The programme of works

The WDC has provided a sound assessment of options and rationale for selection of the preferred programme. They've used evidence to give a compelling explanation of why their preferred programme would have the necessary impact.

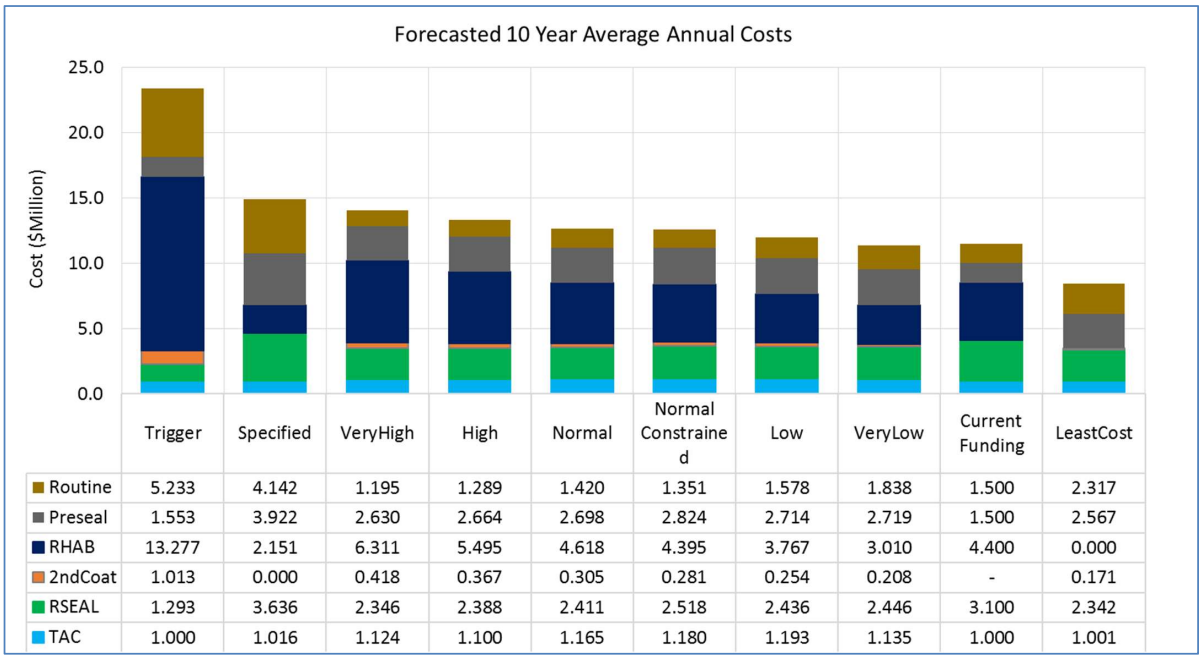
This example demonstrates good practice and fit-for-purpose effort.

6.2.5 Option Assessment

Optimisation using dTIMs modelling was undertaken in August 2017 and has indicated, based on long term condition outcomes, that the following sealed pavement maintenance and renewal regime is recommended over the next 10 years :

- Pavement Rehabilitation 8.7km/yr
- Reseals (Incl Second Coat Seals) 80km/yr
- Thin Asphalt Resurfacing 3.1km/yr

As part of the modelling an option of "Normal Constrained" was also tested. This was done to test that the reduced level of pavement renewal from the previous plan to 6km from 10km would provide a stable network outcome. This was achieved through splitting the optimised budget programme into approximately 6km budget of pavement renewal and 90km of reseal. This forced the optimisation to only a limited amount of funds on pavement renewal only. The resulting outcome showed that the Normal and Normal Constrained had similar network outcomes. This has confirmed that an investment of 6-8km of pavement renewal is sustainable over the ten-year period.

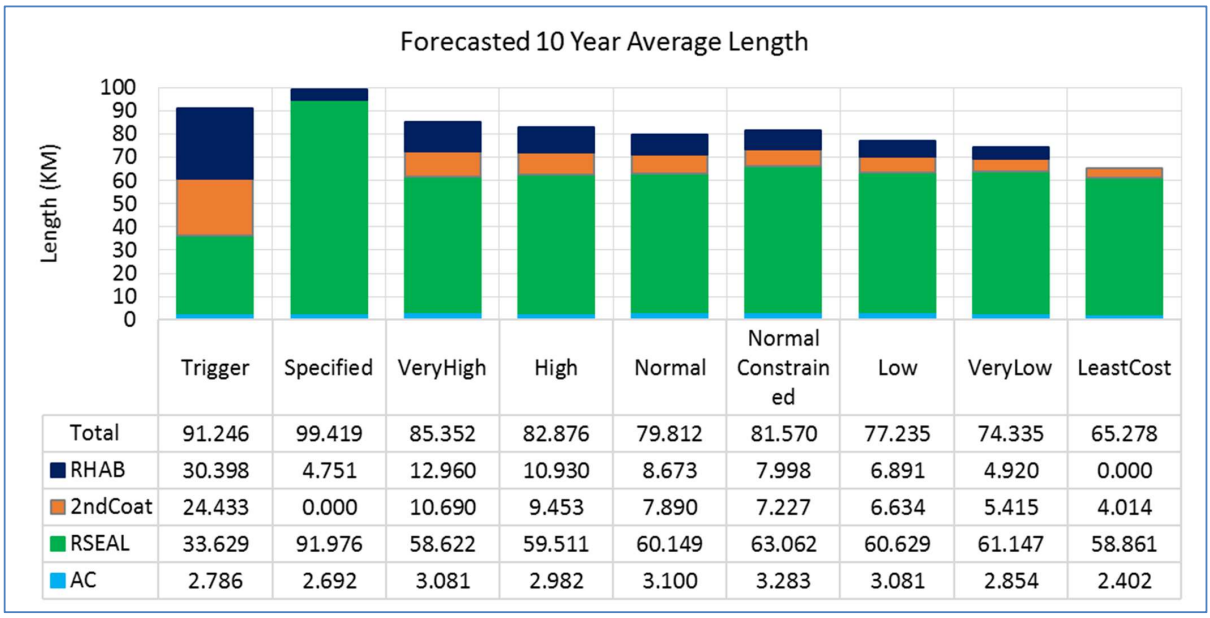


	Trigger	Specified	VeryHigh	High	Normal	Normal Constrained	Low	VeryLow	Current Funding	LeastCost
Routine	5.233	4.142	1.195	1.289	1.420	1.351	1.578	1.838	1.500	2.317
Preseal	1.553	3.922	2.630	2.664	2.698	2.824	2.714	2.719	1.500	2.567
RHAB	13.277	2.151	6.311	5.495	4.618	4.395	3.767	3.010	4.400	0.000
2ndCoat	1.013	0.000	0.418	0.367	0.305	0.281	0.254	0.208	-	0.171
RSEAL	1.293	3.636	2.346	2.388	2.411	2.518	2.436	2.446	3.100	2.342
TAC	1.000	1.016	1.124	1.100	1.165	1.180	1.193	1.135	1.000	1.001

Figure 6-1: Modelling 10 Average Forecast Costs

Source: Whangarei District Council Transportation AMP 2018-2048

This maintenance strategy will, over a 10 year period, result in sealed pavement maintenance costs stabilizing and a minor increase in pavement age and condition. This is shown in the following graphs (from dTIMs).



	Trigger	Specified	VeryHigh	High	Normal	Normal Constrained	Low	VeryLow	LeastCost
Total	91.246	99.419	85.352	82.876	79.812	81.570	77.235	74.335	65.278
RHAB	30.398	4.751	12.960	10.930	8.673	7.998	6.891	4.920	0.000
2ndCoat	24.433	0.000	10.690	9.453	7.890	7.227	6.634	5.415	4.014
RSEAL	33.629	91.976	58.622	59.511	60.149	63.062	60.629	61.147	58.861
AC	2.786	2.692	3.081	2.982	3.100	3.283	3.081	2.854	2.402

Figure 6-2: Forecast 10 Average Renewal Length

Figure 6-3 shows several forecasted network outcomes for the differing investment profiles. In all cases the least cost option (maintenance only and low level of reseal) provides the worst network service level outcomes across the board. The "Specified" programme provides a sustainable outcome over the programme period. The real difference between the Normal Constrained and Normal is how the models intervene. The Normal Constrained allows surface condition to deteriorate in the mid potion of the programme but then brings this back into alignment with Normal budget towards the end of the programme period. This is common across the optioneering between the Normal and Normal Constrained.

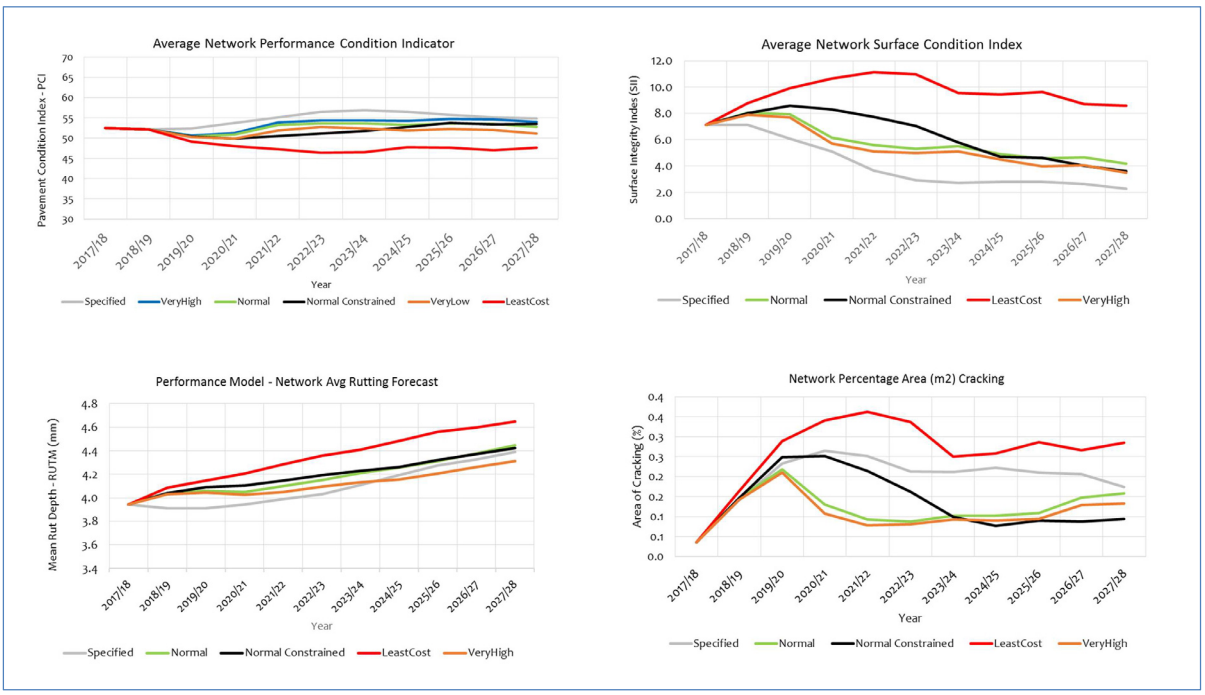


Figure 6-3: Forecasted Network Outcomes

Source: Whangarei District Council Transportation AMP 2018-2048

On balance, when factoring the total cost of the programme and the resulting pavement condition, the most appropriate scenario, given NZTA's constrained funding environment, is a modified version of the Normal Constrained scenario as follows:

- Pavement Rehabilitation: 6km/year which has been optimised and validated on site (This is lower than the 8km/year suggested in the Normal Constrained scenario)
- Chip Seal Resurfacing: 90km/year (to address a backlog of void fill seals which are beyond their useful lives)
- Thin Asphaltic Resurfacing: 3.1km/year

This scenario has a low long term cost profile and results in a fair network condition without significant impact to the level of service provided. It would result in an average pavement recycle time of 172 years, a chip reseal cycle time of 11.5 years and asphaltic concrete resurface cycle time of 16 years.

Sealed Road Condition

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
No Rehabilitation	Carrying out no pavement rehabilitation is similar to the Least Cost option modelled via dTIMS. This indicates that there would be a significant worsening in both pavement and surface condition. Cracking would triple over a 10 year period and rutting would increase. The number of hazardous pavement faults would increase resulting in more crashes.	Sealed Road Condition/ Cost Efficiency	Poor	Significantly Worse	W/C 111: +$700,000 W/C 212: -$700,000 W/C 214: -$3,900,000	$119.3
Status Quo	Significant programme of maintenance repair and reseals to address lack of historic investment. Reseal programme at 100km/annum. Rehabilitation programme at 0.6% of network length per annum.	Sealed Road Condition/ Cost Efficiency	Moderate	Neutral	W/C 111: $4,200,000 W/C 212: $4,200,000 W/C 214: $3,900,000	$174.7
Prioritised Maintenance/ Investigatory Test Pits	Undertaking test pits and using the ONRC principles is likely to result in better decision making and is expected to results in pavement maintenance costs reducing by 5%. The cost to carry out the additional test pits is expected to be $50,000/year	Sealed Road Condition/ Cost Efficiency	Good	Slightly Better	W/C 111: -$150,000 W/C 212: $0 W/C 214: $0	$172.5

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
High PSV Seals/Water Cutting	Carry out a programme of high skid resistance surfaces or water cutting on roads which have a high proportion of wet road loss of control crashes. This is likely to result in a reduction in wet road crashes.	Safety	Good	Significantly Better	W/C 111: $0 W/C 212: +$315,000 W/C 214: $0	$179.1
Reduced Chip Reseals/Large Chip or Single Coat Chip Seals	The dTIMS modelling suggests that a reduced reseal programme of 90km/annum would be achievable without significant risk to pavement condition or maintenance cost increases. The cost change from the 2015/18 programme is an average reduction of 20km of reseal at 7m average width and $4.25/m2 average rate which equates to a saving of $595,000. However, this is partially balanced by an estimated 5% increase for larger chip/single cost chip with more bitumen and a 7% increase in the Reseal Index (due to bitumen price increase). This equates to a $360,000 increase per annum for a $3M programme. The overall reduction is therefore $235,000/annum.	Sealed Road Condition/ Cost Efficiency	Good	Neutral	W/C 111: $0 W/C 212: -$235,000 W/C 214: $0	$171.3
Increased TAC Programme	The dTIMS modelling suggests that a minimum thin AC programme of $1M/year is required to sustain this asset. This would be an increase over current renewal levels and would see an improvement to TAC condition in the Whangarei urban area.	Sealed Road Condition/ Cost Efficiency	Good	Moderately Better	W/C 111: $0 W/C 212: +$150,000 W/C 214: $0	$176.8

Source: Whangarei District Council Transportation AMP 2018-2048

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impact	Annual Cost	30yr PV Cost ($M)
Optimised Rehabilitation Programme	This is similar to the Normal Constrained option modelled by dTIMS. This will result in a relatively stable pavement condition and an improved surface condition over the 10 year modelling period. The rehabilitation programme has been optimised at 6km/year on average (as opposed to the 8km/year suggested in the Normal Constrained dTIMS option) which is almost identical with what has been achieved over the past 3 years. This shows that the current programme is already optimised.	Sealed Road Condition/ Cost Efficiency	Good	Neutral	W/C 111: $0 W/C 212: $0 W/C 214: +$0	$174.7
Programme of Watertable Maintenance	Cutting high lip and digger cleaning/reinstating surface water tables – Assume 10 years average cycle time for all rural roads and 5 year cycle time for forestry and collector routes (or 190km of SWC/annum). Expect 5% reduction in sealed maintenance costs	Sealed Road Condition/ Cost Efficiency, Safety	Good	Slightly Better	W/C 111: -$210,000 W/C 212: +$0 W/C 214: +$0 W/C 113: +$190,000	$174.4

PREFERRED OPTIONS – Prioritised Maintenance/Investigatory Test Pits & Reduced Reseals, Increased TAC, Optimised Rehabilitation and Programme of Watertable Maintenance – this would result in targeting pavement maintenance spend and optimising renewals to activities where it will achieve the greatest impact. A proactive programme of watertable maintenance will reduce water ingress into pavements and extend their lives. However, due to budget constraints WDC is proposing to limiting the W/C 113 funding increase for additional watertable maintenance to $100,000/annum to target sealed roads that are programmed for resurfacing or rehabilitated which will generate most of the sealed pavement maintenance savings.

Council also prefers the High PSV Seals/Water Cutting option – This will reduce the likelihood of crashes occurring on the network during wet conditions.

Service Lids

Option	Assessment	Problem being Addressed	Effectiveness	LOS Impacts	Annual Cost	30yr PV Cost ($M)
Status Quo	Limited service lid adjustment, normally only carried out in association with capital projects and rehabilitations. Almost no service lids are replaced if the lid has sunken within the frame.	Amenity/Safety	Very Poor	Neutral	W/C 111: $0	$0.0

PREFERRED OPTION – Service Lid Adjustment and Renewal: will remove hazardous and uncomfortable sunken service lids from the network over time.

Source: Whangarei District Council Transportation AMP 2018-2048