

# DEVELOPMENT OF A PAVEMENT REHABILITATION STRATEGY FOR NATIONAL ROADS IN QUEENSLAND

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## Scope

- Background
- Objectives
- Road network data and analysis
- Current and potential investment policies
- Findings and recommendations

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# Objectives

- Strategy development
  - assessment of the current condition of existing sealed and asphalt surfaced roads
  - determination of strategic needs and cost estimates, including backlogs
  - determination of the geographical location of investment candidates
  - presentation of future performance scenarios in terms of key performance indicators
- Program development
  - provision of detailed data for application at region level

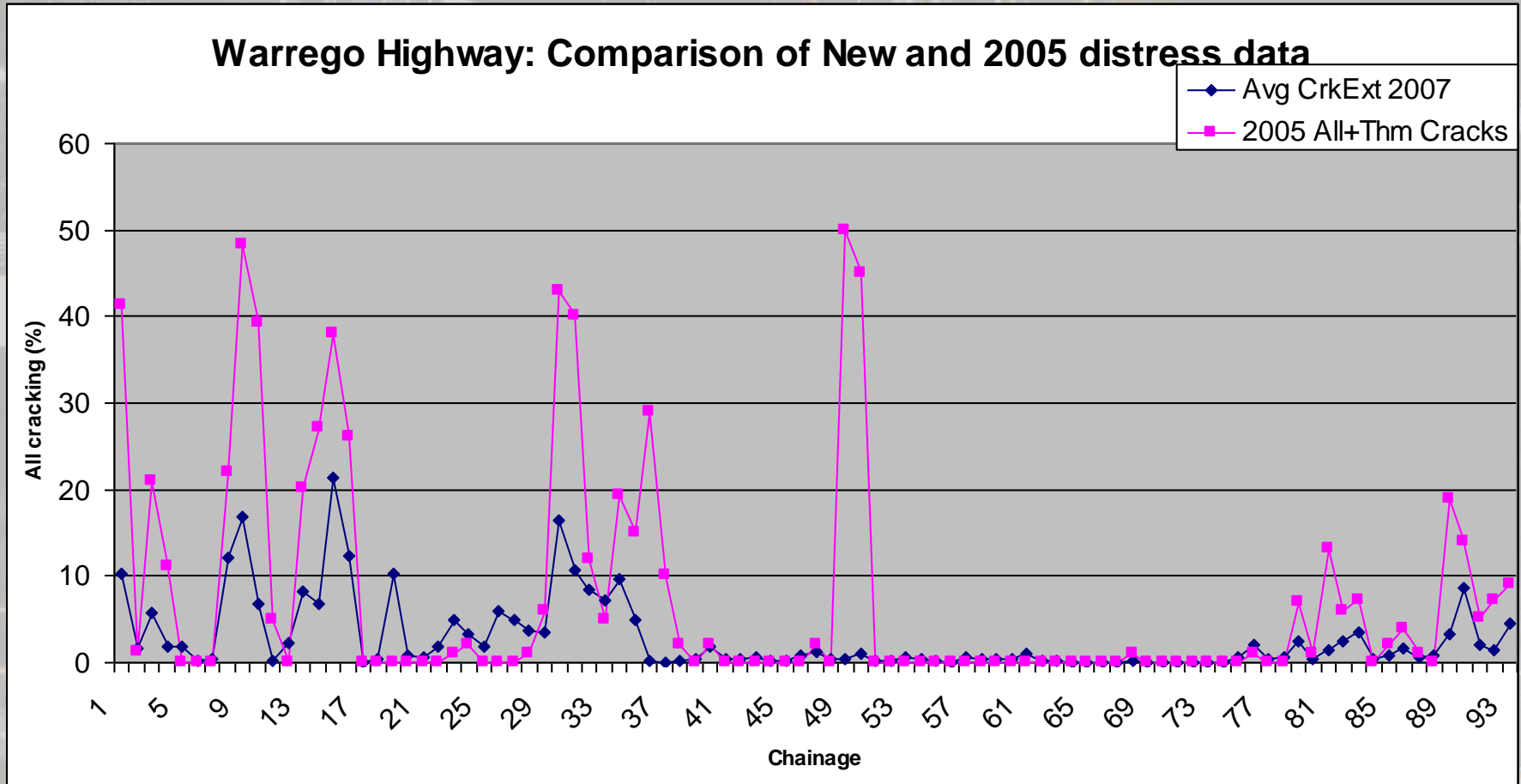
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## Data and site investigations

- 5440 physical segments
- Section specific deterioration and costs
- Field reviews and treatment selection
- Investigation of major highways in SEQ

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## Warrego Highway: Condition data



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## Treatment reviews

- Need to include distress and structural strength based trigger for asphalt pavements at low roughness
  - revised cracking limits
  - if max deflection  $< 0.7$  mm, patch and resurface
  - If max deflection  $> 0.7$  mm, rehabilitation
- Otherwise, confirmed suitability of moderate standards

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# Current Status Analysis

- AusLink Preservation Maintenance Indicator
  - 8% exceeds the target, 3% in poor or very poor condition
- AusLink Ride Quality Indicator
  - 16% mediocre or poor ride quality, 3% poor or very poor
- Pavement age
  - 38% with last rehabilitation age > 20 years, 1% > 50 years
- Pavement (Structural) Risk Index
  - 19% < 5 years, 60% > 20 years
- Routine maintenance costs

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## Example Ride Quality Matrix

		Traffic range (vehicles per day)					
Roughness range (IRI)	Roughness range (NRM)	0-500	501-1500	1501-3000	3001-5000	5001-10000	>10000
		VL	LL	BM	AM	HH	VH
0-2.8	0-75	Good					
2.8-3.2	75-85						
3.2-3.6	85-95	Mediocre					
3.6-4.0	95-105						
4.0-4.6	105-120	Poor					
4.6-5.2	120-135						
5.2-5.7	135-150	Very Poor					
5.7-6.3	150-165						
>6.3	>165						

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**Legend**

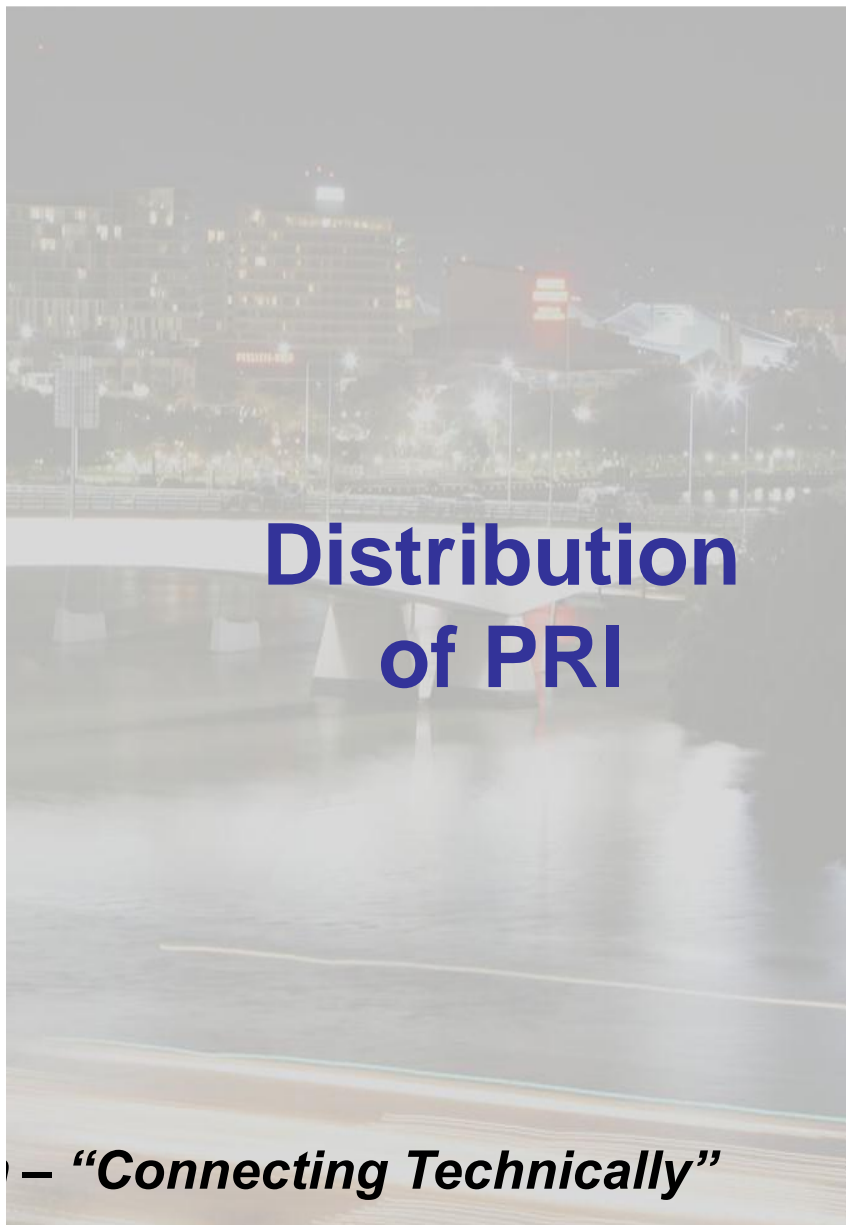
**Pavement Risk Index**

- ▬ Poor/Very Poor <5 Years
- ▬ Fair/Marginal >5 - 20 Years
- ▬ Excellent/Good >20 Years
- ▬ No data Available
- ▬ AusLink Roads
- ▬ State Roads
- ★ Capital Cities
- Towns
- ▬ Major Rivers



**AusLink - Distribution of Pavement Risk Index**

Total Road Length =	5446.85 km	100.0%
Excellent/Good =	3209.22 km	58.9%
Fair/Marginal =	1090.45 km	20.0%
Poor/Very Poor =	970.57 km	17.8%
No Data =	176.62 km	3.2%



## Distribution of PRI

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## Distribution of routine maintenance costs



**Legend**

**Average Maintenance Costs**

- ▬ Extremely high
- ▬ Very high
- ▬ High
- ▬ Moderate
- ▬ Low
- ▬ AusLink Roads
- ▬ State Roads
- ★ Capital Cities
- Towns
- ▬ Major Rivers

	Annual costs
Extremely high	> \$ 20,000
Very high	\$ 7,500 - \$ 19,999
High	\$3,000 - \$ 7,499
Moderate	\$ 1,500 - \$2,999
Low	< \$ 1,500

0 75 150 300 450 600 Kilometres



**AusLink - Distribution of average annual routine pavement maintenance costs**

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## Strategies examined

### Current Funding Policy (Base case)

- full preventative (programmed) maintenance
- section specific routine pavement costs pre-rehab

### Desirable Minimum Standards Policy (No pavement in 'Very Poor' condition)

- full preventative (programmed) maintenance
- section specific routine pavement costs pre-rehab
- Pavement rehabilitation if Very Poor

### 01 Economic Strategy (Maximise NPV)

- Base Maintenance v Moderate Standards, with 4 timing options

### 02 Moderate Standards (Forced – No pavement in 'Poor' condition)

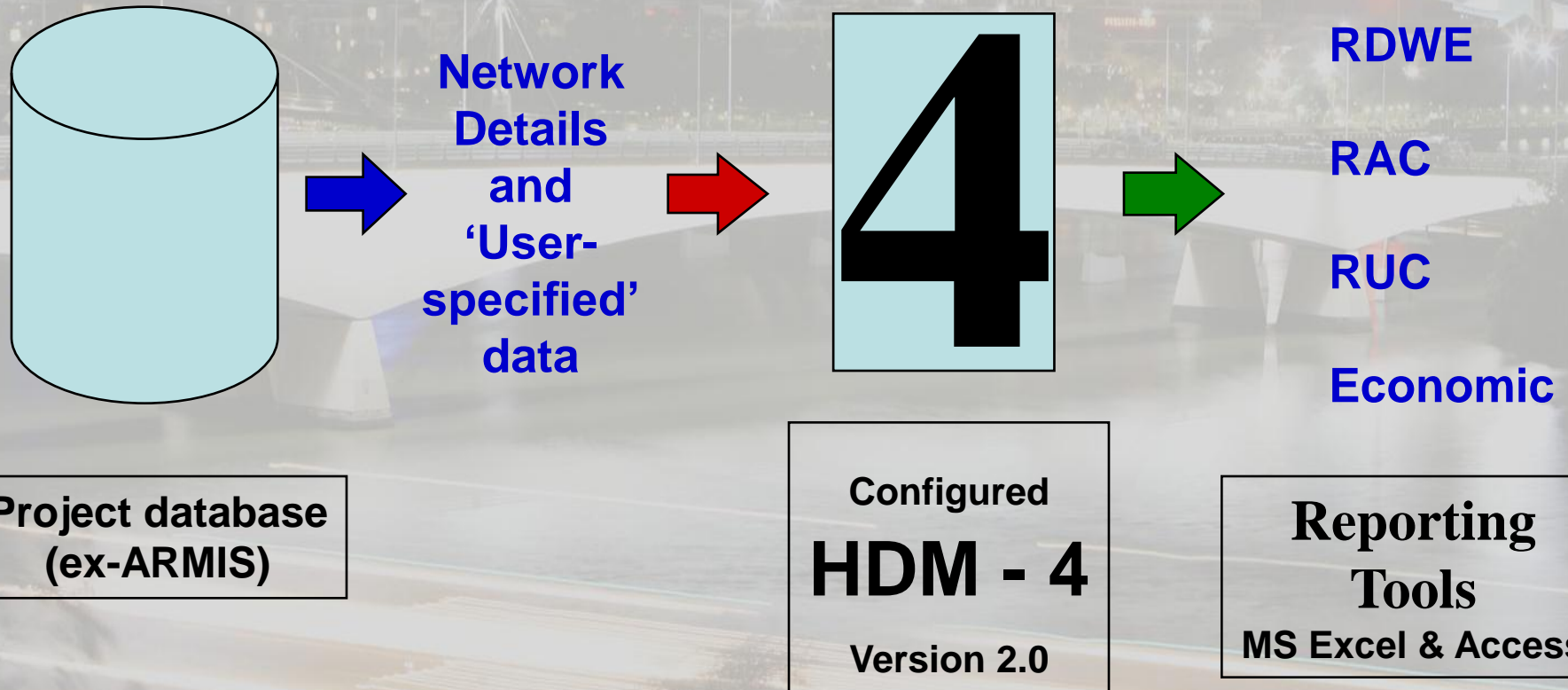
- **Single strategy with full set of treatments & immediate implementation**

### 03 Maximise change in roughness

- Base Maintenance & Moderate standards , with 4 timing options

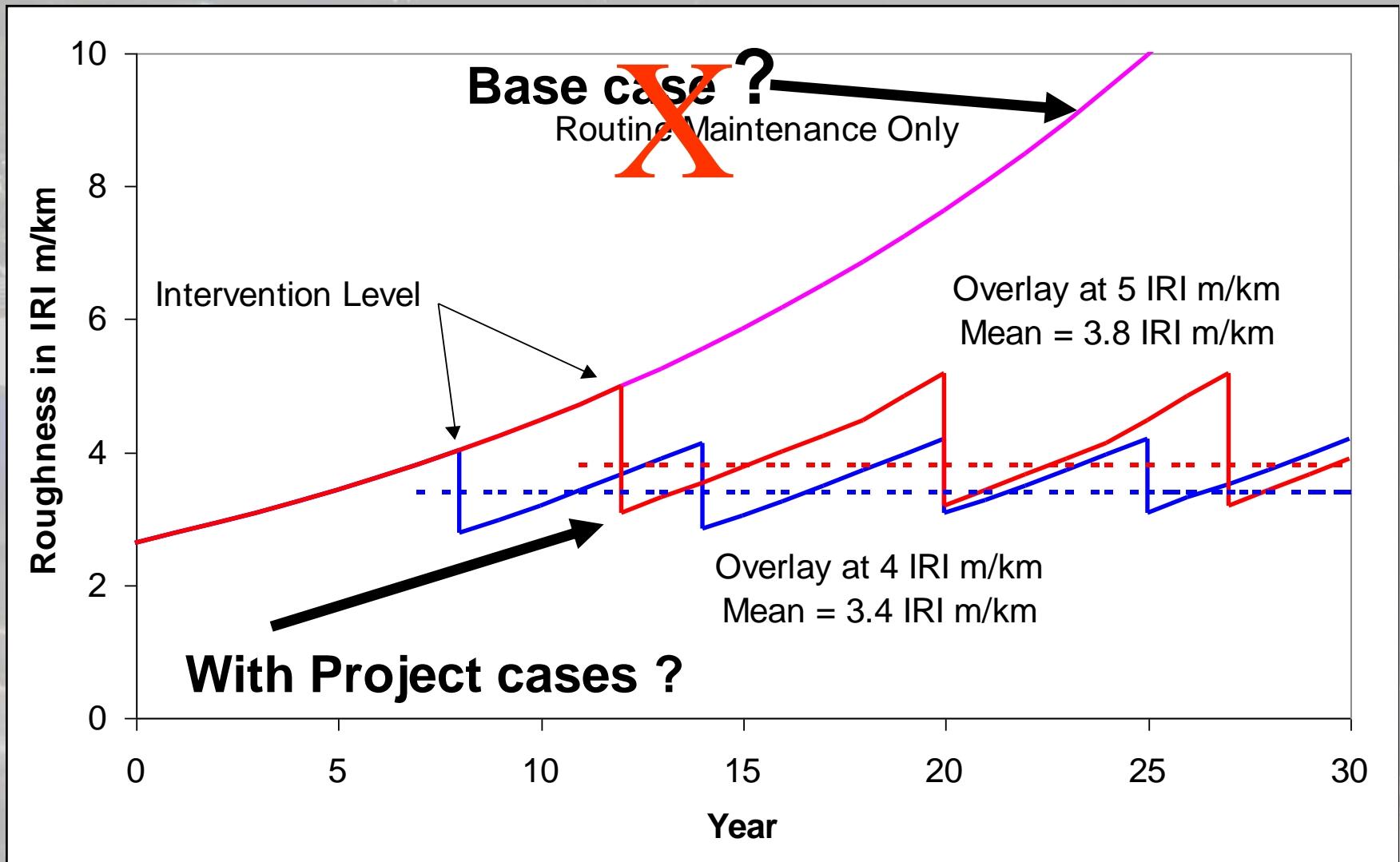
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## Data assembly, analysis & reporting

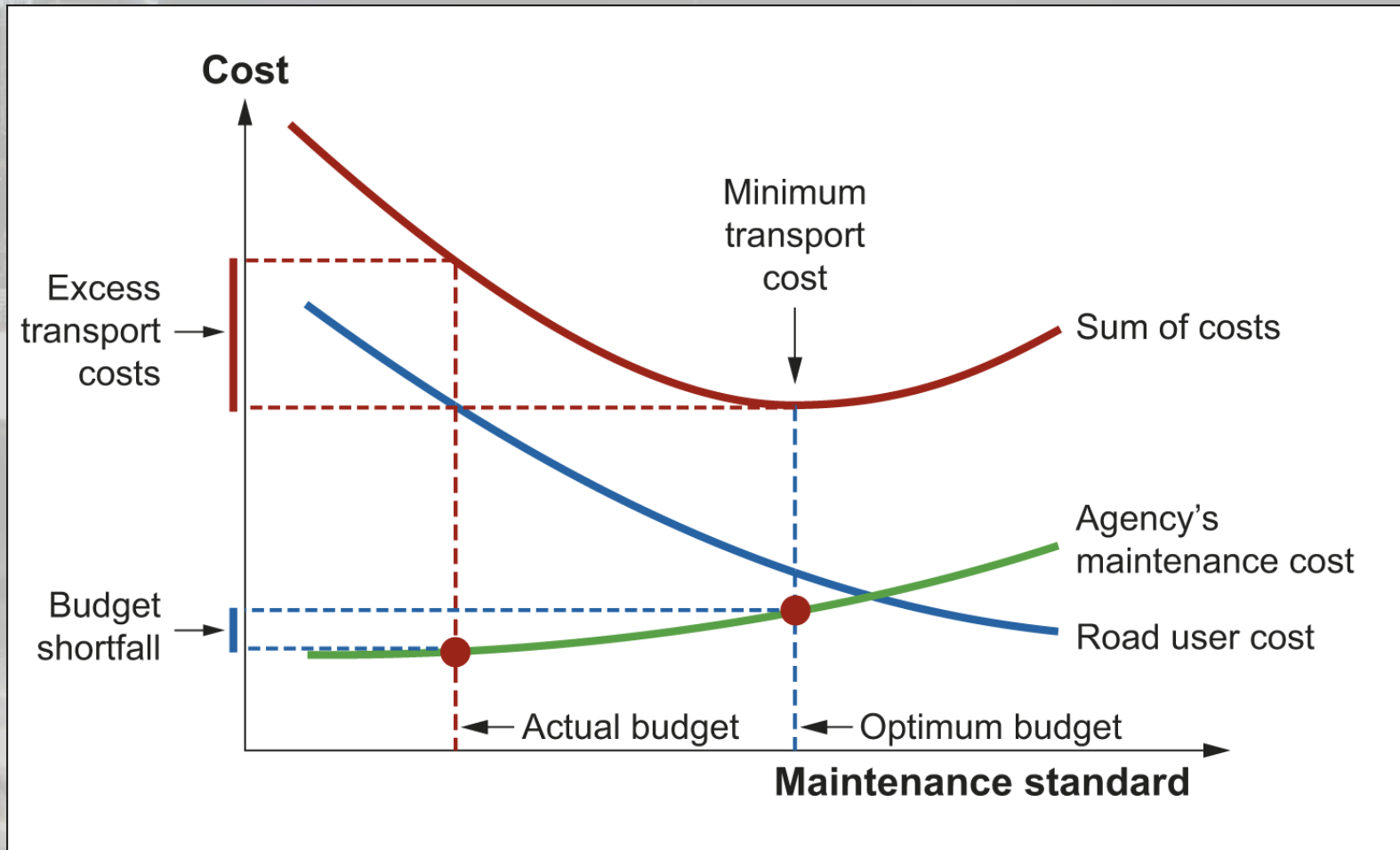


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## Example of treatment strategies



## Total transport costs



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# Findings

- Costs
  - 5 year needs between 3.6 (Minimum desirable) and 4.8 (Moderate standards) times current budget
  - Proposed future rates of coverage similar to other states
- Benefits
  - \$2 to \$3 net benefits per \$ investment above current funding level
  - Realisation depends on what is available
  - Corresponding road user savings between \$3 billion and \$3.5 billion in 20 years

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## Recommendations

1. Aim to justify funding level based on identified need and level of benefits
2. Give priority to routine and preventative maintenance, then rehabilitation using a suitable prioritisation indicator
3. Verify detailed results at a region level and consider in works program development

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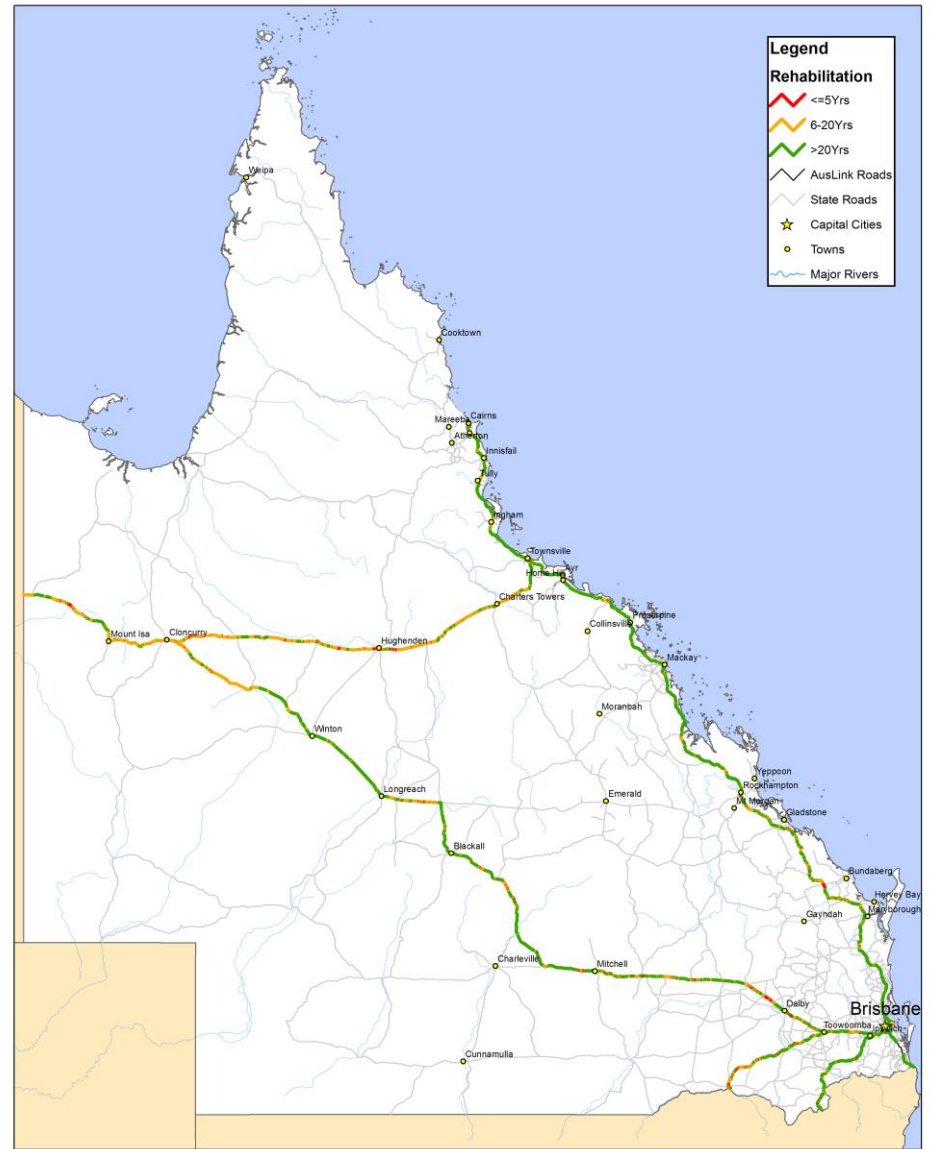
## Presentation of data

- Executive report
- Region level and summary data
  - works, priorities and supporting data
  - summary data by road and corridor
- HDM-4 reporting tool (for HQ)

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AusLink - Program Maintenance Strategy 2



AusLink - Rehabilitation Strategy 2



**Legend**

**Rehabilitation**

- <=5Yrs
- 6-20Yrs
- >20Yrs

AusLink Roads

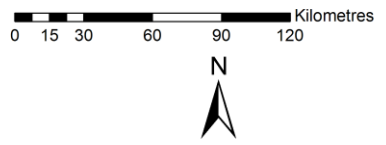
State Roads

Capital Cities

Towns

Major Rivers

Surface condition and deflection triggered additional works

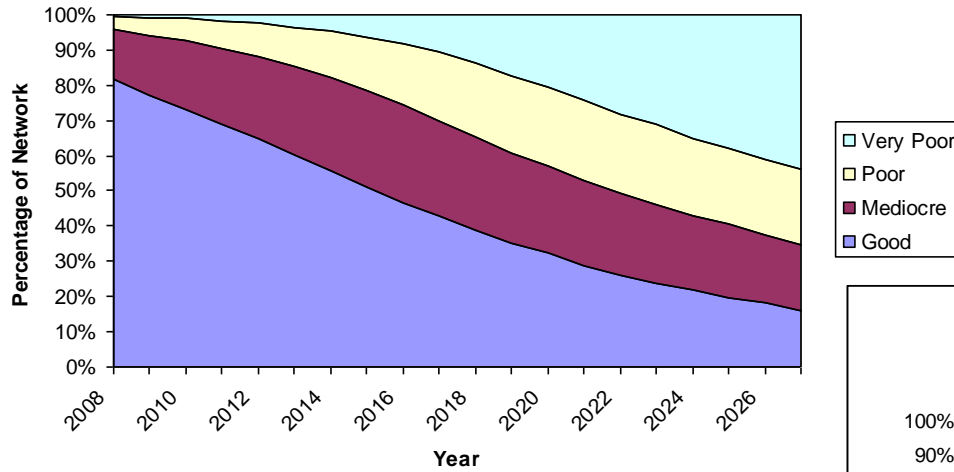


AusLink - Surface condition and deflection triggered additional rehabilitation works

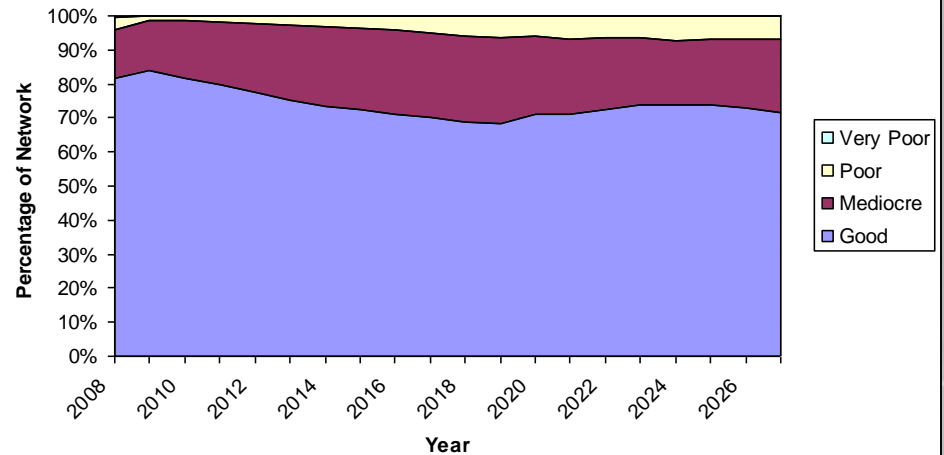
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## Future condition

### Ride Quality Index Distribution Current Funding



### Ride Quality Index Distribution Strategy 2 - Forced standard



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## Region level data 1

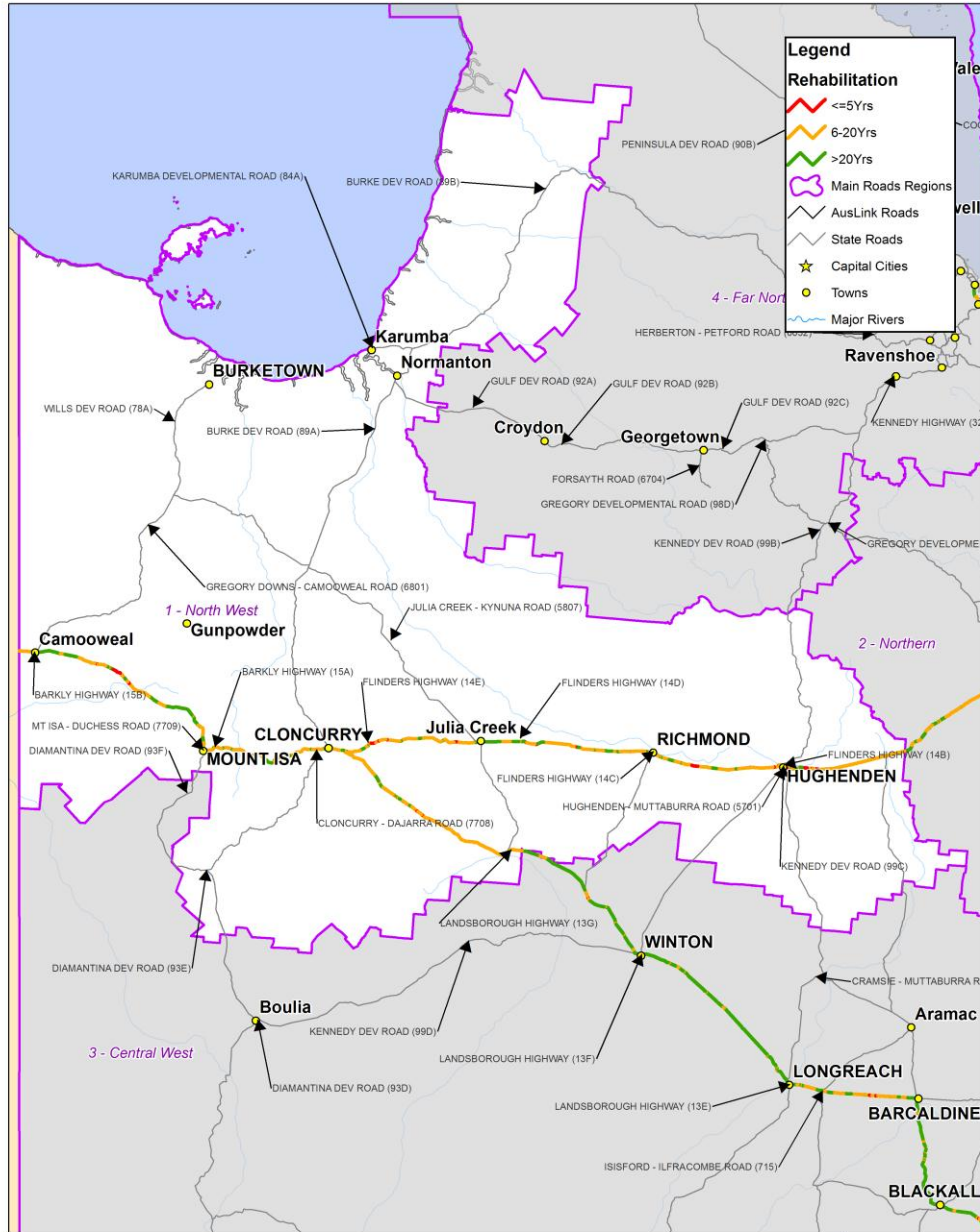
- Tables – Lists of 1 km results
  - Location information
  - Assessed condition, by Traffic, RMPCs, PRI, etc
  - First predicted work, BCR, Works Category
  - Second predicted work
  - Distress and structural based rehab flag
- Maps – spatial presentation of 1 km results
- Pivot tables by region, road, corridor
  - Treatment type and length by period
  - Treatment type and cost by period

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## Region level and summary data 2

Qld Auslink Network - HDM-4 strategy 2 predicted capital works - desired standard

Location Information - LGA boundaries as at 15-3-2008 Use drop down arrows in heading row to select desired sections						First predicted capital work						Second Work		
Corridor	Region	LGA	Road	Cway	Start Ch	1st work year	1st work timing	1st work	1st work cost	Benefit Cost Ratio (BCR)	1st work category	2nd work year	2nd work Type	Rehab recom. based on deflected
Brisbane - Darwin	North West	Mount Isa City Co	15A	2	120	2008	<=5Yrs	Auslink First Rehab Tra	0.420	7.30	Rehab	2018	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	245	2008	<=5Yrs	Auslink First Rehab Tra	0.333	4.54	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	217	2008	<=5Yrs	Auslink First Rehab Tra	0.248	4.31	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	247	2008	<=5Yrs	Auslink First Rehab Tra	0.361	3.94	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	215	2008	<=5Yrs	Auslink First Rehab Tra	0.248	3.87	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	246	2008	<=5Yrs	Auslink First Rehab Tra	0.264	3.03	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	220	2008	<=5Yrs	Auslink First Rehab Tra	0.248	3.03	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	225	2008	<=5Yrs	Auslink First Rehab Tra	0.244	2.93	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	221	2008	<=5Yrs	Auslink First Rehab Tra	0.248	2.92	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	222	2008	<=5Yrs	Auslink First Rehab Tra	0.248	2.78	Rehab	2019	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	3	0	2008	<=5Yrs	Auslink First Rehab Tra	0.411	2.74	Rehab	2018	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	1	135	2008	<=5Yrs	Auslink First Rehab Tra	0.208	2.73	Rehab	2019	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	2	0	2008	<=5Yrs	Auslink First Rehab Tra	0.597	2.67	Rehab	2018	Reseal	FALSE
Townsville - Clon	North West	Cloncurry Shire C	14E	1	136	2008	<=5Yrs	Auslink First Rehab Tra	0.640	2.46	Rehab	2018	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	1	152	2011	<=5Yrs	Auslink First Rehab Tra	0.208	2.45	Rehab	2022	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	216	2008	<=5Yrs	Auslink First Rehab Tra	0.248	2.38	Rehab	2019	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15A	3	120	2008	<=5Yrs	Auslink First Rehab Tra	0.254	2.27	Rehab	2018	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	187	2008	<=5Yrs	Auslink First Rehab Tra	0.248	2.19	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Cloncurry Shire C	14E	1	124	2009	<=5Yrs	Auslink First Rehab Tra	0.304	2.14	Rehab	2020	Reseal	FALSE
Townsville - Clon	North West	Cloncurry Shire C	14E	1	126	2012	<=5Yrs	Auslink First Rehab Tra	0.304	2.13	Rehab	2023	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	192	2011	<=5Yrs	Auslink First Rehab Tra	0.255	2.07	Rehab	2022	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	206	2011	<=5Yrs	Auslink First Rehab Tra	0.248	2.05	Rehab	2022	Reseal	FALSE
Townsville - Clon	North West	Cloncurry Shire C	14E	1	125	2012	<=5Yrs	Auslink First Rehab Tra	0.304	2.04	Rehab	2023	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	1	112	2008	<=5Yrs	Auslink First Rehab Tra	0.208	2.04	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	197	2011	<=5Yrs	Auslink First Rehab Tra	0.248	2.00	Rehab	2022	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	204	2011	<=5Yrs	Auslink First Rehab Tra	0.248	1.99	Rehab	2022	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	195	2011	<=5Yrs	Auslink First Rehab Tra	0.248	1.98	Rehab	2022	Reseal	FALSE
Brisbane - Darwin	North West	Mount Isa City Co	15B	1	118	2008	<=5Yrs	Auslink First Rehab Tra	0.208	1.97	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	201	2008	<=5Yrs	Auslink First Rehab Tra	0.248	1.95	Rehab	2019	Reseal	FALSE
Townsville - Clon	North West	Flinders Shire Co	14B	1	143	2008	<=5Yrs	Auslink First Rehab Tra	0.288	1.84	Rehab	2018	Reseal	FALSE



0 25 50 100 150 200 Kilometres

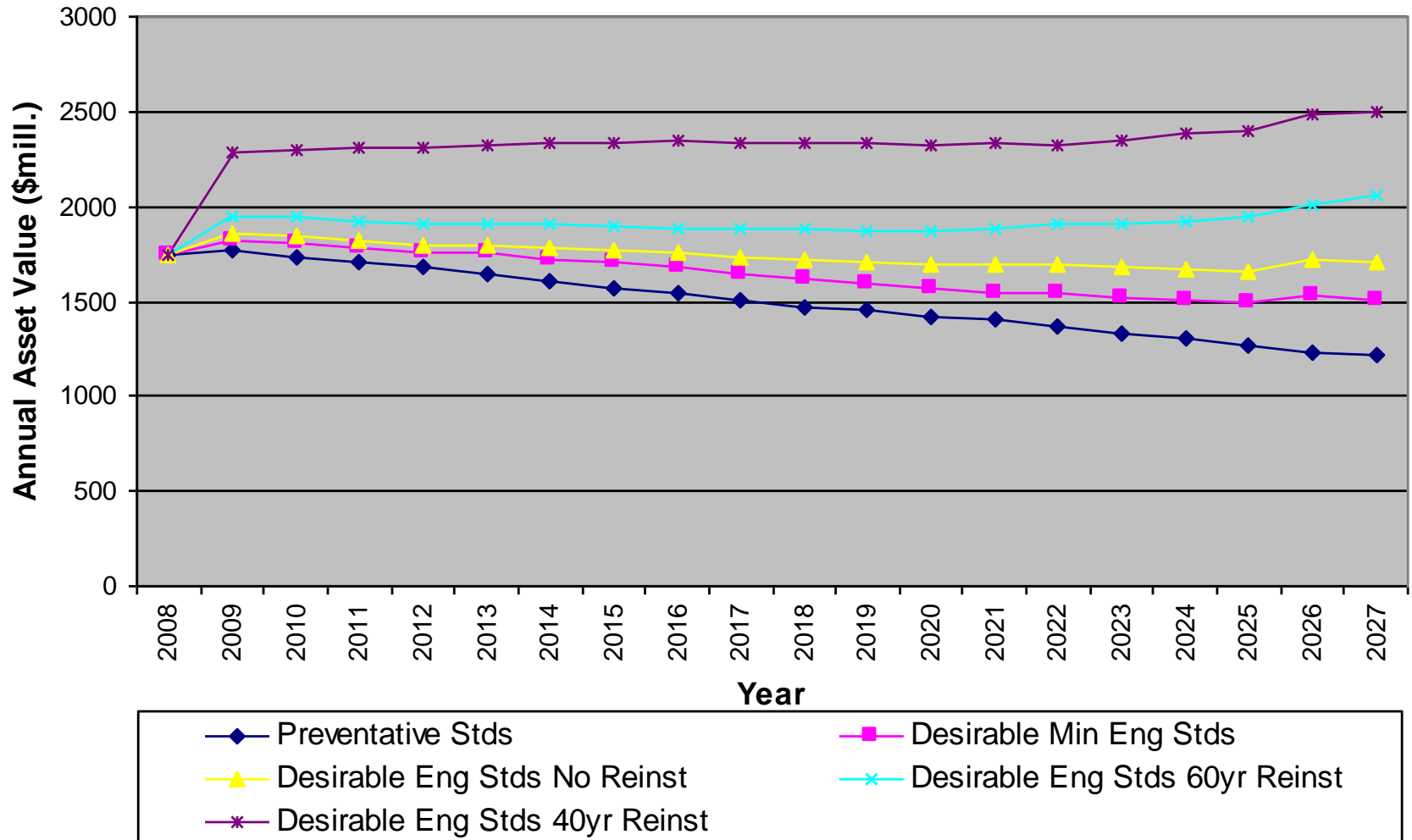


**North West Region (1)  
AusLink - Rehabilitation  
Strategy 2**

## Region level summary data 3

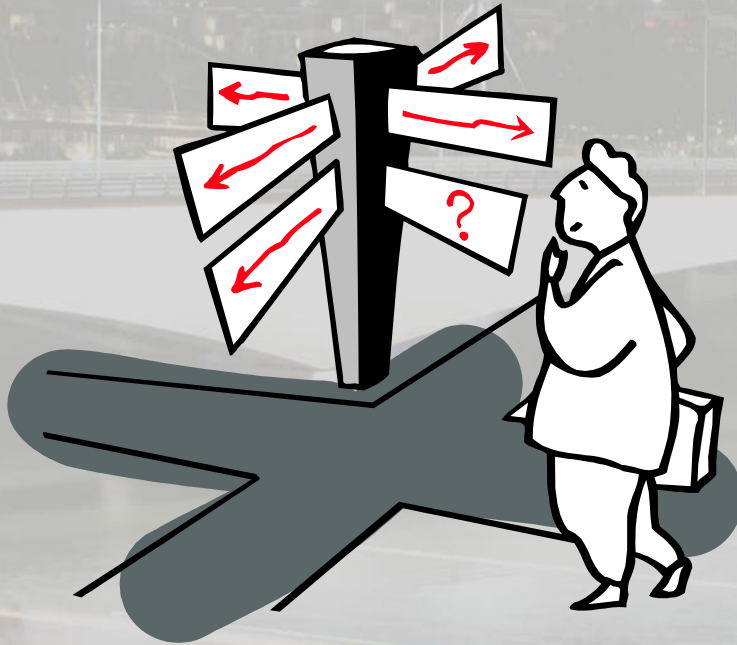
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## Tasmanian Road Network - Annual Asset Value Comparison of Strategies





## Application of the results!



Thank  
you!

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