

**BOARD OF INQUIRY
TE MIHI GEOTHERMAL POWER STATION PROPOSAL**

In the Matter of the Resource Management Act 1991

And

In the matter of resource consent applications by Contact Energy Limited in
respect of the Te Mihi Geothermal Power Station Proposal

REBUTTAL EVIDENCE OF BRETT HARRIES

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INTRODUCTION

1. My name is Brett Harries. Details of my qualifications and experience are given in my Brief of Evidence in Chief, which was filed with the Board of Inquiry and circulated to the parties.
2. This Rebuttal Evidence addresses traffic engineering matters that have been raised in the Statement of Evidence of Robert Clive Swears, called by Transit New Zealand, dated 23 June 2008; and in the memorandum of Gabites Porter attached to the Brief of Evidence of Gemma Frances Platts on behalf of Taupo District Council dated 20 June 2008.
3. I confirm the comments from my Brief of Evidence in Chief about the Code of Conduct for Expert Witnesses.

ROAD SAFETY

4. In his paragraphs 28 and 29, Mr Swears refers to the crash history at the intersection as recorded by Land Transport New Zealand. The number of crashes he identifies at the Poihipi Road / SH1 Intersection differs from the total referred to in Paragraph 81 of my Evidence in Chief. It appears that the difference arises as a consequence of the time difference between the searches undertaken for my evidence, and as undertaken for Mr Swears evidence; and possibly a slightly different interpretation of how proximate to the intersection a crash has to be to be considered an intersection crash. Having reviewed the latest crash data, I am happy to accept Mr Swears' assessment of crashes as contained in his Paragraph 29.
5. However, I maintain my position in my Evidence in Chief that the existing layout of the intersection makes it difficult for motorists turning right out of Poihipi Road to see and judge the speed and position of oncoming northbound traffic, and that this has contributed significantly to the dominance of right-turn crashes.

TYPICAL INJURY CRASH RATES

6. In his paragraphs 34 to 38, Mr Swears refers to the higher than "typical injury crash rate for a priority-T high speed intersection". What Mr Spears is comparing however, is a standard T-intersection involving a side road connection to a normal two-lane highway. In this case however, we have a side

road with two approach lanes that connects to a four-laned highway with a non-standard lane arrangement. In my view therefore, it is misleading to compare the typical crash rate of the former, with what occurs at the latter.

7. In any event, and as I have described in my Evidence in Chief, it is possible to improve the safety of the existing intersection layout by enhancing its geometry as has now been agreed with Transit New Zealand.

TRIP GENERATION

8. In his paragraphs 42 to 55, Mr Swears criticises my trip generation calculations on the basis of his view that:

- (i) concrete truck delivery numbers have been underestimated;
- (ii) average vehicle occupancy assumptions 'appear to be optimistic'; and
- (iii) use of the Huka Falls Resort for temporary accommodation by construction staff "may be contrary to the conditions of consent for the Resort".

9. With regards concrete truck deliveries, I refer to the Rebuttal Evidence of Mr Pummer who confirms that there are 17 concrete trucks in the district that have capacities of 6.4 m³, all of which belong to the same company and can be used as required; and that there are additional 6.4 m³ (and potentially 9.6 m³) trucks in other centres that can also be used as required. In this regard I note that given the size of the concrete pours that will be undertaken, it will be far more practical, efficient and economic for the Applicant to make use of fewer larger trucks for rapid concrete delivery. There will be no benefit in using the smaller 5m³ trucks as suggested by Mr Swears. I therefore confirm that the 6m³ average truck size that I have assumed in my analyses is appropriate.

10. With regards average vehicle occupancies, Mr Swears has assumed an average occupancy of 1.5 staff per vehicle, compared to my assumptions of 2.5 staff per vehicle. Mr Swears' adoption of 1.5 staff per vehicle stems from surveys he has undertaken at Pegasus Town (north of Christchurch), and Meridian Energy's Project West Wind at Makara (near Wellington).

11. There are however, several fundamental differences between the projects that Mr Swears has surveyed, and the Te Mihi project. These include:
 - (i) Access to both the Pegasus and Meridian Energy projects is 'unconstrained' in that there are no road network capacity restraints that provide any incentive for shared or group travel.
 - (ii) As far as I am able to determine, neither the Pegasus nor Meridian Energy projects are subject to a Construction Traffic Management Plan that includes travel demand measures (as is proposed for the Te Mihi project).
 - (iii) The Pegasus project involves a whole range of contractors (rather than a central contractor), which therefore makes coordination of travel particularly difficult.
 - (iv) The Pegasus project will have its primary labour force drawn predominantly from existing residents of Christchurch, and the Meridian Energy project will have its primary labour force drawn predominantly from existing permanent residents of Wellington. The Te Mihi project on the other hand, will have a significant proportion of its construction staff brought into the area from other centres. There will then be a much greater opportunity for coordinating shared and group travel to / from Te Mihi as a consequence of: grouped temporary accommodation of staff in and around Taupo town; the ability to more readily coordinate group travel from a smaller centre like Taupo town when compared to the wider Wellington and Christchurch metropolitan areas; and the inherently high demand for group travel that will occur for workers from outside centres such as Rotorua and Tokoroa.
12. The average occupancy I have adopted takes into account a mixture of travel modes including single occupancy private cars, shared travel in cars and light commercial vehicles, and organised travel by mini vans.
13. For all these reasons, I consider the 2.5 person average occupancy of vehicles for staff travel to be entirely appropriate in this case, although I do acknowledge that the proposed Construction Traffic Management Plan contributes an important input into this assumption.

14. With regards the use of Huka Falls Resort for temporary accommodation of staff, I listed that facility (in Paragraph 115 of my Evidence in Chief) along with other temporary accommodation locations such as Acacia Bay and Kinloch, as examples of locations where some construction staff from outside Taupo may wish to temporarily reside. These examples were provided as a consideration when assigning traffic to / from Te Mihi. I see no problem whatever in having staff temporarily located at Huka Falls Resort, and do not believe such accommodation is contrary to its resource consent Conditions 9A and 9B. I note in this regard that I was present at the hearing that gave rise to the Huka Falls Resort conditions of consent as referred to, and have a good understanding of those conditions and Council's reasoning for them.
15. In any event, this location for temporary accommodation of staff is, (as I have stated), a factor to be considered when assigning traffic. Mr Swears is not correct in stating (his Paragraph 56.3) that the Applicant proposes "to house construction workers at Huka Falls Resort...".
16. Mr Swears has also not considered other conservative assumptions that have gone into the trip generation assessments. These include:
 - (i) That large concrete pours will occur only occasionally, and hence the contribution of concrete truck traffic to peak hour flows on the road network will be similarly occasional.
 - (ii) That the traffic generated by on-site workers has been based on the expected number of full-time equivalent workers associated with the construction and commissioning of all three turbines by 2011. However, the now preferred construction sequence proposes only two turbines established by 2011, with the third to be established by 2016 after the ETA route has been opened in 2011. (Refer Paragraphs 104 and 109 of my Evidence in Chief, and the Evidence in Reply of Mr Bernd Pummer).
 - (iii) That all 400 on-site workers will arrive over a 1½ hour period between 7.00am and 8.30am, and depart over a 1 hour period between 5.00pm and 6.00pm. (Refer Paragraph 111(iii) of my Evidence in Chief). This is a particularly onerous assumption, especially in light of the travel demand provisions of the Construction Traffic Management Plan which will aim to temporarily divert arriving and departing construction related traffic away from these peak hours.

- (iv) That in projecting existing traffic flows to 2011 flow conditions, it has been assumed that an additional 380 new residential dwellings will be developed within the traffic catchment, (ie: 95 new dwellings per annum), whereas recent residential development has been only a fraction of this rate.
 - (v) That on top of the 380 new residential dwellings referred to above, an average traffic growth rate of 3% per annum has been assumed. This is almost 50% higher than the actual average growth rate since 1975 (on SH1 as recorded just north of Poihipi Road), of just 2.2% per annum.
 - (vi) That alternative routes to / from the Te Mihi site are available to relieve any peak effects that might occur, (for example, via Link Road).
17. The consequence of Mr Swears assumptions regarding construction traffic generation is an appreciably higher traffic demand through the SH1 / Poihipi intersection during the morning and evening peak hours, with demand flows that I consider to be beyond what might be considered reasonable during routine peak traffic operations. This then contributes to what I consider to be unrealistic assessments of future delays at the SH1 intersections with Poihipi Road and Norman Smith Street. I discuss this point in more detail later in my evidence.
18. Having considered Mr Swears' evidence, I remain of the view I expressed in my Evidence in Chief, and I disagree with his alternative assumptions for the reasons given above.

ANALYSIS OF SH1 / POIHIPI ROAD INTERSECTION

19. In his paragraphs 79 to 81, and Appendix C, Mr Swears criticises my analyses undertaken of the SH1 / Poihipi Road intersection by comparing the results obtained from the Paramics analysis as I have described, against the Opus results obtained from SIDRA analyses. I have two issues with the analyses that have been undertaken by Mr Swears, as follows:
- (i) His analyses have been undertaken using a programme called SIDRA, which is primarily an intersection design tool. However, SIDRA has several limitations. Firstly, it is not able to accurately model intersections with layouts such as exist at SH1 / Poihipi Road. In particular, it is limited in its ability to accurately model the two stages of the right turn

manoeuvre onto SH1 from Poihipi Road (ie the crossing of northbound traffic, followed by the merge manoeuvre into southbound traffic). This limitation creates a situation where the modelled queues and delays are prone to become substantially higher than occur in practise, especially (as in this case) when side road demands already experience delays.

Partly for this reason, I undertook analyses of the intersection using Paramics, which is a microscopic simulation software package that is considerably more sophisticated than SIDRA, and is better able to more accurately and reliably model intersections of the form as exists. Due to the fact that Paramics can appropriately deal with the right-turn merge manoeuvre, it does not generate unrealistic extrapolations of queues and delays when comparatively small increases in traffic demand are made.

Further, a function of SIDRA is that once it assesses an intersection to be 'at capacity', the outputs it provides in response to even very minor changes causes exponential (and unrealistic) changes in queues and delays.

- (ii) In modelling demands at the intersection, Mr Swears has assessed his higher (and I believe inflated) demand flows that result from his trip generation assumptions, as I have referred to earlier.
20. Having had the opportunity to review my intersection performance analyses against those provided by Mr Swears, I remain confident that the analyses as described in my Evidence in Chief, are reasonable and robust. Further, they confirm that with the mitigation measures proposed, (as per the layout in drawing 9118-5WI/14 Revision A dated 23 June 2008 as attached in Schedule One of the Conditions) the SH1 / Poihipi intersection will be able to accommodate the construction traffic demands with no more than minor adverse effects to the operation and safety of the intersection.

SH1 / NORMAN SMITH STREET INTERSECTION

21. In Paragraphs 77 and 78 of Mr Swears Evidence in Chief, and in the Gabites Porter memorandum attached as Appendix 2 to the Brief of Evidence of Gemma Frances Platts, reference is made to the effect of construction traffic on the SH1 / Norman Smith Street intersection (which is located about 750m to the south of Poihipi Road).

22. The concern of both Mr Swears and the Gabites Porter memorandum, is that the additional traffic flows on SH1 through the Norman Smith Street intersection will add to the side road delays at the intersection. This is an issue that was not directly addressed in my Evidence in Chief, but which I consider warrants further explanation.
23. I acknowledge that right turners out of Norman Smith Street currently do experience delays during the morning peak period. In terms of side-road connections to SH1, this intersection is probably the poorest performing in Taupo. By comparison to the performances of other urban intersections on SH1 up and down the country however, this intersection is barely remarkable in terms of the commuter peak hour delays that are experienced.
24. Further, and for all the reasons that apply in relation to Mr Swears analysis of the Poihipi intersection (ie: use of the less sophisticated SIDRA model for analysis, and the inflation of the trip generation inputs), his analysis of the before and after performance of the intersection has resulted in disproportionately high changes in performance in relation to the comparatively small addition of through traffic demands.
25. In my opinion, and for the reasons I have referred to above, I do not consider that the addition of Te Mihi Power Station construction traffic to SH1 flows through the Norman Smith Street intersection will have a significant impact on that intersection.

PROPOSED CONDITIONS OF CONSENT

26. In Paragraph 88 of his Evidence in Chief, Mr Swears recommends some conditions of consent that are intended to manage the construction traffic effects of the power station until such time that the ETA is opened.
27. While I acknowledge the intent of the conditions, my concern is that they are unnecessarily onerous, and have been developed on the basis of analyses that have in my view over-stated the impacts on the State Highway intersections. For example, the proposed condition described in Paragraph 88.2 of Mr Swears evidence, intends that all construction activities cease during public holidays and during large event weekends in Taupo. However, this is suggested without any factual basis for such restrictions, and ignores that the Construction Traffic Management Plan can be capable of responding to such occasions by

managing on-site activities and their associated construction traffic movements, to either minimise or avoid travel during these peak times, and/or to minimise or avoid the SH1 / Poihipi intersection by using alternative access roads such as Link Road.

28. I have read the modified 'Traffic Management Conditions' as contained in the Rebuttal Evidence of Stephen Daysh. In my view, his recommended conditions will enable all construction traffic effects to be managed appropriately and effectively. I therefore endorse the modifications to the conditions as described by Mr Daysh.

CONCLUSION

29. Having reviewed the evidence prepared by Mr Swears, and the Gabites Porter memorandum attached to the evidence Ms Platts, I remain confident that the analyses and conclusions that I have described in my Evidence in Chief are appropriate and valid.
30. I do not agree with the input assumptions and method of analysis that Mr Swears has used to assess the performances of the State highway intersections. I believe that his analyses have over-stated the implications of construction traffic on the intersections, and that this has subsequently lead to proposed conditions of consent that are unnecessarily onerous and restrictive.
31. For the reasons described earlier, I consider that the proposed conditions of consent as described by Mr Daysh to be more appropriate and acceptable, and I endorse those conditions.

Brett Harries
MANAGING DIRECTOR
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