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Predicting Pavement Life

Status after collecting TSD data over 5 successive years & Extending coverage with MSD

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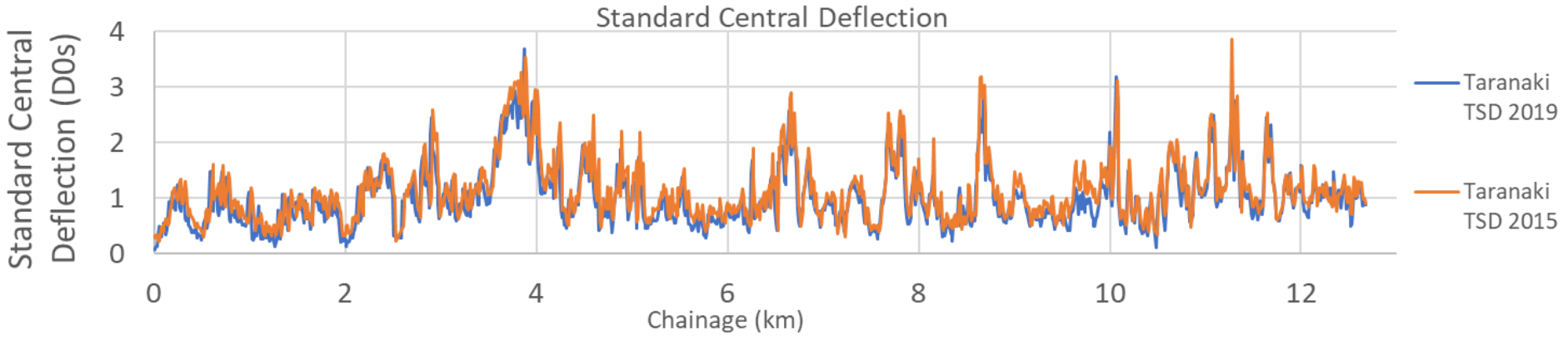
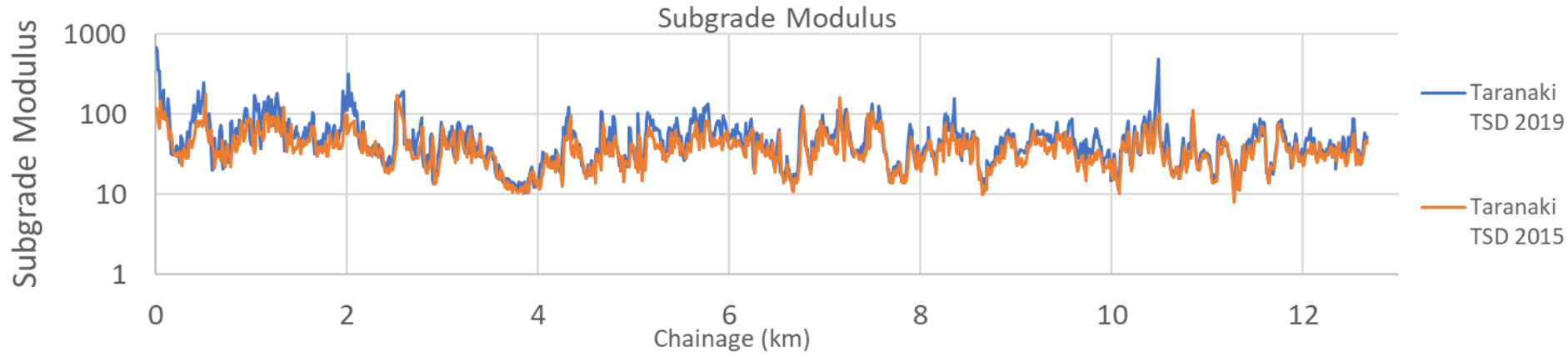
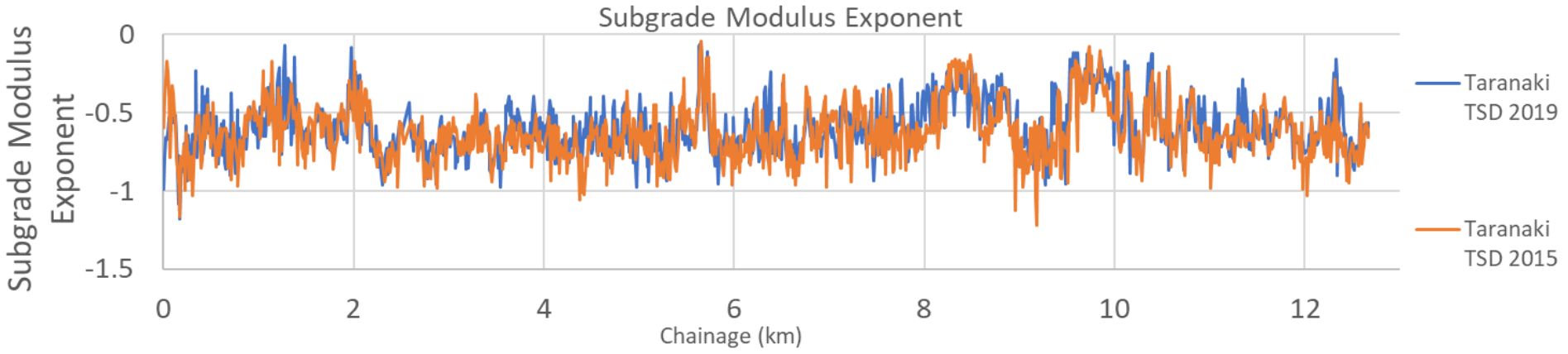
Taranaki TSD 2019 v 2015







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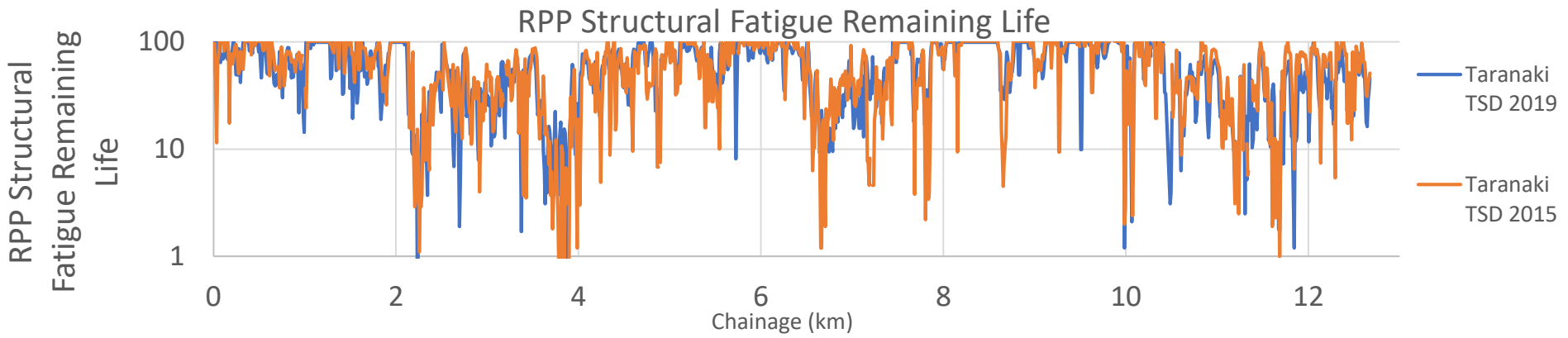
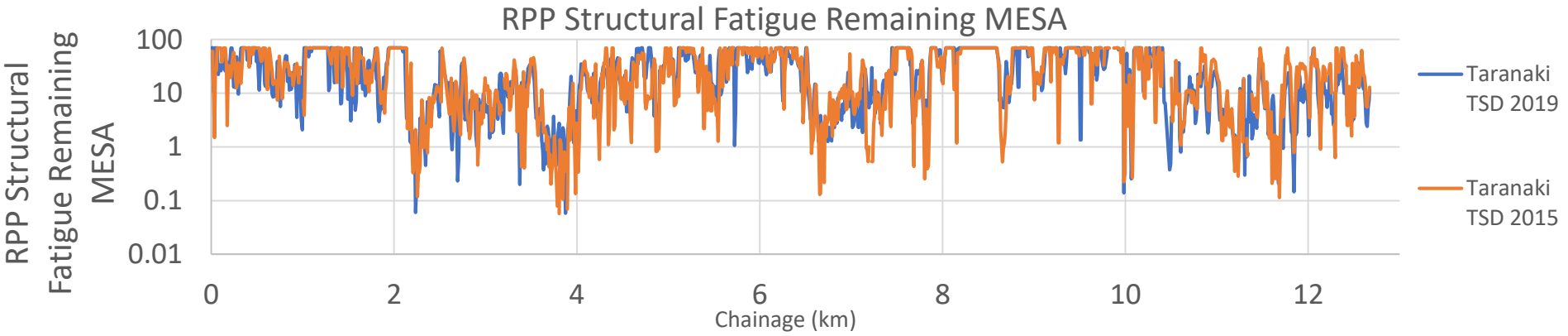
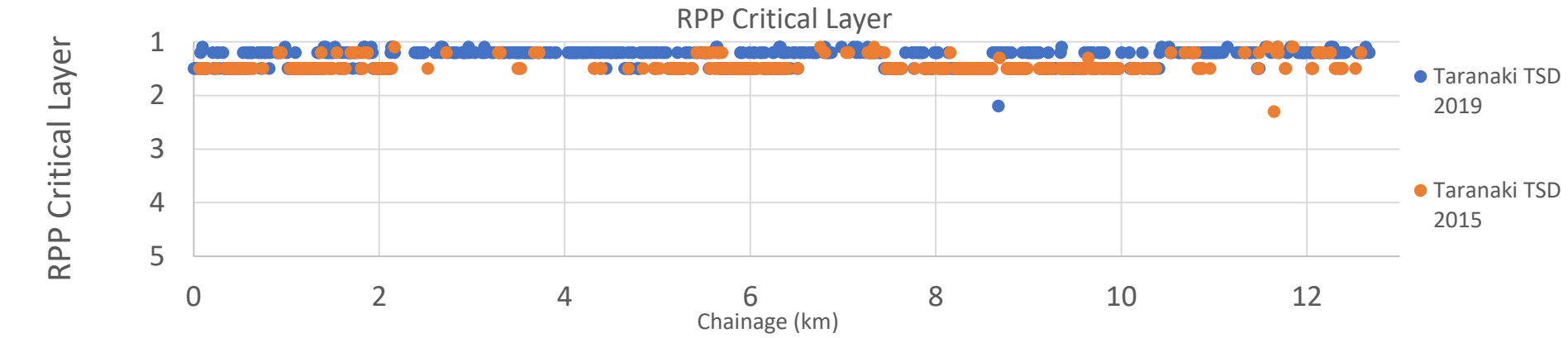
Taranaki TSD 2019 v 2015







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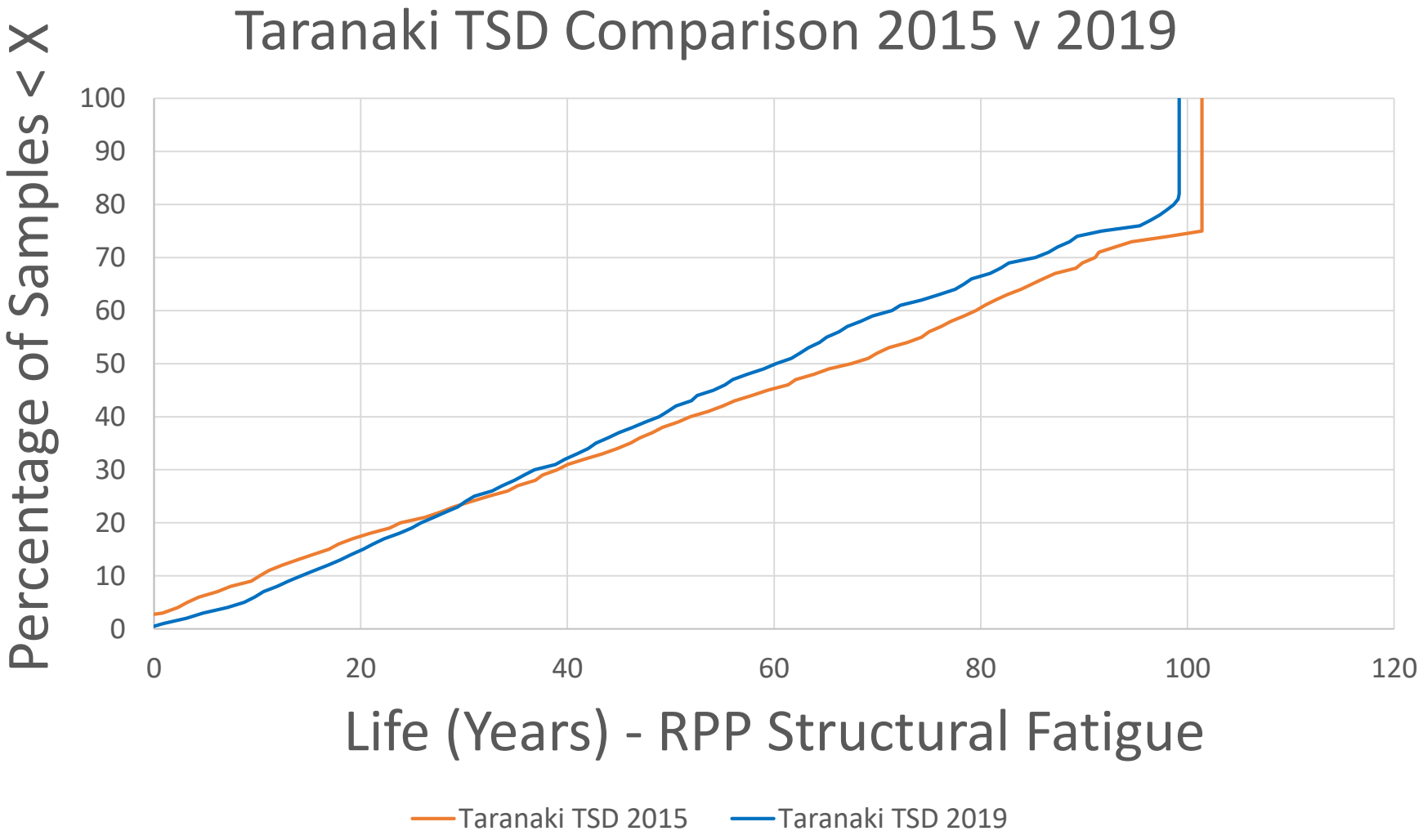
Taranaki TSD 2015 v 2019



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With all main highways tested with TSD now, that information can be used to calibrate alternative equipment (MSD) developed for determining the relative structural capacity of nearby local roads. The Multi Speed Deflectometer is a shorter vehicle that can be accommodated on local roads and establishes remaining life with testing at traffic speeds.

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MSD works only on low volume roads and can generate Structural Number, but it is more practical to generate layer indices, as promoted by Horack, 2008 and others, so that the strength of various layers can be differentiated, rather that use one size fits all. MSD currently generates three layer indices (Surface - SLI, Base – BLI and Lower Layer Index – LLI).

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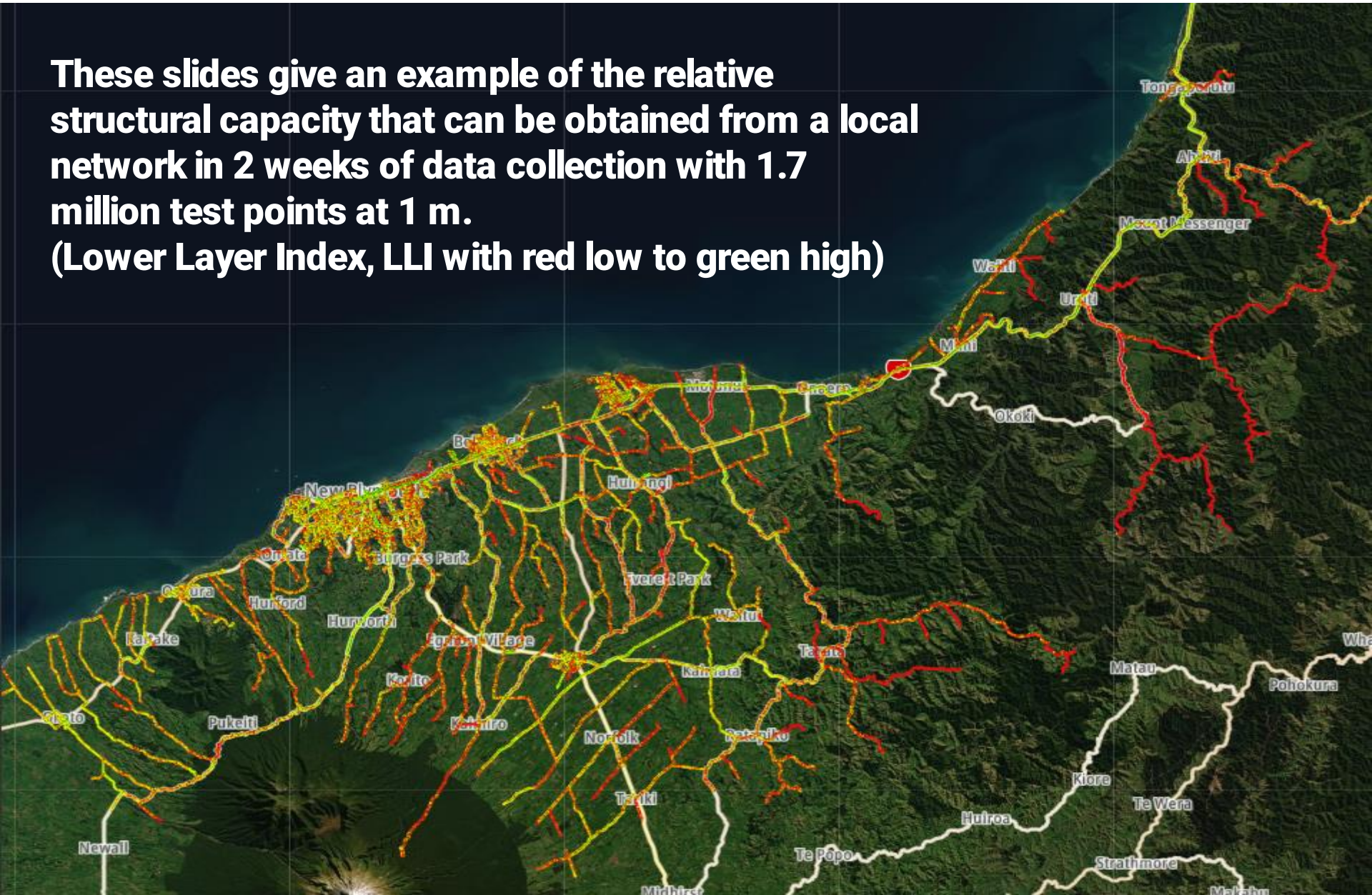
MSD Subgrade Condition

These slides give an example of the relative structural capacity that can be obtained from a local network in 2 weeks of data collection with 1.7 million test points at 1 m.
(Lower Layer Index, LLI with red low to green high)



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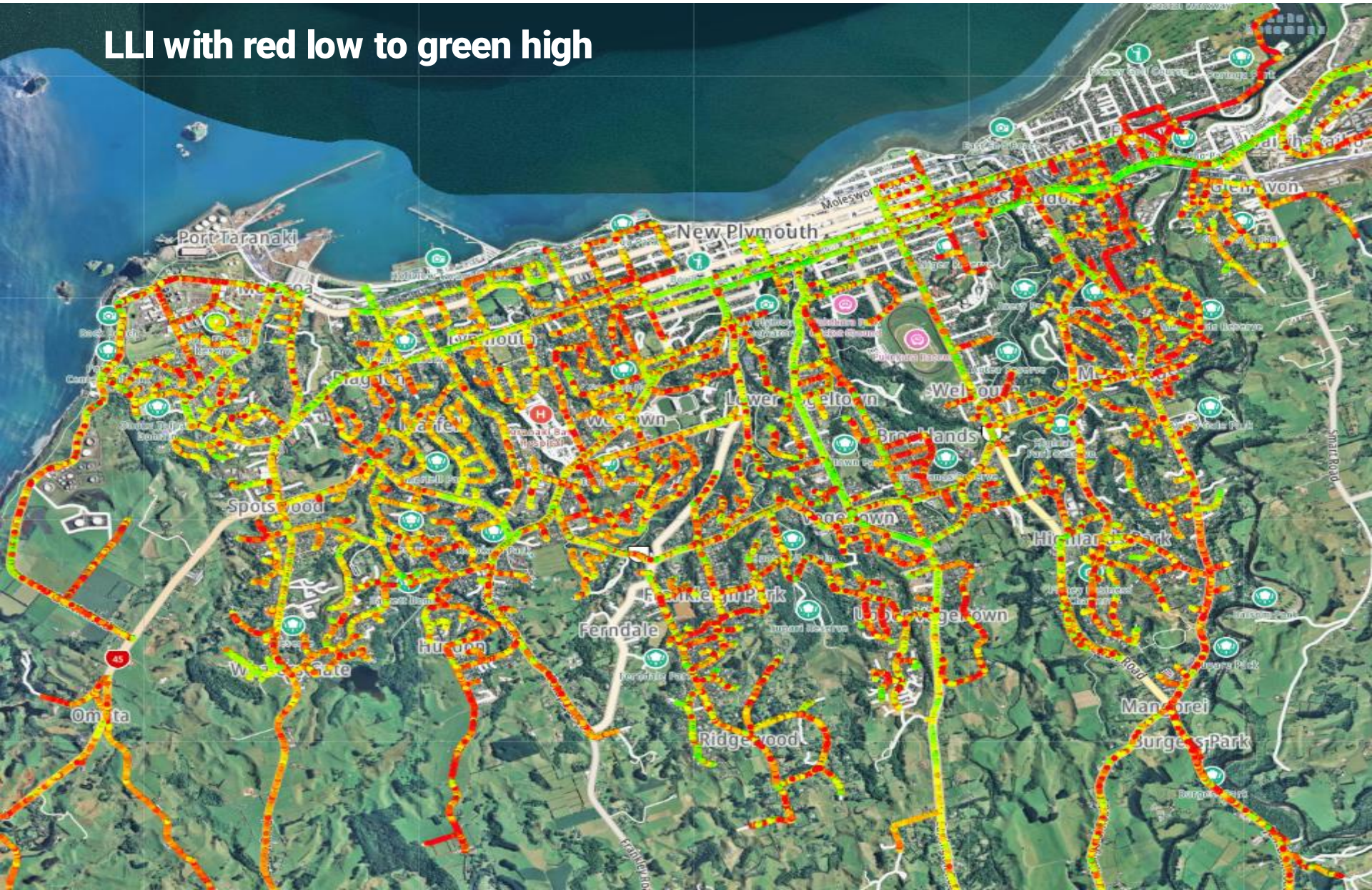
MSD Subgrade Structural Condition (Urban)



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MSD Base Structural Condition

BLI with red low to green high

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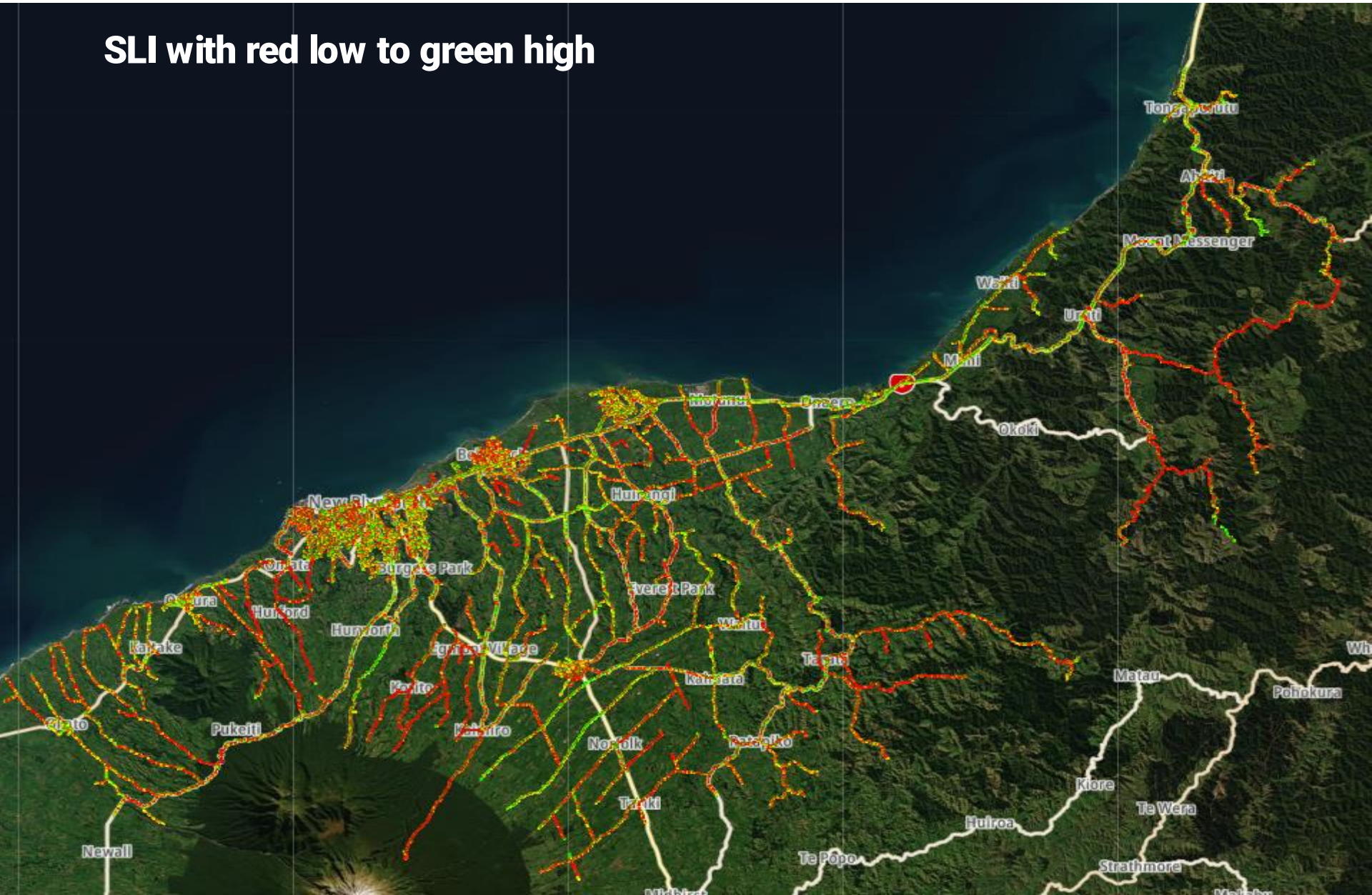
MSD Surfacing Condition



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MSD Structural Number (SNP)

Red = Low Orange=Medium Green = High

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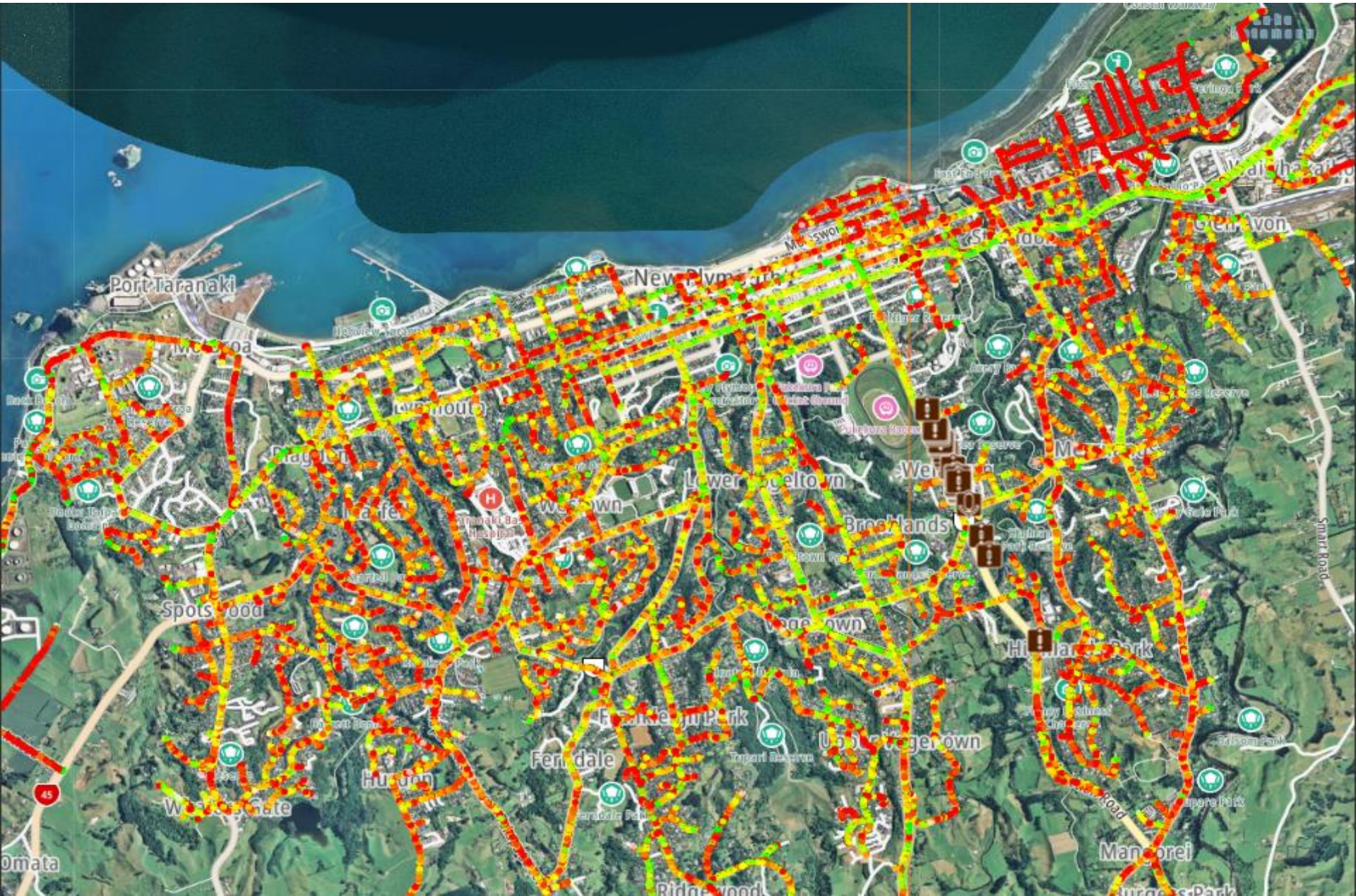
Structural Number (SNP)

Red = Low Orange=Medium Green = High



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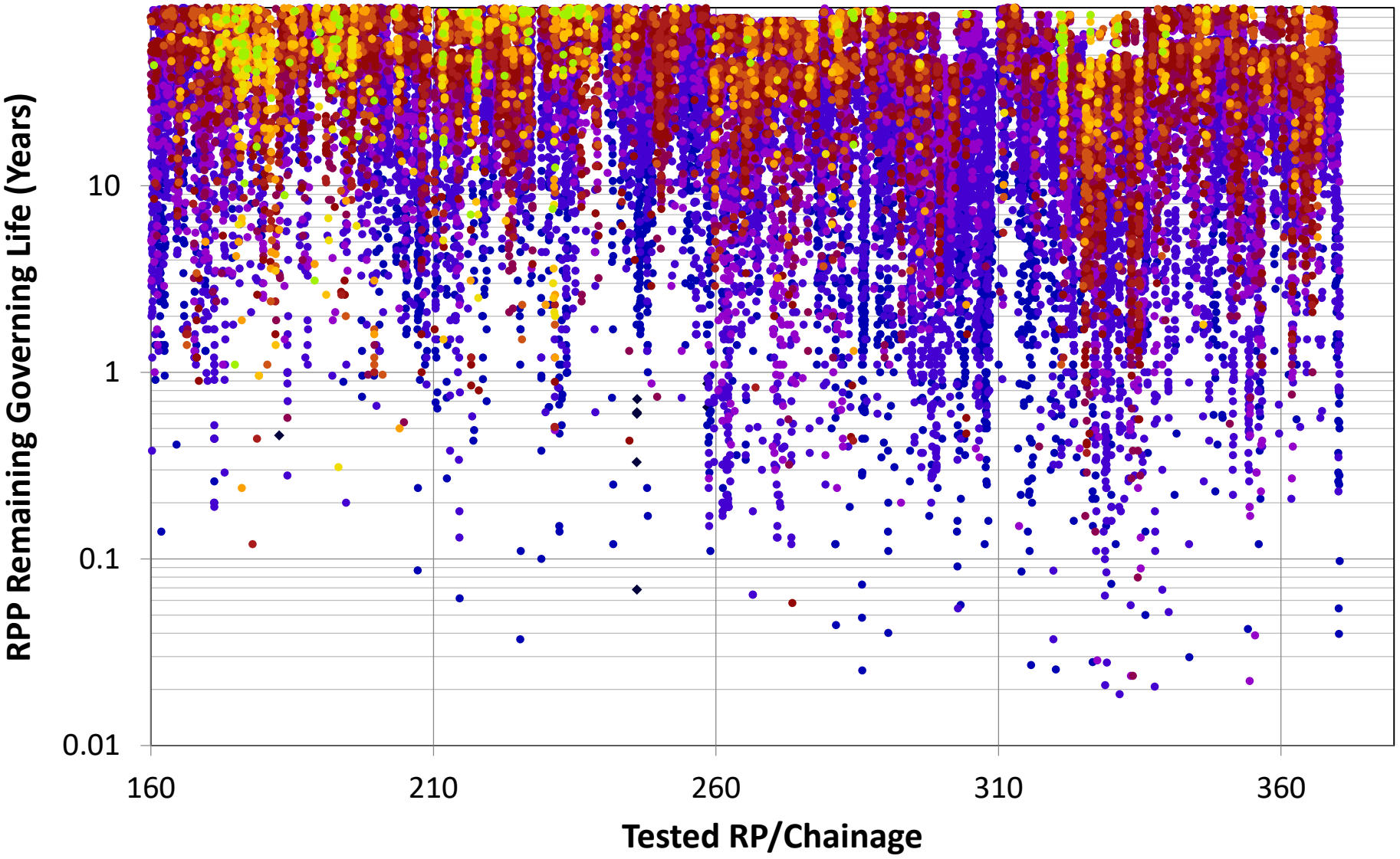
RPP Remaining Governing Life (Years)



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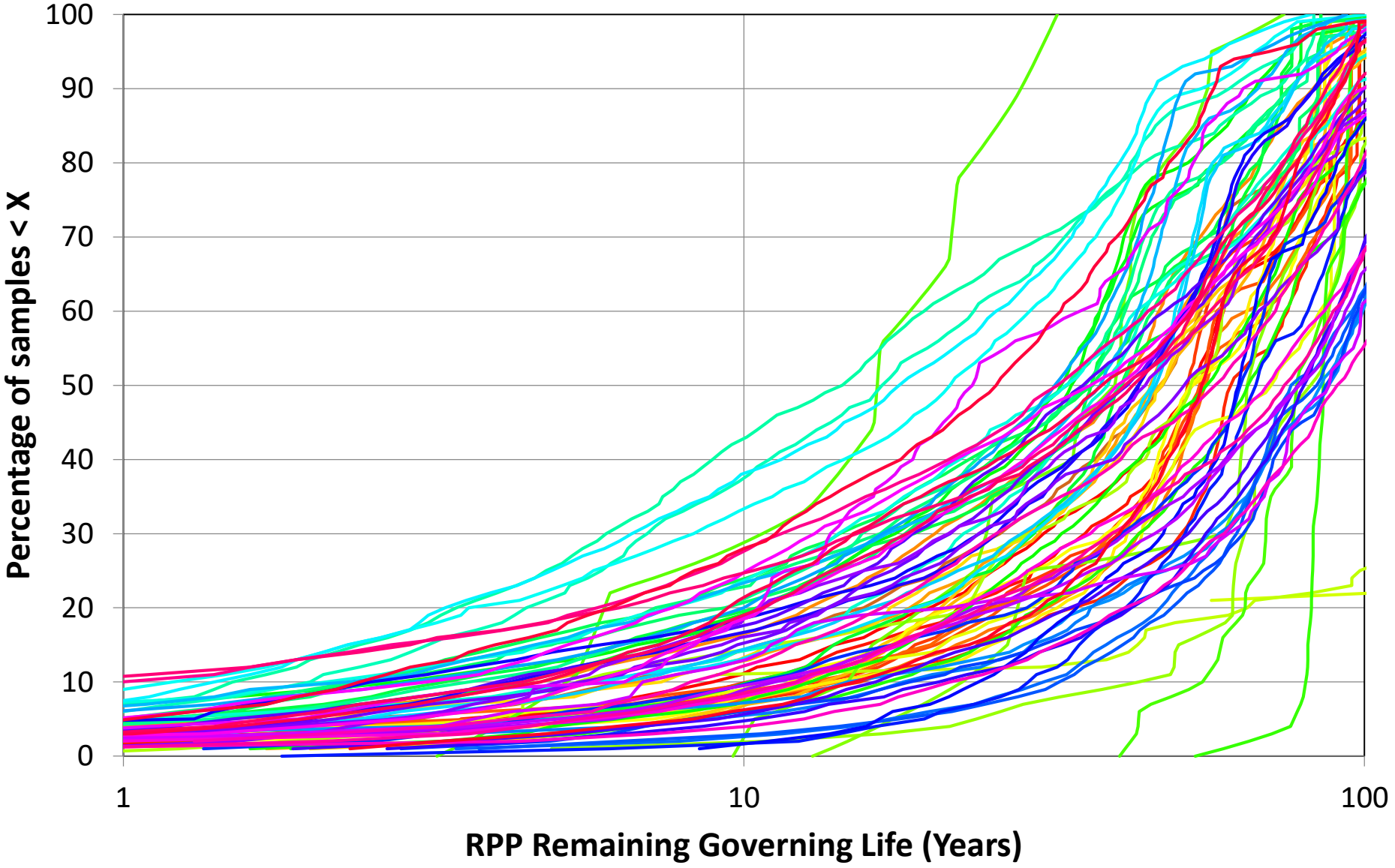
RPP Remaining Governing Life (Years)
Individual Roads



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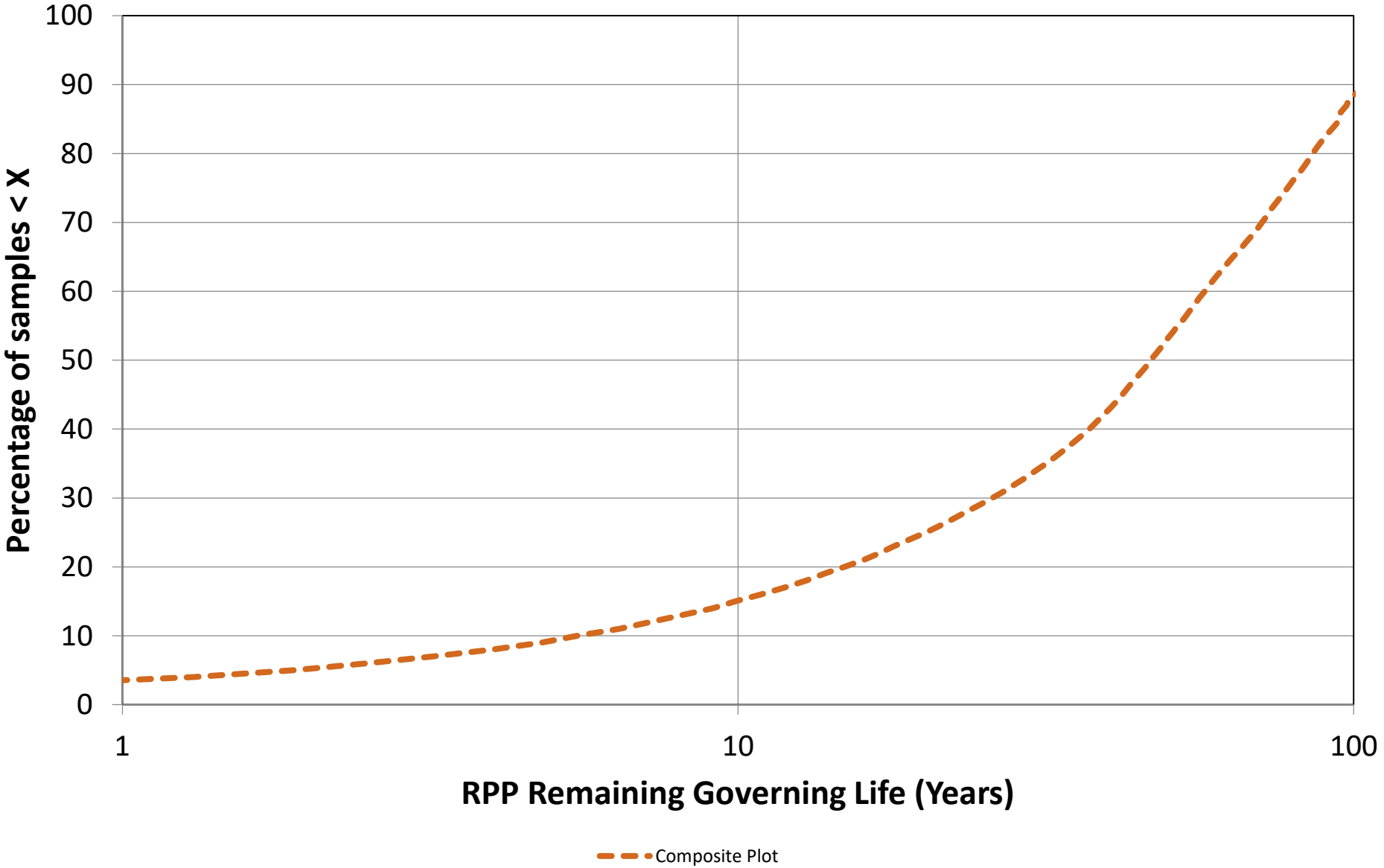
RPP Remaining Governing Life (Years) Network Composite



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Network Level Nominal Designs from Non-destructive Testing

Nominal Designs from Non-destructive Testing (FWD/TSD/MSD)								
Priority	1	2	3	4	5	6	7	8
Road ID	1574	1574	1886	3294	1886	1547	1546	2528
Road Name	025-0156 R1	025-0156 L1	01N-0638 R1	01N-0540-D R2	01N-0638 R1	01N-0680 L1	01N-0664 R1	005-0008 R1
Start (km)	9.570	7.560	2.220	2.430	5.980	10.010	6.240	5.580
End (km)	9.640	7.610	2.360	2.530	6.119	10.220	6.330	5.630
Length (km)	0.070	0.050	0.140	0.100	0.139	0.210	0.090	0.050
Selected Rehabilitation Treatment	Asphaltic Concrete Overlay	Asphaltic Concrete Overlay	FBS	FBS & Replace OG	FBS / Granular Reconstruction	FBS / Granular Reconstruction	FBS / Granular Reconstruction	Localised Digouts
Selected Treatment Code	OVLA_0/100	OVLA_0/110	FBSG_150/45	FBSA_150/36	FBRG_470/12	FBRG_460/39	FBRG_390/19	RCNG_630/53/100
(25yr) Design Traffic (MESA)	1.8	1.8	14.7	10.8	14.7	11.0	11.0	5.1
Proportion of Length Digouts / Patching	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-1.0
Depth of Reconstruction / Digouts	**870**	**840**	**740**	**430**	**620**	**600**	**560**	**630**
Unbound Granular Overlay (RPP)	50	N/A	50	220	250	170	220	200
Unbound Granular Overlay (GMP-AllLayers)	N/A	N/A	N/A	N/A	150	110	120	140
Asphaltic Concrete Overlay	100	110	130	150	150	150	150	150
Foamed Bitumen FBS (NZTA RR461)	240	150	150	150	N/A	N/A	N/A	N/A
Depth of Cement Stabilisation under 150 mm Granular Overlay (mm)	N/A	N/A	N/A	N/A	130	N/A	N/A	N/A
Depth of Cement Stabilisation (mm) from Austroads	240	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Depth of Makeup Metal required for Cement Stabilisation (mm)	10	N/A	N/A	N/A	170	120	130	160
Depth of Reconstruction under 200 mm FBS	100	N/A	N/A	N/A	470	460	390	490

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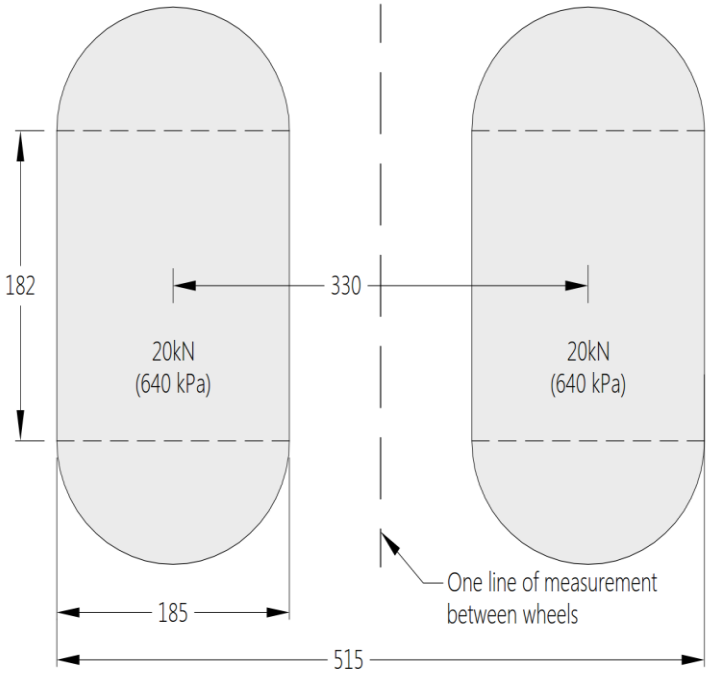
MSD Contact Areas

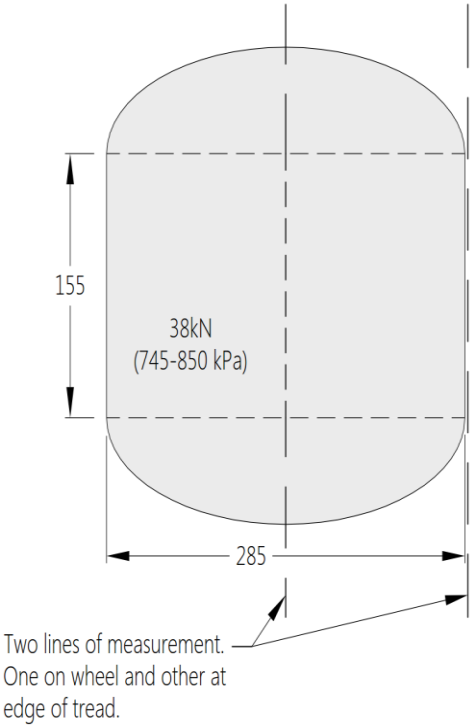
TSD Twin Tyres

MSD Large Single (or Twin)

Twin Wheel Path

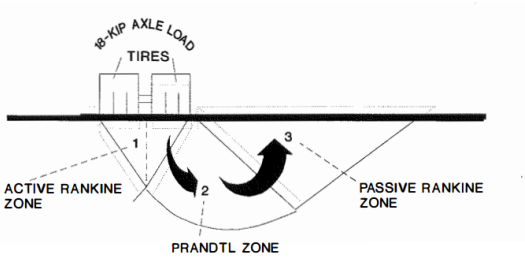


Large Single Wheel Path



Twin 515 mm

L Single 285 mm



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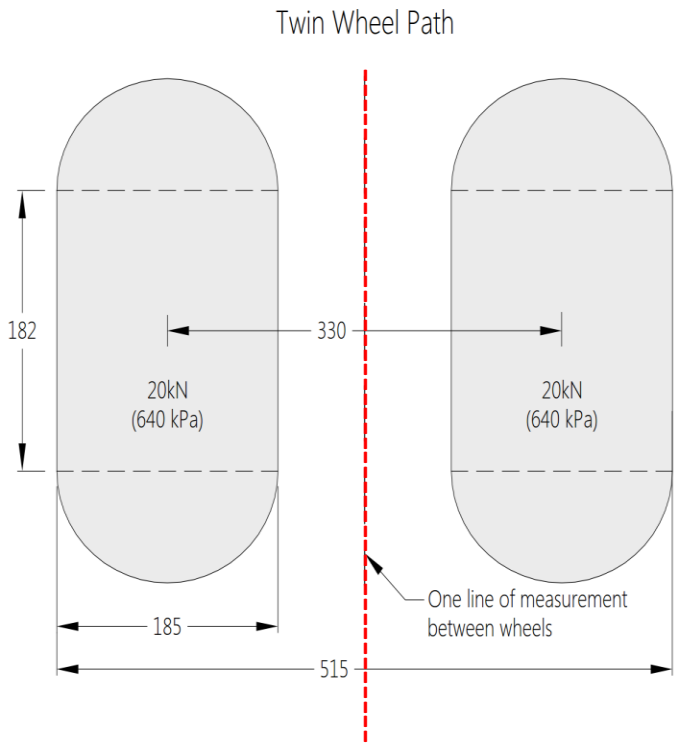
MSD Contact Areas

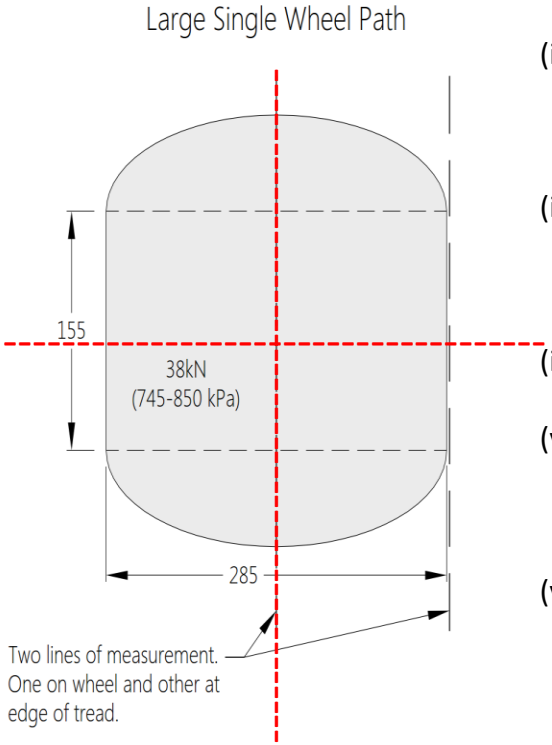
TSD Twin Tyres

MSD Large Single (or Twin)

2-D Longitudinal Profile Between Wheels



3-D Bowl Longitudinal and Transverse Through Wheels



MSD presents several advantages:

(i) Lower capital cost enabling testing of both wheel tracks and multiple units in each country.

(ii) Better definition of top layer moduli for predicting top down cracking of AC and shallow shear life of weak basecourses

(iii) Shorter truck can be used (2 axle) for testing roundabouts, corners, or narrow urban roads with tight turning.

(iv) Testing at slow speeds as well as high

(v) Operates in wet or dry, rough or smooth, not only surfaced but also construction sites and unsurfaced roads

(vi) Year round availability (all seasons)

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PaveState – Mobile Phone App Calibration & Validation

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The End