like, there's  
11 been fill that's been pushed out over the escarpment. And  
12 when you do that the bottom of that fill layer is  
13 consistent with the slope that it's buried, and the top of  
14 the fill layer will often be what we call the repose angle,  
15 which will be - for these sort of materials will be sort of  
16 37 degrees. That's naturally, like, if you think - the  
17 best analogy for that is like the dunes at the beach.  
18 They'll have a maximum angle that they'll sit at, which is  
19 like their repose angle. So, for me, this is fill that's  
20 been pushed out and it's reeled down at its repose angle,  
21 which is why it's so steep.  
22

23 Darren's section, it's not in a one to one scale. So  
24 it's hard to actually compare apples with apples. But  
25 I don't actually agree on the pre-failure geometry between  
26 the two models. So we can talk to this. Like, if Darren's  
27 got another theory, what the soil type is, whether it's  
28 transported or not, that's the fundamental difference  
29 between the two models, which obviously affects opinions on  
30 cause.  
31

32 MR COSTELLO: Affects opinions on cause, it may be more,  
33 but at least two ways. One, fill is the preparatory  
34 factor?  
35

36 MR POPE: Yes, correct.  
37

38 MR COSTELLO: Secondly, does it bear upon whether or not  
39 the retaining wall was a preparatory factor or is it not  
40 relevant to that?  
41

42 MR POPE: Importantly, depositionally, if that is fill or  
43 windblown sands or colluvium, the contribution of the  
44 retaining wall's the same. If it's residual, the  
45 contribution of the retaining wall is completely different.  
46

47 MR COSTELLO: Thank you. Mr Paul, it's time to close, but



1 before we do do you want to make any comment about this  
2 diagram?

3  
4 MR PAUL: I'll just make one point of clarification that  
5 the section that you showed of ours before is after the  
6 landslide, and this section is before the landslide.  
7 I think it's important to understand that.

8  
9 MR COSTELLO: Thank you. It is. Thank you.

10  
11 Madam Chair, what I propose to do tomorrow, just  
12 really for the edification of the witnesses and counsel, is  
13 deal briefly with preparatory factors in respect of 2025  
14 but only in respect of those areas where there's  
15 significant disagreement, in particular 17 and 19, which is  
16 fill, which we've dealt with in part now, I have only a  
17 small number of questions about that, and then 16 and 28,  
18 which are the retaining wall. I expect that the shire may  
19 wish to ask some questions about those topics, and I'll  
20 make way for them to do so.

21  
22 And then I want to move straight into the triggers for  
23 2025, which divides not exclusively but reasonably neatly  
24 into two main topics. One is pathways of water to travel  
25 from the burst site, which is largely but not exclusively a  
26 hydrogeological question. The second is questions of water  
27 chemistry, which are - as with everything - related to but  
28 in some senses distinct. But so that those two topics can  
29 be done quickly I'm going to seek to deal with the two  
30 preparatory factors reasonably quickly, before handing over  
31 to the shire so that they can ask any questions they have.

32  
33 CHAIRPERSON: Thank you. That sounds sensible. Yes.

34  
35 Mr Paul, you'll have a proper opportunity tomorrow to  
36 respond to the evidence that Mr Pope just gave about the  
37 fill.

38  
39 MR PAUL: Sure.

40  
41 CHAIRPERSON: We'll adjourn in a moment. But can I just  
42 remind all of the experts that you are still under  
43 cross-examination. That means - and I'll repeat what  
44 I said before lunch - that means that you are not to speak  
45 to anyone at the organisation that retained you to prepare  
46 your report and give evidence, and you're also not to speak  
47 to the legal representatives acting for those

1 organisations.

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