

CORRECTED VERSION

SELECT COMMITTEE ON PUBLIC LAND DEVELOPMENT

Port Campbell — 7 November 2007

Members

Mr D. Davis

Mr P. Hall

Mr P. Kavanagh

Mr E. O'Donohue

Ms S. Pennicuik

Mr B. Tee

Mr E. Thornley

Chair: Mr D. Davis

Deputy Chair: Mr B. Tee

Staff

Secretary: Mr R. Willis

Research Officer: Ms C. Williams

Witnesses

Mr R. Brown, Sahara J. Enterprises.

The CHAIR — Russell Brown, I understand that Edward Manifold will also be joining you; is that correct?

Mr BROWN — He will be assisting, yes.

The CHAIR — Russell, would you like to begin your evidence, give us a short précis, and then we will ask some questions?

Mr BROWN — Fine. Thank you for inviting me to appear in front of the committee today. I am glad to see that you are actually considering the geological and geotechnical issues in this area. It is very sensitive environmentally. I appreciate your invitation to appear before the committee.

I have had a long involvement with this area. I have worked for VicRoads for 35 years. I was involved with assessment of the Great Ocean Road for stability following the collapse of London Bridge. In that capacity I carried out a number of investigations along the road within the limestone zones some 10 kilometres to the west and also here at Port Campbell. In that investigation I carried out geotechnical investigations. We looked at several techniques for mapping of caverns and underground structures. I have also been involved extensively doing work for Parks Victoria around the area, including Loch Ard Gorge. I have assessed the stability of most of the viewing platforms between Warrnambool and Princetown. I have had a long involvement with the structural and the stability issues around this sort of coastal environment. In relation to the concerns that a lot of the locals have about the stability of the headland, I have studied those caverns, I have mapped them, I have gone into them and I have measured them.

We have drilled to try to determine the extent of some of the other ones. Overall the evidence is that the coastline through this area is very fragile and dynamic and it is very difficult to put time lines on the rate of regression of the coastline. The embayment that you see at Port Campbell is as a result of erosion, followed by cave formation, followed by collapse — and then the erosion cycle commences all over again. The studies that I have done indicate that throughout the area between Warrnambool, Princetown, and possibly as far north as Cobden, the whole area is dissected by what we call lineations. A lineation is basically a zonal weakness that runs through the ground; it is essentially a fissure or crack or join in the rock mass.

Overheads shown.

Mr BROWN — The concentration of groundwater seepage through those lineations is actually what is causing these sorts of coastal formations, like the caverns or like the Twelve Apostles. You can see in that photo up there the highly serrated coastline. Most of the serrations are aligned in a north-west orientation. That is essentially the major lineation direction. The second lineation runs in a south-east direction, so you end up with almost a plainer coastline but with a whole lot of serrations — saw tooth-type impressions — in it. As to the point that is in question, we have mapped four caves in either a north-west or south-east direction, which is consistent with what we have discovered elsewhere. From the study that I did for VicRoads back in 1992 after London Bridge went down, the area out near the Grotto — which is about 10 kilometres?

Mr MANIFOLD — About eight?

Mr BROWN — Something like 10 kilometres to the west, the information that we gained from that was that there was a high risk of immediate collapse of the Great Ocean Road. The recommendation there was to move the road inland, which was the only option. But I think the road at that location was something like 5 metres off the edge of a cliff. The cliffs are 60 metres high vertical, with a big cave underneath.

In the report that I submitted through to my manager, which went through the CEO of VicRoads to the government, essentially the recommendation was to move it as soon as possible. That area there is national park; I was informed that it would take a couple of years to get an act of Parliament through to build a road on national park et cetera. They started building the road within three months; they had it moved within six months. That section of the road is actually now collapsed. The remnants of what used to be the road have essentially been washed away, so there is no sign that there used to be a road there.

I guess the point really is that with a cliff collapse, or a cave collapse, around this area you will end up with essentially vertical sides to the collapse. The joint sets that dissect the area are essentially vertical. We have a whole lot of subsets at various angles. The major joints along the coast are about 100 metres apart. The formation of the

caves was essentially from groundwater seepage, which softens the material and the sea basically just eats it away. Any disruption to groundwater flow will accelerate groundwater seepage in particular zones — we do not really know where; we do not know how much.

One of the difficulties we had when we were doing mapping was that there was no definitive technique to map lineations. We tried drilling lots of bore holes. I did some work for Parks at Loch Ard Gorge. We drilled something like 75 bore holes to try to find what we knew was there. What we were looking for was the second part of the blow hole. There is the blow hole on one side of the road, and there was something else on the other which we knew was there but could not find. In the meantime, buses were parked over the middle section. When we did find what we were looking for, the road was about 5 metres above the top of the cavern. The road was closed that day. It is very, very difficult to find caverns and tunnels with a bore hole. We tried mapping with seismic and with ground-penetrating radar, but none of those sorts of techniques worked.

I think one of you gentlemen asked a question about a geotechnical survey for this development. It is difficult to define or delineate an area that you cannot see. It is easy to drill a bore hole to investigate a particular point in space, but it is very difficult if you do not know where that point really is. Trying to find a crack in the ground is very difficult; you could miss it by 20 millimetres and you would not know. I think the lineations that we have mapped, whether they are based on the joints in the cliff face — when we went down to the pier you could see a nice, straight line along the edge of the bay. One of the lineations is running in that particular north-west direction. You can see the cracks in the cliff face. There is a whole series of micro-fissures, which are generally at right angles to one another.

One of the reasons you get the nice, plain surfaces is that when the groundwater seepage weakens the material at the cliff base level, the waves wash it away until it gets to the next joint, and then the cliff face just peels off. That can be very sudden. That is really the major reason, that VicRoads relocated the Great Ocean road. It was moved well and truly away from the area because it was not viable to move it just 40 metres or 50 metres. For a start, then it would have gone through the war memorial, which was not acceptable; it would have taken out part of the motel, which was not acceptable; it would have wiped out the fishermen's car park, which was not acceptable.

Back in the early 1990s we were working on a soft bridging technique, which is basically supporting the road but without building a concrete structure. Because that was a temporary measure, in the end VicRoads took the option of moving it down through one of the main streets in the town. That was because of uncertainty and the risk that was associated with that particular part of Port Campbell. It is very highly susceptible to a sudden collapse. A collapse would generally be brought about by wave action, which causes a compression of air at the back of a cave, which basically blows out the side of a cliff.

The vibration can sort of trigger something like that. Remember we have got vertical joints. If you have got a cave with vertical joints on the walls, the roof will fall in. You cannot support a large cavern if it has got those sort of vertical-joint sets and that is why you have got that serrated coast, because those joints are going to be vertical. During the period when we were looking at the Great Ocean Road there were various options put up; including — I think in one case — a suggestion to fill in the caves, which is just to fill them up with concrete. Environmentally? You could certainly do it, but it is not exactly what I think we, as environmental managers, like to think we would do. But also, as Dr Manifold pointed out, if you fill up something like that, you try to block a seepage path, you will get seepage around it. Again, it is going to be a short-term solution anyway.

I think the opinions that I have presented to VCAT based on what was studied, what investigations I carried out whilst at VicRoads — generally supported by other expert witnesses, other expert people in that field — show that the rate of erosion is fairly well defined on an average scale. One of the questions at VCAT was in relation to the average rate of cliff recession being 2 centimetres a year, and whether it was a problem. If the average coastline is moving back at 2 centimetres a year, why are we concerned about this particular site? I guess the answer to that is if this major coast collapsed, it suddenly moves 45 metres in one hit.

The rate of cliff recession is very difficult to determine. I think the figures that had been presented by Dr Bird in his text — I think Dr Manifold presented some schematic diagrams of how the cliffs sort of move — were based on the average over about a 6000-year period. What we are trying to do is to find a much more finite time. The difficulty really is to come up with a solution that is going to minimise risk, minimise the risk to the public, minimise risk of whatever is done exasperate the rate of erosion and hence cliff collapse.

One of the things that is probably unique in this particular headland is the fact that there are four caverns, not just one, that we are talking about. If you recall the slide that Dr Manifold put up showing the shaded areas all sort of pointing into about the middle of the car park: the focus in fact is about the middle of the car park. I do not really know why that is the case, but that is the intersection of lineations. We have got a major source of groundwater seepage within this area.

The CHAIR — I think we know where you mean.

Mr BROWN — The major groundwater flow within this area is very sensitive to change; I suppose the impact of changing that groundwater can be very significant. The cliffs there are 24 metres high. A sudden collapse of that major cavern is significant. In fact, I mentioned that I was doing some work looking at the stability of viewing platforms for parks. There is a viewing platform on the headland there that had to be suddenly moved back because half of it fell away within the last two years. Again, that illustrates how fragile that sort of environment is.

We cannot control nature. We are kidding ourselves if we think that we can. I guess the geomorphology of this area is fairly well something that is going to happen regardless of what we do. We certainly do not want to be accelerating what is going to happen. The collapse of the Twelve Apostles recently is a natural process. This will end up forming several other little apostles. London Bridge was another example where the land bridge collapsed, which left an island, which is also dissected with a large cavern running through the middle of it. It is a natural process. We cannot really define or control that, I suppose.

The CHAIR — If I could perhaps just jump in there and ask some questions, and give people an opportunity to do so, and I will be brief because I am conscious that we are a little bit behind time. It seems to me the essence of the issue is that what you have said in your reports, and what I am inviting you to say succinctly now before this hearing, is that the proposed development does not appear to meet the standards of safety that you think are the ones that should be laid out?

Mr BROWN — From what I have seen of the geotechnical assessment which the developers put up, that is really looking at the issue of constructability of the development. I think the issue of impact on the headland was not even considered.

The CHAIR — Was not examined?

Mr BROWN — Was not something that the developer wants to.

The CHAIR — Should the department have insisted on an examination of that potential impact of the development on the public land?

Mr BROWN — Absolutely, because a development of that scale will have an impact, whether it is construction of the underground car parks — Dr Manifold talked about 10-metre excavations — if you dig a big hole, that is really almost down to, not quite but almost down to, water level; if you put in foundations for the structure you have got to drill down below that level; so you are digging holes, you are diverting water around the site. You may well drain the whole area. As an engineer you may want drainage around the car park so that you could pump the area dry. That is also going to have an effect, if you dry out the area. As you would be aware, if something dries out, it tends to shrink, and so does soil. If it shrinks, it opens up the cracks further, so that the next lot of — —

The CHAIR — It is hard to predict the impacts.

Mr BROWN — That is right. So you get a sort of cycle occurring.

Mr TEE — Thanks for that. I am just conscious of our time as well. You gave evidence about the fact that you were involved with the VCAT decisions. I am just trying to get a handle on the process that it has initiated in relation to the survey of the area. In its decision it talked about — I will just read it to you:

Prior to any development commencing a further detailed geotechnical assessment shall be undertaken on the site in accordance with and based on the initial findings and recommendations made by Provincial Geotechnical Pty Ltd in their report dated 2002.

I was wondering — —

Mr BROWN — They refer to Provincial Geotechnical, which, as I think Dr Manifold said, drilled a few bore holes to 2 metres. That is the geotechnical investigation required to build a building. It is certainly not a geotechnical assessment of impacts off-site. Provincial Geotechnical is basically a geotechnical company which was being used to design the foundations.

Mr TEE — I suppose, coming back to the Chair's proposition in terms of what DSE should have asked be done, what is being done is consistent with what VCAT has asked — and that is, you have a look at the area where the development is occurring rather than the greater area?

Mr BROWN — That is certainly my understanding of VCAT's recommendation for the geotechnical assessment. It is looking at the development, and that is it. As I discussed with the panel, it is very easy to carry out an investigation to solve problem within the footprint of a building. You may put down deeper foundations, but that is not necessarily looking at the outside impact. I think they were sort of concentrating on the impact of the caverns on the development, not the other way around.

The CHAIR — The development on the caverns?

Mr BROWN — The impacts of the development on the environment and the stability of the caverns.

Mr O'DONOHUE — Just to follow on from that, so even once the VCAT conditions have been complied with, we still will not have that analysis that you require?

Mr BROWN — I would agree that that is a situation, because my understanding of the VCAT direction was to carry out a geotechnical investigation, because you have to admit that one or two small bore holes on a larger development is not a geotechnical investigation; it is a preliminary study. A proper geotechnical investigation would probably be drilling for each one of the foundations of the columns for the structure or on a bigger scale. It is certainly not looking at a detailed impact.

Mr TEE — Where we get to, then, is that VCAT wants essentially to look at the impact the hotel will have — essentially whether the hotel is safe — rather than wanting to have a look at whether or not the rest of the coast may or may not collapse?

Mr BROWN — Yes.

The CHAIR — Or may be impacted by the development?

Mr BROWN — I think you have probably hit the key word. It is whether or not the hotel is safe, not anything else.

Ms PENNICUIK — I just return to my earlier question that I asked Dr Manifold, which was the impact of the development on the adjoining headland. If you are going to put a development of four stories on the scale that has been described and the amount of concrete involved et cetera, would that excavation and everything that is required there be impacting on the headland?

Mr BROWN — I think I mentioned one of the factors that can actually cause a collapse of a cliff face. Bearing in mind that the cliffs themselves are very high, they are basically vertical. At this location they are 24 metres high, crisscrossed with a whole lot of joints that are also generally vertical. You could get some substantial vibration. Yes, you could have the outer edge of the cliff falling out, or, in the worst case, the caverns collapsing. Those joints run from water level up to ground surface, apart from about the upper half a metre or metre of clay that is running over the top. Yes, you get heavy construction, and you will get considerable vibration which could actually cause or accelerate the failure. The scale of the development, the large excavation, the diversion of groundwater flow around that area, will have an impact.

Ms PENNICUIK — I am particularly interested in the diversion of groundwater flow from that excavation, down towards the headlands. I looked at those shadows; there is already undermining of the structure there, so that could exacerbate it.

Mr BROWN — That is the opinion of me and several other experts in the area. It is very difficult to measure. As I said before, we drilled 70-odd bore holes around Loch Ard Gorge to try to find these things and

could not. We know they are there because we can sometimes see them on the cliff face, but back from the cliff faces it is a bit hard to say. The concentration of those sorts of caverns in that area is certainly significant.

Ms PENNICUIK — Just looking at those shadows, you would have to say that does not look like a stable headland with that concentration of caverns.

Mr BROWN — No, that is correct. It is a very dynamic environment. In fact you can see on the bottom right-hand side of the screen, Beacon Steps, which is cut into the cliff face there. That area is also one of the lineations that dissect that area. These steps would have been cut down one of those joints. The whole coastline is very unstable.

Ms PENNICUIK — Mr Brown, I do understand that the whole coastline is very unstable. If we only look at the evidence of our own eyes, the way the coastline looks with the sheer drops all the way along there, and our own evidence of falls just recently, this is obviously a phenomenon of the area.

Mr BROWN — That is right. When I was doing the initial work back in 1992 there was a section of the coast a bit to the east of Port Campbell. My estimate was that about a 200-metre section of the cliff just peeled off on a 60-metre cliff. That is a very significant fall. It may not do anything for another few years, but a 5-metre regression is a big amount. So yes, it is very unstable.

Ms PENNICUIK — I have one more question, following on. If we look at those shaded areas, I was listening to you before saying that you cannot necessarily pinpoint where trouble spots are. I would assume that the action of the groundwater on this headland does not stop at that car park but goes further back towards the township of Port Campbell?

Mr BROWN — You are quite right. I mentioned before the blowhole on Loch Ard Gorge. You have this big open chasm with a tunnel to the ocean. There were indications that there was a second part of that, so we went looking for it on behalf of Parks. About 60-odd bore holes later we eventually found it. It was just on the edge of the road. That was a second cavern that is beneath the ground, a subterranean cavern that extends probably twice the size of the current blowhole. It is a very, very big structure. So yes, there is a possibility there could be something like that up the hill.

Mr KAVANAGH — Apart from possible damage during construction, you are not able to estimate any time period for the collapse?

Mr BROWN — I think that is sort of the proverbial 'how long is a piece of string?'. It is extremely difficult to ascertain something like that. Back in 1990 we were looking at employing the CSIRO to do a computer model to work out whether in fact the ocean road is going to be safe to leave there. They could not do it. With all their computer modelling skills, it was not possible, because there are so many unknowns. We do not really know where the joints go, how wide they are — —

Mr KAVANAGH — But when it does happen you expect it to be in the car park, did you say; is that right?

Mr BROWN — Sorry?

Mr KAVANAGH — You expect the fault line to be in the car-park area; is that right?

Mr BROWN — When I did that mapping, the cavern went as shown on that shaded line. What is not possible to determine — in fact at that point I think the back of the cave went underwater, and I was not carrying a snorkel. It is very difficult to actually say with certainty. I suppose the experience that we got, looking at the blowhole, is that there is not just going to be one; there are likely to be more. The blowhole was formed initially from a seepage zone probably 200 metres away from the ocean that suddenly collapsed. It was not due to wave action; it all just fell in.

Mr KAVANAGH — Are you aware of any other expert opinion that disagrees with your assessment of the situation?

Mr BROWN — The only one I am aware of is the report that the developer commissioned through Golders, geotechnical consultants. I actually answered their report in my later submission to VCAT. Most of the points that they made were in error.

Mr THORNLEY — I just want to make sure I understand the challenge here. It seems to me that even if we forget the development for a second, it sounds like there is an issue of public safety around this peninsula right now.

Mr BROWN — Yes, which is the reason we moved the Great Ocean Road —

Mr THORNLEY — And I certainly understand the concern, if there is an issue of public safety already, why you would be concerned about the development's potential impact on accelerating the groundwater — I get all that. We seem to have led into this whole discussion; indeed this whole committee has been brought into this issue kind of laterally in a sense. We are here to assess the alienation of four car parks, which is not the main game from what I am seeing, in terms of the public safety issue. If we had not all been brought into this issue through the particular path that we have, which agency would be the right agency to make the safety decision? Who has got the expertise to make that decision?

Mr BROWN — That is a fairly difficult question at this point in time, because within the state government over the last 15 years there is sort of degradation of geotechnical capability generally. I think VicRoads is probably the last of the organisations that had geotechnical ability. In fact that is the reason why I was brought in to make stability assessments after Thredbo in all the alpine resort areas, because there was not anyone else within the government that they could turn to. VicRoads was the only one with geotechnical capability. I suppose, if you go through them, DSE and Parks have not got anything that they could use. DPI used to have some sort of ability, but I am not sure whether they have any more.

Mr THORNLEY — It feels to me that VCAT making a planning decision is really not the place where we should be looking at a core public safety issue. It seems to me if the land is owned, or stewardship is in the hands of the council, then as the owner or controller of the land they have a public safety issue they need to address immediately, and they need to find the expertise, assuming they do not have it, which presumably they do not. The closest we have got to that expertise is maybe VicRoads and people such as yourself who were formerly in that organisation.

Mr BROWN — If you recall, I did all the stability assessments for Parks back in 2003 right through from Warrnambool to Princetown, because there was not anyone else they could get to do it. I do not think I can answer that question apart from the geotechnical section of VicRoads, and that is basically about to fold up anyway.

The CHAIR — Can I thank you, Mr Brown, for your contribution. It has been very interesting indeed. Thank you for the background material we have received too.

Mr BROWN — My pleasure.

Witnesses withdrew.