

Presentation by Malcolm Styles

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Hobart Australia

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Can Marginal Materials Matter? – You Bet!

Unsealed road trial results at
Central Goldfields

Introduction

Unsealed road trial conducted at Possum Gully Road, Central Goldfields Shire Council between December 2016 and December 2018

- Australia



- Victoria and Central Goldfields



Why do a trial of unsealed roads?

Nearly 575,000km of them
here in Oz

Some are really fit for
purpose



Why trial unsealed roads? (continued)

Sustainable Liveability Issues:

- Road making material suitable for unsealed road surfaces becoming scarce
- Rough roads cause damage and expense
- Dust is dangerous and hazardous
- Unsealed surfaces require ongoing maintenance
- Poorly constructed unsealed pavements damage the surrounding environment after heavy rain
- Poor maintenance practice

Imperatives for local councils:

- Find and test the properties of road making material for their suitability to construct unsealed road surfaces
- Measure the roughness of unsealed roads and investigate the reasons
- Experiment with unsealed road materials properties. Perhaps use additives to reduce dust
- Apply the science to construct and rehabilitate unsealed road pavements. Pay attention to compaction and functional pavement widths
- Ensure close attention is paid to pavement materials, compaction, and road drainage outfalls
- Train all staff and supervisors who undertake rehabilitation and maintenance of unsealed roads on good practice. Regularly monitor, report and document maintenance and rehabilitation

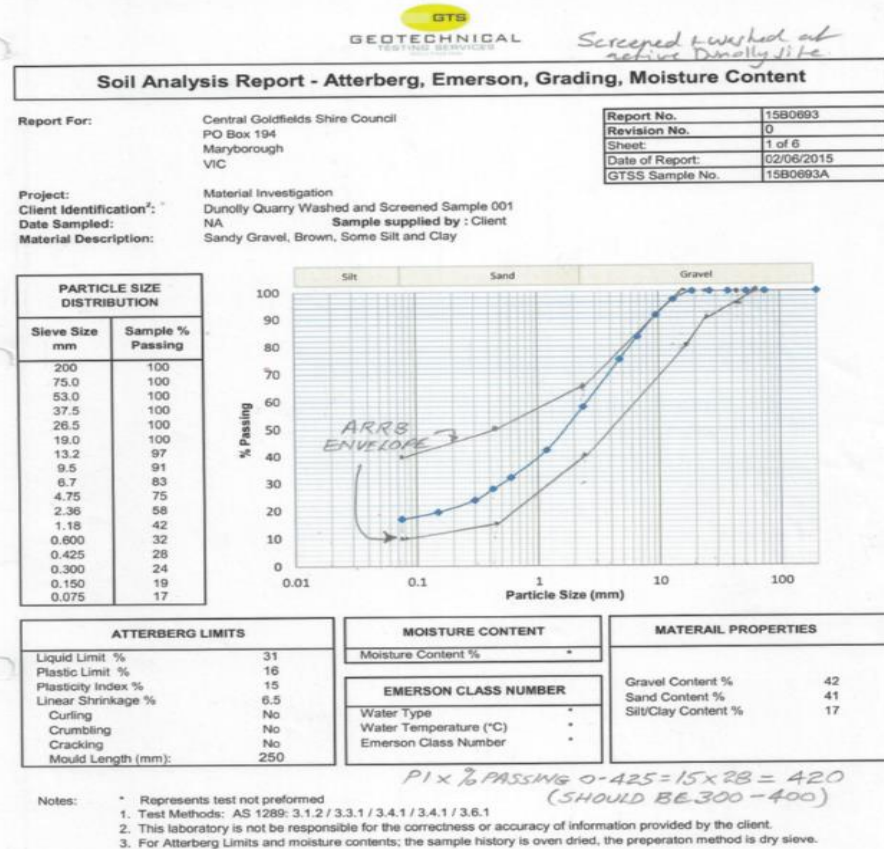
Possum Gully Road Trial – the nine sections described

- **Section 1: Daisy Hill material with 3% foam bitumen, 3% cement**
- **Section 2: Daisy Hill material with 3% polymer**
- **Section 3: Daisy Hill material with 1 litre enzyme per 30 cubic m material**
- **Section 4: Daisy Hill material with 46% class 4 FCR, 8% clay**
- Section 5: Dunolly material with 1 litre enzyme per 30 cubic metres
- Section 6: Dunolly material crushed and screened
- Section 7: Dunolly material crushed and screened with 3% cement
- Section 8: Dunolly material crushed and screened with 5% clay
- Section 9: First 60 m Dunolly with 5% clay, citrus dust suppressant; then 180 m shape only and citrus spray.

Materials

■ Dunolly pit

■ Daisy Hill pit



Approved Signatory:

B.P.Mott
B.P.Mott

Date: June 2, 2015

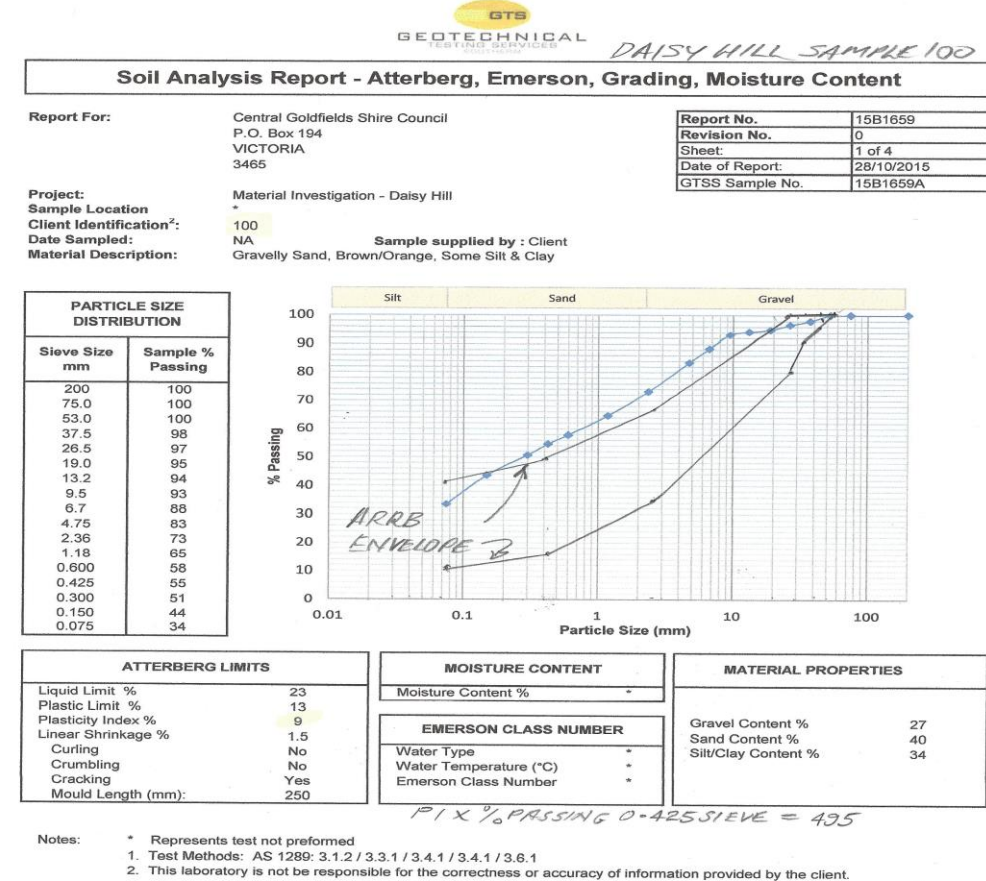
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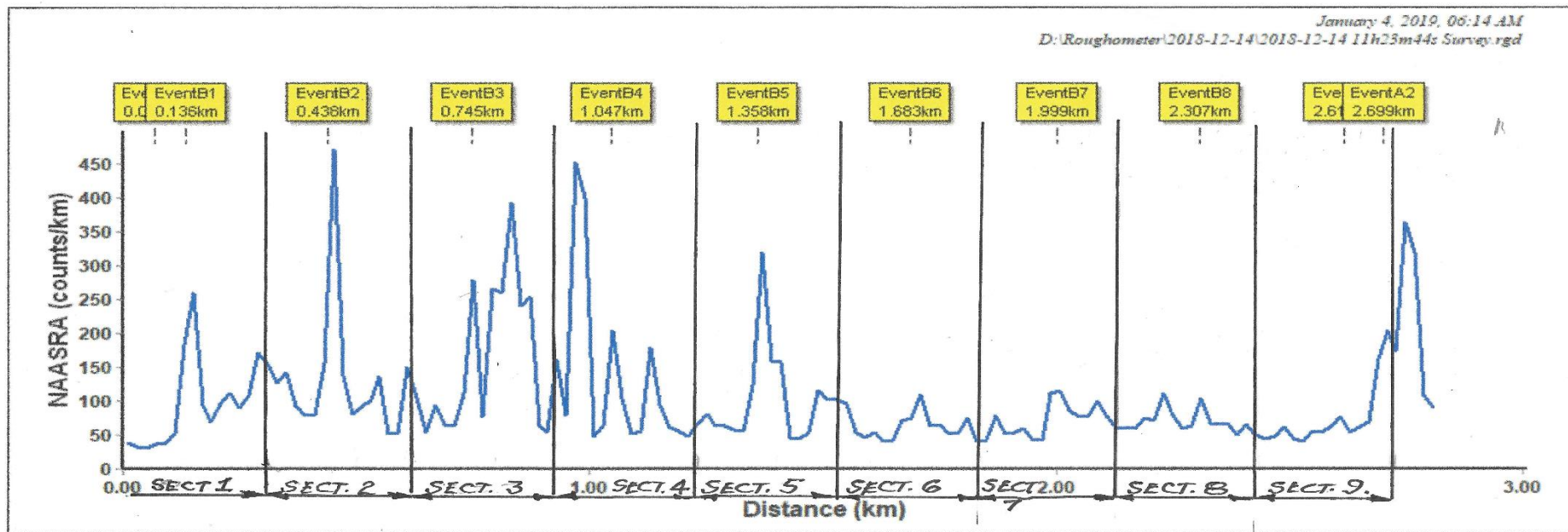
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Roughness



JAN. 2019

Dust

Trial Section	Observ.
1.Daisy Hill material with 3% foam bitumen and 3% cement stabilisation	4.1
2. Daisy Hill sourced with 3% polymer	2.6
3. Daisy Hill material with enzyme 1 litre to 30 m ³	1.9
4. Daisy Hill material with 46% class 4 bluestone FCR plus 8% clay	1.3
5. Dunolly material with enzyme 1 litre to 30 m ³	2.6
6. Dunolly material crushed and screened	2.7
7. Dunolly material crushed and screened with 3% cement	2.9
8. Dunolly material crushed and screened with 5% clay mixed at the source	3.2
9. Dunolly material uncrushed with citrus organic binder dust suppressant	2.5



Construction

Section 1 Cement and foam bitumen emulsion additives to Daisy Hill material



Section 1 Mixed preparatory to grading, watering and rolling



Issues and Constraints

e.g. Result of inattention to crossfall

At crown

- Section 3 at 8 months

- Section 3 at 8 months



Triple Bottom Line assessment

SECTION	1	2	3	4	5	6	7	8	9	Criterion	Average
Capital cost AU\$	\$22.97	\$10.64	\$16.95	\$15.10	\$18.14	\$4.71	\$11.89	\$10.38	\$4.83	Economic	\$12.85
Score	-9.12	3.21	-3.10	-1.25	-4.29	9.14	1.96	3.47	9.02		
Weight	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Weighted score	-9.12	3.21	-3.10	-1.25	-4.29	9.14	1.96	3.47	9.02		
Maintenance over 2 years (cost AU\$)	\$255.30	\$254.49	\$713.87	\$69.11	\$281.32	\$139.85	\$48.78	\$0.00	\$375.00	Economic	\$237.52
										(Section 9 regrade Aug.17)	
Score	-1.68	-1.60	-47.53	16.94	-4.28	9.87	18.97	23.85	-13.65		
Weight	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00		
Weighted score	-3.36	-3.19	-95.07	33.88	-8.56	19.73	37.95	47.70	-27.30		
Roughness NAASRA)	93.90	130.50	165.40	137.90	97.10	68.20	70.50	71.90	67.20	Principally Social	100.29
Score	0.74	-2.92	-6.41	-3.66	0.42	3.31	3.08	2.94	3.41		
Weight	5	5	5	5	5	5	5	5	5		
Weighted score	3.69	-14.61	-32.06	-18.31	2.09	16.54	15.39	14.69	17.04		
Dust	4.1	2.6	1.9	1.3	2.6	2.7	2.9	3.2	2.5	Environmental	2.64
Score	1.46	-0.04	-0.74	-1.34	-0.04	0.06	0.26	0.56	-0.14		
Weight	5	5	5	5	5	5	5	5	5		
Weighted score	7.28	-0.22	-3.72	-6.72	-0.22	0.28	1.28	2.78	-0.72		
Shape loss 1.0 m left (mm)	-27.50	-63.50	-73.50	-41.00	-43.50	-39.50	-41.50	-32.00	-20.50	Environmental	-42.50
Score	1.60	-2.00	-3.00	0.25	0.00	0.40	0.20	1.15	2.30		
Weight	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
Weighted score	4.00	-5.00	-7.50	0.63	0.00	1.00	0.50	2.88	5.75		
Shape loss 1.0 m right (mm)	-16.50	-37.00	-72.00	-29.50	-50.50	-37.50	-31.00	-46.00	-28.50	Environmental	-38.72
Score	2.32	0.27	-3.23	1.02	-1.08	0.22	0.87	-0.63	1.12		
Weight	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50		
Weighted score	5.81	0.68	-8.07	2.56	-2.69	0.56	2.18	-1.57	2.81		
TOTALS	8.29	-19.14	-149.52	10.78	-13.68	47.24	59.25	69.94	6.59		

Observations and Thoughts

Triple bottom line assessment (cont.)

SECTION	1 Daisy Hill	2 Daisy Hill	3 Daisy Hill	4 Daisy Hill	5 Dunolly	6 Dunolly	7 Dunolly	8 Dunolly	9 Dunolly unscreened
Economic factors (weighted scores)	-12.48	0.02	-98.17	32.63	-12.85	28.87	39.91	51.17	-18.28
Social	3.69	-14.61	-32.06	-18.31	2.09	16.54	15.39	14.69	17.04
Environmental	17.09	-4.54	-19.29	-3.53	-2.91	1.84	3.96	4.09	7.84
Total Score	8.30	-19.13	-149.52	10.79	-13.67	47.25	59.96	69.95	-6.60
Notes	Little dust	Rough	Rough, high maint.	Rough, dusty	Loss of shape		Little maint. costs	No maint. req.	Regrade req. after 7 months

Conclusions (first slide of three)

- ✓ Daisy Hill material too marginal for purpose?
- ✓ Some merit in blending with bluestone
- Trial Section 3 – Daisy Hill material at 18 months
- ✓ Screened and crushed Dunolly material fits
- ✓ Section 8 with 5% clay best performer at end of 2 years
- Establish with care pays!



Conclusions continued (second slide of three)

Importance of supervisor and staff training inclusive of understanding the science

- Bother to measure

Get materials, moisture mix and compaction right

- Always make, and fund, the effort at rehabilitation time



Conclusions continued (third slide of three)

- Find and test potential pavement materials sources
 - Good natural materials becoming scarce – don't be frightened to experiment and search

Do it right when rehabilitating

- Will save heaps economically and environmentally



End of Presentation

