

Hydro Tasmania Road Network Management

Norm Cribbin

Hydro Tasmania

Hydro Tasmania Road Network Management



Outline

- Background
- Asset Management Capability
- Description of Assets
- Levels of Service (Intervention Levels)
- Network Inspections
- Response Times
- Condition & Performance
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- Conclusion

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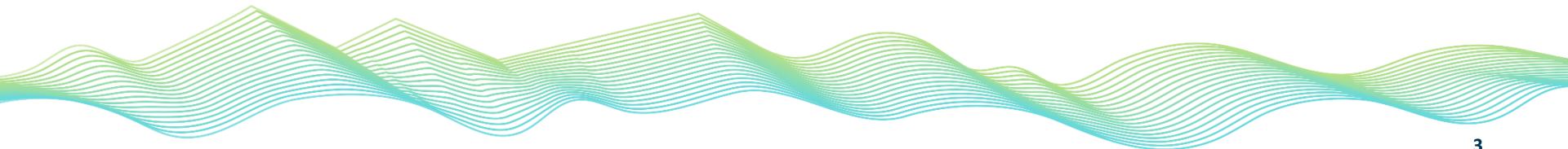


Background

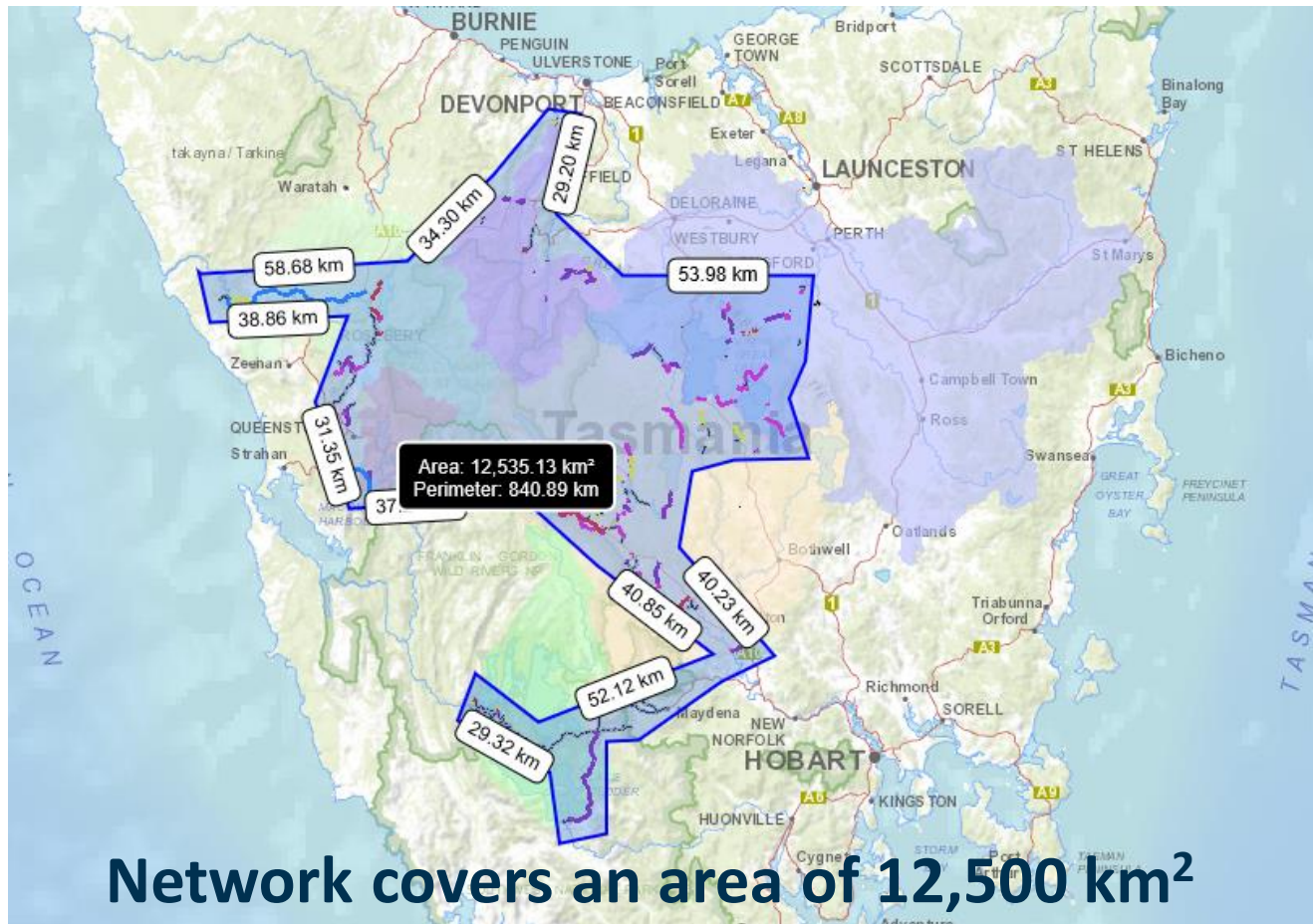
Hydro Tasmania owns and manages 588 km of roads, with some 386 km (66%) open to public access. The objective of Hydro Tasmania roads programme is to maintain a safe and reliable road network for use by Hydro Tasmania employees and the public, established upon an acceptable level of organisational risk.

The management and maintenance of the road portfolio is governed by the corporation's asset management strategy to *"Discharge all safety, duty of care, legislative and operational compliance obligations on a prioritised risk basis"*. This strategy is supported by the corporation's safety vision of *"No harm to anyone at anytime."* by providing safe access to staff and the public.

In order to fulfil the organisation's roads programme objectives, Hydro Tasmania engaged the capability of an experienced road maintenance contractor in 2009 to deliver road management and maintenance services safely and efficiently through a transparent value for money relationship based contract model.



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Key components of Hydro Tasmania's roads asset management include:

- Assessment of Asset Management Capability
- Roads Classification system (Asset Hierarchy & inventory)
- Agreed Levels of Service and Intervention Timing
- Regular Network inspections appropriate to the various road classes
- Knowledge Management
- Programme Governance

This presentation covers the development of Hydro Tasmania's (HT) roads asset management since 2008 to the present.

Asset Management Capability

In 2008 a self-assessment tool, documented by Mihai, Binning and Dowling (2001) was used to assess Hydro Tasmania's organisational maturity relating to road asset management.

Assessed Maturity Score over time

Year	Assessed Maturity Score	Descriptor	Interpretation
2008	102	Undergoing development with knowledge of the correct process	Systematic approach
2008*	154	A good system in place but can be improved	Competence
2011	209	Best practice, continuous improvement phase	Excellence
2012	188	A good system in place but can be improved	Competence
2014	202	Best practice, continuous improvement phase	Excellence
2017	205	Best practice, continuous improvement phase	Excellence

* Reassessment assuming road network plan in place.

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Asset Management Capability

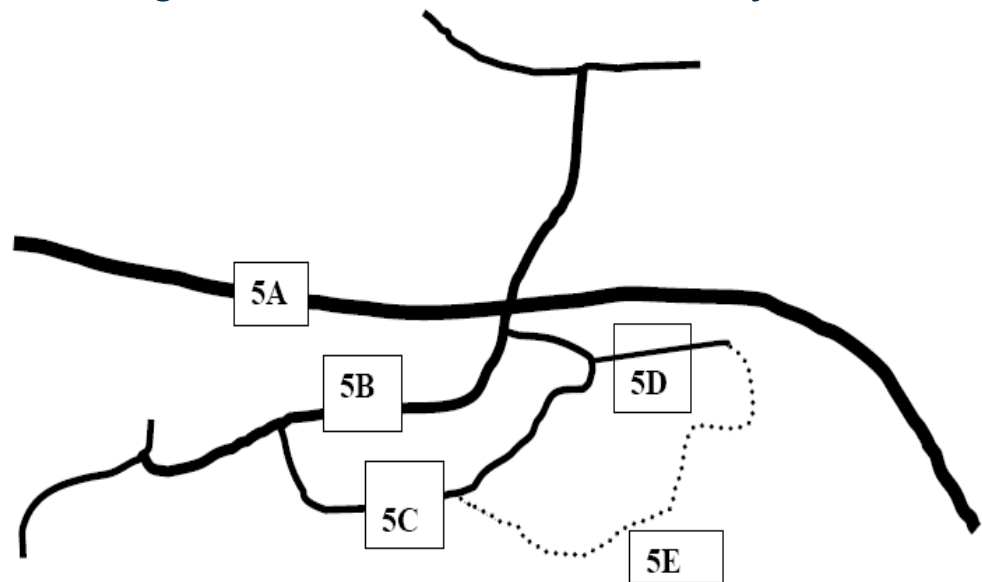
Breakdown of Self-assessment Scores

Element	Description	Possible score	2008 score	2012 score	2014 score	2017 score
1	Agency objectives & stakeholder requirements	30	4	22	22	22
2	Strategy and planning process	65	26	51	52	56
3	Data, information and Knowledge	65	33	52	58	57
4	Business results	30	8	20	22	19
5	People	20	7	15	15	16.5
6	Leadership	20	17	19	19	19
7	Audit and review	20	7	9	14	15.5
	Total	250	102	188	202	205

Description of Assets

- A functional classification system adopted based on Austroads (1989) system of functional classifications for both urban and rural roads.
- Hydro Tasmania road assets have been consolidated into five (5) operational categories based on class type, service function and road type description, as described in *ARRB Roads Classifications, Geometric Designs and Maintenance Standards for Low Volume Roads - Appendix C*.

- 5A Primary Road
- 5B/5B1 Secondary Road
- 5C/5C1 Minor Road
- 5D/5D1 Access Track/Road
- 5E Rough Tracks



Level of Service (Intervention Levels)

- The Level of Service or the point where maintenance intervention has been nominated is based on the collective impact of all defects observed in a given Road Segment (500 m section).
- This value is used in the Pavement Management Model as the OCI input.

Rating	Collective impact of all defects observed
1	Nil
2	Negligible
3	Minor
4	Moderate
5	Extreme

Level of Service (Intervention Levels)

Hydro Tasmanian Road Network - Public Access Level of Service

Road Class	Class Type	Sealed Roads Level of Service (Minimum acceptable Rating)	Unsealed Roads Level of Service (Minimum acceptable Rating)
5A Public Access	Primary Road	2.3	N/A
5B Public Access	Secondary Road	3.0	2.7
5C Public Access	Minor Road	3.3	2.7
5D Public Access	Access Track or Road	N/A	3.7
5E Public Access	Rough Tracks	N/A	5.0

Defect descriptor range is typically set at “Negligible to Minor”

Level of Service (Intervention Levels)

Hydro Tasmanian Road Network - Public Access Level of Service

Road Class	Class Type	Sealed Roads Level of Service (Minimum acceptable Rating)	Unsealed Roads Level of Service (Minimum acceptable Rating)
5A1 Restricted Access	Primary Road	N/A	N/A
5B1 Restricted Access	Secondary Road	3.7	3.0
5C1 Restricted Access	Minor Road	4.2	3.3
5D1 Restricted Access	Access Track or Road	N/A	4.3
5E1 Restricted Access	Rough Tracks	N/A	5.0

Defect descriptor range is typically set at “Minor to Moderate”

Network Inspections

- The network is systematically inspected to ensure identification of existing defects, other hazards and to identify opportunities for network improvements that will reduce risk to users and or minimise maintenance effort over time.

Hydro Tasmanian Road Network – Inspection Frequencies

ARRB Road Class Type	Inspection Frequency	
	Public Access	Restricted Access
5A	Fortnightly	N/A
5B	Monthly	3 Monthly
5C	3-6 Monthly ¹	6 Monthly
5D	6 Monthly – Annual ¹	Annual
5E	Not Inspected	Not Inspected

¹ Inspection frequency based on public usage.

Response Times

- Response Times for the repair of identified defects have a requirement to be rectified between 7 days and 6 months

Hydro Tasmanian Road Network – Response Times

Routine Maintenance Items	IL Code	Intervention Level	Response time				
			Class				
			5A	5B	5C	5D	5E
1.0 Unsealed Roads							
1.1 Pothole Maintenance on Unsealed Roads	UR01	Pothole with depth of 50mm - 100mm and area < 10m2	1 mth	1 mth	3 mth	3 mth	3 mth
	UR02	Pothole > 100mm depth	7 day	1 mth	1 mth	3 mth	3 mth
1.2 Repair of General Pavement Defects on Unsealed Roads	UR03	Scouring, rutting or corrugations >75mm depth and length < 20m.	1 mth	2 mth	3 mth	3 mth	3 mth
1.3 Management of Loose Material on Unsealed Roads	UR04	Loose material >100mm depth at any location on the pavement and <20m2	1 mth	2 mth	3 mth	3 mth	3 mth

Condition and Performance

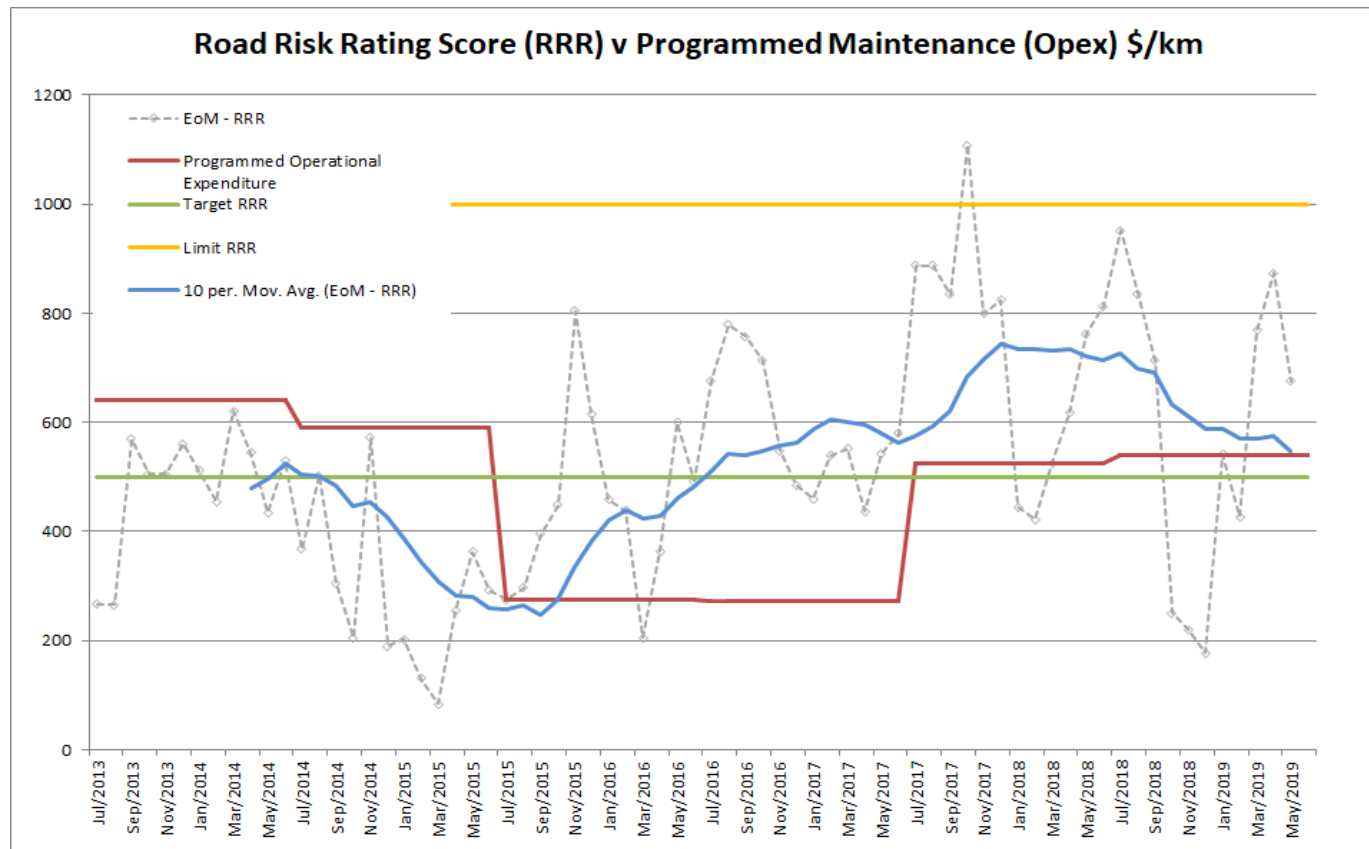
- Road Risk Rating (RRR)
 - Road defect data collected during routine inspections is evaluated against a set of criteria to determine the Road Risk Rating (RRR) score.
 - Individual road link RRR scores are summed to provide an overall RRR score for the entire road network.

Target RRR scores for Road Links and entire Network

Link/Network	Target RRR score	Maximum RRR score
Individual Road Link (<2 km length)	< 20	< 40
Individual Road Link (>2 km length)	< 50	< 100
Entire Road Network	< 500	< 1000

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Condition and Performance



Pavement Management System (RoadWise)

- Hydro Tasmania uses RoadWise as its PMS Modelling tool
- RoadWise produces a condition driven model based on the application of a given management strategy to the road network.
- The network is represented as an ensemble of asset elements (500 m road segments)
- Each segment consisting of two components:
 - Underlying pavement represented by *Pavement Condition Index* (PCI)
 - Surface represented by *Surface Condition Index* (SCI)
- The SCI and PCI indices are updated annually after a dedicated network inspection

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Pavement Management System (RoadWise)

- SCI and PCI data is added to the data input file that is read by RoadWise when modelling is undertaken

Indicates calculated fields - not to be overwritten by data.

Assumed to be First

Index of treatment.

Element type code. Cannot have both Committed Treatment AND Change in Class

If blank, unit rates will apply.

If Consumed ESA supplied, Construction Year also needs to be supplied.

This field MUST be supplied.

"Design" Lane

Norm Cribbin: using a -1 in both SCI and PCI stops the read.

Element	Name	From	To	Carriageway Direction	Lane	Wheelpath	Sub-Net	Type	Class	P- Type if known	Surface Construction Year	Pavement Instruction Year	Treatment Code	Commitments				Cost \$	Retired Element	actual condition	Design Options									
														Treatment At Year	Change in Type	Change in Class	New Class At Year				SCI	PCI	%Annual Growth Rate	either ... %Heavy Vehicles	...or ESA/HV	AADT	Consumed ESA	At Year	DESA	Length
885_1-1	Reece - Pieman Road (Murchus	0.000	0.500					STG	5A	1	1979							0.90	1.28	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-10	Reece - Pieman Road (Murchus	4.500	5.000					STG	5A	1	1979							2.59	1.92	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-11	Reece - Pieman Road (Murchus	5.000	5.500					STG	5A	1	1979							2.59	1.92	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-12	Reece - Pieman Road (Murchus	5.500	6.000					STG	5A	1	1979							1.70	1.92	1.0			0.00E+00	100.0	6.0	600.0				
885_1-2	Reece - Pieman Road (Murchus	0.500	1.000					STG	5A	1	1979							0.90	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-3	Reece - Pieman Road (Murchus	1.000	1.500					STG	5A	1	1979							1.79	1.95	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-4	Reece - Pieman Road (Murchus	1.500	2.000					STG	5A	1	1979							1.79	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-5	Reece - Pieman Road (Murchus	2.000	2.500					STG	5A	1	1979							2.59	2.17	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-6	Reece - Pieman Road (Murchus	2.500	3.000					STG	5A	1	1979							2.59	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-7	Reece - Pieman Road (Murchus	3.000	3.500					STG	5A	1	1979							3.49	1.99	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-8	Reece - Pieman Road (Murchus	3.500	4.000					STG	5A	1	1979							3.49	1.95	1.0			0.00E+00	500.0	6.0	3000.0				
885_1-9	Reece - Pieman Road (Murchus	4.000	4.500					STG	5A	1	1979							2.64	1.95	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-1	Reece - Pieman Road (Railway	0.000	0.500					STG	5A	1	1979							1.70	1.92	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-2	Reece - Pieman Road (Railway	0.500	1.000					STG	5A	1	1979							0.90	1.92	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-3	Reece - Pieman Road (Railway	1.000	1.500					STG	5A	1	1979							3.43	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-4	Reece - Pieman Road (Railway	1.500	2.000					STG	5A	1	1979							1.80	2.28	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-5	Reece - Pieman Road (Railway	2.000	2.500					STG	5A	1	1979							1.74	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-6	Reece - Pieman Road (Railway	2.500	3.000					STG	5A	1	1979							1.80	1.35	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-7	Reece - Pieman Road (Railway	3.000	3.500					STG	5A	1	1979							3.43	2.23	1.0			0.00E+00	500.0	6.0	3000.0				
885_2-8	Reece - Pieman Road (Railway	3.500	4.000					STG	5A	1	1979							3.43	1.95	1.0			0.00E+00	400.0	6.0	2400.0				
885_4-1	Reece - Pieman Road (Huskissi	0.000	0.500					STG	5A	1	1979							0.94	2.17	1.0			0.00E+00	500.0	6.0	3000.0				

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Pavement Management System (RoadWise)

- Available Budgets are input into RoadWise for both Capex and Opex

Network **Hydro** Hydro Tasmania Road Network

RoadWise | **Data** | **Settings** | **Budget** | **Overrides** | **Network** | **Element**

Budget Stream:

Budget is:

Pre-Set:

Roll-Over Unused \$ ☐

Supress Auto Calculation ☒

Note : Negative manual cap (e.g. -inf) means no cap is applied.

Removes a manual cap (one year).

Transfers the Pre-Set value(s) to the manual cap (single year or all years).

Year	Manual	Pre-Set
2018	810k	810k
2019	810k	810k
2020	810k	810k
2021	810k	810k
2022	810k	810k
2023	810k	810k
2024	810k	810k
2025	810k	810k
2026	810k	810k
2027	810k	810k

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Pavement Management System (RoadWise)

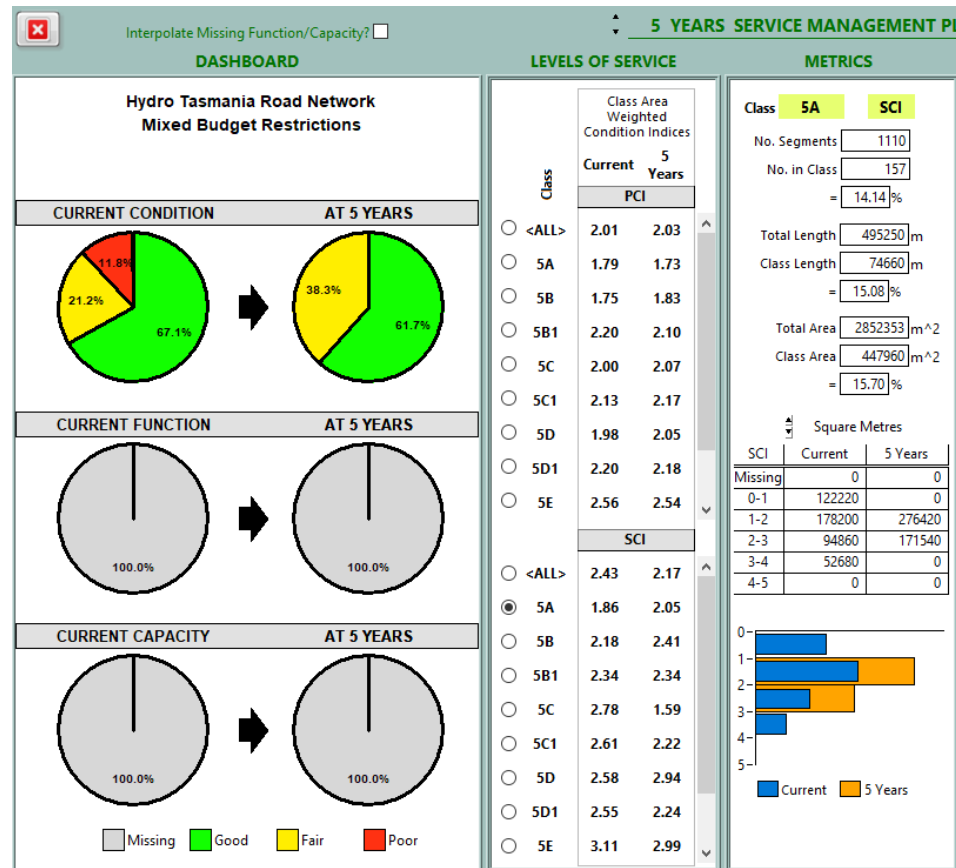
- Model outputs identify which segment and treatment type is to be applied
- Engineering judgement is used to fine tune the final works program

4 YEAR PROGRAMMED TREATMENTS REPORT																				
Scenario FYE19-21								2019				2020				2021				
Item	Segment	Name	From	To	Class	Length	Area	Priority	Treatmer	Budget	Cost	Priority	Treatmer	Budget	Cost	Priority	Treatmer	Budget	Cost	
4 YEAR PROGRAMMED TREATMENTS REPORT																				
Scenario FYE19-21								2019				2020				2021				
Item	Segment	Name	From	To	Class	Length	Area	Priority	Treatmer	Budget	Cost	Priority	Treatmer	Budget	Cost	Priority	Treatmer	Budget	Cost	
~	1005_1-1	~	Arthurs Lake - Gunns Marsh Road (Poatir	~	~	5D	~	5	~	30	~	2	Gradi	~	<Rout	~	2	~	~	
15	10659_1-1		Brumbys Diversion Track - Section B	0	0.5	5D1	500	2500									1	Top D	<Rout	2,5
16	10659_1-2		Brumbys Diversion Track - Section B	0.5	0.52	5D1	20	100												
18	10979_1-1		Tullabardine Boat Ramp Access Road	0	0.21	5B	210	1260												
19	10980_1-1		Bastyan Farrell Switchyard Access Road	0	0.44	5B1	440	2640	650	Mill & Fill	<Routine	1,980								
23	10984_1-1		Mackenzie Dam Crest Road	0	0.5	5B1	500	3000												
24	10985_1-1		Fisher Forebay Levee Crest Access Track	0	0.5	5D1	500	3000									342	Grading	<Routine	120
25	10985_1-2		Fisher Forebay Levee Crest Access Track	0.5	0.6	5D1	100	600									361	Grading	<Routine	24
37	11004_1-1		Liapootah Intake Access Road	0	0.16	5D1	160	960									358	Grading	<Routine	38
38	11007_1-1		Meadowbank Dam Boat Ramp Road	0	0.21	5D1	210	1260					260	Grading	<Routine	50				
59	11012_1-1		Catagunya Switchyard Road	0	0.14	5D1	140	840									359	Grading	<Routine	34
60	11014_1-1		Catagunya Penstock Gatehouse Road	0	0.11	5D1	110	660									360	Grading	<Routine	26
61	11015_1-1		Catagunya Dam Left Abutment Upper Road	0	0.5	5D1	500	3000									341	Grading	<Routine	120
68	11024_1-1		Tarraleah No.1 Canal Pickup No.37 Access Tr	0	0.2	5D1	200	1100									357	Grading	<Routine	44
69	11025_1-1		Tarraleah No.1 Canal Section T08 Access Tra	0	0.37	5D1	370	2035									355	Grading	<Routine	81
70	11026_1-1		Tarraleah No.1 Canal T05 - T06 Access Track	0	0.5	5D1	500	2750									347	Grading	<Routine	110
71	11026_1-2		Tarraleah No.1 Canal T05 - T06 Access Track	0.5	0.84	5D1	340	1870									356	Grading	<Routine	75
84	139_1-1		Cethana Intake Access (Headworks) Road	0	0.5	5C	500	3000												
85	139_1-6		Cethana Intake Access (Headworks) Road	2.5	2.91	5C	410	2460												
86	142_1-2		Cethana Power Station Road	0.5	1	5C	500	3000												
87	142_1-3		Cethana Power Station Road	1	1.03	5C	30	180												
106	163_1-1		Devils Gate Power Station Road	0	0.5	5B	500	3000												
107	163_1-2		Devils Gate Power Station Road	0.5	1	5B	500	3000												
108	163_1-3		Devils Gate Power Station Road	1	1.5	5B	500	3000												

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Pavement Management System (RoadWise)

- Assessment of scenarios for each road class is possible
- Scenarios can be saved
- SCI improvement over 5 years
- SCI scores (LoS) concentrated around 1-2 and 2-3 in 5 years compared to current values
- Modelling has resulted in better utilisation of available funds



Conclusion

- Prior to 2009 Hydro Tasmania road management was undertaken in a spasmodic manner from regional centres
- Variations in annual expenditure were typically up to 300%
- The level of Asset Management maturity in 2008 was assessed as *“Undergoing development with knowledge of the correct process”*
- Hydro Tasmania recognised it needed to partner with an external service provider to deliver at fit for purpose road network with the lowest life cycle cost
- Stornoway Maintenance were engaged in 2009 via a transparent value for money relationship based contract model to assist Hydro Tasmania fulfil the road programme objectives
- Since 2009 Hydro Tasmania and Stornoway Maintenance have worked collaboratively to raise the level of Asset Management maturity to *“Best practice, continuous improvement phase”*

Conclusion

- A road hierarchy based on the Austroads classification system has been adopted
- A predictive pavement management model (RoadWise) is used to inform road network spend
- A Road Risk Rating score has been developed to actively manage road condition criticality and duty of care risk
- The decision to outsource the road management and maintenance has allowed Hydro Tasmania to focus more heavily on core functions but have the confidence that this essential ancillary asset class is being managed and works are effectively delivered, with adequate controls and accountabilities in place.

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Thank you

