Townsville City Council, From Condition Data to Informed Decisions Using PARMMS-Horizons Management Tool

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About…Townsville

Capital of Northern Australia ● The City with Opportunity and Great Lifestyle

AREA:	POPULATION:	HOUSEHOLDS:	BUSINESSES:
3,736 SQ. KM	**190,000**	**70,000**	**5,000**

The Asset Management – WHY?

…Journey to Achieve Sustainability in Business Performance…

- What do they own and where is it?
- What are these assets worth?
- What is its remaining service life?
- What condition is it in?
- What do they spend and what should they spend/invest?
- What is the gap?
- How do they get sustainable infrastructure?
- How resilient is their infrastructure?

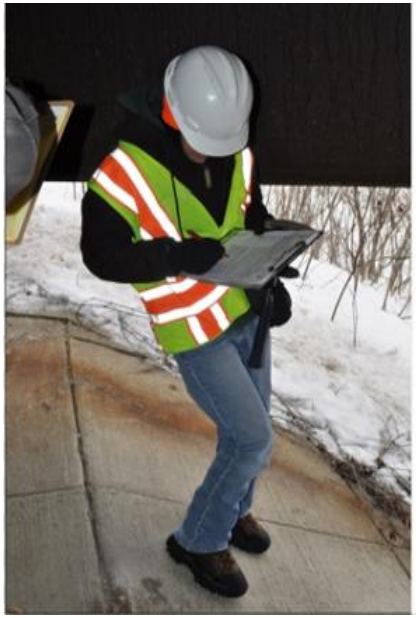
The Asset Management – HOW?

…Journey to Achieve Sustainability in Business Performance…

- Inspection / Data Collection
- Condition Assessment
- Deterioration Model
- Decision Making
- Maintain | Repair | Rehabilitate | Replace
- Prioritise Future Needs
- GIS INTEGRATED INTO AN ASSET MANAGEMENT SYSTEM

Condition Assessment

Traditional (Qualitative)



MICHIGAN DEPARTMENT OF TRANSPORTATION

SAFETY INSPECTION REPORT - CORE ELEMENTS

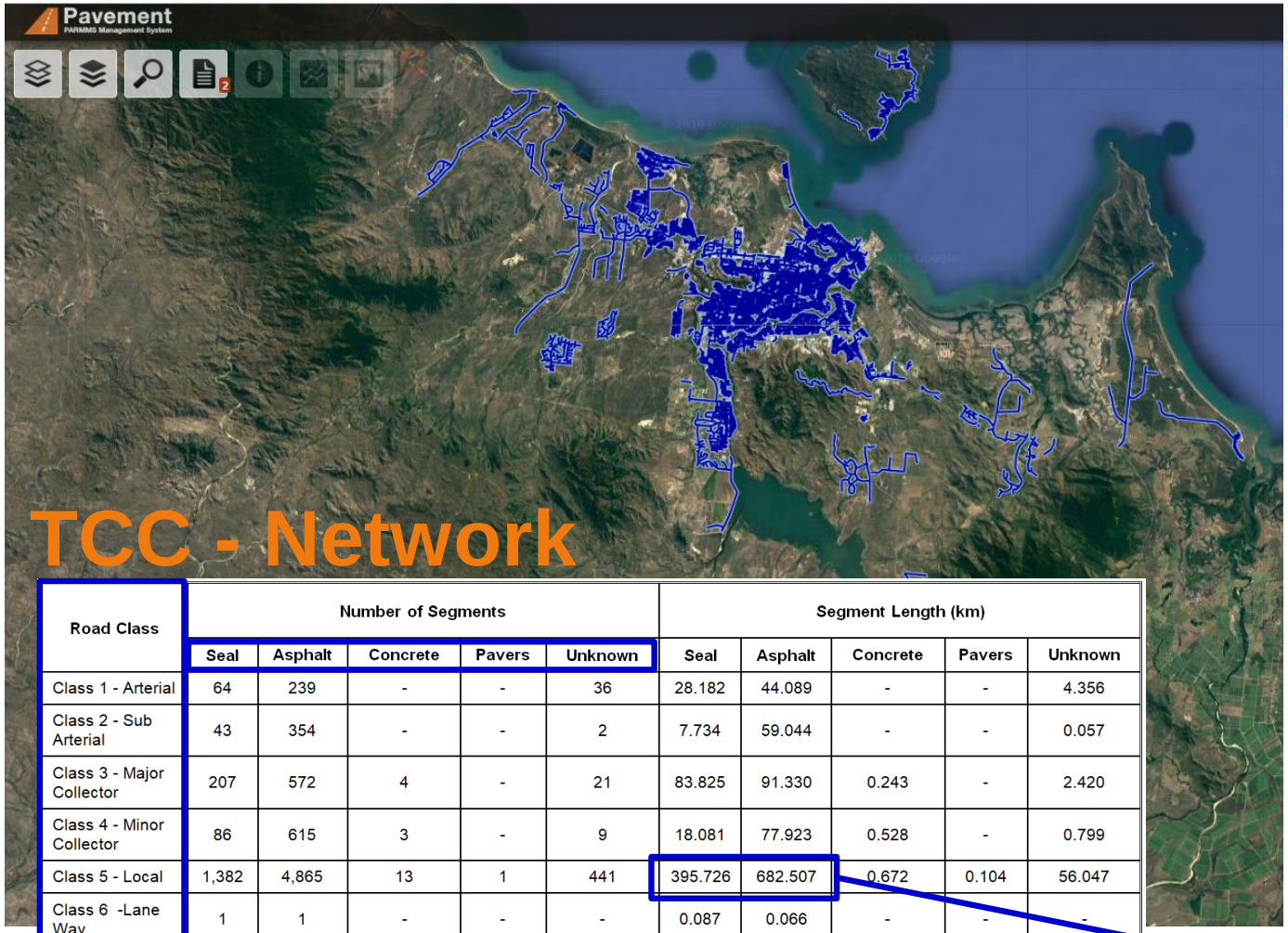
Innovation (Technology / Quantitative)

The relationship for determining the pavement condition index is as follows;

$$PCI = 100 - \sum_{i=1}^{nc} WF_{nc} \max\left[0, \left(\min\left(1, \frac{PD_{nc} - PM_{nc}}{MD_{nc}}\right)\right)\right]$$

Where:

PCI	=	pavement condition index
n	=	number of pavement distresses included in the PCI
c	=	segment road class
WF	=	weighting factor of surface distress type *n* for road class *c*
PD	=	extent of pavement distress type *n*
PM	=	minimum extent of distress type *n* allowed for road class *c*
MD	=	maximum extent of distress type *n* allowed for road class *c*

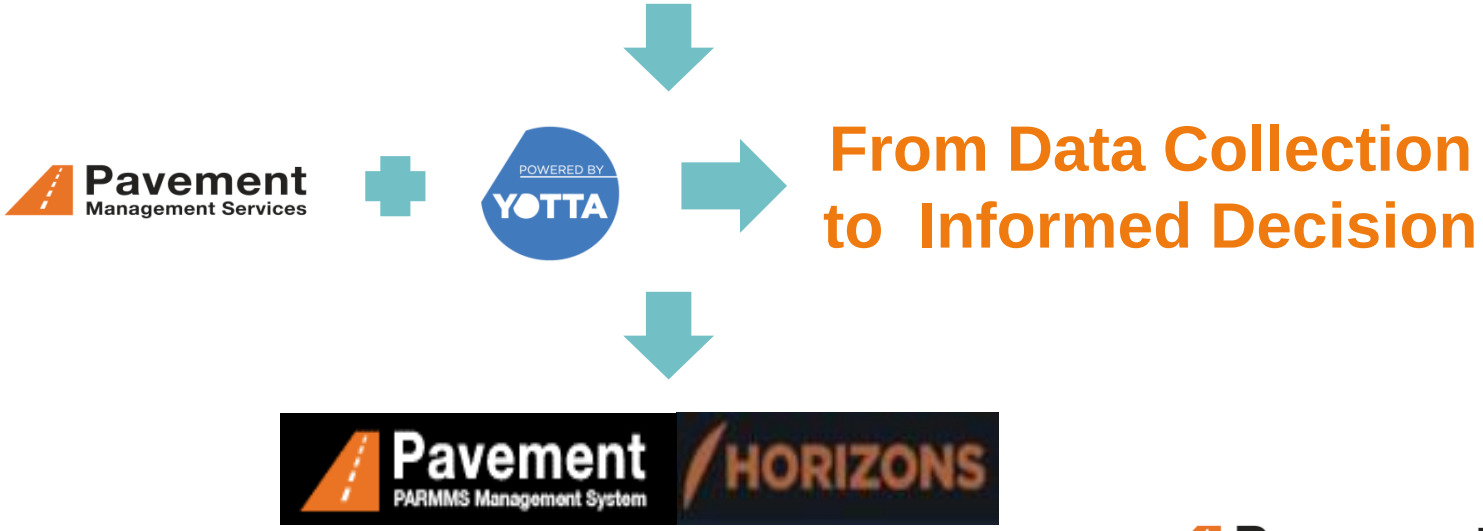


TCC - Network

Road Class	Number of Segments					Segment Length (km)				
	Seal	Asphalt	Concrete	Pavers	Unknown	Seal	Asphalt	Concrete	Pavers	Unknown
Class 1 - Arterial	64	239	-	-	36	28.182	44.089	-	-	4.356
Class 2 - Sub Arterial	43	354	-	-	2	7.734	59.044	-	-	0.057
Class 3 - Major Collector	207	572	4	-	21	83.825	91.330	0.243	-	2.420
Class 4 - Minor Collector	86	615	3	-	9	18.081	77.923	0.528	-	0.799
Class 5 - Local	1,382	4,865	13	1	441	395.726	682.507	0.672	0.104	56.047
Class 6 -Lane Way	1	1	-	-	-	0.087	0.066	-	-	-
Class 7 - Local Access	-	-	-	-	-	-	-	-	-	-
Class 8 - Carpark	-	-	-	-	-	-	-	-	-	-
Other	-	-	141	8	-	-	-	7.980	0.450	-
Total	1,783	6,646	161	9	509	533.635	954.959	9.423	0.554	63.679
			9,108					1,562.250		

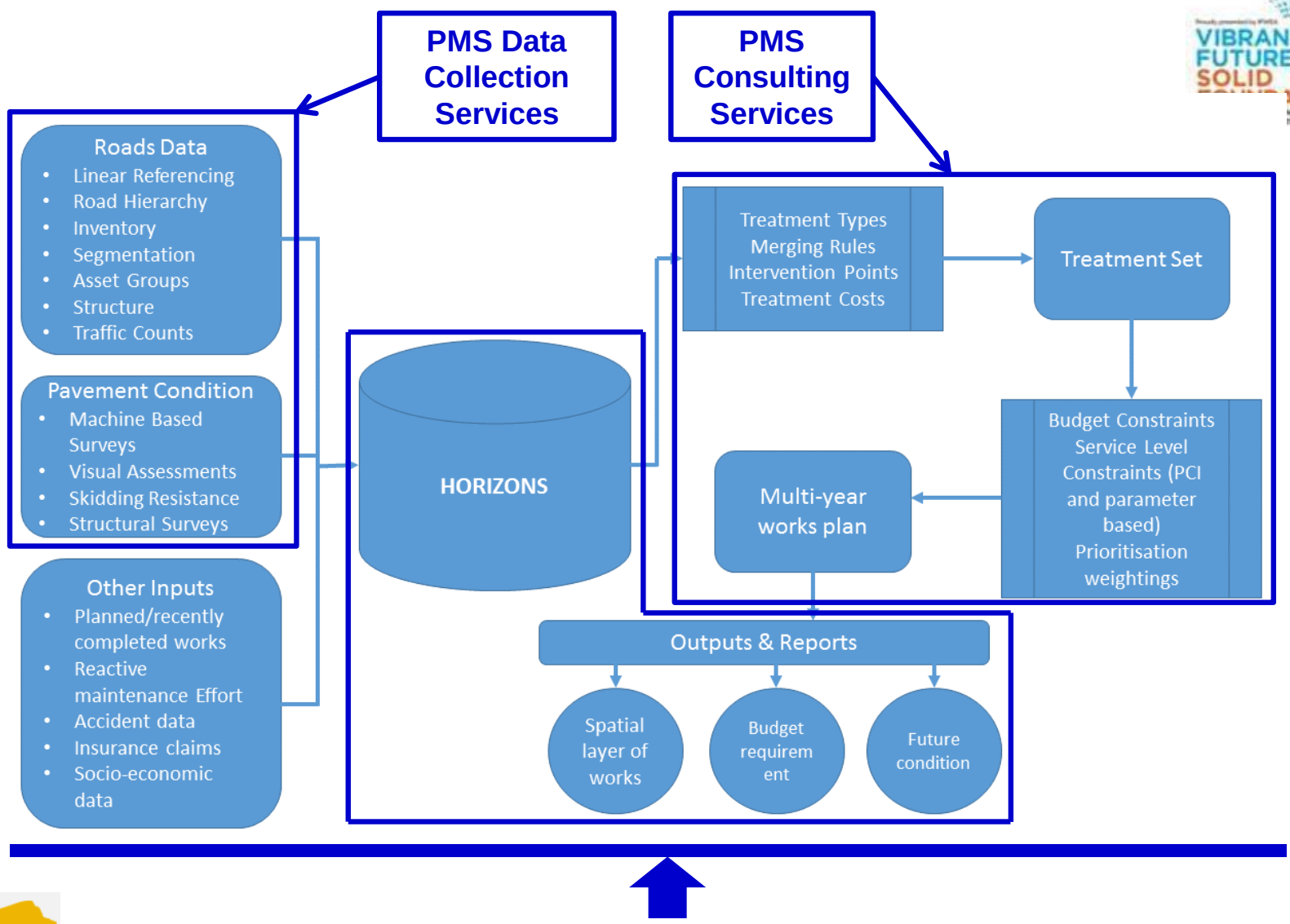
1100km

TCC made the decission to find a system that incorporate pavement condition data into a management tool, that uses multiple data sets to provide a higher level of understanding of the road network.



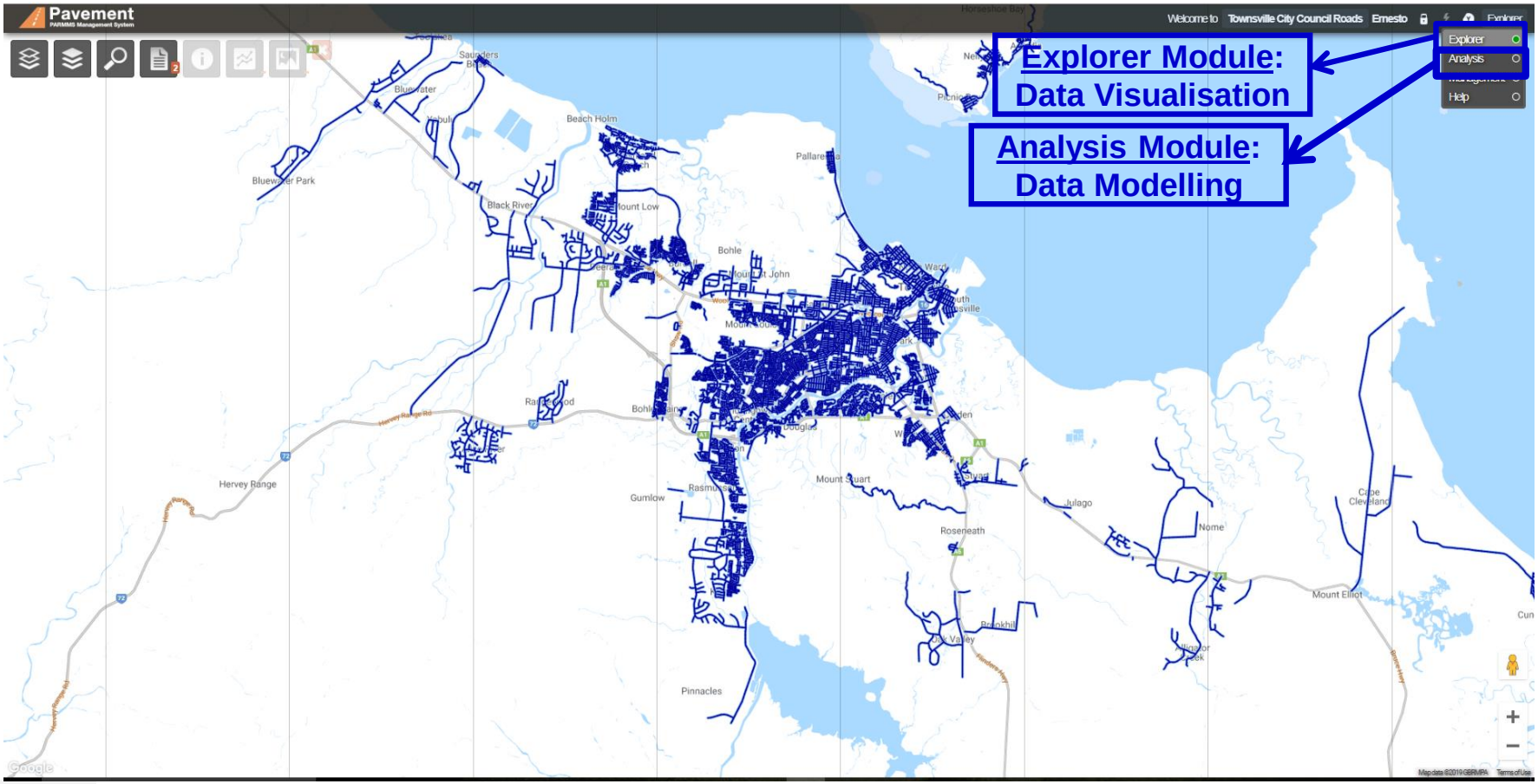
PARMMS® Road Manager

Now Powered by YOTTA-UK

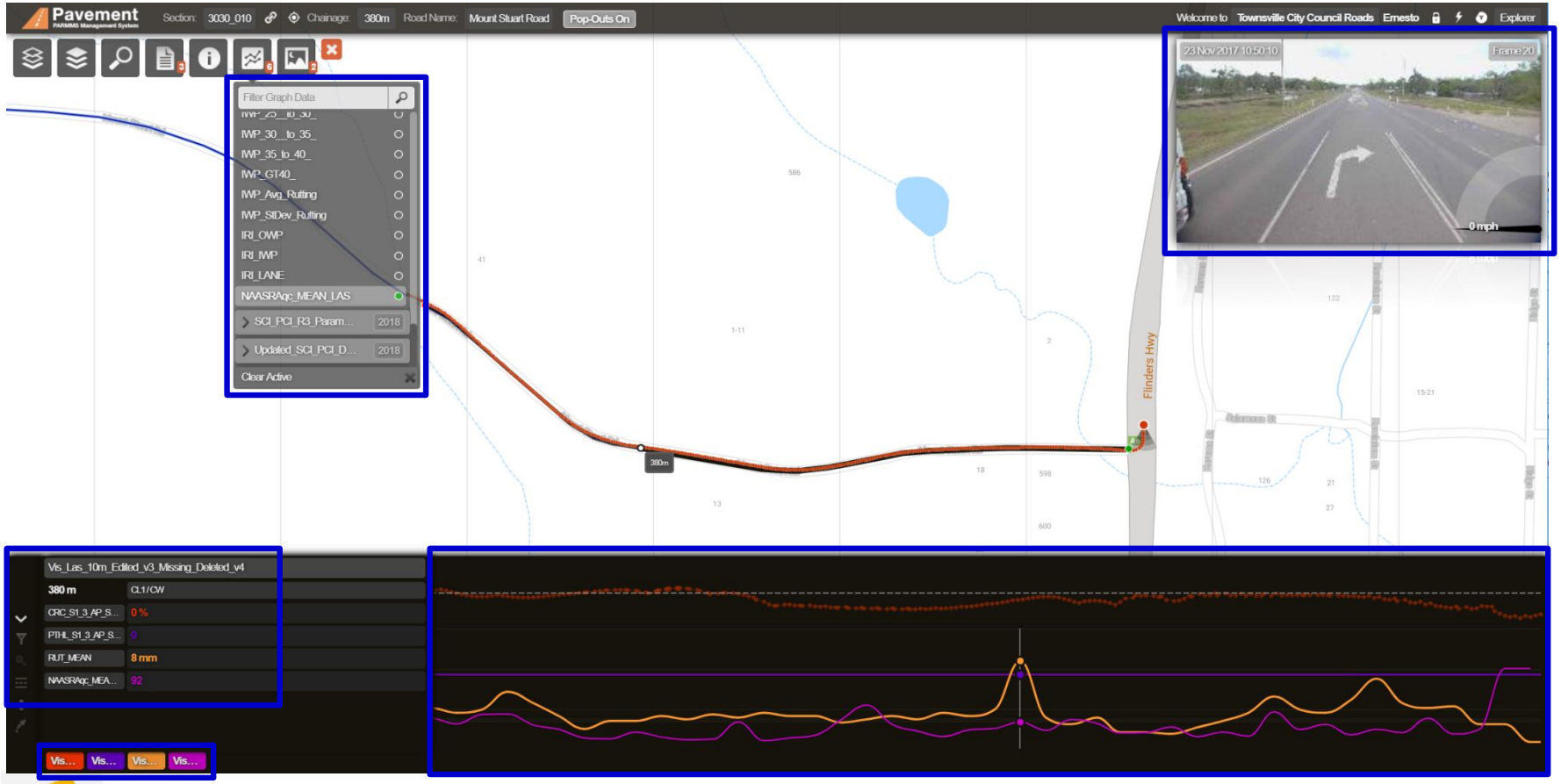


Supported by Horizons Platform

PARMMS-Horizons System



Explorer Module: Interface and Data Visualisation

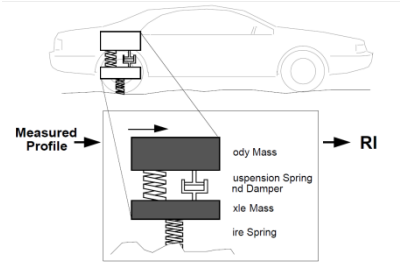


City of Townsville

Pavement Management Services

Data Analysis: Distresses for Modelling

Roughness



Computer Algorithm

Rutting

Figure 4.5: Straightedge and wedge manual rut depth measurement

Source: Australian Road Research Board.

Cracking

A.1.6 Cracking – Crocodile Cracking (Alligator Cracking, Crazing) (CR)

Description:
Interconnected or interlaced cracks forming a series of small polygons resembling a crocodile skin.

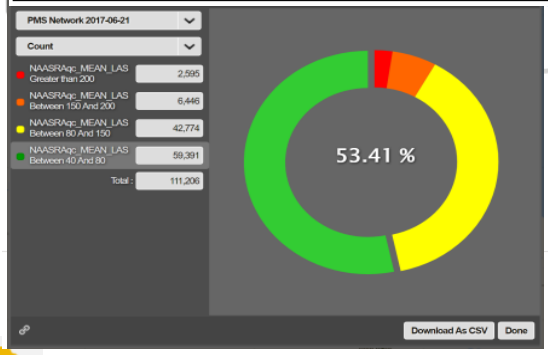
Crocodile cracking is often confined to the wheelpaths and may have a noticeable longitudinal grain.

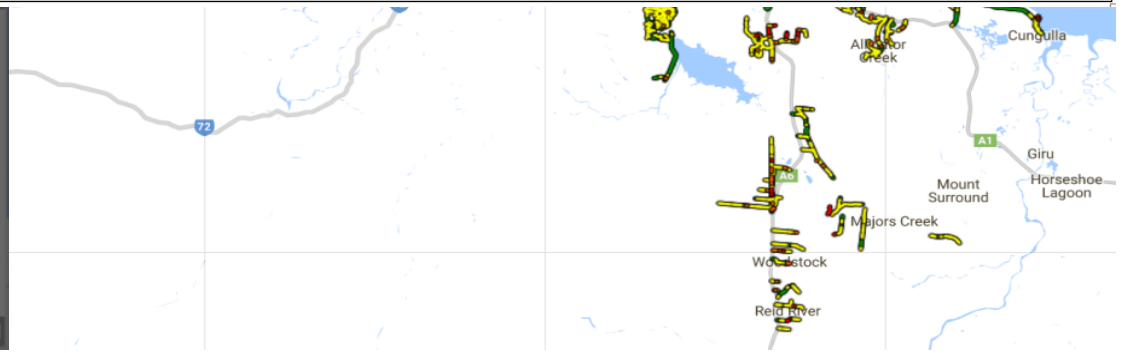
The presence of crocodile cracking usually signifies that the surfacing has reached the end of its design life.

Collected by PMS using the ARAN System

Distribution of Roughness (NRM) Across the Network

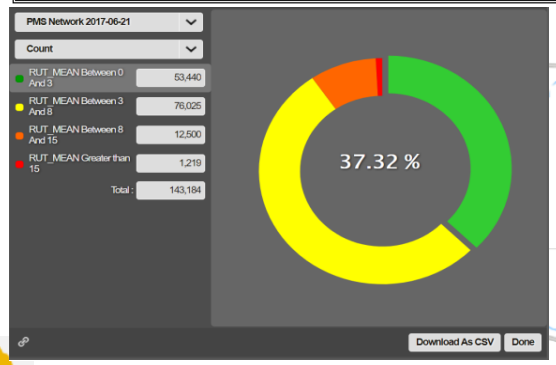
Roughness (NRM) Bins	Network 92%	Seal				Asphalt			
		Class 1&2	Class 3&4	Class 5	Class 6, 7&8	Class 1&2	Class 3&4	Class 5	Class 6, 7&8
40 – 80	53.41%	57.76%	52.80%	41.08%	-	67.10%	61.76%	57.85%	-
80 – 150	38.46%	30.42%	37.91%	46.13%	-	28.04%	33.09%	36.58%	33.33%
150 – 200	5.80%	7.70%	6.73%	8.83%	50.00%	3.42%	3.90%	4.16%	-
> 200	2.33%	4.12%	2.57%	3.97%	50.00%	1.44%	1.24%	1.41%	66.67%

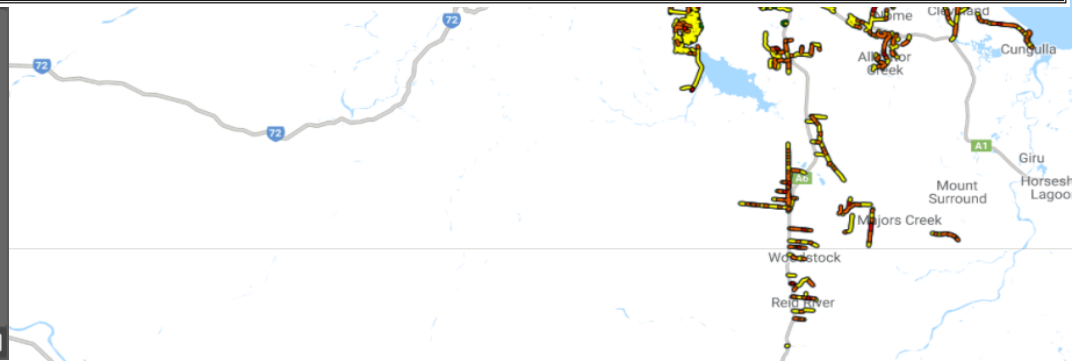




Distribution of Rut Depth (mm) Across the Network

Rutting (mm) Bins	Network	Seal				Asphalt			
	90%	Class 1&2	Class 3&4	Class 5	Class 6, 7&8	Class 1&2	Class 3&4	Class 5	Class 6, 7&8
0 – 3	37.32%	7.92%	5.25%	11.54%	-	31.95%	44.29%	58.86%	-
3 – 8	53.10%	75.86%	65.37%	68.67%	-	62.37%	52.58%	39.18%	100%
8 – 15	8.73%	15.03%	26.67%	18.84%	50.00%	5.29%	2.98%	1.75%	-
> 15	0.85%	1.19%	2.72%	1.75%	50.00%	0.40%	0.15%	0.21%	-





Distribution of Cracking (% Area) Across the Network

Fatigue Cracking (%) Bins	Network	Seal				Asphalt			
		Class 1&2	Class 3&4	Class 5	Class 6, 7&8	Class 1&2	Class 3&4	Class 5	Class 6, 7&8
0 – 3	95.88%	96.35%	99.33%	98.59%	100%	95.48%	96.12%	93.79%	71.43
3 – 8	1.45%	1.30%	0.22%	0.50%	-	1.77%	1.38%	2.16%	-
8 – 15	1.38%	1.22%	0.25%	0.45%	-	1.45%	1.49%	2.04%	14.29%
> 15	1.30%	1.13%	0.19%	0.46%	-	1.30%	1.01%	2.01%	14.29%

City of Townsville

Pavement Management Services

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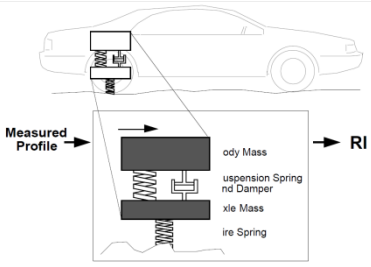

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The presence of crocodile cracking usually signifies that the surfacing has reached the end of its design life.

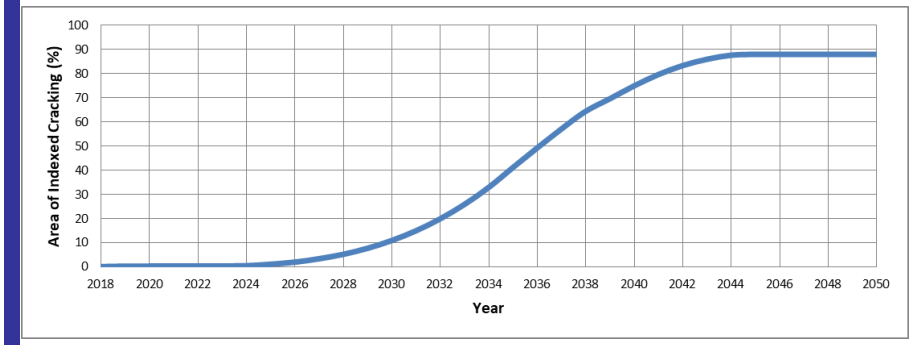
General Network Condition: Good / Very Good!

Intervention Levels

Road Class	Surface Type	Treatment Category	Treatment Type	Treatment Cost ($/sqm)	Fatigue Cracking (%)	NAASRA (counts/km)	Rutting (mm)
Road Class 1 & 2		Do Nothing	Do Nothing	N/A	<1.5	30 – 60	<3.0
		Resurface	Reseal	12.0	1.5 – 3.0	30 – 60	<3.0
		Rehabilitation	Mill and Replace (Chipseal 10mm+14mm)	60.0	1.5 – 3.0	60 – 120	>3.0
		Reconstruction	Reconstruction	95.0	>3.0	>120	>3.0

Deterioration Models Based on Historical Data / PMS Experience

Cracking



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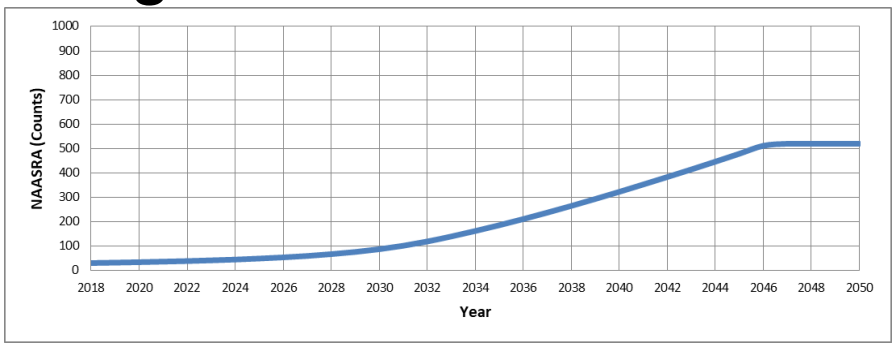
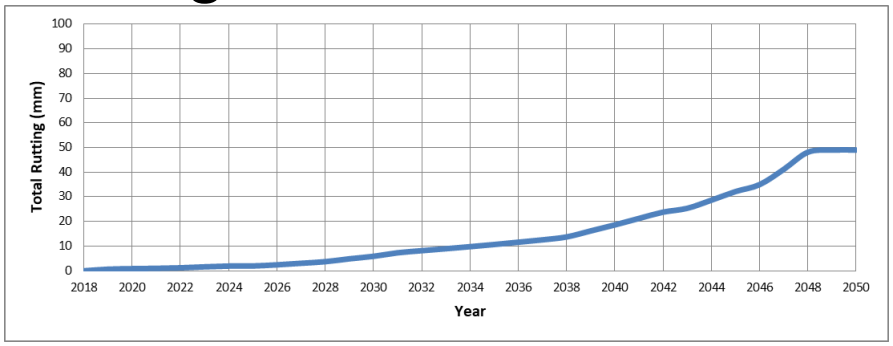
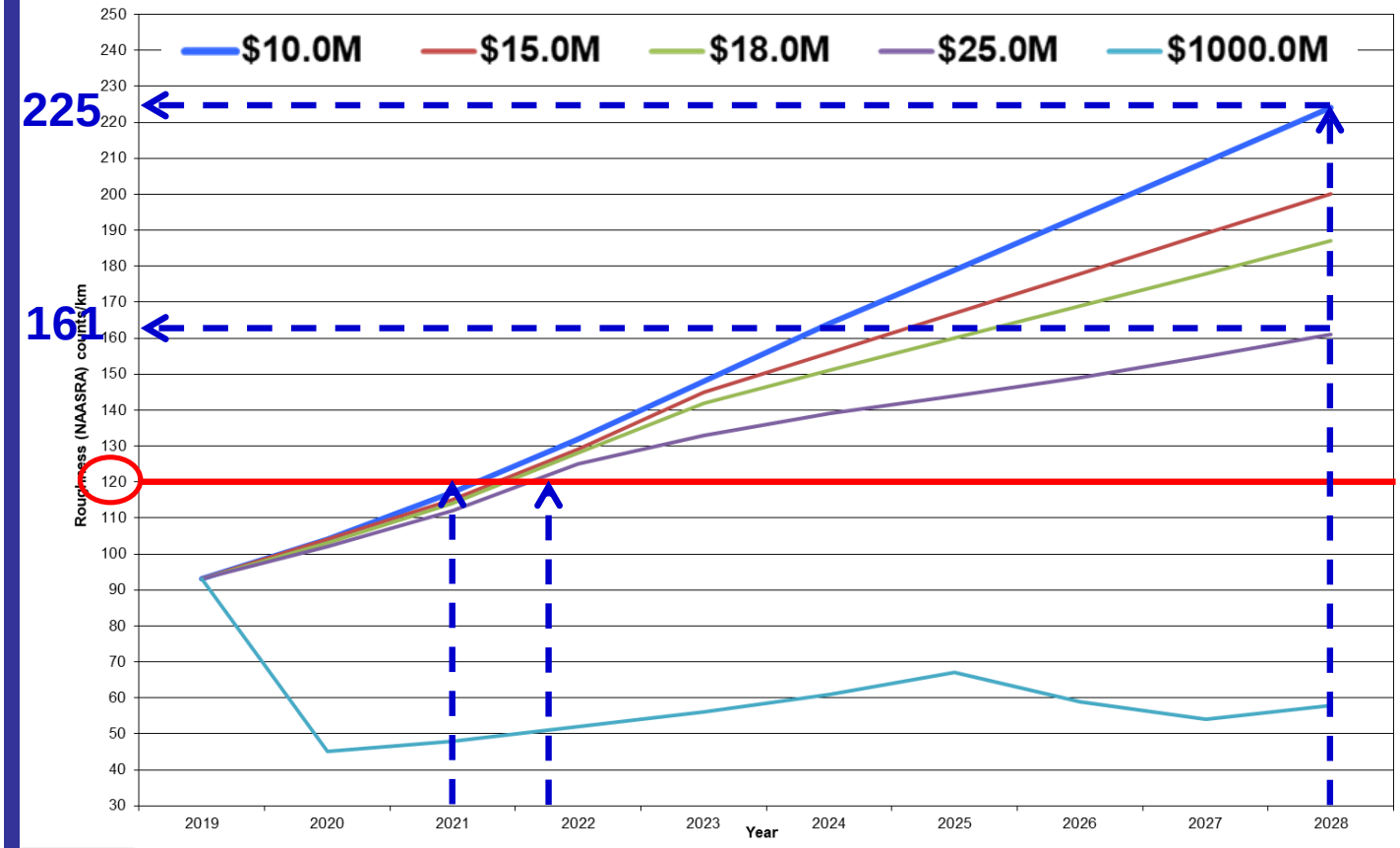


Rutting



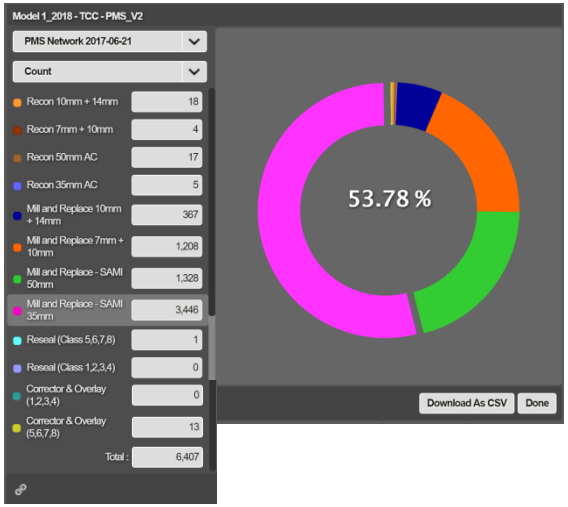
Budget Comparison and Analysis (per Year)



KPI for Reconstruction

Roughness Progression vs. Budget Strategy

Townsville City Council, From Condition Data to Informed Decisions Using PARMMS-Horizons Management Tool



Pavement PARMMS Management System HORIZONS

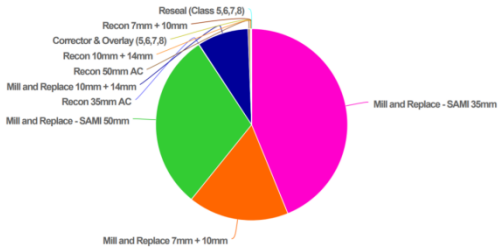
Treatment Set Summary

Details

Treatment Set Name	Model 1_2018 - TCC - PMS_V2
Report Network ⚠	PMS Network 2017-06-21
Network Filter Layer	PMS Network 2017-06-21
Sub-section Length	10.00m
Minimum Treatment Length	1.00m
Consider Alternative Treatments	No
Deteriorate To Date	No
Merged Using	Worst Condition
XSP Merge Method	All
Whole Section Merge	No
Merge Short Treatments	Yes

Total Spend Required $636,888,380.60

This report contains details regarding the complete list of treatments triggered over the network in the current condition. The total cost of treatments given below is indicative and is based on the treatment costs provided within treatment definitions. A detailed list of treatments can be found in the Treatment Set Configuration report.



Mill and Replace - SAMI 35mm	$279,210,373.92
Mill and Replace 7mm + 10mm	$108,076,212.70
Mill and Replace - SAMI 50mm	$190,509,022.83
Recon 35mm AC	$397,680.00
Mill and Replace 10mm + 14mm	$54,883,473.60
Recon 50mm AC	$2,117,901.85
Recon 10mm + 14mm	$1,029,789.17
Corrector & Overlay (5,6,7,8)	$393,832.33
Recon 7mm + 10mm	$266,944.20
Reseal (Class 5,6,7,8)	$3,150.00

Total Quantity Required 9,035,407 m²

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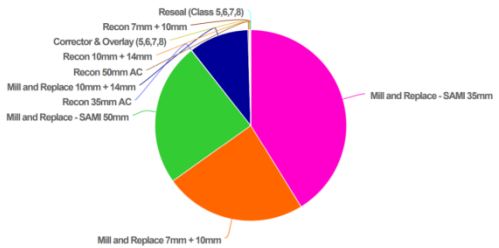

Mill and Replace - SAMI 35mm	3,722,805 m²
Mill and Replace 7mm + 10mm	2,161,524 m²
Mill and Replace - SAMI 50mm	2,189,759 m²
Recon 35mm AC	3,977 m²
Mill and Replace 10mm + 14mm	914,725 m²
Recon 50mm AC	18,910 m²
Recon 10mm + 14mm	10,840 m²
Corrector & Overlay (5,6,7,8)	9,377 m²
Recon 7mm + 10mm	3,141 m²
Reseal (Class 5,6,7,8)	350 m²

Year 1 Works Program

City of Townsville

Pavement Management Services

Townsville…To Sum up…Conclusions

Data Collection…Informed Decisions…Moving Forward…

pms_id	Route_Name	client_id	Ru_18	Ru_19	Pothole_18	Pothole_19	Irregular_Patching_18	Irregular_Patching_19	ROW_18	ROW_19
T4225LA1LI1S0010	Road to Park off T	4225_010	10.5	16.4	2.97	10.13	8.9	18.74	V:/TownsVille/2018/PartB/ROW/000000371201.jpg	V:/TownsVille/2019/PartB/ROW/000000380119.jpg

Photos - 000000371201.jpg

See all photos | Add to a creation

2018

Photos - 000000380119.jpg

2019

Queensland Reconstruction Authorities (QRA)…Sections Included to Reconstruction of Essential Public Assets (REPA)…

City of Townsville

Pavement Management Services

Thank You…

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