

IN THE MATTER	Of the Resource Management Act 1991
----------------------	--

AND

IN THE MATTER **Of an application by
Transwaste Canterbury
Limited to vary a
condition of consent
RC020069**

ADDENDUM 1

To

TRANSPORTATION PLANNING ASSESSMENT

Prepared for

HURUNUI DISTRICT COUNCIL

By

NIGEL JOHN WILLIAMS

15 June 2006

1. In my Transportation Planning Assessment I developed a preliminary view of the possible impact and costs the additional traffic associated with the activity may have on the life of the pavement of Mt Cass Road. Further discussions with the Councils Engineer have confirmed that a more refined analysis would be useful to arrive at a condition that defined the actual costs of any additional maintenance efforts. As a result additional analysis has been carried out on the implications of the proposed increases in traffic volumes on the life and maintenance costs associated with the road structure of Mt Cass Road.
2. This analysis has been carried out by Mr Mark Gordon, Regional Manager of Maunsell Limited. His report (dated 13 June 2006) states:

“We understand that the principal issue concerns the conclusion by Nigel Williams that the life of the pavement would be expected to reduce from 25 years to 13 years, due to an anticipated increase in axle loadings on the pavement from 1.1×10^6 EDA to 1.8×10^6 EDA, and possibly doubling to as much as 2.2×10^6 EDA.

I have discussed these issues with Brendan Bisley, the Christchurch Transportation Manager, and George JasonSmith, one of our Advisory Services consultants who, like myself, has considerable experience in pavement management.

By way of background, we understand that the road was recently widened and reconstructed as a two lane sealed road. We therefore assume that appropriate pavement layer depths have been placed for the 25 year design loading of 1.1×10^6 EDA.

At this point, it is worth noting that 25 years is simply an assumed pavement design life, adopted nationally as standard practice. This assumed design life simply establishes a factor of safety in design, and in practice bears little resemblance to the actual point of failure when reconstruction may be needed.

It therefore does not imply that the pavement will “fail” after 25 years, and in fact practical experience is that most pavements last several times this period before reconstruction or extensive rehabilitation is required. Furthermore, unless there is some deep-seated failure in a subgrade, it is normal practice in a rural situation to simply strengthen the pavement when level of service, economic considerations, or condition indicators justify intervention. Provided that pavement materials are still sound (and this would be expected for the types of material used in Canterbury), then a granular overlay treatment would normally be used to restore / increase strength and provide for additional EDA. This is the philosophy by which this situation should be assessed, and we believe that it is too simplistic to assume that increased EDA would have a proportional effect on pavement life, in this case reducing pavement life to 13 years.

Standard practice in New Zealand is to design pavements in accordance with best practice documents such as *A Guide to the Structural Design of Road Pavements, AG-G17/04, Austroads, 2005*. Our discussion below relates specifically to *Figure 8.4 - Design chart for granular pavements with thin bituminous surfacing*, of this manual.

Assuming an average CBR of say 7 (Mt Cass Rd may be more or less than this, but for comparative purposes this is not relevant), and the original design EDA of 1.1×10^6 , a pavement thickness of around 325mm can be inferred. For an EDA of double this, a thickness of about 350mm is called for. Without an increase in pavement depth given additional loading, there is likely to be some increased strain on the subgrade eventually leading to failure, although without knowing the site geology it is hard to say with certainty what the effect will be or when it may occur.

It will be apparent however that the difference of only 25mm is very small, and this extra thickness will often be achieved during construction as part of “tolerance”. The design thickness is also very sensitive to the subgrade strength or CBR, and in fact this is more significant than differences in pavement loading. Typically, designers take a conservative view on CBR when designing pavements.

The conclusion that can be drawn from all of this is that it is extremely unlikely that a doubling of EDA loading over a 25 year period would have any significant effect in terms of a wide-spread condition based failure of the pavement occurring within the 25 year design period, provided appropriate maintenance is undertaken. Additional truck loadings would increase the amount of wear and tear on the surface, such as potholes, localised repairs / dig-outs etc, thus requiring some additional maintenance expenditure. It is also likely that the life between reseals would be slightly shorter.

Pavement management strategies also consider the point at which maintenance costs start to rise significantly, and/or pavement roughness increases. A pavement intervention such as a granular overlay is then normally programmed. A doubling of pavement loading would likely bring such a need forward by a few years. Assuming that the pavement has been constructed according to the design, and design assumptions are correct, our view is that such a treatment would probably not be needed within the 25 year “design life” of the existing pavement even with the additional loading expected.

Normally, a treatment such as a granular overlay would involve a minimum additional depth of pavement thickness placed over the existing surface of say 80mm followed by new seal. Using the above chart, and assuming no significant degradation of the pavement materials or subgrade, then an extension of total life traffic loading to 1×10^7 EDA could be achieved. This is nine times the original design loading, and again demonstrates the significant additional EDA that can be achieved through only small increases in pavement thickness.

Our conclusion from this assessment is that it is overly simplistic to assume that the actual life of a pavement can be prorated to the design EDA loading, and that a “reconstruction” of the pavement would be required after only 13 years. While the actual pavement life will be shortened by a doubling of EDA, the economic cost of the different scenarios is likely to be trivial – because the different timing of the strengthening treatments are likely to be so far into the future that their NPV costs using the standard discount rate of 10% per annum will be very small.

I trust that these comments address your concerns, but please do not hesitate to contact me should you require further information.

Yours sincerely



Mark Gordon
Regional Manager”

3. From this, it is apparent that the increased traffic volumes will have an insignificant effect on pavement life. In fact the 350mm of pavement depth which has been constructed on Mt Cass Road is the theoretical depth for much more traffic than the applicant envisages, for the original 35 year life of the landfill. The increase in traffic volumes will however have an impact on maintenance requirements particularly on the inwards (east bound) lane due to the use of this lane by laden vehicles.

4. Accordingly the sections in the main Transportation Planning Assessment discussing the impact on road life and costs should be considered in the light of this additional analysis. (Refer to paragraphs: 116.13, 117.8, and 113 to 115).
5. As far as my suggested condition 3 (paragraph 163) is concerned, I now believe it should be modified to take account of the increased maintenance costs identified from this analysis. The present level of contribution (after June 2008) is set at \$5850.00 per year.
6. Any agreement should allow for three reseals and the ongoing maintenance of Mt Cass Road at conservative construction rates of \$2000.00 per km. The apportionment of Transwaste and costs to the Council should be revised to 94% falling to Transwaste Canterbury Limited. This is based on the proportion of heavy commercial vehicles [HCVs] which could potentially use Mt Cass Road for landfill purposes (1320 HCVs per 7 day period = 188vpd) and the estimated number of HCVs using the road prior to the landfill being established (i.e 12% of 108 = 13vpd). The revised maintenance contribution is then calculated as follows:

Routine maintenance	\$10400 per annum.
5200 x 7 x 2.90 x 3 ÷ 35	\$9018
Sub Total	\$19448
Less subsidy from LTNZ	\$9724
Assume Transwaste Share is 94%	\$9140 per annum.

7. Thus the existing Condition 46 of RC020069 should be modified by the deletion of the figure "\$5850", and its replacement by the figure "\$9140".
8. On this basis I am satisfied that - should this application be consented to up to the applicant's fallback position - this more refined approach to the estimate of the direct costs of the additional traffic will ensure that the applicant is bearing an appropriate portion of the cost of maintaining Mt Cass Road.
9. If the applicant's preferred option (the cancellation of Condition 22) is consented to, then it would be appropriate to impose, in addition, an annual review condition to allow periodic reassessment of the contribution, should traffic volumes increase beyond those defined in the fallback position.

Addendum prepared by

Nigel Williams
Consultant Traffic Planner

~ End~