MS PRICE: I would like to call Mr Alexander to the stand.

<GAVIN ALEXANDER, sworn [9.48 am]
<EXAMINATION BY MS PRICE [9.49 pm]
MS PRICE: Mr Alexander, before I lead you on a couple 5 of issues, could you please provide your corrections to your evidence to the Board please?
MR ALEXANDER: Yes, shall I start with an introduction of my involvement on this project?
10
MS PRICE: Yes, certainly.
MR ALEXANDER: Yes. My involvement commenced in earnest in March 2006 when I conducted a site inspection with MRP representatives to
15 scope out the geotechnical investigations. That led onto field investigations and laboratory investigations and assessments which are described in my geotechnical report of July 2006 which is contained as appendix 1 to my evidence.
20 **[9.50 am]**
I provided further support to the design team through 2006 and into 2007 as the earlier designs were developed and this year I have participated in the evolution of the design over the last few months,
25 working with Mr James and others and conducted a very detailed inspection of the site over three days in June with Mr Vaughan. And from what I have learned about the site over those – the three years or more of my involvement, I am quite confident that the geotechnical constraints have been identified and can be addressed with fairly
30 regular standard engineering approaches.
So, there are several corrections to my statements of evidence which I will just take you through. Firstly in my rebuttal evidence, which is my first statement, in paragraph 24 the phrase "active faults" should read
35 "earthquakes".
Paragraph 33, the reference to appendix 4 should read "appendix 3". In paragraph 43, similarly the reference to appendix 4 should read "appendix 3".
40
In paragraph 46, the reference to paragraph 26 and 27 should be to 39 and 40.
In my supplementary evidence, dealing with the section 42A report,
45 paragraph 11, the reference should be to appendix D of Mr James' evidence, not to E – so that is paragraph 11 of my supplementary.

I would like to draw the Board's attention to several of the maps in the folio of maps that was presented yesterday. Three of those relate to the geotechnical aspects of the project, and they show the current layout of the wind farm overlaid with, firstly on map 14, "Geotechnical Investigation Locations" which actually 5 form also appendix 2 to my initial statement, although my initial statement reflects an earlier, not quite current layout of the project.
MR .....: Sorry, sir, how did you go back – I am not sure which pile you are
10 in.
MR ALEXANDER: There was a folio of maps that were - - -
MR .....: The big coloured ones?
15

fine grained material. So the spoil site contains 0.5 of a million cubic metres of soil, and 0.6 of a million cubic metres approximately of 15 weathered rock.
So there has been a lot of talk about the fine-grain nature of the spoil – less than half of it is expected to be fine-grained; the other half will be coarser material, so less likely to generate sediment. Does that answer 20 your question?
MS PRICE: The final part of my question was whether that was sufficient to deal with the sensitive areas in within the Turitea water catchment.
25 MR ALEXANDER: From that assessment of quantities, there is more than enough weathered rock material. In fact there is twice as much weathered rock material expected on this project than is required for structural fills. So, yes, it is.
30 In the sensitive catchments it will be quite feasible to construct those fills from the weathered rock. In fact in – I think it is – let me just check the clause – paragraph 42 of my initial statement I address the critical areas and fill source for those in particular. I will just read that out for you, if you like.
35
"The standards of material selection, and hence margins against slope instability for fill in critical areas" – and I give an example – "the direct catchment of the lower Turitea Reservoir would be higher. This will be achieved by constructing these fills entirely from selected greywacke 40 rock fill, won from the lower parts of deeper cuts".
MS PRICE: Thank you. Yesterday you also heard Commissioner Hudson questioning Mr James on the erodible gullies. Please explain for the layperson how these are created and whether they are an issue for 45 engineered fills.

MR ALEXANDER: These gullies are formed from the runoff of surface flows eroding the weaker soils, and until preferential drainage paths are formed.
5 **[10.00 am]**
They are more likely to develop, as we see, in the northern parts of the site where we expect deeper or thicker layers of soils rather than rock. So rock is a little deeper. They do, they can be engineered to place 10 spills over them, simply by cleaning out and perhaps installing sub surface drainage. Does that answer the question?
MS PRICE: I think so, thank you. And finally, you also heard Commissioner Hudson questioning Mr James about the merits of 15 aggregating smaller fill sites into fewer larger sites over the project area. Could you please give your views as a geotech engineer on this idea from Commissioner Hudson and if you are able to show us options on the maps, that would be great.
20 MR ALEXANDER: Okay. It is certainly - it is practical to aggregate the spoil disposals into fewer and perhaps even one, but there are a number of issues to be considered of course, I will just deal with the geotechnical issues which really relate to stability, making sure these things remain stable. And the other, I guess associated issue, is the 25 sediment which is generated from rainfall runoff from these spoil disposal sites, while they are active.
The larger these are, the greater the surface area unless they are developed in zones and closed, and revegetated in zones. The

accommodate more material than is currently proposed. And I am a
30 civil engineer as well, and as with Mr James we try to spread these things out across the site to reduce the haulage costs and the haulage effects. So in, to my mind, it would be worth keeping several of the sites currently proposed on Bryant Hill, just to save hauling that material all the way back and so the sites D5, 6, and 7 up on the crest to
35 my thinking, they would be the ones worth keeping.
So there is quite a lot of other smaller ones. If this approach was to be taken it could be eliminated.
40 MS PRICE: Thank you, Mr Alexander. You are available for crossexamination.
HER HONOUR: Yes, Mr Reardon?

<CROSS-EXAMINATION BY MR REARDON [10.06 am]

MR REARDON: Thank you, ma'am. Now if I understand matters correctly, you really covered the same ground as a topic 5 as the previous witness, Mr Vaughan?
MR ALEXANDER: I have. But my involvement extends back to the beginning of Beca's involvement on this project, so the beginning of
10 the design process.
MR REARDON: I don't propose to go over the same exact topics. But you will have read the report of the section 42 reporter, Mr Mark-Brown, in this area?
15
MR ALEXANDER: Yes, I have.
MR REARDON: And would it be fair to say I think that he was quite critical of the conclusions that MRP had drawn about silt content in the
20 earthworks?
MR ALEXANDER: He did come do a different conclusion than our initial assessment by Mr Levy, yes.
25 MR REARDON: Have you got a copy of that report with you?
MR ALEXANDER: No, I don't believe I have.
MR REARDON: Perhaps the Board could have a look as well. It is Mr Mark
30 Mark Brown's report in section 42A bundle, and in particular I want to take you to section 8. Now section 8 is headed "Review and Evaluation of Information on the Nature of Superficial Soils", an adjective I haven't come across before, but -. In the opening sentence there is "as erosion of earthworks is an important aspect of this review" he then
35 goes on to test some of the samples that were taken, doesn't he?
MR ALEXANDER: Yes, he does.
MR REARDON: And in the bottom paragraph of that page 7, first page of
40 section 8, he notes that there is a discrepancy between the test log description which notes silt trace of clay and the actual clay content which he notes as being 39 percent. Do you see that?
MR ALEXANDER: Yes.
45

MR REARDON: And he says, "this is in my opinion a significant proportion and not a trace".
MR ALEXANDER: And I would agree with that.
5
MR REARDON: And then on the next page, the first paragraph, he comes to the conclusion that a clay content of 25 percent is more than minor.

an earthworks volumes estimate and a topographical map attached.
Were you given that?
15
MR ALEXANDER: That is not attached to the copy that I have.
HER HONOUR: No, I do not have it either I am afraid.
20 MR REARDON: It was, in fact, the same document I put to Mr James yesterday, ma'am. It is called Turitea Preliminary Earthwork Volumes.
HER HONOUR: Yes.
25 MR REARDON: And there was a topographical map which showed the area - not the areas but the road numbers - roads 1,000, 2,000, 3,000, 4,000 up to 6,000.
HER HONOUR: Yes, thank you. Sorry, we are buried.
30
[10.15 am]
MR REARDON: What I am handing out to the Board there is the same summary but I have done some handwriting on the right hand column
35 just to estimate the percentage of topsoil to rock, which is simply the mathematics you do when you compare the topsoil column with the cut column.
HER HONOUR: And this is what you read out yesterday?
40
MR REARDON: Yes. I put this to Mr James yesterday, yes.
Now, are you familiar with the description in the left hand column of roads 1,000, 2,000, 3,000, 4,000 and so forth referred to on the map?
45

MR ALEXANDER: I am not familiar with which part of the site each of those road numbers refers to.
MR REARDON: Have 5 you been provided with that map?
MR ALEXANDER: No, I do not have that map.
MR REARDON: You will see from the topographical map shown to you that
10 Beca has divided sections of the road up by different numbers.
MR ALEXANDER: Yes.
MR REARDON: And that road 1,000, for example, runs from the Pahiatua
15 Track along the northern side of the reserve and road 2,000 from Pahiatua Track along the main ridgeline - - -
MR ALEXANDER: Yes.
20 MR REARDON: - - - heading south and so forth and then you get around to road 6,000 at the end, which covers Love Ridge and what is sometimes called Western Ridge or Game Ridge or the road that intrudes into the middle of the forest.
25 MR ALEXANDER: Yes.
MR REARDON: So those definitions are related to the preliminary earthworks volumes that you are looking at and it is that map and this preliminary earthworks volumes that was shown by Beca to Mr Mark-
30 Brown.
MR ALEXANDER: Yes.
MR REARDON: And is part of his evidence. What I have done in the right
35 hand column is, and I am just asking you to confirm that my maths are roughly correct, is to show that the topsoil as a percentage of the total cut, is 24 percent in relation to the road - I am sorry, is 14 percent in relation to the road 1,000 section and 27 percent in relation to road 2,000, 15 percent in relation to road 3,000, 18 percent in relation to

that is with a site which is fully cleared in one step, here we have a rolling operation from my experience on this kind of project.
MR REARDON: Yes, thank you.
5
HER HONOUR: Yes, Mr Low?
MR LOW: Mr Alexander, in paragraph 55 of your rebuttal you dispute Dr Palmer's inference **(ph 10.22.22) - - -**
10
HER HONOUR: I am sorry.
MS PRICE: Your Honour, I let it go yesterday but I just thought I would draw your attention to the fact that this party has not put in a cross15 examination notice for this witness, as they had not for Mr Parsons yesterday.
HER HONOUR: Oh, I am sorry, I did not realise that. Did you do this, Mr Low?
20
MR LOW: I am sorry, I did not hear what was said at that point.
HER HONOUR: That you have not put in a cross-examination registration, if you like, for this witness.
25
MR LOW: For Mr Alexander? I believe I have if you look at the - - -
HER HONOUR: You have. Ms Price, he has. Is there an earlier version, a younger version?
30
This is an original of 29 June put in by Mr McClelland, Mr Low, when did you put in yours?
MR LOW: I am going on the current timetable, ma'am.
35
HER HONOUR: I am sorry, there seems to have been a mistake, Mr Low. Mr McLelland's notice I think probably has more traction, I regret that.
MR LOW: Thank you.
40
HER HONOUR: Thank you. Mr Johnson?
MR JOHNSON: No.
45 HER HONOUR: Any re-examination?

MS PRICE: No, thank you, ma'am.
HER HONOUR: Thank you. Mr Heerdegen?
MR HEERDEGEN: Yes, I have got some questions. M 5 r Alexander, in part of your reply you did some ballpark figures where you suggested that the total cut was about 1.7 million cubic metres. And I am not sure whether I wrote them down correctly but you then subsequently said that could be divided into 0.5 million cubic metres of fill, 1.1 million of 10 spoil and 0.5 of soil, are those numbers correct, because according to my addition that adds up to more 1.7?
[10.25 am]
15 MR ALEXANDER: The spoil, of the 1.7, 0.5 goes directly into fill, the structural fills around the site leaving 1.2. Of that 1.2 and I will just put topsoil to one side for the moment because that will be essentially lost or spread over the structural fills I expect rather than being buried in the spoil sites. 1.7 total cut, .5 of that is fill, so there is 1.2 left essentially 20 to go into the spoil sites and I have rounded Mr James' figures to the

20 production or for roading and I would expect them to be, certainly the concrete materials would be stockpiled by the batching plant and roading aggregate, if it was brought in ahead of time, would be stockpiled in some clean lay down area so as not to contaminate the lower part of those materials with soils.
25
[10.30 am]
MR HEERDEGEN: So part of your reply suggested that lay down areas and perhaps even parts of the turbine site and so forth may well be utilised
30 in a temporary fashion as stockpile areas, is that correct?
MR ALEXANDER: That is possible if it was to be allowed under the consents, yes.
35 MR HEERDEGEN: Right. And the other thing is, in terms of the process of construction of roads like this in a site like this, do we see this as being, if you like, a little bit like a creeping worm or whatever, sort of going down the place and it is all contained within a relatively short space, or is this something where, you know, long lengths of road have one
40 process done to them and then another process is applied and then another?
MR ALEXANDER: I expect it to be a linear process. Of course, the main access road through from Pahiatua Track needs to be built to allow
45 access to the western end of the project. And then, off that, my observation of wind farms, and I have not been directly involved in a

construction of one from beginning to end, is that the construction will follow along fairly quickly.
The civil works are quite a large proportion of the cost of a wind farm and so the intention is to get these things 5 built and partially commissioned as quickly as possible. So you have this linear advancement of the main access road and then development progressively from one end to the other of the – you know, erection of the turbines and commissioning of those in a staged process. But it is
10 not a matter of building all the turbines incrementally and then suddenly having them all finished at the same time.
MR HEERDEGEN: Sure. So, in effect, if these lay down pads and turbine sites were to be used as temporary spoil areas, then these are going to
15 be constructed – would have to be constructed at the same time probably as the road, would that be correct?
MR ALEXANDER: I would expect that. I would be surprised at the erection platforms - the turbine erection platforms will be used for anything
20 other than short term stockpiling of imported aggregate material, for example, because a good surface is needed on those for construction and most contractors, by the time they get to their finished construction surface, do not want to damage it or get it dirty.
25 MR HEERDEGEN: I understand. Right, that is all. Thank you very much.
HER HONOUR: Mr Bunting?
MR BUNTING: Now, construction is something I am quite interested in. Has
30 the design team actually sat down and worked through what construction options might be available to a contractor in identifying what critical items there might be from an environmental impact perspective that then may be taken forward into conditions of consent? And I realise that the contractor will want to have their own
35 methodology to do this work but there may be critical things that should

have just one but to go, based on the topography, the sites that I identified - I have put a little bit of thought into that - and so that is perhaps half a dozen sites around the project area, I think would be a
40 good – that would be my preference.
MR HUDSON: And that is in terms of effects overall, from your expertise?
MR ALEXANDER: Yes.
45
MR HUDSON: Thank you.

HER HONOUR: Mr Shenton?
No, I have no questions, thank you very much.