Project Background of this 5yr project

• 10 Councils participated, creating a total of 51 sites

• Objectives set
  – To receive, store, and analyse the data from the 51 sites, looking at material characteristics, climate, traffic (type and volume), and road geometry.
  – To draw conclusions from the data analysis, and.
  – Provide indication of gravel renewal rates

<table>
<thead>
<tr>
<th></th>
<th>Length</th>
<th>Sealed Length (km)</th>
<th>Unsealed Length (km)</th>
<th>% unsealed</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Island</td>
<td>53162.2</td>
<td>38744.9</td>
<td>14417.3</td>
<td>27.1%</td>
</tr>
<tr>
<td>South Island</td>
<td>40414</td>
<td>22400.7</td>
<td>18013.3</td>
<td>44.6%</td>
</tr>
<tr>
<td>Total</td>
<td>93576.2</td>
<td>61145.6</td>
<td>32430.6</td>
<td>34.7%</td>
</tr>
</tbody>
</table>
Displaying and conveying survey data

- Viewer created during monitoring programme to:
  - Assist with review of data, both
    - Visually, and
    - Using Validation tests
  - Provide a useful way to convey data to contributing RCA’s
  - After creation, significant amount of information was highlighted for review
Gravel Loss Review

Method A - Calculation of Statistics from Raw Data
- Average depth change, by site, by survey (6 months)
- Any error in measurement affects the result

Method B - Observational Analysis via the Viewer
- Used to provide an indication, overlooking the ‘funnies’
- Not preferred, but best pragmatic approach
- Reasonable alignment with sites with ‘better’ grid data

LTNZ research project, (Henning, T.F.P. Giummarra, G.J. Roux, D.C. (2008))
- Initial models for Gravel Loss and Shape
- Best practice guidelines
- Recommendations for future actions
Method B – Summary of results

- Majority of loss rates between 6 – 10mm per year
  - Mode 6mm/year, and
  - Median 8mm/year
  - 20% greater than 10mm/year
154,000 m³ per 1mm Loss

<table>
<thead>
<tr>
<th>Scenarios - Volume of gravel lost across New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unsealed Length (km)</strong></td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>North Island 14417.3</td>
</tr>
<tr>
<td>South Island 18013.3</td>
</tr>
<tr>
<td>Total 32430.6</td>
</tr>
</tbody>
</table>

$4.6 Million per 1mm Loss

<table>
<thead>
<tr>
<th>Scenarios – Variation of Renewal Investment Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assumed rate ($/m³)</strong></td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>North Island 30.0</td>
</tr>
<tr>
<td>30.0</td>
</tr>
<tr>
<td>South Island 30.0</td>
</tr>
<tr>
<td>Total 30.0</td>
</tr>
</tbody>
</table>

Claim was $33.7 Million (Unsealed road Metalling)
Considerations noted from project
Summary

• Unsealed roads make up around 35% of the NZ road network, and they
  – Are typically low volume (<100 vpd),
  – Form the only connection of rural business to markets,
  – Require significant quantities of suitable aggregates
  – Are largely un-monitored

• Small variations in loss estimation can cause large variations in renewal expenditure expectations and aggregate usage.

• Need to understand, monitor, and inform more to make the best from available resources.
Thankyou and Questions

Team Members

• MWH
  – Glenn Fawcett
  – Janice Brass
  – Paul Jacobson
  – Michelle Walker
  – Marius van Niekerk
  – Guy Corcoran
  – Derek Roux
  – Theuns Henning
  – Craig Thew

• Transfund / LTNZ / NZTA
  – Gerard Burgess
  – Janice Brass

• Contributing Councils

  Central Otago District Council
  Grey District Council
  Hastings District Council
  Otorohanga District Council
  Selwyn District Council
  South Taranaki District Council
  Southland District Council
  Tasman District Council
  Thames Coromandel District Council
  Waimakariri District Council